NASA SP-7011(14)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

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NASA SP-7011 (14)

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 July, 1965.

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

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INTRODUCTION

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

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

a. NASA entries identified by their *STAR* accession numbers (N65-10000 series),
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(continued)

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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography AUGUST 1965

STAR ENTRIES

N65-23364 Joint Publications Research Service, Washington, D. C.

ON THE DYNAMIC ANALYSIS AND MODELING OF SOME SENSITIVE ELEMENTS

Fan-chi Ku, Chuan-chuan Ch'en, and Hsiang-sheng Wang *In its* Transl. on Communist China's Sci. and Technol. 29 Apr. 1965 p 6–15 refs (See N65-23363 13-34) CFSTI: $3.00

Research on the dynamic characteristics of sensitive elements is reported. The following characteristics of sensitive elements following a stimulus were considered: (1) There is an incubation period. (2) The dynamic characteristics after the incubation period could be represented by the transfer function $K(S) = K_1 + K_2S/1 + T_0S$. Using this equation, a model was derived to approximate the experimental curves of the sensitive elements of the knee of a cat, the single fiber sensitivity to cold on the tongue tip of a cat, the touch sensitivity of frogs and toads, and the toad III short muscle fiber for extending the toe. Models were further used to develop the speed following stimulation and the variation of strength, which were compared with the theoretical curves. When these results were compared with experimental values, models were obtained and the following relations determined: (1) the relation between the greatest impulse frequency and the speed of stimulus, (2) the relation between the transition time and the variation of the stimulus, and (3) the relation between the stable value of stimulus strength and the stable value of impulse frequency. The feasibility of this model is exemplified. Inherent problems of the model are discussed. S.C.W.

N65-23371# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS ON COMMUNIST CHINA'S SCIENCE AND TECHNOLOGY NO. 172

19 Apr. 1965 70 p Transl. into ENGLISH from K'o Hsueh T'ung Pao (Peking), no. 2, 1965

(JPRS-29641; TT-65-30762) CFSTI: $3.00

CONTENTS:

1. REGGE ACTION OF HIGH SINGULARITY POTENTIAL AND NON-REGIONAL POTENTIAL Tai Yuan-pen p 1–22 refs (See N65-23372 13-23)

2. THE ELECTRICAL ACTIVITIES, ESPECIALLY THE INHIBITORY ACTION OF THE CALYX-LIKE SYNAPSES, OF A NEURON IN THE TRAPEZOID BODY Hsiang-T'ung Chang p 23–43 refs (See N65-23373 13-04)

3. THE EFFECT OF X-RAY ON THE FORMATION OF ORGANIC PEROXIDES IN THE BODY AND THE RELATIONSHIP BETWEEN ORGANIC PEROXIDES AND MERCAPTO COMPOUNDS I-sheng Chang, Shang-chun Mei, Lin-li Chou, Wen-yun Liu, Shu-p'ing Miao, and Jui-ch'uan Hung p 44–52 refs (See N65-23374 13-04)

4. CHANGE OF STATIC POTENTIAL IN THE EGG CELL DURING OVULATION OF BUFO BUFO GARGARIZONS Chang Ch'ung-li, Yu Mu-chen, and Chang Chih-i p 53–57 ref

5. SECOND NATIONAL QUATERNARY PERIOD SYMPOSIUM Liu Tung-sheng and Cheng Hung-han p 58–60

6. A GOOD SEED PLANTED WILL YIELD A THOUSAND GOOD GRAINS FOR FOOD Jen Hsiao-p'ing p 61–63

7. SZECHWAN PROVINCIAL ACADEMY OF AGRICULTURAL SCIENCES STUDIES FIRST LINE AGRICULTURAL PRODUCTION Kuo Li-hsiao and Yeh Chi p 64–67

N65-23373 Joint Publications Research Service, Washington, D. C.

THE ELECTRICAL ACTIVITIES, ESPECIALLY THE INHIBITORY ACTION OF THE CALYX-LIKE SYNAPSES, OF A NEURON IN THE TRAPEZOID BODY

Hsiang-t'ung Chang *In its* Transl. on Communist China's Sci. and Tech. 19 Apr. 1965 p 23–43 refs (See N65-23371 13-34) CFSTI: $3.00

The electrical characteristics of the various types of neurons in the trapezoid nucleus were studied on anesthetized rabbits by recording electrodes inserted into the trapezoid nucleus along either side of the ventral, median, and lateral veins on the ventral side of the medulla. Emphasis was placed on observations of the inhibitory action of the calyx-like synapses in response to stimulating sound. The latency in response was used as criterion to distinguish between long-latency and short-latency neurons. The great majority of the neurons were found to be of the short-latency type with a latency of 3 to 4 milliseconds. Long-latency neutrons responded only to clicks applied contralaterally and showed increased latency with the increase of click intensity. Double stimuli with a 2- to 8-millisecond interval between the two successive stimuli showed that the response to the first click can be repressed by the second click, which seems to indicate an inhibitory phase of 2- to 8-millisecond duration. A single click can interrupt the spontaneous rhythmic activity in long-latency neutrons while an inhibitory postsynaptic potential appears at the same time. The long-latency neuron was identified as the neuron that receives the calyx-like synapses and its inhibitory action. G.G.

N65-23374 Joint Publications Research Service, Washington, D. C.

THE EFFECT OF X-RAY ON THE FORMATION OF ORGANIC PEROXIDES IN THE BODY AND THE RELATIONSHIP BETWEEN ORGANIC PEROXIDES AND MERCAPTO COMPOUNDS

I-sheng Chang, Shang-chun Mei, Lin-li Chou, Wen-yun Liu, Shu-p'ing Miao, and Jui-ch'uan Hung *In its* Transl. on Communist China's Sci. and Tech. 19 Apr. 1965 p 44-52 refs (See N65-23371 13-34) CFSTI: $3.00

The formation of peroxides together with the determination of water soluble mercapto compounds and choline esterase was studied in the brains, testicles, and livers of white male laboratory mice after exposure to 700 *r* X-ray for various lengths of time. It was found that the contents of peroxides in the organs of the animals changed only slightly; most samples showed a slight decrease before 24 hours or after the sixth day. The rise and fall curves of peroxides and mercapto compounds in the liver were quite similar and the contents of peroxides and mercapto compounds in the testicles were relatively low 8 hours after exposure to radiation. Exposure to 700 γ radiation for 2 hours to 5 days increased the activity of choline esterase in the brain and liver in relation to the control animals. A comparison of the peroxides and water soluble mercapto compounds content did not show any relationship. It was concluded that the rise in activity of choline esterase is probably caused by indirect physiological compensation. G.G.

N65-23422# Joint Publications Research Service, Washington, D. C.

CLINICAL AND PHYSIOLOGICAL ASPECTS OF INTERPLANETARY AND ORBITAL FLIGHTS

28 Apr. 1965 19 p refs Transl. into ENGLISH from Klin. Med. (USSR), v. 43, no. 2, Feb. 1965 p 3-12
(JPRS-29795; TT-65-30839) CFSTI: $1.00

CONTENTS:

1. CLINICAL ASPECTS OF INTERPLANETARY FLIGHTS V. V. Parin, Ye. B. Zakrzhevskiy, and R. M. Bayevskiy p 1-6 (See N65-23423 13-04)

2. CLINICO-PHYSIOLOGICAL ASSESSMENT OF SEISMOCARDIOGRAPHIC DATA OBTAINED DURING THE ORBITAL FLIGHTS OF VOSTOK-5 AND VOSTOK-6 R. M. Bayevskiy and Yu. N. Volkov p 7-16 refs (See N65-23424 13-04)

N65-23423 Joint Publications Research Service, Washington, D. C.

CLINICAL ASPECTS OF INTERPLANETARY FLIGHTS

V. V. Parin, Ye. B. Zakrzhevskiy, and R. M. Bayevskiy *In its* Clin. and Physiol. Aspects of Interplanet. and Orbital Flights 28 Apr. 1965 p 1-6 (See N65-23422 13-04) CFSTI: $1.00

Clinical aspects include the determination of prophylactic measures, diagnostic procedures, and individual technical systems peculiar to interplanetary travel with a crew. The illnesses during interplanetary travel can be classified as those induced by living conditions, brought about by the action of interplanetary space factors, or connected with endogenous factors. A probability approach to the illnesses of interplanetary crews is of major importance in planning diagnostic procedures as well as medical aid. Clinical effectiveness has been demonstrated for the algorithms of automatic medical checkups which have been worked out for use in a spaceship. G.G.

N65-23424 Joint Publications Research Service, Washington, D. C.

CLINICO-PHYSIOLOGICAL ASSESSMENT OF SEISMOCARDIOGRAPHIC DATA OBTAINED DURING THE ORBITAL FLIGHTS OF VOSTOK-5 AND VOSTOK-6

R. M. Bayevskiy and Yu. N. Volkov *In its* Clin. and Physiol. Aspects of Interplanet. and Orbital Flights 28 Apr. 1965 p 7-16 refs (See N65-23422 13-04) CFSTI: $1.00

A clinicophysiological evaluation of the seismocardiographic data obtained during flights of the Vostok-5 and -6 is presented. The telemetric recordings of seimocardiograms were compared by juxtaposition on seismocardiograms of healthy persons and patients, and established a definite phasal nature for the reactions of the cardiovascular system to prolonged weightlessness. The phase of relatively stable adaptation comprises the following two periods: (1) concurrent action of extracardiac and intracardiac mechanisms of compensation; and (2) predominant action of intracardiac mechanisms. Since clinical data of patients with neurocirculatory dystonia and hypertension of the I to II stage established the extracardiac mechanisms as the last resources of the human system in its adaptation to morbid conditions, it was concluded that prolongation of the compensation mechanisms under conditions of space travel appears to be an unfavorable condition. G.G.

N65-23443# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS FROM PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA (PATHOLOGICAL PHYSIOLOGY AND EXPERIMENTAL THERAPY), VOLUME VIII, NO. 6, 1964

20 Apr. 1965 28 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 8, no. 6, Nov.-Dec. 1964 p 3-7, 32-35, 40-43, 73-74
(JPRS-29666; TT-65-30775) CFSTI: $2.00

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1. EFFECT OF G-FORCES ON THE HIGHER NERVOUS ACTIVITY OF DOGS P. V. Vasil'yev and M. G. Gerd p 1-8 refs (See N65-23444 13-04)

2. THE EFFECT OF IMMUNOTHERAPY ON THE STATE OF TISSUE CALCIFICATION IN RATS WITH THERMIC BURNS B. Ye. Movshev p 9-14 refs

3. VESSELS OF EXTREMITIES IN ACUTE DISTURBANCE OF THE CORONARY CIRCULATION A. V. Dokukin p 15-21 refs

4. THE EFFECT OF SOUNDS AND PHOTIC STIMULI LASTING FOR A LONG PERIOD OF TIME ON DEVELOPMENT OF AN EXPERIMENTAL ATHEROSCLEROSIS IN FEMALE RABBITS I. D. Nasledova and Ya. D. Rafal'skiy p 22-25 ref (See N65-23445 13-04)

N65-23444 Joint Publications Research Service, Washington, D. C.

EFFECT OF G-FORCES ON THE HIGHER NERVOUS ACTIVITY OF DOGS

P. V. Vasil'yev and M. G. Gerd *In its* Transl. from Patol. Fiziol. i Eksperim. Terapiya (Pathological Physiol. and Exptl. Therapy), Vol. VIII, No. 6, 1964 20 Apr. 1965 p 1-8 refs (See N65-23443 13-04) CFSTI: $2.00

The effects of transversely oriented accelerations, which possessed characteristics similar to actual space flight accelerations, on the higher nervous activity and general behavior of animals were investigated. The sensory motor reactions of

dogs were studied to determine the effect of G-forces on conditioned reflex activity. A positive conditioned stimulus and differential stimuli were used, and G-forces were created on a centrifuge with a radius of 3.5 m. The magnitudes of the G-forces, their rise rates and the period of the effect were reproduced according to the schedule of orbital insertion of space ships. Results show that disturbances in the correlation of excitation and inhibition processes occurred in the cerebral cortex as a result of transverse G-forces. In most animals, this was manifested by an increase of the latent period of conditioned reflexes in response to individual stimuli or all stimuli, and a partial or complete failure of these reflexes. It was also concluded that the nature, severity, and duration of disturbances of the higher nervous activity of dogs are determined by the individual characteristics of the animals. S.C.W.

N65-23445 Joint Publications Research Service, Washington, D. C.
THE EFFECT OF SOUNDS AND PHOTIC STIMULI LASTING FOR A LONG PERIOD OF TIME ON DEVELOPMENT OF AN EXPERIMENTAL ATHEROSCLEROSIS IN FEMALE RABBITS
I. D. Nasledova and Ya. D. Rafal'skiy *In its* Transl. from Patol. Fiziol. i Eksperim. Terapiya (Pathological Physiol. and Exptl. Therapy), Vol. VIII, No. 6, 1964 20 Apr. 1965 22–25 refs (See N65-23443 13-04) CFSTI: $2.00

Experiments were performed on mature and immature female rabbits to study the effects of age and continuous sound and photic stimuli on the development of nutritional cholesterol atherosclerosis, and to determine the role of the central nervous system (CNS) in the pathogenesis of atherosclerosis. Animals receiving cholesterol served only as the control. In sexually mature female rabbits, the prolonged action of alternating sound and photic stimuli resulted in a reduction of cholesterinemia and of the cholesterol–phospholipid ratio, and delayed the development of atherosclerosis of the aorta. These conditions were not observed in immature rabbits; however, an increase of cholesterinemia and the cholesterol–phospholipid coefficient in comparison to the control group was observed. The lipid indexes of the blood serum in immature rabbits subjected to photic and sound stimuli did not differ from those of the control group. No difference in the degree of manifestation of atherosclerosis of the aorta was found in either the experimental or control immature rabbit groups. It is assumed that the stimuli used caused impairments in the activity of the CNS in mature rabbits which led to the development of experimental atherosclerosis. S.C.W.

N65-23446# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM MEDITSINSKAYA PROMYSHLENNOST' SSSR (USSR MEDICAL INDUSTRY), VOLUME 18, NO. 12, 1964
6 May 1965 22 p Transl. into ENGLISH from Med. Prom. SSSR (Moscow), v. 18, no. 12, 1964 p 3–5, 18–22, 48–49, 52–53
(JPRS-29954; TT-65-30929) CFSTI: $1.00

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3. TELEELECTROCARDIOGRAPH TEK-1 ON UNIVERSAL POWER SUPPLY A. N. Lebed' p 13–16 (See N65-23347 13-04)
4. ON THE HISTORY OF INVENTION OF A RADIOPROBE FOR THE DETECTION OF FOREIGN BODIES N. P. Fedotov p 17–19 (See N65-23448 13-04)

N65-23447 Joint Publications Research Service, Washington, D. C.
TELEELECTROCARDIOGRAPH TEK-1 ON UNIVERSAL POWER SUPPLY
A. N. Lebed' *In its* Transl. from Med. Prom. SSSR (USSR Med. Ind.), Vol. 18, No. 12, 1964 6 May 1965 p 13–16 (See N65-23446 13-04) CFSTI: $1.00

The basic circuit of the If amplifier of the teleelectrocardiograph TEK-1 instrument was redesigned in order to eliminate inherent problems in the storage battery from which the stationary part of the instrument obtains its power. The design is based on the combined operation of a universal power network and a storage battery. Results show that the combined power supply increased the reliability of the instrument. S.C.W.

N65-23448 Joint Publications Research Service, Washington, D. C.
ON THE HISTORY OF INVENTION OF A RADIOPROBE FOR THE DETECTION OF FOREIGN BODIES
N. P. Fedotov *In its* Transl. from Med. Prom. SSSR (USSR Med. Ind.), Vol. 18, No. 12, 1964 6 May 1965 p 17–19 (See N65-23446 13-04) CFSTI: $1.00

A synopsis on the development and use of radioprobes in military medicine for the detection of bullets, metallic fragments of mines and shells, and other foreign bodies, is presented. The further development and introduction of radioprobes into surgical practice, is advocated. S.C.W.

N65-23450 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PRIMARY AND INITIAL PROCESSES IN THE BIOLOGICAL EFFECTS OF RADIATION Selected Articles
29 Jan. 1965 374 p refs Transl. into ENGLISH from the publ. "Pervichnyye i Nachal'nyye Protsessy Biologicheskogo Deystviya Radiatsii" Moscow, Akad. Nauk SSSR, 1963 p 1–44, 53–156, 192–201, 214–233, 243–270, 277–278 Symp. Papers
(FTD-TT-64-515/1+2; AD-611045)

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1. THE NATURE OF INITIAL RADIATION DAMAGE ON A SUBCELLULAR LEVEL P. A. Alexander and Z. M. Bacq p 8–29 refs (See N65-23451 13-04)
2. PRIMARY MECHANISMS OF RADIOBIOLOGICAL DAMAGE IN AEROBIC AND ANAEROBIC SYSTEMS L. H. Gray p 30–56 refs (See N65-23452 13-04)
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7. FLUORESCENCE INVESTIGATIONS OF THE CHANGES IN NUCLEOPROTEINS AND THEIR DERIVATIVES IN IRRADIATED CELLS M. N. Meysel', Ye. M. Brumberg, T. M. Kondrat'yev, and I. Ya. Barskiy p 124–149 refs (See N65-23457 13-04)

8. PHOSPHORUS METABOLISM IN THE NUCLEUS L. A. Stocken p 150–157 refs (See N65-23458 13-04)

9. EFFECT OF X-RAYS AND AMINO ACID ANALOGS ON THE SYNTHESIS OF DNK AND ON THE NUCLEAR PROTEIN, DETERMINED IN THE SAME TISSUE B. E. Holmes p158–169 refs (See N65-23459 13-04)

N65-23451 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE NATURE OF INITIAL RADIATION DAMAGE ON A SUBCELLULAR LEVEL

D. A. Alexander and Z. M. Bacq *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 8–29 refs (See N65-23450 13-04)

The nature of initial chemical radiation damage in the cell, leading to its death, was studied. The effects of damage to chromosomes, cytoplasm, and the nucleus are discussed to determine whether visible structural damage necessarily precedes cell death. Radiation sensitivity, radiation sensitizers, and intracellular protective agents were studied to determine the mechanism of action of chemical radiation protection. The effects of damage to enzymes and nucleoproteins were studied to determine whether there are molecules or groups of molecules in which changes could be observed immediately after in vivo irradiation at dosages which produce important morphological changes after a long latent period. Injuries to the membranes and intracellular barriers which lead to biochemical disorders are also discussed. S.C.W.

N65-23452 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PRIMARY MECHANISMS OF RADIOBIOLOGICAL DAMAGE IN AEROBIC AND ANAEROBIC SYSTEMS

L. H. Gray *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 30–56 refs (See N65-23450 13-04)

The loss of the reproductive capacity of cells in spores, vegetating bacteria, and cells of higher plants and animals is a result of damage to a small number of macromolecules, essential for the process of reproduction. A large number of data already exist concerning the nature and life of the intermediates of chemical reactions which result in damage to these macromolecules in dry spores. A slight moisture content greatly alters the course of the reactions and reduces the life of many intermediates. In cells with high moisture content, a considerable proportion of the damage may be due to the products of water radiolysis. The fate of individual forms of damage to macromolecules, arising, in particular, via chemical pathways, may be considerably modified by nutritional conditions prior to and after irradiation. The effect of the chemical factors and nutritional conditions is mutually connected. Author

N65-23453 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF RADIATION ON PROTEINS AND NUCLEIC ACIDS IN SOLUTION AND ON INTERFACES

A. G. Pasynskiy *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 57–73 refs (See N65-23450 13-04)

Chemical changes in irradiated protein molecules which lead to the oxidation of SH-groups, the breaking of peptide bonds, and desamination, are discussed. Emphasized is the transition of a large number of protein molecules into the excited or activated state which is accompanied by a regrouping of a part of the links of the polypetide chains and corresponding structural changes. The secondary importance of nucleic acids and nucleoproteins in initiating changes in the cell after irradiation, is discussed. Based on the theory of open systems it is concluded that damage to a few molecules in the internal interfaces may lead to a considerable change in the transport constant and to a disruption of biochemical processes in the cell, even where the bulk of the enzyme and substrate molecules remain unchanged. Reference is made to the importance of this factor to the mechanism of biological intensification of the radiation effect and to the theory concerning the biological effect of radiation. S.C.W.

N65-23454 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF X-RAYS ON INTRACELLULAR BACTERIOPHAGE FORMATION

F. Hercik *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 74–81 refs (See N65-23450 13-04)

The inactivation of the phage productivity of *E. coli B* for T-3 phage was investigated during the action of soft X-rays. The dose-effect curve is of a two-phase nature. At small doses rapid inactivation takes place, whereas at large doses the inactivation proceeds much slower. The phage productivity of irradiated *E. coli B* cells changes upon addition of chloroamphenicol to the culture medium. If chloroamphenicol is added to irradiated bacteria together with the phage during the lobarithmic phase, the decrease in phage productivity is less than would be the case if the effects of the two factors were cumulative. For cultures in the stationary phase, the protective effect of chloroamphenicol is less pronounced. Author

N65-23455 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF IONIZING RADIATION ON PROTEIN SYNTHESIS IN THE CELL

E. Pollard *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 82–101 refs (See N65-23450 13-04)

The aim is to obtain some information concerning the nature of protein synthesis by the use of the disrupting effect of ionizing radiation. The experiments agree with the concept that direct protein synthesis is carried out by organelles sensitive to the effect of ionizing radiation; this sensitivity is typical for ribonsomes in the uncoiled state. The volume of the sensitivity corresponds to the size of S80 ribosomes. The delayed radiation effect is much more difficult to ascertain; in separate experiments it was found that the rate of growth of the DNK in the irradiated cells decreases. This may mean that some sort of decomposition of the nucleus of the bacteria takes place, leading to upsetting of the equilibrium in the cell, and subsequently to a decrease in the synthesis activity of the cell. Author

N65-23456 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHEMICAL STATES ARISING IN CELLS DURING X-IRRADIATION AND THEIR ROLE IN RADIATION DAMAGE

E. L. Powers *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 102–123 refs (See N65-23450 13-04)

The radiation sensitivity of dry bacterial spores was studied under several experimental conditions to determine the role and nature of intracellular chemical changes taking place

during irradiation. Considered are known chemical states, their interactions with oxygen, and the degree of their participation in biological damage caused by irradiation. Spores from *Bacillus megaterium* were used. Data on the effects of heat, nitric oxide, hydrogen sulfide, and oxygen, are presented. S.C.W.

N65-23457 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FLUORESCENCE INVESTIGATIONS OF THE CHANGES IN NUCLEOPROTEINS AND THEIR DERIVATIVES IN IRRADIATED CELLS

M. N. Meysel', Ye. M. Brumberg, T. M. Kondrat'yev, and I. Ya. Barskiy *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 124–149 refs (See N65-23450 13-04)

The utilization of fluorescence microscopy in radiobiological research is discussed. Data on changes in nucleoproteins and their derivatives in irradiated cells of unicellular plant organisms, animal cell cultures in vitro, and cells of the hematopoietic organs of animals, are reported. Emphasized is the use of fluorescent dyes for vital and supravital investigations in the visible part of the spectrum, the use of ultraviolet to determine whether the nature of the ultraviolet fluorescence of organs and cells changes under the influence of ionizing radiation, and the application of ultraviolet fluorescence microscopy to the investigation of cytoplasm objects. S.C.W.

N65-23458 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PHOSPHORUS METABOLISM IN THE NUCLEUS

L. A. Stocken *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 150–157 refs (See N65-23450 13-04)

A review of the possible interrelations of fundamental biochemical processes with DNK (deoxyribonucleic acid) synthesis in animal cells and an attempt to discuss to what degree, in the light of present knowledge, X-irradiation interference in DNK synthesis can be explained, is presented. Phosphorus metabolism in rat thymus nuclei was studied. Low doses of irradiation caused a local disruption of the organized system of the nucleus which resulted in a modification of all processes. The problem of what processes or structures support the organized state of the nucleus was investigated. When the nuclei were isolated in an ionic or saccharose medium, the fraction of inorganic and organic phosphate remained bound in the nucleus. These phosphates were liberated only in acid medium or by such strong mechanical damage that the integrity of the nuclear structure was completely destroyed. The inorganic phosphate outside the nucleus does not affect the phosphorylation of monucleotides. The specific activity of inorganic phosphate in the microsomes is approximately the same as in the cell fluid, but in the mitochondria it is less than in the nucleus. S.C.W.

N65-23459 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF X-RAYS AND AMINO ACID ANALOGS ON THE SYNTHESIS OF DNK AND ON THE NUCLEAR PROTEIN, DETERMINED IN THE SAME TISSUE

Barbara E. Holmes *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 158–169 refs (See N65-23450 13-04)

A simultaneous study on the effects of irradiation and amino acid analogs on nucleic acid synthesis and residual protein synthesis in rat liver cells, is reported. Results of studies on the effects of irradiation on the incorporation of amino acid into nuclear protein showed that large doses of X-rays produced 50% synthesis inhibition which served to slow down the rate of synthesis. The complete synthesis of nucleic acids was formed in irradiated cells. Irradiation inhibited nucleic acid synthesis without inhibiting the synthesis of a specific protein fraction. In normal cells, the synthesis of this fraction took place simultaneously with nucleic acid synthesis. It is concluded that X-rays caused some interference with the interrelations between these two processes. The nature of the damage caused by irradiation to the nucleoprotein complex of the cell was not determined. S.C.W.

N65-23460 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

RADIATIVE DESTRUCTION OF LIPIDS IN THE CELL MICROSTRUCTURES

N. N. Demin and B. D. Blokhina *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 170–184 refs (See N65-23450 13-04)

The effects of radiation damage to lipid complexes in cell organelles and their metabolism, were studied. Data on the quantitative relationships between different lipid fractions in whole cytoplasm and separately in the hyaloplasm of rabbit liver cells subjected to Co^{60} gamma rays, are presented. Results demonstrate that during the development of radiation disease, a slowing down in the degeneration of lipoproteins in the cytoplasmic organelles as well as in the hyaloplasm of cells takes place, which is later replaced by it intensification in the cytoplasm organelles with decrease in the capacity to bind the available free lipids. The strongly bound lipids proved to be more stable in the hyaloplasm. Under the same irradiation conditions, studies were made on the mucosa of the small intestine in an attempt to investigate mitochondria and microsomes. Radiation injury led to marked changes in the lipid composition of the morphological cell components in the mucosa. Results of these studies are compared with those derived from studies on liver cells. S.C.W.

N65-23461 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE ROLE OF FREE DEOXYRIBONUCLEOTIDES IN THE ORIGIN OF RADIATION INJURY

J. Soska, L. Benes, V. Drasil, Z. Karpfel, E. Palecek et al *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 185–198 refs (See N65-23450 13-04)

Data on the effect of deoxynucleotides on mitosis; the capacity of deoxynucleotides and embryonic extract to intensify DNK (deoxyribonucleic acid) synthesis, which is inhibited by irradiation; and the changes in the content of free deoxynucleotides and deoxynucleosides in regenerating liver after irradiation, are presented. On the basis of these data, it is concluded that the effects of radiation on the processes which result in DNK synthesis are more significant in animals, than radiation effects on the process of polymerization or the structure of macromolecular DNK. S.C.W.

N65-23462 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOCHEMISTRY AND RADIOBIOLOGY OF THE CELL NUCLEUS

M. Errera *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 199-209 refs (See N65-23450 13-04)

A summary of existing data relating to normal biochemical processes taking place in the nucleus and an analysis of physicochemical and biochemical changes induced by radiation damage to nuclei, is presented. Data on deoxyribonucleic acid synthesis, protein synthesis, and the role of ionic equilibrium in the metabolism of thymocyte nuclei, are included. S.C.W.

N65-23463 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE MECHANISM OF THE LETHAL EFFECT OF X-RAYS ON ESCHERICHIA COLI

A. Marcovich and R. Vain *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 210-223 refs (See N65-23450 13-04)

The lethal effects of irradiation on *Escherichia coli* are investigated to determine whether dominant lethal mutations arise in the genetic material. Data on the survival curve of the recombinations of HfrH and T^+L^+Sr, survival curves of the recombinations T^+Sr, L^+Sr and T^+L^+Sr, the influence of interrupted conjugation on the viability of T^+L^+Sr recombinations, crossing between irradiated Hfr bacteria and normal F^- bacteria grown on a nonselective medium, and hybridization between the irradiation F^- bacteria and the normal or irradiated Hfr bacteria, are presented. Results of these experiments showed no induction of dominant lethal mutations in the chromosome material of the cells of strain Hfr. By means of selected markers it was shown that the F^- cells can have a favorable effect on the characteristics of the irradiated males. Irradiation damage does not affect the genetic information but mainly the mechanism of transfer of the selected markers to the recombinations. As lethal dominants were not detected by the method of recombinations, two alternative hypotheses are suggested for elucidating the exponential nature of the dependence of the lethal effect of radiation on *E. coli* on the dose. S.C.W.

N65-23464 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

IMPAIRMENT OF THE REPRODUCTIVE CAPACITY OF HUMAN CELLS IN TISSUE CULTURES BY THE EFFECT OF IONIZING RADIATION WITH DIFFERENT LINEAR ENERGY LOSS

G. V. Barendsen *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 224-240 refs (See N65-23450 13-04)

The effects of radiation with different linear energy losses on the proliferating capacity of tissue cultured human kidney cells, were studied. When alpha irradiation was used, the survival curve was of an exponential nature, while for radiation with low linear energy loss, the survival curve was of a more complex nature. Studies of the effect of fractional irradiation showed that after X-ray or beta radiation, partial restoration takes place. Restoration was not observed after alpha irradiation. The effect of different doses of alpha radiation with subsequent or preceding X-irradiation was also studied. The X-rays acted on the survival of the cells after alpha irradiation in the same way as if the cells had not been previously irradiated. Opposite results were obtained using two separate doses of X-irradiation. In this instance, the effect of the second dose depended on the magnitude of the first, thus, a certain cumulative effect is observed. It was shown that the effect of oxygen on the radiation sensitivity of these cells was considerably less during alpha irradiation than when using X-rays. S.C.W.

N65-23465 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INITIAL STAGES OF RADIATION DAMAGE TO CHROMOSOMES AND METHODS OF THEIR PREVENTION

A. Hollaender *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 241-254 refs (See N65-23450 13-04)

The initial stages of radiation damage to cytological and genetic material, and methods of preventing radiation damage were studied. Two different approaches were used which consisted of decreasing the radiation dose to elucidate the effects and evaluating them quantitatively, and elucidating the possibilities of protection against the effect of radiation. Results of studies on the effect of small radiation doses on the frequency of mitoses; the synergistic effect of small doses of combined X-rays and ultraviolet; and a combined study on the use of chemical substances as protective agents, and the possibility of assisting in the restoration of radiation damage to the cell before this damage is fixed or gives rise to a chain reaction, are presented. It is surmised that by studying the survival rate of living cells, the duration of mitosis, the nature of chromosome breakages, and the appearance of mutations, all stages, from the initial absorption of radiant energy up to the final breakage of chromosomes, the recombination of chromosome fragments, or the appearance of mutations can be traced. S.C.W.

N65-23466 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INVESTIGATION OF ENZYMES AND YEAST CELLS BY MEANS OF ACCELERATED HEAVY IONS

Kornelius A. Tobias, Thor Brustad, and Thomas Manney *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 255-271 refs (See N65-23450 13-04)

The effect of heavy accelerated ions, such as protons, alpha particles, ions of boron-10, carbon-12, nitrogen-14, oxygen-16, neon-20, and argon-40, on living cells and biogically important molecules was studied. Results of studies on the effects of irradiation on dehydrated enzyme molecules in the dry state, and studies with yeast cells to determine whether the liquid medium of the nucleus is capable of modifying the effect of heavy ions are presented. Also included is an analysis of the inhibiting effect of radiation on cell division in *Saccharomyces cerevisiae*. S.C.W.

N65-23467 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INSTANTANEOUS REACTIONS OF NERVES AND MUSCLES TO IONIZING RADIATION

O. Hug and G. I. Schliep *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 272-288 refs (See N65-23450 13-04)

Isolated nerve-muscle preparations were used to investigate different parameters responsible for instantaneous reactions to ionizing radiation. Nerve/muscle preparations of leeches (*Hirudo med.*), the earthworm (*Lumbricus terr.*), and isolated leech muscles were studied. In nerve/muscle preparations two different effects were observed. If the preparation was in a state of spontaneous contraction, irradiation produced a temporary inhibition; and, conversely, in a state of relative rest, irradiation produced rhythmic contractions. There was a strict relationship between the effect and power of the dose and total irradiation dose. The effect of irradiation on a strip of the abdominal wall of the leech, which was completely isolated from the nerve chain, showed that the dose and power of the dose necessary to produce a reaction were considerably greater than in the case of the intact nerve/muscle preparation. Data on muscle relaxation inhibition by acidification, contraction

produced by radiation in a muscle not capable of relaxation, the effects of single exposure at submaximum dose, and the reaction of a muscle preparation under conditions where the metabolic processes are undisturbed, are included. S.C.W.

N65-23468 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MECHANISM OF CHEMICAL RADIATION PROTECTION
Z. M. Bacq and P. Alexander *In its* Primary and Initial Processes in the Biol. Effects of Radiation 29 Jan. 1965 p 289–363 refs (See N65-23450 13-04)

The role of cysteamine and related compounds as chemical protector substances against irradiation, was studied. In experiments with model systems, cysteamine proved capable of protecting animals by the following three methods: redistribution of absorbed energy, reduction of the damaged molecule, and temporary combination with the damaged molecule. The mechanism of protection of living mammalian systems was also studied. It is postulated that one or several mechanisms, in which free radicals participate, are more likely to be responsible for the protective properties of cysteamine in mammals. Protection through competition for free radicals and through reduction is possible in addition to direct energy transfer. The mechanism of reduction may play an important part because it explains why protection is more effective in aerobic cells. The exclusion of disulfide metabolism, tissue anoxia, and histamine, as the primary mechanisms of chemical protection, is discussed. S.C.W.

N65-23589# School of Aerospace Medicine, Brooks AFB, Tex. Dept. of Physiology
A NEW METHOD FOR THE MEASUREMENT AND EXPRESSION OF OXYHEMOGLOBIN DISSOCIATION CURVES
J. Ryan Neville and John J. Sasner Dec. 1964 18 p refs Submitted for Publication
(SAM-TR-64-75; AD-457236)

A continuous rapid plot of the shape of oxygen dissociation curves can be obtained with a single small sample of blood diluted in appropriate buffer. The method requires the continuous removal of oxygen (both dissolved and combined) via aerobic respiration of yeast in the dilute blood sample (20:1, pH 7.4) while simultaneously recording the PO_2 with a polarographic dropping mercury electrode (DME). Methods of analysis are presented for converting polarographic current-time records into oxyhemoglobin dissociation curves similar to those obtained by more classical technics. An alternative interpretation of the current-time curves in terms of the relative oxygen flux (ROF) to the DME is described. This results in dissociation curves giving meaningful expression to certain dynamic factors involved in oxygen transport to tissues, including diffusion and rates of reaction, which are not revealed by the classic thermodynamic relationship. Examples of such curves, relating percent saturation to ROF are presented and the theoretic aspects of the derivation discussed. Author

N65-23596# Atomic Energy Commission, Washington, D. C. Div. of Biology and Medicine
TERRESTRIAL AND FRESHWATER RADIOECOLOGY
A Selected Bibliography (Supplement 3)
Alfred W. Klement, Jr. and Vincent Schultz Feb. 1965 119 p (TID-3910(Suppl. 3)) CFSTI: $2.50

This supplemental bibliography contains 1192 references related to field or laboratory studies of wild species of plants and animals with respect to radiation effects on metabolic studies involving radionuclides. Studies of laboratory strains or domestic strains are generally not included. G.G.

N65-23616# Flying Personnel Research Committee, London (England).
THE PRODUCTION OF RADIATION BURNS ON THE RETINA AT THE THRESHOLD LEVEL OF DAMAGE: A LITERATURE SURVEY AND TENTATIVE MATHEMATICAL THEORY
K. E. Spells Mar. 1964 41 p refs
(FPRC/1222)

Results of experiments to determine the threshold conditions for the production of burns on the retina of the eye by radiation were collected from the literature; all of the experimental work performed so far has been on rabbits. This survey covers experiments in which the exposures were long (minutes, or fractions thereof) and short (0.5 msec by lasers), and attempts to treat the problem theoretically were included within its scope. Working from a somewhat different set of assumptions than have been used in previous mathematical work on the subject, a tentative theory is presented for the production of threshold burns. This theory shows a measure of agreement with existing experimentally determined data which is encouraging, and its predictions include the case of threshold burn production by exposures of very brief duration (10 msec and below). Author

N65-23645# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
METABOLISM OF RADIOIODIDE IN *CHLORELLA VULGARIS* [METABOLISMO DEL RADIOIODURO POR LA *CHLORELLA VULGARIS*]
Leopoldo J. Anghilcri 1965 10 p refs In SPANISH
(Rept.-132)

Experiments were conducted to determine iodine metabolism in *Chlorella Vulgaris* in media containing radioactive iodine-131. More than 50% of the intracellular iodine absorbed was in the iodide state. Although the protein fraction contained a large part of the isotope, no quantitative values of the protein composition could be determined, as the iodide protein compounds proved unstable during hydrolysis. Charts showing the percentages of activity obtained by various extraction methods are given. R.N.A.

N65-23678*# National Aeronautics and Space Administration, Washington, D. C.
THE EFFECT OF MANUAL LABOR AND PERSPIRATION ON BLOOD AND TISSUE [UBER DIE EINWIRKUNG DER MUSKELARBEIT UND DES SCHWITZENS AUF BLUT UND GEWEBE]
W. Gross and O. Kestner May 1965 30 p refs Transl. into ENGLISH from Z. Biol. (Munich), v. 70, 1919 p 187–210 (NASA-TT-F-9338) CFSTI: HC $2.00/MF $0.50

Information is given on changes in the composition of blood and tissue as a result of strenuous muscular activity, i.e. hiking. Tests were carried out on dogs, rabits, small donkeys, and on human beings to ascertain water losses in the body, salt losses, and their effect on the body metabolism, in particular the blood and tissue. Tests were carried out on humans during a mountain climb in Italy under various conditions of weather, exertion, food intake, and perspiration. Under conditions of salt deficiency the body weight was measured prior to departure, upon arrival, on the following two mornings, and on the third day. Measurements were made of various factors before and after the trip (albumen in %, serum viscosity, hemoglobin count, body weight, body loss). Three types of water which are referred to as concentration water, reduction water, and destruction water, are differentiated, and the properties of each are discussed. Determinations were made to ascertain the water reservoirs of the body, such as

the muscles. It is concluded that water and salt are only temporarily taken from the blood during manual labor and subsequent perspiration, and that salt intake is necessary to bring about full replacement of water lost through perspiration. Author

N65-23710*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CORIOLIS EFFECTS DURING PITCH AND ROLL MANEUVERS IN A PILOTED FLIGHT SIMULATOR
John D. Stewart and Brant Clark (San Jose State Coll.) [1964] 31 p refs Presented at the Ann. Meeting of Aerospace Med. Assoc., Miami Beach, 11–14 May 1964
(NASA-TM-X-51755) CFSTI: HC $2.00/MF $0.50

The effects of a suprathreshold values of Coriolis acceleration on flight simulator pilots' perception of illusory motion, and perception of position in space were studied in order to obtain data on perception of cockpit rotation, detection of changes in cockpit position, and on motion sickness. Results of the study suggest that, within the range of conditions studied, the subjects judge body position with respect to direction of resultant force acting on the body. The data also support the belief that stimulation of the semicircular canal by Coriolis forces has little effect on judgement of the postural vertical. C.L.W.

N65-23729# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
THYROID CENTELLOGRAM [CENTELLOGRAMA TIROIDEO]
D. Artagaveytia, O. Degrossi, H. Gotta, and V. Pecorini 1964 14 p refs In SPANISH
(Rept.-129)

Thyroid nodules quite often hide malignant tumors, but because of the latter's greater affinity for iodine they can be distinguished by radiological comparisons of radioiodine absorption. This paper discusses the use of scintillograms in diagnosing thyroid tumors and presents statistical evidence from radiological studies on their effectiveness. R.N.A.

N65-23742*# California Univ., Los Angeles. Brain Research Inst.
EFFECT OF SPACE ENVIRONMENT ON CIRCADIAN RHYTHMS OF PLANTS, FOR THE PURPOSE OF DEFINING AND VERIFYING AN EXPERIMENT SUITABLE FOR USE IN A BIOSATELLITE Final Report, Sep. 1, 1964–Feb. 28, 1965
J. D. French and T. Hoshizaki 28 Feb. 1965 8 p refs
(Grant NsG-528)
(NASA-CR-62707) CFSTI: HC $1.00/MF $0.50

An apparatus to simulate weightlessness condition for plants, NOGRAVATRON, was developed. An infrared time lapse photographic system, a strain-gage recording system which measures the movements of pinto leaves and whose signal is suitable for telemetry; and a prototype flight package for neurospora experiments were also developed. Response differences were found in growth rates and growth directions in barley seedlings grown in a simulated weightlessness condition. Leaf movement when the plant is stationary and grown under constant conditions was confirmed and delineated. Size of the experimental plant material was reduced. Leaf movements of pinto beans were found to respond to a simulated weightlessness condition by the loss of leaf movements or by a phase shift of the leaf movements. Basic 27-hour leaf movement rhythm was confirmed by computer analysis of photographic time lapse data. Author

N65-23775# Joint Publications Research Service, Washington, D. C.
PROCESSING OF INFORMATION ON LIVING ORGANISMS. DISCUSSIONS ABOUT THE BRAIN
A. Napalkov and A. Turov 23 Apr. 1965 12 p Transl. into ENGLISH from Nauka i Zhizn' (Moscow), no. 9, Sep. 1964 p 68–72
(JPRS-29744; TT-30815) CFSTI: $1.00

Data on the arrangement and functioning of receptors and analyzers, systems perceiving and developing information on the condition of the external environment, the condition of the external environment and the internal medium of the organism, and the evolutionary position of the organism, are presented. Discussed are the echo-locating apparatus of the bat, the proprioreceptive sensing device of the praying mantis, the mechanoreceptors of Arthropoda and the *Calliphora* fly, the labellum bristles of flies, and thermoreceptors of rattlesnakes. Results of physiological experiments on the frog show that, by means of the visual analyzer, it is able to recognize definite moving figures in its environment and to classify them as useful, harmful and indifferent. An electron model of this apparatus confirmed the correctness of these experiments. S.C.W.

N65-23776# Joint Publications Research Service, Washington, D. C.
INDUSTRIAL TOXICOLOGY
E. B. Kurlyandskaya et al 10 May 1965 36 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 3, Mar. 1965 p 3–15, 38–43, 60–63
(JPRS-29981; TT-65-30939) CFSTI: $2.00

CONTENTS:

1. THE CRITERIA OF NOXIOUSNESS DURING STANDARDIZATION OF CHEMICAL CONTENT IN THE AIR OF INDUSTRIAL PLANTS E. B. Kurlyandskaya and I. V. Sanotskiy p 1–9 refs
2. STUDY OF CENTRAL NERVOUS SYSTEM FUNCTION DURING TOXICOLOGICAL EXPERIMENTS M. Khorvat, E. Frantik, F. Korzhinek, A. Mikiska, and G. Mikiskova p 10–19 refs
3. EXPERIMENTAL TREATMENT AND PROPHYLAXIS OF ACUTE ARSENIC POISONING I. Ye. Okonishnikova p 20–27 refs
4. TRACING OF PHENOLS IN THE ATMOSPHERE K. K. Dushutin and Yu. A. Manyashin p 28–29
5. THE FIRST CONFERENCE IN MOSCOW OF THE HEADS OF ORGANIZATIONAL AND METHODOLOGICAL DEPARTMENTS OF INSTITUTES OF INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES (MARCH 1964) N. I. Vokova p 30–33

N65-23777# Joint Publications Research Service, Washington, D. C.
SOME MEDICAL, PSYCHOPHYSIOLOGICAL, AND TECHNICAL ASPECTS OF SPACE FLIGHT
V. Parin et al 11 May 1965 13 p Transl. into ENGLISH from Med. Gazeta (Moscow), 23 Mar. 1965 p 2
(JPRS-29998; TT-65-30950) CFSTI: $1.00

CONTENTS:

1. MEDICINE AND OUTER SPACE V. Parin p 1–4
2. GROUP PSYCHOPHYSIOLOGY F. Gorbov p 5–7
3. SPACE SUITS V. Krichagin p 8–10

N65-23793*# National Aeronautics and Space Administration, Washington, D. C.
THE DEPENDENCE OF DIURESIS ON THE SALT CONTENT AND HYDROGEN ION CONCENTRATION OF DRINKING WATER [UBER DIE ABHANGIGKEIT DER DIURESE VOM SALZGEHALT UND DER WASSERSTOFFIONENKONZENTRATION DES GETRUNKENEN WASSERS]
E. Starkenstein May 1965 23 p refs Transl. into ENGLISH from Arch. Exptl. Pathol. Pharmakol. (Berlin), v. 104, 1924 p 6–22
(NASA-TT-F-9337) CFSTI: HC $1.00/MF $0.50

This paper explains tests to determine the amount of urine excreted from different types of mineral waters and ordinary waters taken into the organism. Tests were made of a variety of German mineral waters and, were carried out on rabbits, dogs and man. Distilled water, sodium chloride solutions, tap water and various mineral waters were tested and the amount of excretion in ccm was measured during a 4-hour period from 1 liter of the liquid which was imbibed. Amount of urine excretion was found to depend upon the salt content of the liquid, the free carbon dioxide, the alcohol content, and the hydrogen ion concentration, among other factors. Salt content inhibits excretion; carbon dioxide stimulates it. The diuresis-stimulating effect of carbon dioxide is primarily due to the hydrogen ion concentration. Author

N65-23813*# General Technical Services, Inc., Yeadon, Pa.
FURTHER STUDY OF THE DYNAMIC SYSTEMS RESPONSE OF SOME INTERNAL HUMAN SYSTEMS
A. S. Iberall and S. Z. Cardon Washington, NASA, May 1965 179 p refs
(Contract NASw-1066)
(NASA-CR-219) CFSTI: HC $5.00/MF $1.00

A contribution is made toward a new theory of automatic control as a background for analysis of the entire biological system. Author

N65-23841# School of Aerospace Medicine, Brooks AFB, Tex.
GAS CHROMATOGRAPHIC DETERMINATION OF SMALL VOLUMES OF NITROGEN DISSOLVED IN BLOOD Final Report, Jun.–Dec. 1964
Kenneth G. Ikels Mar. 1965 12 p refs
(SAM-TR-65-6; AD-460797)

A gas chromatographic method, in conjunction with a modified Van Slyke apparatus, is described for the determination of small volumes of N_2 dissolved in blood. Essentially, the method consists of the extraction of a sample under reduced pressure followed by the absorption of O_2 and CO_2. The remaining gas, chiefly N_2, is quantified by gas chromatography. The observed Bunsen absorption coefficient for N_2 in blood agrees closely with the values reported in literature. The method is accurate to within 0.3 μ l of N_2 gas. The method is suitable for use throughout the physiologic range of dissolved N_2 which could be encountered in nitrogen elimination studies. Author

N65-23850# Royal Inst. of Tech., Stockholm (Sweden). Speech Transmission Lab.
SPEECH TRANSMISSION LABORATORY QUARTERLY PROGRESS AND STATUS REPORT, OCTOBER–DECEMBER 1964
J. Lindqvist et al 15 Jan. 1965 55 p refs
(Contract DA-91-591-EUC-3413; Grants AF-EOAR-64-28; NIH NB-04003-02)
(STL-QPSR-4/1964)

CONTENTS:

N65-23889# New York Eye and Ear Infirmary, N. Y.
LARGE RETINAL BURN STUDY
Harold Najac, Blossom Cooper, Leo Todman, and James C. Newton Philadelphia, Frankford Arsenal, Dec. 1964 21 p
(Contract DA-36-038-AMC-685(A))
(R-1747; AD-456515)

Some tentative values are given for the threshold doses associated with minimal retinal lesions for typical large image diameters (4 and 6 mm). A pulsed xenon source was used with exposure times varying between 20 and 100 milliseconds and irradiance levels between 10 and 30 cal/cm^2 sec. Author

N65-23936 Technische Hochschule Aachen (West Germany). Deutsches Wollforschungsinstitut
ON THE DECOMPOSITION OF POLYESTER FIBERS THROUGH HYDROLYSIS AND AMINOLYSIS [UBER DEN ABBAU VON POLYESTERFASERN DURCH HYDROLYSE UND AMINOLYSE]
Heimo Pfeifer Cologne, Westdeut. Verlag, 1964 119 p refs In GERMAN Forschungsber. des Landes Nordrhein-Westfalen No. 1212

Alkaline hydrolysis of polyester fibers did not support earlier findings that the observed weight loss is a linear function of time, but rather an exponential function of time resulting in a lattice expansion pattern of the decomposing fiber. Polyester decomposition by aminolyses produced pure amides and the synthesis of two model substances yielded the bis-benzylamid and mono-ethylendiamid of the terephthalic acid. Hydraulic decomposition of the polyester fibers in water of 100° to 150° C under pressure showed a definite tensile loss. Organic solvents at higher temperatures had a fixation effect on the fibers. Exposure to xenon photolyses for 10 weeks decreased absolute hardness 75% and tensile strength 76%. Neutron radiation resulted in marked fiber damage with linear decrease of molecular weight but no lattice expansion pattern was observed in the leftover fibers. Transl. by G.G.

N65-23941# Agricultural Research Service, Watkinsville, Ga.
RESEARCH IN PLANT TRANSPIRATION: 1962 Production Research Report No. 87
James E. Pallas, Jr., Anson R. Bertrand, Donald G. Harris, Charles B. Elkins, Jr., and Clyde L. Parks Mar. 1965 56 p refs Prepared in cooperation with Ga. Agr. Expt. Sta. and U. S. Army Electron. Res. and Develop. Activity GPO: $0.45

In a controlled environment growth room, radiant energy, relative humidity, and soil moisture tension had marked effects on the transpiration rate of plants. Guard cell operation was affected by moisture availability. Osmotic pressure determinations made concurrently with stomatal observations showed that, with the species studied, operation of stomata could not be correlated with changes in osmotic pressure of the guard cells. Tests were made of several formulations applied to leaves to provide either a physical barrier to transpiration or a potential control of stomatal operation. Materials included latex and plastic compounds, waxes, mercury and fluoride compounds, and α-hydroxysulfonates. Although a number of these formulations reduced transpiration, few did so without also depressing plant growth. In experiments with the most effective transpiration suppressants, treated leaves developed a temperature differential of 6° to 10° C, over that of untreated leaves. Author

N65-23960# Martin Co., Baltimore, Md.
PERSONNEL SUB SYSTEMS
D. G. Thomas [1964] 23 p refs Presented at Eurospace Conf., Brussels, 23–24 Jan. 1964

The use of this analytical basis for the determination of the allocation of functions to man and machine forms the cornerstone of the concept referred to as Systems Functional Analysis. This analysis begins with a definition of the proposed mission and describes in detail the functions essential to the fulfillment of the mission requirements. The initial step is the description in general of the gross functions of the system. Progressively, these gross functions are further defined into subfunctions, and sub-subfunctions. Allocation of these functions, severally, to man or machine, respectively to their relative capability, reliability, economy, etc., can then be performed. The techniques for accomplishing this objective, which constitute a methodology for human engineering support of system design, can be approached by generating an appropriate checklist and precisely articulating a task sequence analysis, in terms of logic symbols. Author

N65-23980*# Minnesota Univ., Minneapolis.
PROCEEDINGS OF THE ATMOSPHERIC BIOLOGY CONFERENCE
Lucille H. Sukalo, ed. [1965] 244 p refs Conf. held at Minnesota Univ., 13–15 Apr. 1964
(Grant NsG-461)
(NASA-CR-62786) CFSTI: HC $6.00/MF $1.50

Conference papers on atmospheric biology are presented. For individual titles see N65-23981–N65-24000.

N65-23981* Minnesota Univ., Minneapolis. School of Physics
THE ATMOSPHERIC ENVIRONMENT
H. T. Mantis *In its* Proc. of the Atmospheric Biol. Conf. [1965] p 1–10 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Atmospheric properties of temperature, density, and the accompanying field of radiation as related to the biological environment are discussed. Natural injection of biological material at base of atmosphere will be determined by a complex interaction of properties of the biological material itself and particular characteristics of atmosphere at surface of earth. Extreme variability of atmospheric surface layer is emphasized. While it is predicted, therefore, that for most pollens and spores there would be a rapid decrease in concentration with altitude, particles approaching micron size might be expected in concentration at tropopause almost half as great as near surface. Some additional environmental hazards encountered by small particles at high altitudes will be discussed. Author

N65-23985* Litton Systems, Inc., St. Paul, Minn. Applied Science Div.
MECHANICAL METHODS FOR COLLECTING STRATOSPHERIC BIOLOGICAL AEROSOLS
D. A. Lundgren, A. R. McFarland, and V. W. Greene *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 49–67 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Characteristics of impaction and filtration aerosol collection mechanisms are reviewed with particular reference to high altitude environments. Both theoretical and experimental aspects are considered. Discussions and data are presented relative to collection efficiency, viability decay, and amenability of sample to subsequent analysis. Examples of current stratospheric particulate sampling apparatus are given, and their applicability to biological aerosol sampling is examined. It was concluded that very high collection efficiencies on particles of microbiological size are more easily obtained as stratospheric pressure decreases (altitude increases). Impaction and filtration methods are most applicable to stratospheric biological aerosol collection requirements of large sample size and low background contamination levels. Rockets, aircraft, and balloonborne sampling apparatus now exist that could be applied to biological sampling with certain limitations placed upon each. The most serious problem of high velocity aircraft and rocket sampling for viable biological matter is heating the collected particles. Aircraft and balloonborne samplers are most easily adapted to biological sampling requirements. Author

N65-23986* California Univ., Berkeley. Space Sciences Lab.
DETECTION AND STUDY OF MICROBIAL POPULATION IN UPPER ATMOSPHERE. SIMULATED HIGH ALTITUDE MICROBIAL SAMPLING WITH AN ELECTROSTATIC PRECIPITATOR
David Nicholson, William J. Oswald, and Robert C. Cooper *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 69–78 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

In the study of microorganisms that might exist in the upper atmosphere, a method of capturing such microorganisms in viable form is required. Theoretical studies indicated that a high collection efficiency could be attained with an electrostatic precipitator under near vacuum conditions. Experimental verification of the theoretically high efficiency of the precipitator and of the viability of organisms captured was sought through use of a laboratory aerosol chamber. In the chamber, suspensions of *Serratia marcescens* were established with atomizing equipment. An airstream drawn from the chamber was passed through the precipitator and through an Andersen sampler in parallel. The collected material was regrown and enumerated to evaluate the collector efficiency as compared with the Andersen. Many more viable organisms were collected in the Andersen than in the precipitator. With a second Andersen in series following the precipitator in the airstream, it appeared that the precipitator removed many more bacteria than could be enumerated as viable. On the basis of the limited evidence presented, it is tentatively concluded that *S. marcescens* was to a large extent killed during collection in the electrostatic precipitator. The killing mechanism (perhaps ozone production in the corona discharge of the precipitator) is under study. Studies are also in progress to modify the precipitator to increase its efficiency. Author

N65-23987* California Inst. of Tech., Pasadena.
PARAMETERS FOR BIOCOLLOIDAL MATTER IN THE ATMOSPHERE

Alexander Goetz *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 79–97 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Parameters can be derived from properties of aerocolloidal matter in general. Of the particulates to be considered more or less permanent atmospheric constituents, the upper size limit lies for the biosphere at kinetic (Stokes') diameters ($5\mu \leq d \leq 8\mu$), but decreases rapidly with altitude, whereas the lower limit for stable particulates of significant frequency appears to be at ($d \sim 0.05\mu$). This size range embraces, thus, about two decades and includes bacterial cells, spores, and virus-like forms, but excludes from permanent suspension pollen, seeds, etc. Aerocolloidal matter in the average represents but 10^{-7} to 10^{-8} of suspending gas mass and amounts to a numerical concentration of 10^6 to $10^{10}/m^3$ of which the biocolloidal components can be assumed to be only a minute fraction ($\leq 10^{-5}$). Constitution of natural aerocolloids—particularly regarding their organosoluble and thermally metastable components—is discussed and illustrated. Author

N65-23990* Mainz Univ. (West Germany).
LARGE-SCALE DISTRIBUTION OF MICROORGANISMS IN ATMOSPHERE
C. E. Junge *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 117–125 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Microorganisms in atmosphere can be represented by particles of Stokes' radii of about 1 micron and larger. Large scale distribution of such particles in troposphere and stratosphere is discussed. Conclusions for troposphere, based on considerations of physical processes involved and on studies of inorganic aerosols seem in line with information for atmospheric microorganisms. For stratosphere the vertical distribution of particles is calculated for sedimentation-diffusion equilibrium under various assumptions about the eddy diffusion coefficient. It is concluded that even larger microorganisms can penetrate into lower 10 km of the stratosphere. However an upward penetration of microorganisms beyond 25 km, in extreme cases beyond 30 km, can hardly be expected even for the smallest atmospheric microorganisms. Exposure of microorganisms to ozone and sulfur oxidation products in stratosphere is briefly discussed. Author

N65-23991* Woods Hole Oceanographic Institution, Mass.
BIOLOGICAL SIGNIFICANCE OF BACTERIAL COUNTS IN AQUATIC ENVIRONMENTS
Holger W. Jannasch *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 127–132 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50
(Grant NSF G-861)

Some recent marine bacteriological studies are discussed with regard to adequacy of techniques and possibility of an ecologically significant interpretation of counts obtained. It is concluded that to obtain statistically significant counts of any specific metabolic type of bacterium presupposes knowledge of growth requirements, germination properties, and extent of clumping and overgrowth. While under such conditions bacterial counts represent fair estimates of concentration of these organisms (regardless of their physiological state), they are not acceptable as an adequate measure of bacterial activity in natural populations. New approaches, employing continuous and semicontinuous growth systems, are promising more realistic estimates of bacterial activity in vivo. Author

N65-23992* Michigan Univ., Ann Arbor. Dept. of Botany
ATMOSPHERIC PARTICULATE MATTER OF PLANT ORIGIN
William S. Benninghoff *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 133–145 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Particulates of plant origin are grouped in following categories. (1) small, lightweight propagules; (2) single- or few-celled plant bodies or fragments; (3) deciduous tissue parts from plant surfaces; and (4) fragments of vegetable humus. Different kinds of particles in categories (1) and (2) remain viable in the lowest level of atmosphere for widely different time periods. Both living and nonliving particles are possible agglomeration nuclei or in some instances substrates for smaller parasitic or saprophytic organisms. Plant origin particulates can be recovered from atmosphere near ground by static samplers, dynamic samplers, and devices for entrapping rain washout. Results of static sampling to obtain pollen spectra of modern vegetation are discussed. Phytogeographical studies of seed and spore dispersal provide indications of transport distances. Geographic distributions of source plants for given kinds of particulates and distributions of different vegetation types determine patterns of sources from which air movements transport particulates. Source patterns are complex in detail because of habitat differences, and vary with seasons and with shorter term weather sequences. Author

N65-23993* Minnesota Univ., Minneapolis. Dept. of Botany
LONG-TERM ANALYSIS OF ATMOSPHERIC POLLEN
Agnes Hansen and A. Orville Dahl *In its* Proc. of the Atmospheric Biol. Conf. [1965] p 145–150 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Detailed analysis of airborne pollen has been carried on continuously since 1932. At that time a pilot operation was instituted after considerable observation of anemophilous species in the field. Pollen of many species from 50 different genera occur each season on the sampling slides. The 10 most abundant kinds of airborne pollen, in order of decreasing importance are these: *Ambrosia* (ragweeds), *Artemisia* (wormwood-sage), Gramineae (grass), Chenopodiales (Russian thistle, pigweeds), *Rumex* (dock), *Quercus* (oaks), *Ulmus* (elms), *Betula* (birches), and *Urtica* (nettles). Such factors as precipitation, wind direction, and temperature, influence the record of pollen on the sampling slide. The data of the highest 24-hour concentration of any specific kind of pollen varies over the years. The range in total seasonal concentration of pollen (expressed as number of pollen grains per square centimeter of surface of the sampling slide) may vary extensively. Author

N65-23994* Bernice P. Bishop Museum, Honolulu, Hawaii. Dept. of Entomology
AIRPLANE TRAPPING OF ORGANISMS AND PARTICLES
E. P. Holzapfel and J. L. Gressitt *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 151–163 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

An air plankton trap for operation on a Super Constellation aircraft was developed. During 3 years of operation 59 arthropods plus numerous fragments were collected over the Antarctic, Pacific, and continental United States. Plant and mineral material have also been collected and analyzed. The trap has been operated about 668 500 km (415 260 statute miles). Collecting results and inflight tests indicated low efficiency. Author

N65-23995* Rothamsted Experimental Station, Harpenden (England).
PROBLEMS OF SAMPLING FOR ATMOSPHERIC MICROBES

P. H. Gregory *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 165–169 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Technical difficulties of sampling in the upper air are posed by (1) the large volumes to be tested; (2) aerodynamical problems of removing particles with standard equipment not designed for high intake speeds; (3) problems of retaining viability after capture; (4) limiting contamination during passage through the lower atmosphere and in the laboratory; (5) recognition of contaminants. Author

N65-23996* Army Biological Labs., Fort Detrick, Md.
SAMPLING MICROBIOLOGICAL AEROSOLS IN THE LOWER ATMOSPHERE
Charles R. Phillips and Herbert M. Decker *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 171–177 ref (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Experience has been obtained in lower atmospheric sampling for viable airborne microorganisms outdoors and indoors. A large number of sampling devices have been developed for this purpose, many of which are not directly adaptable to low temperatures and low pressures that exist in upper atmosphere. Author

N65-23997* Illinois Univ., Urbana. Dept. of Microbiology
CAN SPORES SURVIVE SPACE TRAVEL?
H. O. Halvorson and V. R. Srinivasan *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 179–185 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Roles of calcium and dipicolinic acid in contributing heat resistance to spores and also resistance to desiccation are discussed. Spores' limits of tolerance to heat, and stability of this tolerance during storage, are studied. That the resistance of the spore is related to its affinity for water, brings into focus the question of the role of bound water in spore resistance to desiccation. If the water in spores is bound or if the spores are dry in presence of water is discussed. Spores are more resistant than vegetative cells to radiation. Organic compounds containing disulfide bonds such as found in cystine confer limited protection to biological materials against irradiation. Bacterial spores have been shown to possess macromolecules rich in cystine-like structures. The kinetics of incorporating radioactive S^{35} into cystine-like structures during sporulation indicates that the increase in cystine-rich structures corresponds with the increase of the radioresistance of the cell. Author

N65-23998* California Univ., Berkeley. School of Public Health
AN APPROACH TO STUDY OF MICROFLORA IN ATMOSPHERE
R. L. Dimmick and R. J. Heckly *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 187–197 refs Sponsored by ONR (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

Holding suitable organisms in controlled atmospheric conditions and studying their viability for the purpose of extrapolating to natural conditions is discussed. These are general techniques employed in study of microorganisms in contact with the atmosphere: (1) In aerobiological techniques, cultures are aerosolized into chambers under controlled conditions, air is sampled, and survival studied. (2) In freeze-drying techniques, cultures are frozen at various temperatures and placed in a high vacuum until the moisture content has been reduced to between five % and some unknown lower limit. (3) In surface drying techniques (desiccation), cultures are painted onto surfaces, then exposed to a variety of atmospheric conditions. Author

N65-23999* Litton Systems, Inc., St. Paul, Minn. Applied Science Div.
MICROBIOLOGICAL EXPLORATION OF STRATOSPHERE RESULTS OF SIX EXPERIMENTAL FLIGHTS
V. W. Greene, P. D. Pederson, D. A. Lundgren, and C. A. Hagberg *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 199–212 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50
(Contracts NASr-81; NASw-648)

Several balloonborne probes were launched to determine existence and identity of viable microorganisms at altitudes between 30 000 and 90 000 ft. Large volume, high efficiency filtration devices were employed to acquire samples ranging from 20 000 to 100 000 ambient ft^3 of stratospheric air, and a variety of controls and precautions were incorporated to preclude extraneous, nonstratospheric contamination. Post-impact contamination was a significant source of microorganisms on the filters. Nevertheless, it was possible to determine that the maximum microbial density above the tropopause was less than 1×10^{-3} organisms/ft^3, and was probably less that 1×10^{-4}/ft^3. Molds belonging to the genera *Alternaria* and *Cladosporium* were consistently isolated from samplers exposed in the stratosphere. Author

N65-24000* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ATMOSPHERIC COLLECTION AT 130,000 FEET
Gerald A. Soffen *In* Minnesota Univ., Minneapolis Proc. of the Atmospheric Biol. Conf. [1965] p 213–219 refs (See N65-23980 13-04) CFSTI: HC $6.00/MF $1.50

An air impactor, capable of continuous sampling for 12 to 24 hours has been designed to collect particles from the upper atmosphere (130 000 ft). The aerosol is impacted on the previously sterilized surface of a moving drum, driven by a timing mechanism. This enables the sample to be spread over a large surface and to be calibrated with respect to the time of collection. The sample is retrieved, handled aseptically, and cultured using standard laboratory procedures. The instrument has been tested under simulated atmospheric conditions and evaluated. It was flown on three successive balloon flights; a small number of microorganisms was indicated. The results of these collections will be discussed. Author

N65-24004# California Univ., Los Angeles. Biotechnology Lab.
UPPER EXTREMITY PROSTHETICS RESEARCH; HUMAN TRACKING; SENSORY MOTOR CONTROL; AND MYOELECTRIC CONTROL
John Lyman 15 Mar. 1965 24 p
(Contracts V1005p-9779; N123(60530)32857A; AF 33(615)-1969; Grant VRA-RD-1201M-64)
(Rept.-65-14; AD-613680)

The objectives and current status of biotechnological projects on prosthetics, sensory motor control, human engineering, and myoelectric control systems are reported. Among the specific topics discussed was the selection of an amputee who indicated willingness to undergo minor surgery for correction of a muscle hernia. Strain-gage measurements were made of the following muscles on the amputated site: pectoralis, latissimus dorsi, upper and lower part of the trapezius, and the sacrospinalis. All of these muscles were highly atropied and only the pectoralis provided a useful control signal. Output on the nonamputated side was comparable to nonamputee subjects. E.E.B.

N65-24039*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
SURVIVAL AFTER DECOMPRESSION TO A VACUUM

John Billingham [1964] 19 p refs Presented at Aerospace Med. Assoc., Miami, Fla., 11–14 May 1964
(NASA-TM-X-51669) CFSTI: HC $1.00/MF $0.50

A program to investigate the physiological, pathological, and subsequent behavioral changes in animals exposed for varying periods of time to a near vacuum and recompressed to a 35 000-foot altitude with oxygen was considered essential to provide some indication of the probability of survival, the immediate and residual tissue damage, and the subsequent ability to perform tasks. This paper presents some results of this investigation. Author

N65-24064# Joint Publications Research Service, Washington, D. C.
BIOLOGICAL MODELING AND BIONICS
P. I. Gulyayev 20 May 1965 9 p refs Transl. into ENGLISH from Vestn. Vysshey Shkoly (Moscow), no. 2, Feb. 1965 p 41–47
(JPRS-30177; TT-65-31041) CFSTI: $1.00

The merging of scientific disciplines, such as mathematics, bionics, and cybernetics for the development of models to solve complex biological problems, is discussed. S.C.W.

N65-24065# Joint Publications Research Service, Washington, D. C.
ELECTROMETRY IN MEDICINE
20 May 1965 5 p Transl. into ENGLISH from Nauka i Tekhn. (Riga), no. 12, Dec. 1964 p 37
(JPRS-30182; TT-65-31045) CFSTI: $1.00

The development of new methods for use in clinical and diagnostic medicine is reported. A method for measuring stomach acidity without removing gastric juice is based on the use of an electronic apparatus that automatically records the movements, acidity, and temperature of the stomach. An instrument for determining the condition of the adrenal cortex in cardiovascular and metabolic disorders, and a fluorometric method for determining hormone concentration to an accuracy of one ten-millionth of a gram are reported. S.C.W

N65-24080# Kentucky Univ., Lexington. Dept. of Physiology and Biophysics
RESPONSES OF COLD- AND WARM-ADAPTED DOGS TO INFUSED NORADRENALIN AND ACUTE BODY COOLING Final Report, Oct. 1963–Nov. 1964
Tetsuo Nagasaka and Loren D. Carlson Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Feb. 1965 18 p refs
(Contract AF 41(609)-2193)
(AAL-TR-64-21; AD-462102)

A total of 12 experiments was done in cold-adapted (C-A) and warm-adapted (W-A) beagle dogs, kept more than 40 days at −10° C and 28° C, respectively. The dogs were infused with noradrenalin for 20 minutes at 30° C and after 45 minutes of acute cold exposure to 5° C. At 28° to 30° C, basal O_2 consumption was higher in C-A dogs. Oxygen consumption of C-A dogs increased with a slight increase in the heart rate in the 18 to 20 minutes after body cooling and then decreased. In W-A dogs, O_2 consumption decreased continuously after acute cold exposure. Calorigenic effects of infused noradrenalin were consistent in C-A and W-A dogs at 30° and 5° C; there was no difference between the increased amount of O_2 consumption from the initial levels. Noradrenalin caused increased heart rate in W-A dogs at 30° and 5° C, with decrease or no change in C-A dogs. Colonic, pinna and paw skin temperatures were significantly higher in C-A than in W-A dogs. Noradrenalin caused an increase in the temperatures, but the effect of the drug was more prominent in W-A than in C-A animals at lower temperature. Author

N65-24082# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
PROJECT COLD CASE
Frederick A. Milan Feb. 1965 30 p refs
(AAL-TDR-64-23; AD-462767)

Results of an investigation of the cold land survival capabilities of pilots wearing the full pressure high altitude flying outfit are presented. Six subjects wearing these garments were placed under simulated survival conditions in a wooded area. Ambient air temperatures reached −30° F and were below −27° F for at least 50% of the time. On the third day air temperatures rose and remained at −10° F until the conclusion of the test which lasted 72 hours. Two subjects wearing the full pressure suit without additional clothing survived for 11 and 30 hours. At the end of this time they were fatigued and moderately hypothermic. Two subjects with the full pressure suit plus a nine-piece down-filled survival outfit (clothing outfit, arctic survival) survived for 52 and 72 hours. The 52-hour survivor suffered a noncold injury which necessitated his removal. Two subjects with the full pressure suit plus an experimental ADC walk-around sleeping bag survived for 72 hours each. Author

N65-24083# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
COLD TEST EVALUATION OF SOME COMPONENTS OF THE NASA MERCURY SURVIVAL KIT
Paul A. Albert Feb. 1965 22 p ref
(AAL-TDR-64-24; AD-462624)

Inhouse comparative testing was performed on the NASA and the standard MB-4 one-man life rafts, to determine which provided greater protection against heat loss from subject to surroundings. Instrumented subjects, with and without air pillow for buttock insulation, were seated in the rafts in water at 2.0° C and ambient air temperatures of 0° and −18° C, for 2-hour periods. The raft and other components, such as the NASA life vest, strobe light, transceiver and water container, were also cold-soaked at −30° C, to determine structural integrity and certain operational characteristics, both during the exposure and after rewarming to a more temperate state. Results indicate that the NASA raft and, under certain conditions, possibly the water container are superior to current Air Force items for survival in cold environments. Author

N65-24227# Joint Publications Research Service, Washington, D. C.
EXPERIMENTAL BIOLOGY AND MEDICINE
Yu. M. Levin et al 10 May 1965 36 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 58, no. 12, Dec. 1964
(JPRS-29980; TT-65-30938) CFSTI: $2.00

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3. CELLULAR ACTIVATION DURING THE REPARATIVE REGENERATION OF THE LIVER OF WHITE MICE UNDER CONDITIONS OF FUNCTIONAL ORGANIC STRESS N. F. Semenova p 17–24 refs

4. THE EFFECT OF MEDICINAL SLEEP ON THE MITOTIC ACTIVITY OF NORMAL AND DENERVATED EPIDERMIS OF WHITE RATS A. N. Kulagin p 25–28 refs

5. ON THE POSSIBILITY OF UTILIZING THE NEURONALLY ISOLATED CORTEX FOR INVESTIGATING THE MECHANISM OF THE EFFECT OF PHARMACOLOGICAL AGENTS IN A CHRONIC EXPERIMENT M. M. Khananashvili p 29–33 refs

N65-24228# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology
ECOLOGY OF THE NEVADA TEST SITE. II: STATUS OF INTRODUCED SPECIES
Janice C. Beatley Mar. 1965 39 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-554)

A vegetative analysis of three Eurasian plant species, *Bromus rubens, Bromus tectorum,* and *Salsola kali,* which are common to the Nevada Test Site area, is presented. Data on the geographic distribution, soil and water requirements, and reproductive patterns of these species are also included. S.C.W.

N65-24230# Joint Publications Research Service, Washington, D. C.
ELECTROPHYSIOLOGY OF CONDITIONED REFLEXES AND DRUG ACTION ON THE BRAIN AND MODELING OF NERVOUS SYSTEM FUNCTIONS
11 May 1965 45 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 15, no. 1, 1965 (JPRS-30007; TT-65-30955) CFSTI: $2.00

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1. ELECTROPHYSIOLOGY OF A CONDITIONED REFLEX FORMED IN RESPONSE TO STIMULATION OF THALAMIC MIDLINE NUCLEI G. T. Sakhiulina and G. Kh. Merzhanova p 1–12 refs
2. ELECTROPHYSIOLOGICAL DATA ON THE INFLUENCE OF SOME PSYCHOPHARMACOLOGICAL DRUGS ON VARIOUS STRUCTURES OF THE HUMAN BRAIN N. N. Traugott, L. Ya. Balonov, and D. A. Kaufman p 13–27 refs
3. DYNAMIC LOCALIZATION OF CONDITIONED INHIBITION PRODUCED BY HYPNOTIC SUGGESTION I. I. Korotkin and M. M. Suslova p 28–38 refs
4. SEMINAR ON FUNCTIONS OF THE NERVOUS SYSTEM Ye. N. Sokolov p 39–42

N65-24231# Joint Publications Research Service, Washington, D. C.
ONE APPROACH TO MODELING PSYCHOLOGICAL FUNCTIONS
N. M. Amosov, E. T. Golovan', S. Ya. Zaslavskiy, K. A. Ivanov-Muromskiy, and V. S. Starinets 19 May 1965 38 p refs Transl. into ENGLISH from Kibernetika i Tekhn. Vychisleniy (Kiev), 1964 p 116–143

In an investigation of the simulation of the human psychological activity, attention is directed toward a proposed model of the mental process, which has, as its basis, logic rules specifically developed in the learning process, and which requires the presence of emotional states for controlling and monitoring. These emotional states control and direct the mental process and are altered, further developed, or stabilized in response to the resulting intellectual activity. From the technical point of view, a general discussion is given of the model operation, along with a block diagram and a discussion of the operation of the individual blocks of the model. C.L.W.

N65-24236# Fish and Wildlife Service, Seattle, Wash. Technological Lab.
EFFECTS OF IONIZING RADIATION ON LIPIDS OF FISH Final Report, Nov. 1963–Nov. 1964
Maurice E. Stansby and George Kudo Washington, D. C., AEC, Nov. 1964 28 p ref
(Contract AT(49-11)-2058)
(TID-21405) CFSTI: $2.00

An investigation was made of problems related to changes caused by irradiation at 0.3 megarad of lipids and associated pigments in eight species of fish ranging in lipid content from 5% to 20%. Samples were irradiated and subsequently stored at 33° F, after being packaged both in evacuated tin cans and in sealed mylar–polyethylene pouches. Changes in the fish, immediately after irradiation and after storage for periods up to 6 weeks, were measured by use of an experienced sensory panel and, in some cases, by determining the peroxide number of the lipid after extraction from the fish. Five species of salmon, rainbow trout, herring, and sablefish were used. All of the species showed a combination of adverse changes that more than neutralized any advantages of retardation of bacterial spoilage by the irradiation process. Samples irradiated and stored in the polyethylene pouches in the presence of air showed extreme adverse changes. Those samples that were vacuum packed showed much less development of rancidity, but loss of normal color and loss of natural flavor was still very marked. Author

N65-24249# Argonne National Lab., Ill.
BIOLOGICAL AND MEDICAL RESEARCH DIVISION ANNUAL REPORT, 1964
Dec. 1964 232 p refs
(Contract W-31-109-ENG-38)
(ANL-6971) CFSTI: $6.00

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7. EXTERNAL RADIATION TOXICITY p 90–119 refs
8. GENETICS p 120–132 refs
9. METABOLISM OF FISSION PRODUCTS p 133–142 refs
10. PHYSIOLOGY p 143–165 refs
11. PLANT RADIOBIOLOGY p 166–205 refs
12. RADIOPROTECTION p 206–214
13. THEORETICAL BIOLOGY p 215–223 refs

N65-24254# North American Aviation, Inc., Columbus, Ohio.
EFFECTS OF TASK LOADING ON PILOT PERFORMANCE DURING SIMULATED LOW-ALTITUDE HIGH-SPEED FLIGHT
Stanley M. Soliday et al Ft. Eustis, Va., Army Transportation Res. Command, Feb. 1965 92 p refs
(Contract DA-44-177-AMC-66(T))
(USATRECOM-TR-64-69; AD-614243)

The effects of task loading on pilot performance during simulated low-altitude high-speed flight were studied. Approximately 210 hours of flight were made by experienced pilots in a moving-base simulator that had a total vertical travel of 12 feet and an acceleration capability of ±6G. The flights were made over several types of terrain at several airspeeds under different conditions of navigation task and emergency task loading. Medium-heavy turbulence was simulated for all flights. Data were analyzed in terms of human performance aspects of the missions. Author

N65-24262# Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information
RADIOACTIVE DECONTAMINATION A Literature Search
Henry D. Raleigh, comp. Apr. 1965 78 p refs
(TID-3535, Suppl. 1) CFSTI: $3.00

Included are 336 references to unclassified publications on physical and chemical methods for the removal of radioactive contamination. The references cover the period from July 1959 through December 1964. Subject, author, and report number indexes are provided. Author

N65-24272# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology
A DUAL LUNG SCANNING TECHNIQUE FOR EVALUATION OF PULMONARY FUNCTION Preliminary Report
George V. Taplin and Norman D. Poe May 1965 19 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-556)

A new scanning technique is described for visualizing the lower respiratory tract safely following the inhalation of radioaerosols. Normally, inhaled radioactive particles of small size ($< 1.0\mu$) are evenly distributed throughout the lungs. However, with partial bronchial obstruction, the poorly ventilated region usually shows a lower level of radioactivity with a small area of increased activity at the site of obstruction in man and dog. Complete bronchial obstruction is readily detectable as an area of absent radioactivity. Bronchial patency and arterial blood flow can be evaluated together by scanning following the inhalation of a low-energy aerosol and the intravenous injection of 10μ to 50μ size aggregates of albumin ^{131}I. Combined inhalation and intravenous lung scan studies were performed in patients with tuberculosis, emphysema and bronchiectasis, and in dogs with experimental and complete bronchial obstruction, pulmonary artery occlusion, and phrenic nerve section. The dual scanning technique provides data on regional pulmonary arterial blood flow and bronchial patency otherwise obtainable only by far more complicated and less physiological methods. Author

N65-24294*# IIT Research Inst., Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, 15 Feb.–15 May 1965
Charles A. Hagen [1965] 13 p
(Contract NASr-22)
(NASA-CR-62829; IITRI-L6023-1) CFSTI: HC $1.00/MF $0.50

Bacillus cereus and bacillus subtilis vegetative and spore cells grown in a simulated Martian environment were studied to detect and determine possible mutation and adaptation, to determine the effect of freeze–thaw cycles, and to detect changes in thermal resistance. No mutation was observed in either, but freeze–thaw cycles were found to affect spore germination, vegetative cell growth, and sporulation. In neither case was there indicated any change in thermal resistance. C.L.W.

N65-24296*# Dynamic Science Corp., South Pasadena, Calif.
STERILIZATION HANDBOOK Final Report
John B. Opfell, C. E. Miller, N. S. Kovar, P. E. Naton, and R. D. Allen 26 Aug. 1964 185 p refs
(Contract NASw-777)
(NASA-CR-62837; SN-37) CFSTI: HC $5.00/MF $1.25

An effective sterilization and control program handbook is presented containing data on management; design and development of sterile spacecraft, including procured parts, contractor-fabricated parts, materials, and assemblies; and procedures for producing sterility, for measuring microbiological contamination, and for maintaining sterility. It provides the necessary information for the design, manufacture, and verification of biological sterility on and in space vehicles and payloads. R.C.S.

N65-24297*# Dynamic Science Corp., South Pasadena, Calif.
STERILIZATION HANDBOOK, APPENDIX
26 Aug. 1964 82 p
(Contract NASw-777)
(NASA-CR-62838; SN-37, Final) CFSTI: HC $3.00/MF $0.75

The high solubility of ethylene oxide in rubber induced dematitis from ethylene oxide sterilized rubber gloves and garments. In a 10% gaseous atmosphere rubber will absorb from 12 to 15 mg/g of ethylene oxide, but a high diffusivity makes the concentration in rubber gloves safe for most skins 1 hour after sterilization. The physical and chemical properties of the sterilizing agents beta-propiolactone, ethylene imine, ethylene oxide, and formaldehyde are listed in short form. An alphabetical bibliography of articles pertaining to sterilization processes and effects is presented, with reference numbers for the corresponding abstracts in STAR, Barber 1961, Swift 1963, International Aerospace Abstracts, or the DDC Technical Abstracts Bulletin. G.G.

N65-24301# Alaska Univ., College. Geophysical Inst.
PROCEEDINGS, SYMPOSIA ON ARCTIC MEDICINE AND BIOLOGY. IV: FROSTBITE
Eleanor Viereck, ed. 1964 454 p refs Symp. held at the Arctic Aeromed. Lab., Fort Wainwright, Alaska, 17–19 Feb. 1964

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2. EXPERIMENTAL INJURIES PRODUCED BY PROLONGED EXPOSURE TO COLD AIR J. Peter Kulka (Robert Bent Brigham Hospital) p 13–49 refs
3. STUDIES ON THE PATHOGENESIS OF COLD INJURY. MICROCIRCULATORY CHANGES IN TISSUE INJURED BY FREEZING Eldred D. Mundth (Naval Med. Res. Inst.) p 51–73 refs
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9. EXPERIENCES WITH CONSERVATIVE MANAGEMENT OF COLD INJURY AMONG CIVILIANS F. A. Simeone (Western Resorse Med. School) p 207–238 refs
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AGENT IN THE TREATMENT OF EXPERIMENTAL FROSTBITE Eldred D. Mundth (Naval Med. Res. Inst.) p 269-292 refs

14. SYMPATHECTOMY IN THE TREATMENT OF FROSTBITE Harris B. Shumacker, Jr. (Indiana Univ.) p 293-320 refs

N65-24315# Joint Publications Research Service, Washington, D. C.

LEUKEMIA AND IONIZING RADIATION

M. V. Svyatukhin 19 May 1965 14 p refs Transl. into ENGLISH from Arkh. Patol. (Moscow), no. 2, 1965 p 6-13
(JPRS-30161; TT-65-31032) CFSTI: $1.00

The influence of ionizing radiation on the origin and development of human leukemia is discussed. The nature of the threshold radiation dose, the influence of diagnostic and therapeutic X-ray procedures, the medical use of radioactive isotopes as radioactive iodine^{131}, and the diagnostic use of radioactive colloidal thorium oxide, are considered as direct mechanisms which contribute to the development of radiation induced leukemia. Indirect mechanisms of importance to the etiology of radiation induced leukemia as somatic mutations and defective chromosomes, hormones, the thyroid gland, the thymus, and viruses, are also considered. The effects of radiation dose on the development of lymphatic and myeloid leukemias in humans and mice, and inherent problems in the classification of acute lymphatic leukemias appearing after radiation, are also discussed. S.C.W.

N65-24348# Joint Publications Research Service, Washington, D. C.

PROBLEMS OF SPACE FLIGHT

L. Khachatur'yants 19 May 1965 7 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), 20 Mar. 1965 p 6
(JPRS-30152; TT-65-31023) CFSTI: $1.00

Technical and biological problems associated with extravehicular activity in free space are discussed. Emphasized is the effect of weightlessness on coordinated movements. The inability of pressure suits to guarantee freedom of movement and an adequate field of vision is discussed. Research focusing on the technological development of single- and two-seater capsules with outside manipulators for overcoming problems of depth perception and motor coordination; and the development of a test bed which would simulate supportless space and train cosmonauts to orient themselves purposefully, with the ultimate goal being to walk as well as turn in space is proposed. S.C.W.

N65-24349# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF PSEUDOPSYCHOPATHOLOGY UNDER CONDITIONS OF ISOLATION AND SENSORY DEPRIVATION

O. N. Kuznetsov and V. I. Lebedev 19 May 1965 14 p refs Transl. into ENGLISH from Zh. Nevropatol. i Psikhiatr. (Moscow), v. 65, no. 3, 1965 p 386-393
(JPRS-30158; TT-65-31029)

An analysis of specific psychic changes, such as illusions, the sensation of a stranger's presence, subjectively realized dreams, eudetic conceptions, ideas of reference, and overvalued ideas, which were observed in experiments on prolonged isolation with relative sensory deprivation, is presented. It is surmised that although these psychic manifestations resemble psychopathological disturbances, they show fundamental differences. The established psychic changes are attributed to specific individual reactions to the experimental conditions. The term pseudopsychopathology is coined to distinguish these specific reactions from pathological reactions. The use of pseudopsychopathological manifestations in general psychiatry, for differentiating between psychopathological symptoms caused by disease and reactions to disturbances induced by the outside world, is discussed. S.C.W.

N65-24351# Joint Publications Research Service, Washington, D. C.

CONTROL SYSTEMS AND MAN'S HEALTH

A. V. Napalkov and N. A. Chichvarina 24 May 1965 18 p Transl. into ENGLISH from Priroda (Moscow), no. 12, Dec. 1964 p 31-38
(JPRS-30214; TT-65-31063) CFSTI: $1.00

A discussion of control mechanisms which induce pathological conditions in living organisms is presented. It is surmised that at the basis of the theory of self-organizing control systems lie algorithms of different levels, which influence the functioning of the internal organs. The integration of algorithms into cybernetics for determining the etiology and pathology of certain disease entities is discussed. The significance of complex control mechanisms in cancer, hypertension, angina pectoris, bronchial asthma, and diabetes is exemplified. Also included is an analysis of Pavlovian theory. Results of experiments supporting the theory that the formation of new pathological forms of control lie at the basis of many diseases are reported. S.C.W.

N65-24360# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Behaviorial Sciences Lab.

A COMPARISON OF THREE FULL-PRESSURE SUITS IN TERMS OF CONTROL ACTIVATION TIME Final Report, Nov. 1963-Feb. 1964

Earl D. Sharp Dec. 1964 22 p
(AMRL-TR-64-126; AD-613597)

Three pressure suits, both pressurized and unpressurized, were compared on the basis of times taken by two subjects to initiate action and to reach to and operate controls located in various positions in a simulated workspace. The suits compared were the Apollo Phase B, the Gemini G2C-1, and the Apollo 1960 State-of-the-Art. The controls used were knobs, toggle switches, and pushbuttons. The work area investigated was semicircular, extending left and right 78°, 34 to 49 inches above the floor, at a distance of approximately 2 feet. Average times for each combination of suit, suit condition (pressurized or unpressurized), control type, control location, and hand used are presented. No suit appeared to be unequivocally superior. Total time to initiate action, and to reach to and operate toggle switches and pushbuttons was typically, although not universally, shorter when wearing the Apollo 1960 State-of-the-Art suit. Total time to initiate action and to reach to and operate knobs was typically, although not universally, shorter when wearing the Gemini G2C-1 suit; however, not all locations could be reached when wearing this suit. Author

N65-24362# California Univ., Berkeley. Operations Research Center

AN INVESTIGATION OF THE BURN-IN AND RELATED PROBLEMS

Michael J. Lawrence Nov. 1964 31 p refs
(Contract Nonr-3656(18))
(ORC-64-32(RR); AD-613276)

Two problems involving the derivation of bounds on distributions with a decreasing failure rate (DFR distributions)

are presented. Given that an item has a decreasing failure rate, sharp upper and lower bounds on the burn-in time to achieve a specified mean residual life are derived. The bounds rely only on the DFR assumption, and a knowledge of the first moment and a percentile of the failure distribution. An early estimate of the 5-year survival proportion (commonly called the 5-year cure rate) is of interest in assessing the value of a treatment for a mortal disease such as cancer. Assuming that the distribution of time to death is DFR and assuming a knowledge of the mean and a percentile, sharp upper and lower bounds on the survival proportion are obtained. In addition, some bounds on the hazard rate and density of a DFR distribution are given. Author

N65-24370*# National Aeronautics and Space Administration, Washington, D. C.

PROBLEMS OF ENGINEERING PSYCHOLOGY

B. F. Lomov, ed. May 1965 153 p Transl. into ENGLISH of "Probl. Inzh. Psikhologii" Presented at the 1st Leningrad Conf. on Eng. Psychology, Jun. 1964

(NASA-TT-F-312) CFSTI: HC $5.00/MF $1.00

An annotated bibliography of 120 papers on problems in engineering psychology is presented. Information abstracts cover research on self-organizing systems, functions of humans in control systems, characteristics of operator activities, simulation of psychic activity, reliability and accuracy of operator activities, design of operator working posts, training and selection of operators, group activity, methods of investigating human activity, reception of information by human subjects, sensorimotor processes, reactions, operative thinking, and memory. J.M.D.

N65-24417# Oregon State Univ., Corvallis. Science Research Inst.

EFFECTS OF HYDRAZINES ON THE METABOLISM OF CERTAIN AMINES AND AMINO ACIDS Final Report, 1 Jun. 1963–30 Jun. 1964

D. J. Reed, F. N. Dost, and C. H. Wang Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 44 p refs

(Contract AF 33(657)-11757)

(AMRL-TR-64-113; AD-610570)

Effects of intraperitoneally administered simple hydrazines upon the metabolism of amines and amino acids in rats were examined. Unsymmetrical dimethylhydrazine (UDMH), monomethylhydrazine (MMH), and hydrazine strongly inhibited oxidation of putrescine-1, 4-C^{14} (1,4-diamino butane) and methylamine-C^{14} to $C^{14}O_2$. The MMH caused a virtually complete inhibition of monoamine oxidase activity in vivo, but inhibition by UDMH and hydrazine was limited. In vivo and in vitro diamine oxidase activity was heavily suppressed by all three hydrazines. A possible difference between the enzyme systems which metabolize methylamine and putrescine is indicated. The metabolism of varied oral and intraperitoneal doses of L-glutamic acid-1-C^{14} was inhibited by hydrazine, but not by UDMH or MMH. In vivo decarboxylation of trace amounts of 3,4-dihydroxyphenylalanine-1-C^{14} was not affected by any of the three hydrazines. It was also indicated that UDMH may cause a substantial loss of gastric motility. Author

N65-24418# Pittsburgh Univ., Pa.

PROGRAMMING METHOD AND RESPONSE MODE IN A VISUAL-ORAL TASK Final Report, Oct. 1961–Oct. 1963

Attila P. Csanyi, Robert Glaser, and James H. Reynolds Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 19 p refs

(Contract AF 33(616)-7175)

(AMRL-TR-64-129; AD-614014)

Programing methods and response modes were investigated to determine effective training methods. The identification and pronunciation of phonetic symbols were taught by two different programing methods and two different response modes. The programing method featured either prompting or confirmation, and the response mode was either overt or covert. Achievement was measured on both a multiple choice test and a test requiring overt oral responses. Considerable variation occurred among the test scores for each learning condition. Differences among the conditions, tending to indicate the superiority of overt responding and of confirmation, were significant on only one case. Overt responding was superior for retention when measured by tests requiring overt oral responses. The prompting method coupled with the covert response mode tended to produce poorer learning and retention than the other conditions, but it required only 30 to 50 percent as much learning time as the other conditions. Author

N65-24435# Joint Publications Research Service, Washington, D. C.

VESTNIK OF THE USSR ACADEMY OF MEDICAL SCIENCES, VOL. XX, NO. 2, 1965

27 May 1965 161 p refs Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), v. 20, no. 2, 1965 97 p

(JPRS-30288; TT-65-31100) CFSTI: $5.00

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15. ACUTE GASTROINTESTINAL HEMORRHAGES K. I. Shirokova p 131-142 refs

16. THE PROBLEM OF INVESTIGATION OF MUCOID SUBSTANCES IN THE STOMACH G. V. Tsodikov p 143-155 refs

N65-24437# Joint Publications Research Service, Washington, D. C.

VESTNIK OF THE USSR ACADEMY OF MEDICAL SCIENCES, VOL. XX, NO. 3, 1965

28 May 1965 155 p refs Transl. into ENGLISH from Vestnik Akad. Med. Nauk SSSR (Moscow), v. 20, no. 3, 1965 p 3-95

(JPRS-30306; TT-65-31111) CFSTI: $5.00

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4. THE DETECTION OF TWO CELL LINES IN BONE MARROW AND PERIPHERAL BLOOD CULTURES IN CHRONIC MYELOLEUKEMIA Ye. K. Pyatkin and G. G. Poroshenko p 29-35 refs

5. ON THE ETIOLOGY OF CERTAIN ENDOCRINE DISEASES (ADRENALS AND THYROID GLAND) B. N. Klosovskiy, M. F. Yankova, and A. V. Tambovtseva p 36-55 refs

6. SOME CLINICO-GENETIC FORMS OF DIABETES MELLITUS I. S. Liberman p 56-65 refs

7. ON THE NATURE OF HEREDITY IN THE PROGRESSIVE MUSCULAR DYSTROPHIES AND THE ROLE OF ENVIRONMENTAL FACTORS A. I. Lepukal'n p 66-72 refs

8. HEREDITARY INFLUENCES ON THE DEVELOPMENT OF IMMUNO-BIOLOGICAL FACTORS IN THE ORGANISM S. I. Ginzburg-Kalinina p 73-79 refs

9. RADIATION ASPECTS OF GENETIC CELL DIFFERENTIATION AND THE PROBLEM OF MALIGNANT GROWTHS N. P. Dubinin and I. L. Gol'dman p 80-102 refs

10. HEREDITARY CHANGES DUE TO ENZYMES I. A. Rapaport p 103-111 refs

11. THE GENETIC ACTIVITY OF THALIDOMIDE (THE IMIDE OF N-PHTHALYGLUTAMIC ACID) L. M. Filippova p 112-118 refs

12. A METHOD FOR THE PRELIMINARY EVALUATION OF THE TERATOGENIC ACTIVITY OF PHARMACOLOGICAL PREPARATIONS USING CHICK EMBRYOS P. N. Aleksandrov, V. A. Bodganova, A. I. Ivanov, A. P. Skoldinov and A. M. Chernukh p 119-124 refs

13. GENETIC RESEARCH IN THE USA B. V. Konyukhov p 125-130

14. MEDICAL GENETICS AND THE 11TH INTERNATIONAL GENETIC CONGRESS Ye. F. Davidenkova p 131-138

15. RESULTS OF A SYMPOSIUM ON THE BASIC DIRECTIONS IN SOVIET RHEUMATOLOGY (AN ENCOUNTER WITH RHEUMATOLOGISTS FROM THE USA) A. A. Tustanovskiy and A. N. Orlova p 139-151

N65-24455# Brooks Hospital, Inc., Brookline, Mass.

THE REGULATION OF PHOTOSYNTHETIC ACTIVITY IN *CHLAMYDOMONAS REINHARDI* **Final Technical Report**

G. C. McLeod 25 Apr. 1964 25 p refs

(Contract AF 19(604)8443)

(AFCRL-64-342; AD-610863)

The y-2 mutant strain of the unicellular green alga *Chlamydomonas reinhardi* undergoes bleaching and regreening under rigidly defined, controllable conditions. Development of several photosynthetic reactions during regreening was studied; rates of several reactions remained constant during the first 2 to 3 hours, then increased rapidly. It is suggested that this increase is triggered by development of a structurally active chloroplast or subunit of the chloroplast. This unit could provide for physical separation of products and for their transport to regions of the cell suitable for their protection and metabolism. That the proteins play a predominant role is certain, since the function of the chlorophylls depends partly on photochemical reactions in which properties of the pigment-protein complex are essential. Several forms of this complex appear extant and able to change into one another during development. The regreening cell is a dynamic system whose photosynthetic capabilities are bound to the chloroplast and vary with environment. Author

N65-24488 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DOSE OF COSMIC RADIATION IN BIO-UNITS OF VOSTOK-3 AND VOSTOK-4

V. N. Lebedev, V. S. Morozov, G. F. Murin, M. D. Nikitin, and M. I. Salatskaya *In its* Cosmic Res. 6 Feb. 1964 p 196-199 refs (See N65-24475 14-29)

Special biounits in Vostok-3 and Vostok-4 measured the dose of cosmic radiation by P and K nuclear emulsions, a scintillation photodosimeter, and type XX X-ray film. As a result of the measurements, the total dose of cosmic radiation during flight was 41 ±6 mrad for Vostok-3 and 30 ±4 for Vostok-4. Author

N65-24489 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF SPACE FLIGHT FACTORS ON THE VOSTOK-3 AND VOSTOK-4 ON THE MICROSPORES OF *TRADESCANTIA PALUDOSA*

N. L. Delone, P. R. Popovich, V. V. Antipov, and V. G. Vysotskiy *In its* Cosmic Res. 6 Feb. 1964 p 200-224 refs (See N65-24475 14-29)

In experiments on microspores of *Tradescantia* a portion of the material was fixed by P. R. Popovich 56 hr after the start, which precluded the effect of vibration and accelerations acting on biological objects during launch of the spaceship. On analysis of the material obtained, a new type of arrangement, spherical fragments, was detected which can be recorded not only in the metaphase, anaphase, and telophase, but also in the prophase, and interphase. Different mitotic disorders were noted. Author

N65-24490 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF SPACE FLIGHT FACTORS ON THE INCIDENCE OF SEX-LINKED RECESSIVE LETHAL MUTATIONS IN *DROSOPHILA MELANOGASTER*

Ya. L. Glembotskiy, Yu. A. Lakhin, G. P. Parfenov, and Ye. M. Kamshilova *In its* Cosmic Res. 6 Feb. 1964 p 225-240 refs (See N65-24475 14-29)

Tests described were carried out on Vostoks-3 and -4 to elucidate the effect of space flight factors on the incidence of several types of mutations in *Drosophila melanogaster*. These data coincide with results of analogous tests carried out during the preceding five space flights not only with *Drosophila*, but with other objects (mice, seeds of different plants). It was established that the reaction of each of these objects to conditions of different flights varies greatly, but a parallelism of the hereditary reaction of these objects to conditions of one and the same flight was observed. It was hypothesized that this is because of the variability of the mutagenic effect of certain space flight factors from flight to flight. That such factors may be weightlessness, rocket vibration, velocity, or cosmic radiation is discussed. It is improbable that one factor alone can cause the observed effects. Author

N65-24575*# Pennsylvania State Univ., University Park.
PHYSICS OF CELLULAR SYNTHESIS, GROWTH AND DIVISION Annual Status Report, 1 Apr. 1964–31 Mar. 1965
Ernest C. Pollard 30 Apr. 1965 14 p refs
(Grant NsG-324)
(NASA-CR-62925) CFSTI: HC $1.00/MF $0.50

Separate reports on research progress and current work in cellular growth, synthesis, and division physics are given. The reports cover radiation and pressure effects on bacterial cells, incorporated tritium compounds decay in *E. coli*, calculation of regional energy deposits in localized tritium, lethality mechanism by tritium decay in T4 coliphage, polyelectrolytic solutions, ionizing radiation effect on the configuration of DNA, electron spectrum resonance of irradiated single-crystal thymidine, and microspectrophotometry instrumentation error. R.C.S.

N65-24592# Palo Alto Medical Research Foundation, Calif.
THE OXYGEN DELIVERY RATE OF HUMAN BLOOD
J. Percy Baumberger, Helen Chinn Leong, and J. Ryan Neville Brooks AFB, Tex., School of Aerospace Med., Dec. 1964 19 p refs Prepared jointly with Stanford Univ.
(Contracts AF 41(609)-1695; AF 41(657)-255)
(SAM-TR-64-89; AD-461389)

Blood's oxygen delivery rate (ODR) is discussed, and polarographic methods for its study are presented. Experimental results show (1) an increase in ODR with decrease in percent saturation of hemoglobin and (2) a significant difference in the ODR of the blood of one individual as compared to that of another. Significance of ODR to tissue hypoxia and the general relationship of ODR to other aspects of the oxygen transport system are discussed. While no definite explanation has been found for the observed individual differences in ODR, variations in the erythrocytes themselves appear decisive. Author

N65-24593# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
COMPOSITION OF GAINS DURING PROTEIN REPLETION IN THE COLD
David A. Vaughan and Lucile N. Vaughan Dec. 1964 14 p refs
(AAL-TDR-64-15; AD-462160)

Male Sprague–Dawley rats were fed a nitrogen-free diet at 25° and 7° C. At the end of a 10-day depletion period, they were fed diets containing 6%, 9%, 12%, 15% and 18% casein for 14 days. Carcass analyses (minus liver and intestinal contents) were carried out for protein, water and fat. At 6% casein, carcass accretion consisted mainly of fat in both groups, with very little nitrogen increment. At higher levels of casein, tissue protein accretion reflected dietary protein increments at both temperatures, although fat accretion was somewhat reduced at 7° C. In a second experiment, fibrin at 6% and 9% was compared with casein during repletion at both temperatures. Fat accretion at both levels of fibrin was significantly reduced at 7° C, although other tissue increments were not appreciably affected. These results indicate that weight gains at low levels of protein consist mainly of nonprotein components and that cold exposure tends to normalize tissue accretion at these levels. Increased intake of protein resulting from the increased consumption of food in the cold is a possible explanation. Author

N65-24616 Akademie der Wissenschaften und der Literatur, Mainz (West Germany).
SPECTROGRAPHIC RESEARCH ON THE EFFECT OF IONIZING RAYS ON ELEMENTARY BIOLOGICAL OBJECTS, USING PARAMAGNETIC ELECTRON RESONANCE [SPEKTROGRAPHISCHE UNTERSUCHUNGEN MITTELS PARAMAGNETISCHER ELEKTRONENRESONANZ UBER DIE WIRKUNG IONISIERENDER STRAHLEN AUF ELEMENTARE]
Adolf Müller 1964 123 p refs In GERMAN *Its* Abhandl. der Math.–Naturwiss. Klasse No. 5 Available from the Akad. der Wiss. und der Lit.: 11,60 DM

By ionization at 100° and 300° K induced radicals in dry bacteriophage and their components were measured by spectral analysis. Comparison of the phage-protein and phage-nucleic acid spectra with the dose effectiveness of the radical concentration showed cleavage of the H-atoms and resulting induction of the carbon radicals. All substances showed a correlation between the radical concentration and the radiation dosage of X-rays, and γ-rays, as well as α-radiation. It was concluded that the observed radicals constitute biological damage regardless of their physical–chemical nature. G.G.

N65-24618# Scientific Committee on the Effects of Atomic Radiation (UN).
REPORT OF THE UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION
1964 123 p refs Official Records of Gen. Assembly, 19th Session, Suppl. No. 14(A/5814)

Discussed is the contamination of the environment by nuclear explosions, the mechanisms of radiation uptake in food chains and eventually in body tissues, and the possibility of quantitatively assessing the risk of induction of malignancies by radiation in man. Strontium 90 and cesium 137 are the most important fission products from nuclear explosion that contaminate man's diet, and in 1963 dietary contamination levels in the Northern Hemisphere were considerably higher than those in the Southern Hemisphere. The transfer of cesium 137 through food chains to man is enhanced under certain ecological conditions, and exceeds the world average by a factor of more than 100 in inhabitants of arctic regions who live mostly on reindeer and caribou meat. Short-lived radionuclides have been measured in the environment, in food, and in the human body more often since the end of 1961. Estimates of the radiation relation to cancer induction in man are presented based on dose commitments to the gonads, to the cell lining bone surfaces, and to the bone marrow. Technical indexes contain the available scientific information. G.G.

N65-24619# Iowa State Univ. of Science and Technology, Ames. Inst. for Atomic Research
ORGAN DISTRIBUTION FOLLOWING AN INTRAPULMONARY INJECTION OF RARE-EARTH COMPOUNDS

Fred C. Davison, William O. Reece, and Richard B. Talbot Apr. 1965 21 p refs
(Contract AT(11-1)-1170)
(COO-1170-3) CFSTI: $1.00

Distribution studies in guinea pigs and rats, following intrapulmonary injections of stable rare-earth citrates and oxalates, showed significant lung burden still present 120 days after injection. Data presented demonstrate translocation to the femur, liver, kidney, spleen, heart, adrenals, gonads and brain. Author

N65-24622# Rochester Univ., N. Y.
PLATELET SIZE DISTRIBUTION FOLLOWING X-IRRADIATION
R. O. Spertzel, T. J. Bucci, and M. Ingram 19 Apr. 1965 17 p Presented at the 2d Intern. Cong. of Radiation Res., Harrogate, England, 5–11 Aug. 1962
(Contract W-7401-ENG-49)
(UR-663) CFSTI: $1.00

Routine microscopic examination of stained blood films has indicated that platelet size becomes irregular in dogs during recovery from single large X-ray doses, and in men receiving low level exposures over long periods. A differential sedimentation method using polyvinylpyrolidone (PVP) is used to obtain suspensions of platelets nearly free of contaminating red and white cells. The final dilution of platelet suspension prepared just prior to size distribution analysis is 1:250 in modified saline. The platelet volumes in male and female dogs are analyzed. Consecutive sampling of the same animal resulted in strikingly consistent histograms, and the histograms of male and female dogs vary greatly, indicating a sex-dependent distribution. All histograms showed an asymmetric tailing in the larger volumes during recovery, which was not seen in normal platelet populations. A bar graph showing a typical sequence of changes in an irradiated dog is presented. R.C.S.

N65-24623# Atomic Energy Commission, Washington, D. C. Div. of Nuclear Education and Training
LABORATORY EXPERIMENTS IN RADIATION BIOLOGY
Edward I. Shaw (Kansas Univ.) Apr. 1965 86 p refs
(Contract AT(11-1)-1093)
(TID-18616 (Rev.)) GPO: $0.50

This laboratory manual provides a set of experiments on radiation biology which demonstrate the operation of fundamental principles without the use of costly equipment. Discussed are special techniques and the preparation of special equipment; characteristics of radiation detection instruments; the interaction of radiations with matter; methods of measurement of radiation, and assay of radioactivity in various materials; radioactive tracer experiments; and experiments on the biological effects of radiation. Several experiments are included which use ultraviolet radiations from germicidal or short wave ultraviolet lamps. G.G.

N65-24674*# Chicago Univ., Ill. Dept. of Biophysics
INTEGRATED RESEARCH AND TRAINING IN SPACE-MOLECULAR BIOLOGY Annual Progress Report, Apr. 1, 1964–Mar. 31, 1965
Humberto Fernandez-Moran [1965] 50 p refs
(Grant NsG-441-63)
(NASA-CR-62879) CFSTI: HC $3.00/MF $0.50

The organization, testing, and operation of the electron microscope laboratories was completed, and all laboratories are fully operational. A 2.8 Å resolution was obtained for the first time by imaging the (200) plane of NaCl crystals by direct illumination using a special pointed filament with tantalum tip. Research continued in correlated electron microscope and electron diffraction studies of Orgueil carbonaceous chondrite meteorites; electron microscopical studies of pre-Cambrian organized systems; and electron microscopy experiments with high-field superconducting solenoid lenses of niobium–zirconium and niobium–tin alloys. Training of several persons was carried out in connection with the various research projects. G.G.

N65-24690# Joint Publications Research Service, Washington, D. C.
EFFECT OF ADRENOCORTICAL INSUFFICIENCY AND HYPERFUNCTION ON THE SENSITIVITY OF RATS AND MICE TO CARBON MONOXIDE POISONING
V. A. Pukhov 27 May 1965 6 p refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), v. 27, no. 3, May–Jun. 1964 p 343–345
(JPRS-30295; TT-65-31105) CFSTI: $1.00

The effect of adrenocortical insufficiency on resistance to carbon monoxide poisoning after excision or autotransplantation of the adrenals in mice and rats is studied. Within a week after the operation, resistance of rats with adrenal transplants was at its lowest and was no different from that of rats with the adrenal removed. Two weeks after the operation, the percentage of survival among rats increased, and after a month the experimental group differed very little from the control group in resistance to CO poisoning. Resistance to oxygen deficiency followed the same pattern. Adrenocorticoid hypofunction, expressed in impaired production of glucocorticoids, has a negative effect on the adaptability of the organism to oxygen deficiency. Preliminary injections of ACTH increases the resistance of rats to CO. On the basis of these results, it is concluded that a high functional level of the adrenal cortex contributes to the adaptation of the body to oxygen deficiency. R.C.S.

N65-24691# Joint Publications Research Service, Washington, D. C.
EFFECT OF ASPHYXIA ON THE ECG OF PUPPIES AND KITTENS OF DIFFERENT AGES
M. M. Kohanovs'ka 28 May 1965 8 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 10, no. 5, Sep.–Oct. 1964 p 609–614
(JPRS-30297; TT-65-31106) CFSTI: $1.00

Changes in the ECG during asphyxia in puppies and kittens of different ages, as well as in mature animals used for controls, were studied. A total of 45 dogs and 25 cats, including 36 newborns, 15 two weeks old, 13 one and a half-months old, and 6 mature, were examined. Asphyxia was induced through compression of the trachea. Results show that during asphyxia changes in cardiac rhythm are clearly age-related. In mature animals the marked slowing down of the rhythm observed during the 1st and 2nd minutes of asphyxia shifts to marked acceleration of the heart beat. In newborn puppies and kittens the slower cardiac rhythm which develops after the initial sharp reduction is of a gradual type. Acceleration of rhythm, which can be observed as asphyxia develops, starts later (5th or 6th minute) and is less pronounced. Detection of age-related features of irradiation of excitation from the respiratory center is also described. N.E.A.

N65-24696# Joint Publications Research Service, Washington, D. C.
THE ENDURANCE BARRIER OF PILOTS
S. P. Umanskiy 2 Jun. 1965 25 p Transl. into ENGLISH from "Bar'yer Vynoslivosti Letchika" Moscow, 1964 p 97–120
(JPRS-30380; TT-65-31143) CFSTI: $1.00

Aviation technological improvements made in protective clothing, ejection seats, and parachutes to increase the constitutional endurance of pilots in flight or in case of emergency escape are presented. The history of the antigravity suit and safety helment is given, showing how basic improvements were made in their design and construction. R.C.S.

N65-24710# Lockheed Missiles and Space Co., Sunnyvale, Calif.
AN INTEGRATED APPROACH TO EVALUATING THE PERFORMANCE CAPABILITIES AND PHYSIOLOGICAL STATE OF SPACECRAFT CREWS
R. S. Lincoln and J. E. Mangelsdorf 28 Apr. 1965 25 p refs Presented at the Symp. on Human Physiol. and Performance Determinants of Manned Space Systems Design, San Fernando Valley State Coll., Calif, 14 Apr. 1965
(LMSC-6-65-65-15)

A development project concerned with all major aspects of crew monitoring, from the development of measurement techniques to the interpretation of processed data, was initiated. The objectives of the project are: (1) to develop an automatic system to assist in monitoring crew performance capabilities and physiological state, and (2) to develop digital techniques for processing, displaying, and analyzing obtained data. Author

N65-24727# California Univ., Livermore. Lawrence Radiation Lab.
SPECIAL PROBLEMS OF THYROID DOSIMETRY: CONSIDERATIONS OF I^{131} DOSE AS A FUNCTION OF GROSS SIZE AND INHOMOGENEOUS DISTRIBUTION
Lynn R. Anspaugh 25 Mar. 1965 21 p refs
(Contract W-7405-ENG-48)
(UCRL-12492) CFSTI: $1.00

Problems concerned with an accurate calculation of I^{131} dose to the thyroid are considered. Detailed calculations presented show that an error of only 3% to 6% is involved if dose equations which treat the thyroid as an infinite medium are used. This is true even for an infant's thyroid weighing only 1.71 g. Effects of apparent nonuniform distribution of I^{131} are also considered. A model system wherein all the I^{131} is confined to colloid spheres occupying 50% of the thyroid volume is found to deliver a uniform dose throughout the thyroid. That hot spots involving several follicles might occur is considered in light of reported literature studies of human and animal thyroids. The conclusion drawn from these considerations is that such hot spots will not occur in normal, but might in diseased thyroid tissue. Author

N65-24732# Joint Publications Research Service, Washington, D. C.
ARTICLES FROM MEDITSINSKAYA GAZETA (MEDICAL GAZETTE)
6 May 1965 12 p Transl. into ENGLISH from Med. Gazeta (USSR), 26 Jan. 1965 p 3
(JPRS-29953; TT-65-30928) CFSTI: $1.00

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1. TULAREMIA N. Osuf'yev p 1–3
2. PHYSIOLOGY OF FLYING F. Kosmolinskiy p 4–6 (See N65-24733 14-04)
3. LONG-RANGE RESULTS OF SURGERY FOR CORONARY INSUFFICIENCY B. Korolev p 7–9

N65-24733 Joint Publications Research Service, Washington, D. C.
PHYSIOLOGY OF FLYING
F. Kosmolinskiy *In its* Articles from Med. Gazeta 6 May 1965 p 4–6 (See N65-24732 14-04) CFSTI: $1.00

Aviation physiology is concerned with the interaction of the organism and the environment during flight. It establishes the laws governing the activity of the organism in performing various tasks, and works out the methods for developing in pilots useful occupational skills and physical endurance. Problems of aviation investigations, difficulties in calculating a variety of factors and conditions that affect the pilot, and the relationship between aviation physiology and other allied disciplines are discussed. N.E.A.

N65-24736# Joint Publications Research Service, Washington, D. C.
ARTICLES FROM KRASNAYA ZVEZDA (RED STAR), 7 MARCH 1965
14 May 1965 6 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), 7 Mar. 1965
(JPRS-30083; TT-65-30993) CFSTI: $1.00

CONTENTS:
1. AUTOSUGGESTION EXPERIMENTS IN KARAGANDA p 1
2. CAN MAN LIVE BEYOND THE LIMITS OF THE PLANET? p 2–4 (See N65-24737 14-04)

N65-24737 Joint Publications Research Service, Washington, D. C.
CAN MAN LIVE BEYOND THE LIMITS OF THE PLANET?
In its Articles from Krasnaya Zvezda (Red Star), 7 Mar. 1965 14 May 1965 p 2–4 (See N65-24736 14-04) CFSTI: $1.00

This article is primarily a rebuttal to an editorial on the adverse affects of weightlessness on humans. It is observed that the action of gravitational force stimulates quite a few receptor organs–including such types of sensory apparatus as the labyrinths. Under conditions of weightlessness the sensory input arising from the effects of gravitational force ceases. Although it was thought that irreversible conditions might result, such that coordinated movements would be disturbed, this does not occur. Individual disturbances in function appeared in some subjects in the form of dizziness. However, other cosmonauts who remained in orbit for rather long times experienced no unpleasant sensations. E.E.B.

N65-24810# Naval School of Aviation Medicine, Pensacola, Fla. Naval Medical Center
EVALUATION AND PREDICTION OF PHYSICAL FITNESS, UTILIZING MODIFIED APPARATUS OF THE HARVARD STEP TEST
John L. Patterson, Jr., Ashton Graybiel, Harry F. Lenhardt, and M. Jones Madsen 15 Dec. 1964 34 p refs *Its* Rept.-4
(NSAM-890; AD-458383)

Investigations on methods for the evaluation of physical fitness suitable for both military and civilian personnel are summarized. The results with maximal tests of fitness utilizing two grades of severe muscular work are presented, together with correlations among performance, degree of training, and age of the subjects. In addition, measurements made on submaximal tests are compared with the maximal performances, and the possibilities of predicting maximal performance are discussed. Data on the reliability of heart rate curves during exercise and recovery from exercise are presented, together with observations on their sensitivity to the effects of mild illness. Author

N65-24861# Joint Publications Research Service, Washington, D. C.
MEDICO-BIOLOGICAL STUDIES OF FLIGHT CONDITIONS AND TRAINING
11 May 1965 13 p Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 3, Mar. 1965 p 34-40
(JPRS-29999; TT-65-30951) CFSTI: $1.00

CONTENTS:

1. EXPERIMENTS WITH GRAVITY LOAD AND WEIGHTLESSNESS N. Gurovskiy and M. Cherepakhin p 1-4 (See N65-24862 14-05)
2. MORE EXACT FLIGHT SIMULATION IN THE TRAINER Ye. Derevyanko, V. Kuznetsov, and V. Myl'nikov p 5-8 (See N65-24863 14-05)
3. AIR FORCE MEDICAL MAN, YE. V. KOBYAKOV G. Semenko p 9-10

N65-24862 Joint Publications Research Service, Washington, D. C.
EXPERIMENTS WITH GRAVITY LOAD AND WEIGHTLESSNESS
N. Gurovskiy and M. Cherepakhin *In its* Med.-Biol. Studies of Flight Conditions and Training 11 May 1965 p 1-4 (See N65-24861 14-05) CFSTI: $1.00

Six of 25 subjects exposed to weightlessness of 18 to 25 seconds followed by weight loads up to two G's for 5 to 10 seconds in the course of parabolic flights, expressed negative psychological and physiological reactions, and four test subjects reacted with a heightened emotional tone. Subsequent flights failed to induce significant vegetative reactions in persons who had reacted negatively to weightlessness during the first flights. The reaction in all subjects fairly adapted close to indifference during further flights. G.G.

N65-24863 Joint Publications Research Service, Washington, D. C.
MORE EXACT FLIGHT SIMULATION IN THE TRAINER
Ye. Derevyanko, V. Kuznetsov, and V. Myl'nirov *In its* Med.-Biol. Studies of Flight Conditions and Training 11 May 1965 p 5-8 (See N65-24861 14-05) CFSTI: $1.00

Moving pictures taken of a pilot's gaze in actual flight and in trainers show a limitation to observations of the gyrohorizon, the vertical speed indicator, gyrocompass, airspeed indicator, and altimeter. It was concluded that a specially directed training session is necessary to evaluate the flight situation in a timely and accurate manner and to determine specific gage failures. The pilots psycho-physiological reserves should be determined in the trainer by deactivation of a light bulb in a light cluster positioned on the instrument panel. This method intensifies the pilots activity and makes it possible for the flight surgeon and unit commanders to find shortcomings in pilot training and to study individual pilot traits. G.G.

N65-24875# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM FIZIOLOGICHNYY ZHURNAL (PHYSIOLOGICAL JOURNAL), VOL. XI, NO. 1, 1965
17 May 1965 35 p refs Transl. into ENGLISH from Fiziol. Zh. (Kiev), v. 11, no. 1, Jan.-Feb. 1965
(JPRS-30099; TT-65-31001) CFSTI: $2.00

CONTENTS:

1. THE DEVELOPMENT IN THE UKRAINE OF THE IDEAS OF A. A. BOGOMOLETS ON HUMAN PHYSIOLOGICAL AGING AND LONGEVITY A. F. Makarchenko and A. Z. Kolchinskaya p 1-11
2. HUMAN THERMOREGULATION IN THE LIGHT OF CYBERNETICS M. K. Vitte p 12-18 refs (See N65-24876 14-04)
3. REACTION OF THE NEURAL ELEMENTS OF THE GASTROINTESTINAL TRACT TO THE RADIATION EFFECT DUE TO TOTAL X-RAY IRRADIATION Z. Ya. Tkachenko p 19-28 refs (See N65-24877 14-04)
4. SCIENTIFIC CONFERENCE ON THE DETERMINATION OF OXYGEN PRESSURE IN LIVING TISSUE BY THE POLAROGRAPHIC METHOD V. A. Berezovskiy p 29-32 (See N65-24878 14-04)

N65-24876 Joint Publications Research Service, Washington, D. C.
HUMAN THERMOREGULATION IN THE LIGHT OF CYBERNETICS
M. K. Vitte *In its* Transl. from Fiziol. Zh. (Physiol. J.), Vol. XI, No. 1, 1965 17 May 1965 p 12-18 refs (See N65-24875 14-04) CFSTI: $2.00

The present state of development of the theory of heat exchange in man permits representing the diversified influence of weather conditions (temperature, humidity, movement of the air, and thermal radiation), as well as the level of heat formation of the body, in the form of mathematical equations. In view of this the author expresses the hypothesis that information on environmental factors which affect thermoregulation can be programed, and that the process of thermoregulation can be studied with utilization of the laws of cybernetics. Author

N65-24877 Joint Publications Research Service, Washington, D. C.
REACTION OF THE NEURAL ELEMENTS OF THE GASTROINTESTINAL TRACT TO THE RADIATION EFFECT DUE TOTOTAL X-RAY IRRADIATION
Z. Ya. Tkachenko *In its* Transl. from Fiziol. Zh. (Physiol. J.), Vol. XI, No. 1, 1965 17 May 1965 p 19-28 refs (See N65-24875 14-04) CFSTI: $2.00

The effects of radiation on the reflexogenic zones of the digestive tube were studied experimentally in rabbits. Eighteen rabbits were subjected to whole-body X-ray irradiation dose of 1100 R, after which the animals were sacrificed at 1 hour, 1, 3, 5, or 7 days. The greatest changes were found in the neural plexuses of the esophagus and stomach, especially in the motor cells of the Auerbach's and Meissner's plexuses, which manifested dystrophy and destruction; purely compensatory reactions occurred in the other gastrointestinal areas. In the radiated muscle fibers, destruction was most often observed in the fibers of the cable bundles of muscle layers. Along with the severe damage, however, reorganization of the nucleus of the nerve cells, growth of dendritic processes, and proliferation of glia, appeared even after on the 7th day after irradiation. J.M.D.

N65-24878 Joint Publications Research Service, Washington, D. C.
SCIENTIFIC CONFERENCE ON THE DETERMINATION OF OXYGEN PRESSURE IN LIVING TISSUE BY THE POLAROGRAPHIC METHOD
V. A. Berezovskiy *In its* Transl. from Fiziol. Zh. (Physiol. J.), Vol. XI, No. 1, 1965 17 May 1965 p 29-32 (See N65-24875 14-04) CFSTI: $2.00

Various polarographic studies of oxygen pressure in tissue and of new polarographic methodologies are indicated. Topics recently under investigation include variation in oxygen pressure throughout the body when in different physiological states, oxygen pressure in the cerebrum of rats under the influence of narcotics, dependence of tissue oxygen pressure

on the permeability of the cellular wall, changes in oxygen pressure in the myocardium, and correlation of the oxygen pressure in the brain and its bioelectric activity. Most of the polarographic instruments used in these studies were simple electrodes inadequate for definitive studies; more complex electrodes, similar to the Clark electrodes used for measurement of blood pressure, will be necessary. In studies of new methods, an open platinum electrode was used for clinical investigation of oxygen pressure in porous tissue in man, and a model was designed with mercury electrodes which might be adequate for rapid determination of the dissociation curve of blood hemoglobin. J.M.D.

N65-24887# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS ON COMMUNIST CHINA'S SCIENCE AND TECHNOLOGY, NO. 182
28 May 1965 62 p refs
(JPRS-30299; TT-65-31107) CFSTI: $3.00

CONTENTS:

1. ORAL CONTRACEPTIVE STEROIDS Wei-shan Chou and Ming-lung Huang p 1–25 refs
2. EFFECT OF SECONDARY ELECTRONS IN RADIOCHEMICAL SYSTEMS Man-wei Chang p 26–49 refs (See N65-24888 14-06)
3. ENTOMOLOGICAL MEETING DISCUSSES DESTRUCTION OF PESTS p 50–51
4. CONFERENCE HELD TO DISCUSS PREVENTION OF SCHISTOSOMIASIS IN KIANGSU AND CHEKIANG p 52–54
5. NEW DRUG FOUND FOR TREATING SCHISTOSOMIASIS p 55–59

N65-24889# Joint Publications Research Service, Washington, D. C.
BURN SHOCK AND CYBERNETICS, ARTIFICIAL BLOOD CIRCULATION, AND A 20-CATHODE MULTIPOLAROGRAPH
3 Jun. 1965 25 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 9, no. 1, Feb. 1965 p 3–10, 60–62, 74–76
(JPRS-30405; TT-65-31159) CFSTI: $1.00

CONTENTS:

1. BURN SHOCK AS AN AUTOMATIC CONTROL PROCESS Ye. V. Gubler p 1–12 refs (See N65-24890 14-04)
2. CHANGES IN BODY AND BLOOD TEMPERATURE IN PATIENTS OPERATED UNDER CONDITIONS OF ARTIFICIAL BLOOD CIRCULATION WITH A MODERATE HYPOTHERMIA I. Yu. Vinokurova p 13–17 refs (See N65-24891 14-04)
3. 20-CATHODE MULTIPOLAROGRAPH R. B. Stelkov p 19–22 refs (See N65-24892 14-04)

N65-24890 Joint Publications Research Service, Washington, D. C.
BURN SHOCK AS AN AUTOMATIC CONTROL PROCESS
Ye. V. Gubler *In its* Burn Shock and Cybernetics, Artificial Blood Circulation, and a 20-Cathode Multipolarog. 3 Jun. 1965 p 1–12 refs (See N65-24889 14-04) CFSTI: $1.00

An attempt is made to analyze burn shock by considerations of automatic control in the organism during pathological processes. An interrelation scheme is shown that presents the main physiological parameters for burn shock, the effects resulting in deviation from the standard, and the control circuits restricting their deviation. The control processes in burn shock are discussed, and the reasons for the pathological deviations are given. Attempts at mathematical modeling of the total burn shock process are still unsuccessful since some of the pathological deviations are a direct consequence of disruptive effects. However, most represent the reverse side of the control reactions, where often deviations of several parameters from standard limits appear in order to limit the dangerous deviation of one parameter. In addition, deviations controlling one circuit might be disruptive for another one. G.G.

N65-24891 Joint Publications Research Service, Washington, D. C.
CHANGES IN BODY AND BLOOD TEMPERATURE IN PATIENTS OPERATED UNDER CONDITIONS OF ARTIFICIAL BLOOD CIRCULATION WITH A MODERATE HYPOTHERMIA
I. Yu. Vinokurova *In its* Burn Shock and Cybernetics, Artificial Blood Circulation, and a 20-Cathode Multipolarog. 3 Jun. 1965 p 13–17 refs (See N65-24889 14-04) CFSTI: $1.00

The relationships between temperatures in various parts of the body during artificial blood circulation combined with modern hypothermia were studied on patients with open heart surgery. Temperatures were recorded in a 1-minute interval in the esophagus, rectum, tympanum, muscles, and the venous outflow from the patient. The following perfusion stages were observed: (1) active cooling during blood circulation in the heat exchange system; (2) passive cooling at the expense of previously cooled blood without subsequent temperature reduction of the blood; and (3) active warming during pumping of blood warmed in the heat exchange. It was concluded that body temperature changes in patients during perfusion are closely related to the temperature of the donor's blood pumped by the equipment during the first minutes of artificial blood circulation as well as to the temperature of mixed blood pumped during the entire perfusion period. Perfusion at 35° to 36° C in the first minutes of artificial blood circulation with a subsequent gradual temperature reduction to the required level is advised for patients with low initial temperatures. G.G.

N65-24892 Joint Publications Research Service, Washington, D. C.
20-CATHODE MULTIPOLAROGRAPH
R. B. Stelkov *In its* Burn Shock and Cybernetics, Artificial Blood Circulation, and a 20-Cathode Multipolarog. 3 Jun. 1965 p 18–22 refs (See N65-24889 14-04) CFSTI: $1.00

Described is a multipolarograph that uses one reflecting galvanometer for the simultaneous determination of the maximal current in 20 objects. Point-contact electrodes and a special switchboard are used to obtain integrated data for the induced current which is determined by the quantity of the reducible substance in all 20 cathodes. The current strength is directly proportional to the cathode area under equal conditions of changes in all objects being examined. This formation of a large number of electrodes increases the observed area and makes it possible to decrease by 10 to 20 times the area of each separate electrode and to obtain averaged data on the quantity of the substances observed in very limited segments of identical tissues or samples. Data are presented on oxygen voltage in the brain tissues of 20 mice after administration of 2.5 mg adrenalin per kg of body weight; an increase of 20.3 ±3.9% resulted. G.G.

N65-24899*# Dynamic Science Corp., South Pasadena, Calif.
MICROORGANISMS IN SOLID MATERIALS. PHASES I, II, III, AND IV Final Summary Report
Earl G. Mc Nall and William T. Duffy 23 Apr. 1965 150 p refs Prepared for JPL
(Contract NAS7-100; JPL-950740)
(NASA-CR-62980) CFSTI: HC $4.00/MF $1.00

For a high degree of reliability of microbial decontamination, methods for the detection of viable microorganisms, as sensitive and reliable as possible must be developed. Detection of microorganisms within the interstices of solid materials may be approached conceptually from a number of directions. Of detection methods studied—culturing, electron spin resonance nonfluorescent staining, fluorescent staining, electrophoresis, and autoradiography—culturing is most reliable. This method depends on the ability of the microorganism to undergo cellular division. There are deficiencies in this method since physical and/or chemical trauma associated with the exposure of the microorganism from its location within the solid may cause inability to demonstrate the organisms' viability by culture methods. Author

N65-24915 National Academy of Sciences—National Research Council, Washington, D. C. Space Science Board
BIOLOGICAL STUDIES
In its U.S. Space Sci. Program, Rept. to COSPAR 1963 p 85–98 ref (See N65-24908 14-30)

Researches in the following fields are reported: (1) Exobiology includes not only the search for extraterrestrial life or fossil evidence for it, but a study of the organic chemistry of stages that are hypothetical forerunners of living forms, and of sterilization techniques necessary to prevent the contamination of extraterrestrial environments and the destruction of possible exobiota. (2) Environmental biology studies effects on biological processes of those properties of space (weightlessness, absence of diurnal rhythms, etc.) uniquely different from the normal earth-bound environment. (3) Human physical and psychological factors requiring attention are studied; they include life support, radiation protection, and reaction to abnormal stimuli or its lack (isolation, etc.). Author

N65-24938# Joint Publications Research Service, Washington, D. C.
HYGIENE AND SANITATION IN THE USSR
26 May 1965 72 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 3, Mar. 1965 p 8–13, 17–21, 42–55, 61–66, 114–116
(JPRS-30241; TT-65-31077) CFSTI: $3.00

CONTENTS:

1. MATERIALS FOR DETERMINING THE MAXIMUM PERMISSIBLE CONCENTRATION OF CHLOROBENZOL IN ATMOSPHERIC AIR L. P. Tarkhova p 1–9 refs (See N65-24939 14-04)

2. CHANGES IN SOME BIOCHEMICAL INDICES OF THE OXIDIZING PROCESSES IN ADAPTATION TO COLD L. A. Guseva p 10–17 refs (See N65-24940 14-04)

3. MATERIAL FOR DETERMINING THE AIR EXCHANGE IN ROOMS FOR POWERFUL GAMMA-INSTALLATIONS N. V. Sobol', A. Kh. Breger, and A. A. Petrushkov p 18–28 refs (See N65-24941 14-04)

4. THE PROTECTIVE ROLE OF FOOD AND VITAMINS IN RADIATION INJURIES TO THE ORGANISM S. R. Perepelkin p 29–43 refs (See N65-24942 14-04)

5. DETERMINATION OF FURFUROL IN THE AIR A. A. Belyakov and V. G. Smirnova p 44–47 refs (See N65-24943 14-06)

6. A FAST METHOD FOR DETERMINING LEAD IN THE AIR V. A. Razumov and T. K. Aydarov p 48–50 refs (See N65-24944 14-06)

7. A CHROMATOGRAPHIC METHOD FOR DETERMINING URANIUM AND PLUTONIUM IN THE AIR V. F. Pomytkin, A. M. Vorob'yev, G. B. Bokova, and V. I. Fomicheva p 51–54 refs (See N65-24945 14-06)

8. SOME PROBLEMS OF PREVENTIVE SANITARY SUPERVISION OVER ATMOSPHERIC AIR PROTECTION IN THE DNEPROPETROVSK OBLAST V. I. Petrov and G. K Kameko p 55–58

9. THE WATER FACTOR IN THE EPIDEMIOLOGY OF TYPHOID FEVER A. M. Levitov and A. I. Tolkachev p 59–62

10. BLOOD-SERUM PROTEINS IN CONTACT WITH LEAD P. M. Yaverbaum p 63–65

11. CONFERENCE ON TOXICOLOGY AND HYGIENE OF HIGH-MOLECULAR COMPOUNDS S. L. Danishevskiy p 66–69

N65-24939 Joint Publications Research Service, Washington, D. C.
MATERIALS FOR DETERMINING THE MAXIMUM PERMISSIBLE CONCENTRATION OF CHLOROBENZOL IN ATMOSPHERIC AIR
L. P. Tarkhova *In its* Hyg. and Sanit. in the USSR 26 May 1965 p 1–9 refs (See N65-24938 14-04) CFSTI: $3.00

The content of chlorobenzoi in atmospheric air and the action of small concentrations of it on man is investigated. It is shown that the threshold perception of chlorobenzol is 0.4 mg/cu m for the most sensitive person. The threshold of its action on the electric activity of the brain is 0.2 mg/cu m. The maximum single-time permissible concentration lies at the 0.1 mg/cu m level. Chlorobenzol in 1 mg/cu m concentration in the chronic treatment of white rats causes a lowering and distortion of the correct ratio of the chronaxia of the antagonist muscles, raises the cholinesterase activity, and lowers the alpha globulin content of the blood serum. Chlorobenzol in 0.1 mg/cu m concentration in chronic treatment on white rats does not cause the changes observed at high concentration of that substance (1 mg/cu m). The average 24-hr maximum permissible chlorobenzol concentration may be at the level of the maximum single-time concentration (0.1 mg/cu m). N.E.A.

N65-24940 Joint Publications Research Service, Washington, D. C.
CHANGES IN SOME BIOCHEMICAL INDICES OF THE OXIDIZING PROCESSES IN ADAPTATION TO COLD
L. A. Guseva *In its* Hyg. and Sanit. in the USSR 26 May 1965 p 10–17 refs (See N65-24938 14-04) CFSTI: $3.00

Evaluations of the oxidizing processes after chilling of subjects adapted to cold and not adapted to cold are made. Changes in the oxidizing processes after chilling of cold adapted and noncold adapted subjects were evaluated from the accumulation of lactic acid and pyrotartaric acids in the blood, and from secretions of incompletely oxidized products of metabolism in the urine. Chilling of persons adapted to cold caused no increase in the blood pyrotartaric acid content, however the initial quantity of pyrotartaric acid was 20% higher than in persons not adapted to cold. The organic acid content in the urine of unadapted persons dropped sharply during chilling, while in those adapted to cold almost no change was observed. It is concluded that the chilling of organisms adapted to cold causes no sharp changes in the metabolism in the period of exposure, but the initial levels of metabolism, according to the indices studied, are clearly higher than in unadapted organisms. It is assumed that one of the characteristics of an

organism adapted to cold is the establishment of metabolism on a new and higher level. N.E.A.

N65-24941 Joint Publications Research Service, Washington, D. C.
MATERIAL FOR DETERMINING THE AIR EXCHANGE IN ROOMS FOR POWERFUL GAMMA-INSTALLATIONS
N. V. Sobol', A. Kh. Breger, and A. A. Petrushkov *In its* Hyg. and Sanit. in the USSR 26 May 1965 p 18–28 refs (See N65-24938 14-04) CFSTI: $3.00

On the basis of the theoretical computations and experimental data, formulas, and nomograms were given for determining the consumption of air and the frequency of air exchange in irradiation chambers depending on the volume of the chamber room and the activity of the irradiator. The equations obtained were confirmed experimentally. Author

N65-24942 Joint Publications Research Service, Washington, D. C.
THE PROTECTIVE ROLE OF FOOD AND VITAMINS IN RADIATION INJURIES TO THE ORGANISM
S. R. Perepelkin *In its* Hyg. and Sanit. in the USSR 26 May 1965 p 29–43 refs (See N65-24938 14-04) CFSTI: $3.00

The protective or curative-and-preventive role of food, in cases of acute and subacute radiation injuries, in raising the resistance of the organism is studied. A diet with varying ratios between vegetable and animal proteins and varying compositions of these proteins in interactions with specific vitamin complexes, was used. Results showed that a milk and egg diet had the most favorable effect on test animals in cases of radiation injury, while a liver diet had a less positive effect on the course of the pathological process, followed by the physiological, meat and vivarium diets. When the food was enriched with a complex of vitamins C, P, and group B vitamins in various doses, the severity of the course of radiation sickness declined. By using various diets together with vitamins, one can weaken or intensify the severity of the process provoked by ionizing radiation. N.E.A.

N65-24964# Melpar, Inc., Falls Church, Va.
BIOCHEMICAL FUEL CELL Tenth Quarterly Progress Report, 1 Oct.–31 Dec. 1964
Gordon C. Blanchard and Charles R. Goucher [1964] 54 p refs
(Contract DA-36-039-SC-90878)
(Rept.-10; AD-462449)

An experimental investigation of some factors which regulate hydrogen production from sugars and natural products by micro-organisms is described. Previous studies demonstrated that several natural products including sweet potatoes, Idaho potatoes, peas, beans, rice, pineapples, and oranges could serve as sources of fuel for hydrogen generation by *Clostridium welchii*. Most of the work is concerned with hydrogen evolution from one of the better natural products, the sweet potato, as well as from sugars. The research showed that nongrowing *Cl. welchii* show no lag before hydrogen evolution. Another milestone was the finding that *Escherichia coli*, a common harmless organism, can be used to produce hydrogen and prepare the medium for the growth of *Cl. welchii*. Also, it was found that hydrogen production can be continued in fermentors for long periods of time by simply periodically adding additional substrate and alkali to the reaction mixture while hydrogen is still being evolved. Author

N65-24993*# Chicago Univ., Ill. Dept. of Biophysics
EXOBIOLOGY STUDY: ANALYTICAL SYSTEMS FOR BIOLOGICAL STUDY OF MARS, THE ROLE OF ELECTRON MICROSCOPY AND ELECTRON OPTICAL TECHNIQUES IN EXOBIOLOGY
Humberto Fernandez-Moran Apr. 1965 25 p refs
(Grant NsG-441)
(NASA-CR-62954) CFSTI: HC $1.00/MF $0.50

The possible contributions of electron microscopy and related electron optical techniques, centering on experiments in situ, with telemetry back to earth, are discussed. Essentially, the approach is based on the fundamental role of microscopy in science and represents a logical complement and extension of the automatic light microscope for use on a planet. The distinctive methodological features of electron microscopy are outlined, and the essential engineering details are presented for a specific project embodying a miniaturized electron microscope with coupled preparative devices for sampling, preparing, sorting, and telemetering of specimen data. Also, some promising approaches in the development and implementation of proposals are surveyed with particular emphasis on the priority to be assigned. E.E.B.

N65-25002*# Case Inst. of Tech., Cleveland, Ohio.
[INVESTIGATION OF CONTROL IN MAN–MACHINE SYSTEMS WITH EMPHASIS ON PROBLEMS OF REMOTE MANIPULATION] Progress Report, 1 Aug. 1964–31 Jan. 1965
14 May 1965 21 p Includes paper presented at 6th Ann. Symp. of the Profess. Group on Human Factors in Electron., The Inst. of Elec. and Electron. Engr., 6–8 May 1965
(Grant NsG-728)
(NASA-CR-62878) CFSTI: HC $1.00/MF $0.50

A technique for applying numerical control to a remote manipulator to allow the operation to divert more attention from the machine to the assigned task is presented. Ideally the operator should specify only the destination, but this does not determine a unique path. An algorithm is devised for computer calculation of the optimal path from point of origin to point of destination; the program is given the start point and gradient for the hand, and initial path parameters, and it calculates the machine variables for 100 steps along the path. Analysis of computer simulation runs indicates that the point-to-point optimization approach becomes less satisfactory as length and complexity of the path increases, but the speed of path generation and its short-path performance suggests that a modification of the program may lead to acceptable paths. J.M.D.

N65-25023# Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension
ISOTOPE TECHNIQUES IN THE BIOLOGICAL SCIENCES A Literature Search
Helen L. Ward, comp. May 1965 54 p refs
(TID-3512 (Suppl. 1)) CFSTI: $2.00

A total of 463 selected references on new techniques and instruments for using radioisotopes are included in this bibliography. The major reference sources were *Nuclear Science Abstracts, The Bibliography of Agriculture, Biological Abstracts, Chemical Abstracts* and *Index Medicus*. The period covered was 1958 through 1963. Author

N65-25025# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA (PATHOLOGICAL PHYSIOLOGY AND EXPERIMENTAL THERAPY) VOL. IX, NO. 1, 1965

11 May 1965 25 p refs
(JPRS-30015; TT-65-30963) CFSTI: $1.00

CONTENTS:

N65-25026 Joint Publications Research Service, Washington, D. C.

STAGING OF AN EXPERIMENT DURING PRACTICAL WORK IN PATHOLOGICAL PHYSIOLOGY ON THE SUBJECT OF "OXYGEN STARVATION"

E. N. Berger and Ye. A. Markova *In its* Transl. from Patologicheskaya Fiziol. i Eksperim. Terapiya, V. IX, No. 1, 1965 11 May 1965 p 20–22 (See N65-25025 14-04) CFSTI: $1.00

Reported is the development of a practical method for use in pathophysiological studies of the effects of reduced barometric pressure in small experimental animals, with simultaneous recording of respiration, cardiac activity, and brain wave frequency. Included is a discussion of equipment and results of investigations with rats. S.C.W.

N65-25027# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS FROM BIOFIZIKA (BIOPHYSICS), VOL. X, NO. 1, 1965

17 May 1965 26 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 10, no. 1, 1965
(JPRS-30097; TT-65-30999) CFSTI: $1.00

CONTENTS:

N65-25028 Joint Publications Research Service, Washington, D. C.

THEORY OF GLOBULE-BALL TRANSITIONS IN MACROMOLECULES

O. B. Ptitsyn and Yu. Ye. Eyzner *In its* Transl. from Biofizika (Biophys.), Vol. X, No. 1, 1965 17 May 1965 p 1–6 refs (See N65-25027 14-04) CFSTI: $1.00

Proposed is a theory to show that the presence of cooperative globule ball transitions in macromolecules during denaturation and of the reverse phenomenon of globularization of polymer chains should, under certain conditions, follow the common premises of macromolecular physics. In contrast to the ball spiral transitions, the globularization of macromolecules represents a true first order phasic transition of the type of gas condensation. The applicability of the theory to any macromolecules where the forces of intramolecular cohesion are greater than the cohesion forces in the molecules of the solvent, as for example in certain block copolymers, and its applicability to globular structures formed in highly diluted solutions of regular polymers, are discussed. The significance of the critical point for globule ball transition is also considered. S.C.W.

N65-25029 Joint Publications Research Service, Washington, D. C.

USE OF THE LUMINESCENCE OF ACRIDINE ORANGE DYE IN THE STUDY OF THE SECONDARY STRUCTURE OF NUCLEIC ACIDS

O. F. Borisova and L. A. Tumerman *In its* Transl. from Biofizika (Biophys.), Vol. X, No. 1, 1965 17 May 1965 p 7–15 refs (See N65-25027 14-04) CFSTI: $1.00

Proposed is a new method for determining the degree of spiralization of a given nucleic acid, which is based on the differences in luminescent characteristics (duration of fluorescence) of acridine orange dye bound with the spiralized (two-band) or despiralized (one-band) segments of the nucleic acid. Results of experiments on spiralization in DNA are presented. Comparative data are included on the basic luminescent and absorption characteristics of acridine orange monomeric molecules in aqueous solutions, the green and red fluorescence band of the same dye bound with DNA, and the dimers of the dye. S.C.W.

N65-25030 Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF ENERGY CORRELATIONS BETWEEN BIOLUMINESCENCE AND THE RESPIRATION OF LUMINESCENT BACTERIA

I. I. Gitel'zon, R. I. Chumakova, and A. M. Fish *In its* Transl. from Biofizika (Biophys.), Vol. X, No. 1, 1965 17 May 1965 p 16–23 refs (See N65-25027 14-04) CFSTI: $1.00

The quantitative correlation between luminescence and glucose consumption by luminescent bacteria was studied to determine what part of the energy obtained by bacteria upon splitting glucose is emitted in the form of visible light. The following were among the results observed from experiments with Photobacterim species: (1) Increased luminescence intensity after the addition of glucose had a definitely marked maximum, after which attenuation set in. (2) The time required to achieve maximum intensity, following glucose addition, and the ratio of maximum luminescence intensity to the luminescence intensity, prior to glucose addition, did not depend on bacterial concentration. (3) Luminescence intensity and the energy used in the excitation of the luminescent molecule are directly related to the use of the energy substrate. (4) The highest consumption of glucose occurred during the period from the addition of glucose up to the moment of maximal luminescence increase. Determinations of radiant flux, radiant energy, and bacterial density are included. A hypothetical discussion based on the premise that bacterial luminescence represents a direct leakage of energy from the oxidation channel is also included. S.C.W.

N65-25051 Joint Publications Research Service, Washington, D. C.

EXPERIMENT OF THE PHYSIOLOGICAL ANALYSIS OF THE SOLUTION OF CONTROL PROBLEMS BY A PERSON

Ye.V. Voloshinova *In its* The Theory and Appl. of Autom. Systems 26 May 1965 p 253–266 refs (See N65-25031 14-10) CFSTI: $8.28

The human dynamics of forming systems of temporary connections which ensure control of complicated processes are investigated. In experiments on solution of control problems, human subjects were exposed to quantitative information which varied according to certain differential equations, and they were instructed to maintain specified gage levels by manipulating a control stick, and then to formulate hypotheses concerning the pattern of change in the input data. The physiological aspects of the learning process involved in these tests are analyzed, particularly the phenomena of visual and motor adaptation. J.M.D.

N65-25154# United Kingdom Atomic Energy Authority, Risley (England). Safeguards Div.

AN ASSESSMENT OF ENVIRONMENTAL HAZARD FROM FISSION PRODUCT RELEASES

J. R. Beattie 1963 91 p refs

(AHSB(S) R-64) HMSO: 7s 6d

Hazards to the health of the general public that may arise from a release of fission products following a reactor accident are assessed. The proportions of fission products in the reactor are those resulting from a continuous period of operation at power and a preferential release of the more volatile fission products. The dispersion of a release in the atmosphere is discussed, and curves of concentration vs. distance are based on Pasquill's work for average weather and inversion weather conditions. Allowance was made for the depletion of activity by deposition from the cloud as it traveled downwind and special attention was given to the hazards from inhaled or ingested iodine. The magnitudes of various releases were specified in terms of the activity of the iodine-131 component of the release, due to the overriding importance of this isotope with *relation to public health hazards following a reactor accident.* However, the hazards from other fission product elements and isotopes were also assessed. R.W.H.

N65-25163# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.

ANALYTICAL METHODS FOR THE DETERMINATION OF RADIOSTRONTIUM IN BIOLOGICAL MATERIALS

A. Parker, E. H. Henderson, and G. S. Spicer Jan. 1965 40 p refs

(AERE-AM-101) HMSO: 5s 6d

Details are given for the isolation, radiochemical purification, counting, and calculation of the strontium 90 and strontium 89 content of biological materials. These include animal bones, human bones and teeth, milk, and vegetable ashes, and soils. Methods for the calculation of standard deviations of counting are also given. Author

N65-25164# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

HEALTH PHYSICS ASPECTS OF PLUTONIUM HANDLING

B. A. J. Lister 1964 208 p refs

(AERE-L-151) HMSO: 40 s

A series of lectures on health physics aspects of plutonium are presented covering these topics: plutonium properties, hazards, and general methods of control; plutonium containment; plutonium monitoring—air sampling; plutonium monitoring—surface and personnel monitoring; plutonium metabolism; plutonium excretion and bioassay; in vivo measurement and treatment of internally deposited plutonium; criticality control in plutonium areas; and emergency procedures and experience in plutonium areas. Author

N65-25203# Florida Univ., Gainesville. Dept. of Physiology

EFFECT OF DIMERCAPTOPROPANOL (BRITISH ANTILEWISITE) ON THE TOXICITY OF OXYGEN AT SIX ATMOSPHERES PRESSURE ON WHITE MALE RATS

Peter V. Van Tassel Brooks AFB, Tex., School of Aerospace Med., Mar. 1965 10 p refs

(Contract AF 41(609)-1553)

(SAM-TR-65-11; AD-461388)

Six groups of 10 white male Holtzman rats were given doses of 10, 25, 40, 50, 75 and 100 mg/kg, respectively, of British antilewisite. Time of onset of the first convulsion after the animals were exposed to 6 atmospheres of oxygen and the survival times were compared with those of 50 control animals. As the dose was increased to 40 mg/kg, both the onset of convulsions and the survival time were increased to a peak and then decreased with further increase in dosage until they reached almost control levels again at the dose of 100 mg/kg. Another group of animals was given equivalent doses of the vehicle in which British antilewisite was dissolved and of an inactive analog of British antilewisite (glycerin). It was shown that the effect seen was not due to either the vehicle or the inactive analog. Author

N65-25204# School of Aerospace Medicine, Brooks AFB, Tex.

PAROTID FLUID STEROID RESPONSES TO GRADED DOSES OF CORTICOTROPIN

Ira L. Shannon, John R. Prigmore (Utah Univ.), and William A. Gibson May 1963 6 p refs

(SAM-TDR-62-30; AD-415273)

Parotid fluid and urine 17-hydroxycorticosteroid (17-OHCS) measurements were carried out in 90 systemically healthy young adult males who received graded intramuscular doses of ACTH. The administration of 20, 30, and 40 units of ACTH produced significant increases in parotid fluid free 17-OHCS levels 2 hours after dosage. The 17-OHCS levels in parotid fluid following 5 and 10 units of ACTH did not differ significantly from those for the control group. The total 17-OHCS excretion rates in urine over the 6-hour experimental period showed a steady increase with the increase in dose levels. These findings strengthen the premise that parotid fluid steroid measurements may be employed in evaluating human adrenocortical status. Author

N65-25215# Naval School of Aviation Medicine, Pensacola, Fla.

SOME ISSUES IN THE DEVELOPMENT OF A MOTION SICKNESS QUESTIONNAIRE FOR FLIGHT STUDENTS

Lawrence E. Hardacre and Robert S. Kennedy 9 Mar. 1965 8 p refs

(NSAM-916; AD-463223)

Responses to an experimental motion sickness questionnaire were compared with actual motion sickness resulting from exposure to Coriolis effects at 7.5 rpm. Answers to 12 items were related to subsequent motion sickness. In an effort to ascertain honesty of responses to the questionnaire, it was administered to three groups with varying instructions. *No significant differences in scores among these groups or* with the experimental group above were found. Author

N65-25254# North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
EFFECTS OF COLD EXPOSURE UPON THE ACTION OF THERAPEUTIC DRUGS
James Y. P. Chen and H. C. Bergman Fort Wainwright, Alaska, Arctic Aeromed. Lab., Feb. 1965 29 p refs
(Contract AF 41(609)-1989)
(AAL-TDR-64-20; AD-615490)

Based on determinations of LD_{50}, ED_{50} and therapeutic index, in mice and rats, morphine sulfate was found at least six times as toxic and three times as effective in the cold (4°C) as at room temperature (22° to 24°C). In the rat, morphine showed a very wide margin of safety in the cold as well as at room temperature— therapeutic index, about 180. With pentobarbital, the margin of safety indicated by therapeutic index in mice and rats in the cold was only one-third that at room temperature, no significant differences were noted in the ED_{50} (median hypnotic dose) of the drug in all species tested at 4° and at 22° C. No significant differences were found in plasma concentrations of test drugs at different temperatures to account for the increased toxicity of morphine and pentobarbital in all animals studied, as well as the apparent increased efficacy of morphine in mice and rats acutely exposed to cold. Greater percentage pressor response to norepinephrine was demonstrated in dogs with or without hemorrhagic hypotension at 4° than those at 22° C. The analgesic-potentiating effect of chlorpromazine was found greater in rats in the cold than at room temperature when subeffective doses of morphine were administered simultaneously with a given dose of chlorpromazine. Clinical implications of these findings are discussed, and recommendations offered. Author

N65-25269*# Northrop Space Labs., Hawthorne, Calif.
ANALYTICAL REVIEW OF PASSIVE MASS TRANSFER OF WATER VAPOR IN A SPACE SUIT
Joseph A. Peterson, Constantino Cafaro, Arnold P. Shlosinger, and Kay F. Sterrett May 1965 56 p refs
(Contract NAS2-2102)
(NASA-CR-63144; NSL-65-87-1) CFSTI: HC $3.00/MF $0.50

This report presents results of an engineering study and analysis to determine the feasibility of transporting water vapor from the skin of an astronaut through an oxygen-water vapor mixture filled gap and on to a surface capable of adsorbing or condensing and removing the moisture in a space suit. A desiccant bed or a wick cooled below the required dew point were devices considered for adsorbing or condensing and retaining or removing the moisture. The theoretical analysis of binary diffusion coefficients indicates that the rate of diffusion across a gap is adequate for application in a space suit. The thermal diffusion coefficient was found to have no significant effect upon the diffusion rate in the space suit. Application of the derived design criteria for desiccant beds indicates their feasibility in removing water vapor for limited time periods. The concept of condensing on a cooled wick appears feasible for application to extended periods of time. The analysis of condensing on cooled wicks requires experimental input parameters and a digital computer solution to provide numerical performance data. Direct empirical determination of these performance data appears more practical than experimental input parameter determination and computer analysis. Author Author

N65-25270*# Allied Research Associates, Inc., Boston, Mass.
BIBLIOGRAPHY ON BIOSENSORS. A SAMPLING OF THE WORLD LITERATURE 1960–1964. VOLUME III
J. Healer Apr. 1965 197 p refs
(Contract NASw-535)
(NASA-CR-63145; ARA-211-F-4, Pt. 2) CFSTI: HC $5.00/MF $1.50

N65-25292# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
ULTRAMICRO METHODS IN BIOCHEMISTRY. VII: THE DETERMINATION OF PLASMA OR SERUM UREA NITROGEN. VIII: THE DETERMINATION OF SERUM URIC ACID. IX: THE DETERMINATION OF SERUM CREATININE
E. van Stewart and Bernard B. Longwell Apr. 1965 34 p refs
(Contract AT(29-2)-1013)
(LF-22) CFSTI: $0.50

Ultramicro methods for the determination of serum urea nitrogen, uric acid, and creatinine have been evaluated and the results are recorded in reports VII, VIII, and IX, respectively. The method for the determination of urea nitrogen is an ultramicro adaptation of the reaction in which a blue color is developed when the ammonium ion reacts with phenol and hypochlorite. Ammonia is released from urea with urease. The entire reaction is conducted on 5 μl of serum or plasma and the final volume of reaction mixture is 2.205 ml. The procedure for the determination of uric acid is an ultramicro adaptation of the method which depends on the reduction of phosphotungstic acid in the presence of bicarbonate. The phosphotungstic acid reagent contains lithium sulfate as a stabilizing reagent. The reaction is conducted on 100 μl of protein free solution prepared from 20 μl of serum by precipitation with tungstic acid. Comparative analyses show very good agreement between this method and the macro procedure from which it was derived. The creatinine method is an adaptation of a standard procedure utilizing the reaction with alkaline picrate. The reaction is carried out on 100 μl of protein-free solution obtained from 40 μl of serum by precipitation of the protein with tungstic acid. The results obtained with the method are in good agreement with values obtained using the macro procedure from which the ultramicro analysis was derived. Each analytical procedure is evaluated by determination of its reproducibility, and standard deviation analyses are presented. Author

N65-25300*# Biosystems, Inc., Cambridge, Mass.
PHYSIOLOGY OF THE VISUAL CONTROL SYSTEM
Lawrence Stark, Carl Kupfer, and Laurence R. Young Washington, NASA, Jun. 1965 92 p refs
(Contract NAS2-1328)
(NASA-CR-238) CFSTI: HC $3.00/MF $0.75

The neurological aspects of the eye movement control system are investigated using experimental and analytical techniques. Specifically, it is maintained that the basic difference between version and vergence rests with the intermittency operator and the discrete control of version. Control system analytical evidence supports a central processor location for the intermittency operator as opposed to a motor or sensory one. Neuroanatomical and physiological evidence also supports a central processor locus for the intermittency operator. Possible loci hypothesized are the accessory vestibular nuclei or contiguous pontine areas. Author

N65-25341# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ARTIFICIAL RAISING OF AIR PRESSURE
M. J. Pavlok 1 Apr. 1965 9 p Transl. into ENGLISH from Spec. Hyg. Letce (Czechoslovakia), 1954 p 24–27
(FTD-TT-65-258/1+2; AD-460454)

Several flight suits that were developed prior to the introduction of pressurized cabins are described. Various experiments have shown that the flying suit cannot be a definite solution for the prevention of hypoxia at high altitudes. Principles of increasing the pressure artificially originated on stratospheric balloon gondolas, and were later applied to the construction of cabins of rocket aircraft for flights into the stratosphere. Pressurized cabins are now in use on many aircraft with a wide range of altitude above sea level and are a great contribution to the struggle against hypoxia, permitting higher aircraft ceilings. R.W.H.

N65-25344# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
STUDIES WITH TRITIUM (H_3)-LABELED PYRIDOXINE Technical Report, 1 Oct. 1963–1 Jul. 1964
David A. Vaughan and Robert L. Winders Mar. 1965 14 p refs (AAL-TR-64-29; AD-462052)

The 24-hour excretion of tritium radioactivity following both large and small injected doses of tritium-labeled pyridoxine hydrochloride was investigated in rats receiving various dietary treatments. Pyridoxine deficient animals retained more of the small (12 μg) doses than did animals receiving an adequate diet. When the pyridoxine antagonist, desoxypyridoxine, was fed to the pyridoxine deficient animals, retention of the tritium-pyridoxine was reduced, indicating that the antagonist had tied up some of the tissue sites ordinarily available for pyridoxine or its derivatives. Cole exposure did not alter these relationships. Larger doses (500 μg) of pyridoxine were used less efficiently, but the absolute amounts retained suggested that the vitamin can be stored in quite large amounts. Author

N65-25401*# Massachusetts Inst. of Tech., Cambridge.
THE RESISTIVITY OF MICROORGANISMS TO THERMAL INACTIVATION BY DRY HEAT Final Report
Gerald J. Silverman and Cecil G. Dunn [1965] 17 p (Grant NsG-691)
(NASA-CR-63198) CFSTI: HC $1.00/MF $0.50

In comparing glass fiber filters to membrane triacetate filters it was noted that the glass filters were more consistent and their average value was equivalent to about one log cycle decrease after 4 hours of exposure at 106° C. Filters removed after 10 minutes of exposure to forced and preheated air showed the anticipated decrease in spore population. Four hours of forced air at ambient temperature did not result in the loss of spores from the filter by physical removal. The membrane filter technique required a greater number of organisms to be placed on a filter as the exposure time was increased. The variation is expected to be greater until most of the variables which can affect viability are understood and controlled. Modifications in the chamber may minimize this variation. E.E.B.

N65-25425# Joint Publications Research Service, Washington, D. C.
OXYGEN CONSUMPTION BY ANIMAL TISSUES AFTER THE COMBINED ACTION OF CERTAIN GASES
S. N. Sinitsyn 7 Jun. 1965 4 p Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), no. 4, Jul.–Aug. 1964 p 470–471
(JPRS-30443; TT-65-31176) CFSTI: $1.00

The oxygen consumption by liver, brain, and lung tissues of 406 white rats weighing 150 to 250 grams was measured by Warburg's manometric method after exposure to a carbon monoxide, nitric oxide, and carbon dioxide mixture. This mixture induced more pronounced oxygen consumption changes by the tissues than the action of two constituents alone. The inhalation of 2.5% volume petroleum gas containing hydrogen sulfide dropped oxygen consumption by brain tissues 14.4%, with a return to normal after 24 hours. Inhalation of gas mixture during deep nembutal-induced sleep had no effect on brain oxygen consumption. It was concluded that a combined action of gases intensifies the impairment of oxygen consumption by tissues. The maximum permissible concentrations of individually used gases may be toxic if used in combinations. G.G.

N65-25426# Joint Publications Research Service, Washington, D. C.
ANALYTICAL METHOD OF DETERMINATION OF SONIC PRESSURE OF DOLPHIN SIGNALS AT THE POINT OF RECEPTION
Ye. V. Shishkova 8 Jun. 1965 7 p Transl. into ENGLISH from Rybn. Khoz. (Moscow), no. 2, 1965 p 25–27
(JPRS-30466; TT-65-31183) CFSTI: $1.00

Hydrophone recording data were used to analyze sonic signals emitted by dolphins, in order to determine the value of the sonic pressure at the point of emission. A time interval of 2 seconds and more between recordings of shot-type signals and weaker secondary similar signals was attributed to echo reflections from submarine rocks or fish shoals. Values for the sonic pressures of the direct and the echo signals measured at the point of reception, and of the time interval before reception of the direct signal and the echo were used to calculate the coefficient of spatial attenuation and sonic pressure at point of emission for two recordings. It was found that the sound intensity at point of emission was higher by one order than the algesic sensation threshold for man, and it was concluded that the dolphin stunned fish by its sonic shots in order to catch them easier. G.G.

N65-25430# Joint Publications Research Service, Washington, D. C.
PRIMARY RADIOBIOLOGICAL PROCESSES
M. I. Amiragova, N. A. Duzhenkova, M. I. Shal'nov, and A.IV. Savich 10 Jun. 1965 10 p Transl. into ENGLISH from the book "Pervichnyye Radiobiologicheskiye Protsessy" Moscow, Atomizdat, 1964 288 p
(JPRS-30541; TT-65-31231) CFSTI: $1.00

The transformation of the energy of ionizing radiation in living organisms is discussed, along with the effect of radiation on (1) nucleic compounds and their low-molecular substances; (2) porphyrins and other substances important for tissue respiration; and (3) amino acids, proteins, and the role of these processes in radiation injury. A comparison of radiobiochemical and radiobiological transformation data in model systems lists the following main radiobiological effects as possible primary disturbances: (1) direct absorption of energy by the nucleoproteins leading to changes that help the process of DNA reduplication to start; (2) mutagenic action leading to changes in the DNA molecules; (3) malignant neoplasma through mutation of the somatic cells triggered by injury to the DNA matrix; (4) radiochemical reactions with substances dissolved in the cytoplasm, reversible injury to the tissue respiration system, and configurational changes in the DNA and its submolecular complexes with disruption of the intermolecular bonds; and (5) radiochemical transformations of all principal parts of the cell at 10000 rads or more. G.G.

N65-25431# Joint Publications Research Service, Washington, D. C.
THE PROBLEM OF OXYGEN DEFICIENCY

I. R. Petrov 11 Jun. 1965 14 p refs Transl. into ENGLISH from Patc'. Fiziol. i Eksperim. Terapiya (Moscow), v. 8, no. 1, Jan.–Feb. 1964
(JPRS-30576; TT-65-31250) CFSTI: $1.00

Oxygen deficiencies of dissimilar origin and the resulting pathological changes in the body systems, with emphasis on the functions of the central nervous system, are briefly summarized. It was shown that cooling, overheating, radiation sickness, and hetero- and autosensitization increases the sensitivity of the organism to oxygen deficiency, and that soporific doses of narcotics, artificial hypothermia, and ACTH increase the resistance of the organism. The basic principles of the prophylaxis and the therapy of the consequences of oxygen deficiencies taking the form of clinical death, hemorrhaging, anemia of the brain, and certain forms of poisoning are evaluated. The influence of cooling under conditions of hypoxemia and hypercapnia with its resulting rapid reestablishment of the ATP and cryophosphate content in the nerve cells is pointed out. G.G.

N65-25435 Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
FIELD EVALUATION AND CONTROL OF PERSONNEL BEHAVIOR
R. J. Nertney Apr. 1965 31 p ref
(Contract AT(10-1)-205)
(IDO-17074) CFSTI: $2.00

This paper presents considerations in performing human factor studies in a relatively unperturbed working environment and outlines certain programs. Working group indices were established based on specific organizational objectives by management. The ability of the organization to fulfill these objectives is sampled by staff evaluators on a "did do" or "did not do" basis. Reduction to simple dichotomy makes use of quality control techniques possible and provides useful numerical indices for evaluation and control of personnel behavior under field working conditions. Author

N65-25448# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex. Dept. of Microbiology
EXPERIMENTAL INFECTION OF BEAGLES WITH ECHO VIRUS TYPE 6
F. F. Pindak and W. E. Clapper May 1965 17 p refs
(Contract AT(29-2)-1013)
(LF-25) CFSTI: $0.50

Live Echo 6 virus was administered orally to six beagles previously shown by culture to be free of this agent. Some symptoms suggesting enteric disease were observed in most of the dogs. The virus was isolated from the stools of four and the blood of one, but no neutralizing antibodies could be demonstrated. Repeated intramuscular injection of live virus in six dogs produced titres as high as 1:512 and a four-fold or greater rise in all. No signs of illness were observed in those given parenteral injections. Author

N65-25457# Joint Publications Research Service, Washington, D. C.
ALL-UNION CONFERENCE IN LENINGRAD ON AEROIONIZATION IN INDUSTRIAL HYGIENE, NOVEMBER 1963
B. B. Koyranskiy, L. Ya. Ukvol'berg, M. V. Dmitriyev, and G. S. Berezyuk 7 Jun. 1965 8 p Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 10, Oct. 1964 p 60–62
(JPRS-30442; TT-65-31175) CFSTI: $1.00

A synopsis of reports discussed at the conference is presented. Among those cited were studies of theoretical and practical problems of aeroionization under industrial conditions; the use of aeroionotherapy in the treatment of bronchial asthma; and the use of aeroionization to control dust in industrial establishments, and as an air disinfectant. Also considered are studies on the effect of aeroions on the blood, the central nervous system, cerebrocortical functions, and gastric secretions. Among the new methods of generating and calculating [illegible]o- and hydroions are the use of counters for geophysical measurements and of wire antennas, fed by an apparatus for franklinization, for ionizing the air of large rooms; and the ultramicroscopy of electrically charged aerosols for determining the concentration of dust particles. S.C.W.

N65-25458# Joint Publications Research Service, Washington, D. C.
DETERMINATION OF THE FRACTIONING COEFFICIENTS AND THE BIOLOGICAL AVAILABILITY OF THE PRODUCTS OF NUCLEAR EXPLOSIONS IN RADIOACTIVE FALLOUTS
Yu. A. Izrael' 8 Jun. 1965 10 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR, Ser. Mat., Fiz. (Moscow), v. 161, 1965 p 343–346
no. 1–3 1965 p 343–346
(JPRS-30500; TT-65-31211) CFSTI: $1.00

The distribution density of radioactive products on large spherical particles (with a diameter greater than 10 to 20μ), forming as a result of surface explosions is discussed. Also considered are air explosions in which the formation of particles occurs as a result of condensation of evaporating bomb matter and coagulation of submicron particles. Included is a method for determining the dependence of coefficients of fractionation and biological contamination on particle size. Results of determinations for the isotopes Sr^{90} and Ba^{140} with respect to the isotope Zr^{95} are reported. S.C.W.

N65-25459# Joint Publications Research Service, Washington, D. C.
THE DANGERS OF ANESTHESIA AT HIGH ALTITUDES
Yu. I. Datkhayev 11 Jun. 1965 7 p refs Transl. into ENGLISH from Eksperim. Khirur. i. Anesteziol. (Moscow), no. 2, Mar.–Apr. 1964 p 61–64
(JPRS-30577; TT-65-31251) CFSTI: $1.00

Under high-altitude conditions of hypoxia, ether anesthesia in combination with air is not recommended for wide use, especially during major and prolonged abdominal operations. The anesthetization of patients by the stunning method (a rapid increase of the dosage of ether in the inhaled air) is impermissible under high-altitude conditions. The lingering character of the saturation phase of anesthesia at high altitude is often accompanied by prolonged vomiting. Evacuation of the stomach of patients prior to anesthetization increases the safety of the latter. The slightest complication of external respiration during anesthetization and in the postanesthesia period, under conditions of high-altitude hypoxia, very often leads to an undesired strain on the respiratory and circulatory apparatus. Under conditions existing at high altitudes it is necessary to consider the possibility of prolonged apnea after the administration of curare compounds. Author

N65-25514# Joint Publications Research Service, Washington, D. C.
SPEECH, ARTICULATION, AND PERCEPTION

V. A. Kozhevnikova and L. A. Chistovich 10 Jun. 1965 272 p refs Transl. into ENGLISH of the book "Rech', Artikulyatsiya, i. Vospriyatiye" Moscow-Leningrad, 1965 p 1-241
(JPRS-30543; TT-65-31233) CFSTI: $6.00

Results are presented of an original experimental investigation of the speech process conducted by a group of physiologists, linguists, mathematicians, and engineers. New methods are described for the investigation of the activity of the speech-forming mechanism, based on the application of modern electronic technology. New theoretical concepts are advanced relative to the organization of the speech perception processes. The research findings are considered against the background of the problems associated with man's communicating with electronic computers. Author

N65-25529# Philco Corp., Willow Grove, Pa. Bio-Cybernetics Lab.

A CORRELATIONAL STUDY OF MYOPOTENTIAL RESPONSE AND FORCE OF MUSCLE CONTRACTION DURING VARYING ACTIVITY DEMANDS Interim Report

F. Ray Finley and Roy W. Wirta 17 Mar. 1965 33 p refs (Contract Nonr-4292(00))
(Rept.-2386; AD-613930)

A major objective of the Philco biocybernetics engineering activity has been to develop an optimum degree of compatibility between man and the machines which he used to augment his performance capacity. One phase of study, in the pursuit of this objective, has been developed about a hypothesis that the myoelectric activity associated with muscular contraction could be utilized to control a powered exoskeletal system designed to amplify one's strength. This phase of study is the subject of this interim report. TAB

N65-25540 Joint Publications Research Service, Washington, D. C.

SECOND SYMPOSIUM ON BIOTELEMETRY HELD IN SVERDLOVSK

V. V. Parin and V. V. Rozenblat 9 Jun. 1965 7 p Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 50, no. 9, Sep. 1964 p 1191-1193
(JPRS-30528; TT-65-31226) CFSTI: $1.00

A synopsis of reports discussed at the second symposium on biotelemetry, which focused on the use of radiotelemetry in physiological and medical research, is presented. Included are data on the general aspects of radiotelemetry in physiology and medicine, the technological and methodological aspects of radiotelemetry, and results of experimental radiotelemetric research. Among the reports presented were an analysis of problems in classifying biotelemetric systems, the use of biotelemetry in aerospace medicine, the development of separate units in radiotelemetric systems, methods of recording body and skin temperature, the use of biotelemetric data for investigating spacecraft control systems; and results of pathophysiological studies of man and experimental animals which emphasized the use of radioelectrocardiographic and radiopulsometric data in determining pathological shifts. S.C.W.

N65-25541# Joint Publications Research Service, Washington, D. C.

TRANSISTORIZED DIRECT CURRENT MILLIVOLTMETER FOR BIOLOGICAL RESEARCH

V. A. Mayskyy 10 Jun. 1965 10 p refs Transl. into ENGLISH from Fiziol. Zh. Akad. Nauk Ukr. RSR (Kiev), v. 11, no. 2, 1965 p 265-268
(JPRS-30557; TT-65-31239) CFSTI: $1.00

The development of a transitorized direct current millivoltmeter, which consists of a simple transitorized alternating current amplifier and compact silicon stabilitron converters, is reported. The circuitry is described, and the requirements of the clock pulse generator are discussed. Illustrated is an electrical diagram and a general view of the instrument. S.C.W.

IAA ENTRIES

A65-23199
PIONEERING WORK IN BIOINSTRUMENTATION FOR FLIGHT EXPERIMENTS AND FLIGHT SIMULATION.
Joseph J. Zuccaro (NASA, Ames Research Center, Moffett Field, Calif.).
IN: ELECTRONICS IN TRANSITION; WINTER CONVENTION ON MILITARY ELECTRONICS, 6TH, LOS ANGELES, CALIF., FEBRUARY 3-5, 1965, PROCEEDINGS. VOLUME 4. [A65-23182 13-09]
Conference sponsored by the Professional Technical Group on Military Electronics of the Institute of Electrical and Electronics Engineers, Los Angeles Section.
Los Angeles, Institute of Electrical and Electronics Engineers, Los Angeles District, 1965, p. IIIB-86 to IIIB-102.

Description of various cardiovascular and respiratory instrumentation systems that have been developed for use in physiological measurements on test pilots in high-performance aircraft and in space-flight simulators. This development work has been extended to include miniaturized amplifiers and radio-telemetry devices that can be worn on a man or can be implanted in animals. Refinements made to a standard electrocardiogram sensing technique have produced higher quality ECG data from even an exercising subject. A high-performance amplifier has been developed which has further improved the quality of these data. A description is given of a compact physiological monitoring system being developed, which is worn on the ear and is capable of providing a continuous record of blood oxygen saturation, blood pressure, heart rate, and the blood pulse wave. Another system being developed, which should make it practical to retrieve electroencephalographic data from human subjects being monitored while in an aircraft or flight simulator, is also described. (Author) A. B. K.

A65-23224 #
URINE AND WASTE-WATER RECOVERY BY ELECTRODIALYSIS.
C. E. Hansen and C. Berger (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Astropower Laboratory, Electrochemistry Dept., Newport Beach, Calif.).
American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-16. 11 p. 16 refs.
Members, $0.50; nonmembers, $1.00.

Description of a manned-spacecraft subsystem for recovering potable water from urine, wash water, and humidity condensates. This subsystem encompasses the processes of adsorption, filtration, electrodialysis, and air evaporation. The performance characteristics of the subsystem are discussed, together with weight and power-penalty estimates for a projected six-man, 90-day resupply orbital mission. A. B. K.

A65-23231 #
PASSIVE ELASTIC FORCE OF THORACIC CAGE [FORZA ELASTICA PASSIVA DELLA GABBIA TORACICA].
Emilio Agostoni, Piero Mognoni, and Giorgio Torri (Milano, Università, Istituto di Fisiologia Umana, Milan, Italy).
Accademia Nazionale dei Lincei, Atti, Rendiconti - Classe di Scienze Fisiche, Matematiche e Naturali, vol. 36, Feb. 1964, p. 230-233. In Italian.
USAF-supported research; U.S. Public Health Service Grant No. RF 15.

Experimental investigation of the difference in the volume of the thoracic cage and, therefore, in diaphragm location, under different circumstances, the pulmonary volume remaining the same. The following determinations were made: (1) the relationship between pulmonary volume and thoracic circumference with the respiratory muscles at work and at rest, and (2) the relationship between thoracic circumference and intrathoracic pressure at rest. The tests were made on three subjects in sitting position. A figure illustrates the relationship between the change in thoracic circumference and intrathoracic pressure at rest. It is shown that the passive elastic force exerted by the thoracic cage, at the pulmonary volume considered, must be at least -100 cm H_2O instead of -40 cm H_2O as believed so far. M. M.

A65-23416
METABOLIC ALTERATIONS IN RATS EXPOSED TO ACUTE ACCELERATION STRESS.
J. Oyama and W. T. Platt (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
(Federation of American Societies for Experimental Biology, Annual Meeting, 48th, Chicago, Ill., Apr. 15, 1964.)
Endocrinology, vol. 76, Feb. 1965, p. 203-209. 30 refs.

Extension of a previous investigation of factors involved in stress-induced liver glycogenesis. Fasted female Sprague-Dawley rats were exposed to a relative centrifugal force of 4.5 g for varying periods ranging from 0.5 to 96 hr, employing an 8.5-ft radius centrifuge. During the first 24 hr, there was a significant and sustained increase in the concentrations of blood glucose, plasma-free fatty acid, and plasma corticosterone. Plasma-free amino acids were decreased. Several of the glucogenic amino acids (alanine, arginine, phenylalanine-tyrosine, and proline) were decreased preferentially. There was a progressive increase in liver glycogen deposition detectable within the first hour of centrifugation which reached a maximum after 5 to 24 hr. The glycogen response was eliminated by adrenalectomy and hypophysectomy. Adrenodemedullated rats showed a decreased glycogen response. Alloxan-diabetic rats did not show any increase in liver glycogen above the initially high levels present. The combined stresses of centrifugation and starvation effected a marked depletion of both liver and gastrocnemius muscle glycogen. Starvation alone resulted in an increase in liver glycogen with a concomitant fall in muscle glycogen. It is concluded that the liver glycogen deposited in acceleration-stressed rats is mediated by the secretion of corticosterone following activation of the pituitary-adrenal system. (Author) D. H.

A65-23454 #
CHEMICAL PROBLEMS IN ATMOSPHERE CONTROL.
Frederick W. Thompson, Jr. (USAF, Systems Command, Research and Technology Div., Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio).
American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-47. 5 p. 22 refs.
Members, $0.50; nonmembers, $1.00.

Overall summary of efforts exerted in the atmosphere control area by the Air Force Flight Dynamics Laboratory. The chemical problems involved in this facet of environmental control are discussed in terms of past and current programs. The paper presents information on both contractually sponsored and in-house efforts. Programs reviewed include carbon dioxide and water control, carbon-dioxide reduction, water electrolysis, trace-contaminant removal and effects, oxygen concentration, and subsystem analysis. The bibliography provides a listing of the Laboratory's activities in atmosphere control technology over the past two years.
(Author) M.M.

A65-23460
SPACEFLIGHT SIMULATORS FOR ASTRONAUT SELECTION AND TRAINING.
H. F. Huddleston (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
(Space Environment Simulators Symposium, Northampton College of Advanced Technology, London, England, Nov. 17, 1964.)
Spaceflight, vol. 7, May 1965, p. 88-97. 135 refs.

Consideration of space-flight simulators for selecting and training astronauts. The simulation of control-display dynamics is discussed. Visual aspects of the vehicle-control and life-support systems are said to be of prime importance, followed closely by dynamic and procedural fidelity. The simulation of various situational stressors associated with confinement within a small

spacecraft and of a number of environmental stressors capable of producing observable anatomical or physiological damage by their action or presence is considered in some detail. It is pointed out that stresses have been dealt with in isolation and that very little research has been done on the problem of multiple stress. A.B.K.

A65-23461
BIO-MEDICAL PROBLEMS OF PROLONGED SPACEFLIGHT.
B. A. Gooden.
Spaceflight, vol. 7, May 1965, p. 98-103. 22 refs.

Consideration of the effects of prolonged space flight on the cardiovascular system. The problem of ascertaining the exact mechanism and causes of orthostatic hypotension is characterized as being the most pressing one in space medicine. A brief summary is given of the normal mechanisms for maintaining blood pressure and their relation to syncope. The normal mechanism of orthostatic tolerance is described. Factors said to be involved in the development of susceptibility to orthostatic hypotension during prolonged space flight are suggested. It is pointed out that it has not yet been demonstrated that weightlessness alone produces an increased susceptibility to orthostatic hypotension. Techniques for measuring the degree of cardiovascular deconditioning of a subject and experimental procedures for producing cardiovascular deconditioning on Earth are outlined. Results of measurements of the degree of cardiovascular deconditioning of astronauts Schirra and Cooper are presented. Various methods for protecting astronauts against orthostatic hypotension during and after long space missions are suggested. A.B.K.

A65-23486
SURVIVAL AND GROWTH OF TERRESTRIAL MICROORGANISMS IN AMMONIA-RICH ATMOSPHERES.
S. M. Siegel and C. Giumarro (Union Carbide Corp., Research Institute, Tarrytown, N.Y.).
Icarus, vol. 4, Apr. 1965, p. 37-40. 9 refs.
Contract No. NASw-767.

Demonstration that various bacteria and ascomycetes have grown on specimens of Euphorbia xylophylloides and other xerophytes after two months in atmospheres containing NH_3 with CH_4, H_2, or air. NH_3 levels of at least 50,000 ppm far exceeded conventional upper safe limits for human toxicity. Extreme performance was shown by a stress-adapted Penicillium brevi-compactum which grew slowly in 95% NH_3/5% CH_4. It is considered that these observations are significant with reference to the origin and current existence of microbial life on Jupiter.
(Author) F.R.L.

A65-23616 #
SPACE LABORATORY MISSION SIMULATION AND TEST IN A CLOSED ECOLOGICAL SYSTEM.
R. L. Batterton, K. H. Houghton, and T. C. Secord (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Santa Monica, Calif.).
IN: NEW DIMENSIONS IN SPACE TECHNOLOGY; SPACE CONGRESS, 2ND, COCOA BEACH, FLA., APRIL 5-7, 1965, PROCEEDINGS. [A65-23599 13-31]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Canaveral Council of Technical Societies, 1965, p. 235-255.

Facilitation of the design, development, and management of advance manned space systems through the use of mission simulation techniques. These techniques are being used in the space cabin simulator program which has been initiated at the Douglas Aircraft Co. The first phase of this program has recently been completed. In this phase, a four-man crew accomplished a 30-day mission while confined in a double-walled space chamber which duplicates projected space cabin conditions. This mission simulation was said to be quite successful in many respects. Some results of this phase are presented, and future phases of the program are discussed. (Author) D.H.

A65-23617 #
ACCELERATED PROCEDURE FOR DETERMINATION OF GAS-OFF PRODUCTS FROM SPACE CABIN MATERIALS.
Paul P. Mader and Gerald V. Colombo (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Life and Environmental Systems Branch, Santa Monica, Calif.).
IN: NEW DIMENSIONS IN SPACE TECHNOLOGY; SPACE CONGRESS, 2ND, COCOA BEACH, FLA., APRIL 5-7, 1965, PROCEEDINGS. [A65-23599 13-31]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Canaveral Council of Technical Societies, 1965, p. 256-268.

Description of a fast and accurate method for the empirical evaluation of the degassing characteristics of materials and supplies carried aboard a space capsule. The proposed procedure utilizes 72-liter flasks as reaction chambers. Materials to be tested were introduced into one group of flasks for a period of 30 to 60 days. The flasks were maintained under temperature, pressure, and lighting conditions expected to prevail within the spacecraft. Parallel experiments were conducted over a 24-hr period at a flask temperature of 120°F obtained by irradiation of the flask with mercury vapor lamps. At regular predetermined intervals the flask atmospheres were tested for outgassed contaminants by gas chromatography in conjunction with IR spectroscopy. Several examples of test results are presented. They indicate that different temperatures did not affect the reaction mechanism involved in the outgassing processes. The type of products which had outgassed remained the same; and, as expected, only the quantity of released products was higher at higher temperatures. (Author) D.H.

A65-23618 #
FACTORS AFFECTING THE THERMAL EQUILIBRIUM OF A SUBJECT IN THE APOLLO EXTRA-VEHICULAR MOBILITY UNIT.
Ronald Lang and Robert G. Syversen (United Aircraft Corp., Hamilton Standard Div., Space and Life Systems Dept., Windsor Locks, Conn.).
IN: NEW DIMENSIONS IN SPACE TECHNOLOGY; SPACE CONGRESS, 2ND, COCOA BEACH, FLA., APRIL 5-7, 1965, PROCEEDINGS. [A65-23599 13-31]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Canaveral Council of Technical Societies, 1965, p. 269-280. 6 refs.

Description of the Apollo pressure suit, the portable life support system, and the accompanying accessory garments used for meteoroid and thermal protection (collectively known as the Extra-vehicular Mobility Unit - EMU). The problem of thermal control during an Apollo mission is complex. Test subject thermal equilibrium must be maintained through a combination of active and passive control over a wide range of ambient conditions. This requirement has necessitated extension of the state of the art in several areas. A specific example is the use of a porous plate sublimator as a heat sink with automatic control of water feed rate as a function of heat load. Design of this component and of the water separator is complicated by the fact that they must operate in a zero- or one-sixth-gravity field. Manned testing, using liquid cooling, has defined thresholds for subject comfort levels. When used in conjunction with an optimized liquid flow, the Liquid Cooling Garment (LCG) has prevented sweating at peak loads of 500 kcal/hr without the physiological stresses associated with a gas-cooled system. The gas loop has been designed to provide those life support functions necessary to maintain the physiological well-being of a subject in lunar surface environments. Passive thermal control, employed as applied to the External Thermal Garment (ETG) and on the helmet visor, will provide adequate protection from the lunar thermal environment. D.H.

A65-23642 #
DESIGN REQUIREMENTS FOR MANNED ORBITAL AND LUNAR BASES.
J. T. Celentano and D. Amorelli (North American Aviation, Inc., Space and Information Systems Div., Life Sciences Dept., Downey, Calif.).
IN: NEW DIMENSIONS IN SPACE TECHNOLOGY; SPACE CONGRESS, 2ND, COCOA BEACH, FLA., APRIL 5-7, 1965, PROCEEDINGS. [A65-23599 13-31]
Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Canaveral Council of Technical Societies, 1965, p. 743-752. 15 refs.

Description of the essential habitability needs that allow man to perform for long periods of time. Satisfaction of his physiological needs is the prime requirement for assuring man's performance in a short-duration space mission. Many authorities feel that long-duration missions will require essentially only an increase in requirements proportional to the length of the mission, based upon short-term figures. On the other hand, it is stated that considerations regarding the most efficient use of man in an actual space environment presume that all of the environmental requirements for human existence have been provided. These needs can be satisfied through appropriate design requirements, established early in the developmental program, so that man can exist and operate satisfactorily in an orbital or lunar-base environment.
(Author) D.H.

A65-23773 #
ATMOSPHERIC OZONE AND SUPERSONIC AIRCRAFT OPERATIONS.
K. Langlo.
WMO Bulletin, vol. 14, Apr. 1965, p. 106-108.

Study of the pattern of concentration of atmospheric ozone, giving special attention to safeguards that may be necessary to protect the passengers and crew of SST's from the toxic effects of ozone. It can be concluded from data by Jaffe and Estes that the ozone concentration outside present jet aircraft at cruise altitudes is close to the maximum permissible value (0.1 ppm by volume in an 8-hr day); at SST cruise altitudes, it is five to ten times higher. It can be stated that provided supersonic aircraft are equipped with adequate filters to keep ozone concentrations below an acceptable limit, there will be no need to issue special ozone information for operational purposes. If the pressurization system of an aircraft permits a certain amount of ozone to enter the cabin, it may be necessary to know the concentration of ozone in the cabin during the flight at cruise altitude. Since the flight path at the cruise altitude will be determined by operational factors other than ozone concentration, it is considered most unlikely that anything more than average (climatological) ozone-concentration data will be required for operational purposes. D.H.

A65-23787
TARGET APPROACH IN BIOLOGICAL SYSTEMS.
R. Tomović (Belgrade, University, Faculty of Electrical Engineering, Belgrade, Yugoslavia) and R. Petrović (Institute for Automation and Telecommunications, Belgrade, Yugoslavia).
IEEE Transactions on Automatic Control, vol. AC-10, Jan. 1965, p. 22-27. 5 refs.

Analysis of specific features of target approach in biological systems, considering the design of automata with similar performances. The theoretical basis for design of servoarms is found in optimal control theory. Before the design stage, a theoretical study was made of the rendezvous problem, resulting in development of a control law and a synthesis procedure for the controller, yielding nearly optimal trajectories in real time with arbitrary position of the target in space. (Author) B.B.

A65-23840
SURVIVAL OF MICRO-ORGANISMS IN SPACE.
John Hotchin, Peter Lorenz, and Curtis Hemenway (Union University, Dudley Observatory; New York State Department of Health, Div. of Laboratories and Research; New York, State University, Albany, N.Y.).
Nature, vol. 206, May 1, 1965, p. 442-445. 20 refs.
Grant No. NsG 155-61.

Description of the first successful direct exposure of unprotected terrestrial microorganisms to the environment of space, and their recovery. The survivability of unprotected microorganisms had been merely conjectural hitherto; the subject is not academic as it involves fundamental questions concerning the spread of life throughout the universe. Two flight experiments are described, one using a rocket for short-term exposure at high altitude, and the other a balloon for longer exposure at lower altitude. The former carried a payload in the form of a micrometeorite collection device, containing samples of autoclaved nylon-re-enforced filter disks for the collection of microbes in flight, and also additional surfaces coated with dried preparations of various terrestrial microorganisms. The rocket exposure was about 233 sec in duration and it reached a height of 155 km. The balloon flight test was similar, except that the altitude varied from about 33.5 to 35 km during the exposure, which lasted approximately 6 hr. Results of the tests and interpretations of the data are given; some microorganisms survived in both tests, but the survival rate was higher for the balloon test. D.P.H.

A65-23841
EVIDENCE OF LIFE PROCESSES IN A SEDIMENT TWO AND A HALF BILLION YEARS OLD.
T. Belsky, R. B. Johns, E. D. McCarthy, A. L. Burlingame, W. Richter, and Melvin Calvin (California, University, Dept. of Chemistry, Lawrence Radiation Laboratory, and Space Sciences Laboratory, Berkeley, Calif.).
Nature, vol. 206, May 1, 1965, p. 446, 447. 21 refs.
AEC-supported research; Grant No. NsG 101-61.

Investigation for the purpose of determining whether the isoprenoid alkanes, which have been proposed as biogenetic indicators, when identified by chemical means, in the Soudan iron formation of Minnesota, the Antrim shale, and the San Joaquin oil, could be of biological origin. The isoprenoid alkanes have a high degree of "structural specificity," which is the criterion adopted when selecting an indicator of biogenesis. The Soudan Iron formation is dated by isotopic means as being not less than 2-1/2 billion years old, the Antrim shale about 265×10^6 years, and the San Joaquin oil about 30 million years. The hydrocarbon fraction from the Soudan shale was isolated and purified; the isoprenoid components were separated on a gas-liquid chromatography column and the structures of the collected samples were determined by mass spectrometry. A sample of Antrim shale and a sample of San Joaquin oil were analyzed and the isoprenoids were identified using the same techniques. The data obtained provide a reasonable basis for believing that indigenous hydrocarbons of Precambrian sediments are of biological origin and that the use of biological markers will prove a valid approach when isolating hydrocarbons from meteorites to determine if they are of biological origin.
D.P.F.

A65-23842
IS THE EARLY EVOLUTION OF LIFE RELATED TO THE DEVELOPMENT OF THE EARTH'S CORE?
Carl Sagan (Harvard University; Smithsonian Institution, Smithsonian Astrophysical Observatory, Cambridge, Mass.).
Nature, vol. 206, May 1, 1965, p. 448. 16 refs.

An investigation which attempts to show that even if the Earth's magnetic field was inconsequential in Archean times, the effect on the development of life on this planet would not have been deleterious and indeed may have been salutary, in open contradiction to Uffen's hypothesis. Biogenic organic matter and fossils of living organisms have been found in sediments dated as old as 2.0 to 2.8×10^9 years, and the existence of such relatively advanced organisms as colonial algae in this period strongly implies that the origin of life occurred considerably earlier than 3×10^9 years ago. In this absence of the geomagnetic field, the Earth will not be bathed in the solar proton flux because of atmospheric absorption; this is true for atmospheric pressures on the primitive Earth of as little as 10^{-2} atm. Therefore it seems likely that atmospheric attenuation would prevent any damage to prebiological or biological processes, and in any event organisms residing below the surface of the early waters could not have been affected. The penetration of the solar wind into the region of the tropopause suggests that this would facilitate the production of organic molecules, as a result of the effect of the proton bombardment on the primitive reducing atmosphere. D.P.F.

A65-23920
REGENERATIVE TECHNIQUES FOR CLOSED BIOLOGICAL SYSTEMS [REGENERATIONSMETHODEN BEI GESCHLOSSENEN BIOLOGISCHEN SYSTEMEN].
Karl Kammermeyer (Iowa, State University, Dept. of Chemical Engineering, Iowa City, Iowa).
(DECHEMA-Kolloquium, Frankfurt am Main, West Germany, June 26, 1964.)
Raumfahrtforschung, vol. 9, Apr.-June 1965, p. 91-95. 30 refs.
In German.

A discussion of regenerative methods for maintaining a normal atmosphere and conditions favorable for humans aboard spacecraft, including water recovery, removal of CO_2 and regeneration of O_2, removal of human wastes and their regeneration by biological and other recovery systems. The human functions of breathing, drinking and eating are discussed in terms of providing the raw materials for the recycling process; conditions for solid waste storage are described, as a suitable solution for missions of short duration. The regeneration of CO_2 by catalytic reduction is referred to, and CO_2 adsorption curves by activated charcoal are given. CO_2 regeneration by photolysis, pyrolysis, electrolytic alkali-metal methods, the Hydrier process, and the Sabatier process is also discussed. Water recovery from urine, using microwaves to speed up the evaporation time, and a polystyrene cell is described. The problem of the disposal of the solid wastes remaining after water recovery from urine is also discussed. D. P. F.

A65-23930
FATIGUE AND THE CONTROLLER.
John G. Wilson (Toronto Air Traffic Control Centre, Toronto, Canada).
The Controller, vol. 4, Jan. 1965, p. 14, 15.

Discussion of the effects of fatigue on the work of air traffic controllers. Causes of fatigue are identified as environmental, or related to the work itself, and personal, or related to internal stresses on the individual. When fatigue develops, motor responses suffer, careless attitudes are produced, actions tend to be based on habit rather than on the necessities of the situation, and all control factors may not be properly checked. It is considered that thorough training and competent supervision are the best methods of minimizing the effects of fatigue. F. R. L.

A65-24071
HUMAN RESPONSES TO SONIC BOOM.
Charles W. Nixon (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 36, May 1965, p. 399-405. 8 refs.

Consideration of the manner in which individuals and communities have responded to the sonic boom as revealed by data accumulated during the last several years by specific governmental and aviation agencies. The data are summarized in terms of the nature of human responses and the manner in which they occur, factors influencing acceptance of the boom, the possibility of physiological injury, psychological effects, and some reports of alleged minor damage to property and their relation to human reactions. (Author) M. M.

A65-24072
MOTION PERFORMANCE OF PRESSURE-SUITED SUBJECTS UNDER ZERO AND LUNAR GRAVITY CONDITIONS.
John C. Simons, Dieter E. Walk, and Charles W. Sears (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 36, May 1965, p. 406-414. 11 refs.

Investigation of the motions of unsuited and pressure-suited subjects while they performed lunging, egressing, and landing tasks during the weightless and lunar gravity maneuvers of a large cabin aircraft. Performance data are discussed for various combinations of clothing, gravity, and body-position conditions. Time and contact data are presented for the egress motion as it is influenced by changes in the exit diam. Motions of suited subjects generally required 30% more time than corresponding motions of unsuited subjects under both gravity levels. Most motions required 35% more time during zero-G than during lunar-G. No significant differences in egress time were found for four different body positions. Five inches of exit clearance improved egress time by 6%. Accuracy of motion rather than time of motion appeared to be a more sensitive measure of operator performance for the egress task. (Author) M. M.

A65-24073
OXYGEN CONSUMPTION DURING FLIGHT AT MODERATE G.
F. Vogt Lorentzen (Institute of Aviation Medicine, Oslo, Norway).
Aerospace Medicine, vol. 36, May 1965, p. 415-417. 5 refs.

Experimental determination of oxygen consumption during flying. It is noted that oxygen consumption during a strenuous flying program lasting for 6 to 8 minutes corresponded to about or somewhat higher than 300 kgm/min. The uptake was down to almost resting levels from 1 to 2 minutes after the G load, which might seem to be in contradiction to some other investigations. The difference can be explained by difference in duration and size of G and by the different methods used. (Author) M. M.

A65-24074
DISSOLVED NITROGEN AND BENDS IN OXYGEN-NITROGEN MIXTURES DURING EXERCISE AT DECREASED PRESSURES.
Eugene A. Degner, Kenneth G. Ikels, and Thomas H. Allen (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 36, May 1965, p. 418-425. 29 refs.

Experimental determination of the average intensity and duration of bends pains, by means of four types of simulated orbiting laboratory flights of 10 to 21 hours duration, involving 107 man-flights and 93 analyses of N_2 dissolved in blood. Generally bends occurred most often during transfer and reconnaissance. Once bends appeared, it re-occurred in subsequent flight stages. It is claimed that this can be avoided by sufficient breathing of O_2 so that blood N_2 falls to levels which are theoretically insufficient to provide enough N_2 molecules to form seed bubbles. On this basis, it can be predicted that missions in a pure O_2 environment require 120 minutes of O_2 breathing at 14.5 psia before decompression to 5 psia, and an additional 375 minutes before a second decompression to 3.5 psia. At that time, one could return to 5 psia O_2 or, preferably, to an O_2-N_2 ratio of 46 to 50 at 7 psia; the latter takes 33 minutes of O_2 breathing before reconnoitering at 3.5 psia. It is pointed out that, if pressure suits and locks operated successfully at 5 instead of 3.5 psia, O_2 breathing time could be saved, and the danger of bends avoided. (Author) M. M.

A65-24075
EFFECTS OF VARIABLE DECOMPRESSIONS TO 45,000 FEET.
Charles I. Barron and Thomas J. Cook (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).
(Airlines Medical Directors Association, Meeting, Miami Beach, Fla., May 9, 1964.)
Aerospace Medicine, vol. 36, May 1965, p. 425-430. 7 refs.
FAA Contract No. FA 3082.

Experimental determination of the effects of decompression from 8000 to 45,000 ft at rates of 5 to 38 sec on four civilian test pilots and four passenger subjects. Masks of several types currently in use in transport and business aircraft were worn or donned at varying intervals of exposure. Physiological measurements and cellular enzyme determinations were recorded in all tests, and performance and communication studies were conducted on the pilots. The results of the tests revealed the inability of subjects to complete all preset instructions. Extreme reactions of varying degree occurred in the three subjects exposed to 5-sec decompressions. Jerking movements occurred in two of the subjects who did not apply their masks for periods of 5 to 6 sec after reaching maximum altitude. Encephalographic changes, indicative of severe hypoxia, occurred in these cases from 16 to 40 sec after the start of decompression. Performance and communications were adversely affected in all pilots undergoing decompression without wearing a mask; however, enzyme changes were insignificant. The passengers had difficulty in applying the mask properly. The study confirmed the findings of other investigators in noting that, unless 100% oxygen was inspired within 5 to 7 sec after exposure to 45,000 ft, unconsciousness would occur at 13 to 16 sec. The test emphasized the necessity for wearing an oxygen mask during all rapid decompressions to 45,000 ft, and the desirability of improvement in oxygen-dispensing devices for passengers. (Author) M. M.

A65-24076
A NOVEL APPROACH TO MEASUREMENT OF MAN'S HEAT EXCHANGE WITH A COMPLEX RADIANT ENVIRONMENT.
A. P. Gagge, J. A. J. Stolwijk, and J. D. Hardy (Yale University, School of Medicine, John B. Pierce Foundation Laboratory and Dept. of Physiology, New Haven, Conn.).
Aerospace Medicine, vol. 36, May 1965, p. 431-435. 6 refs.
Research supported by the American Society of Heating, Refrigerating and Air-Conditioning Engineers; National Institutes of Health Grant No. OH-00179-01.

Experimental investigation whereby unclothed subjects in a sitting position were exposed to a variable source of thermal radiation (two 1500-watt quartz heaters). Ambient temperatures varied between 15°C and 32°C; air movement (less than 7 cm/sec) and relative humidity (less than 30%) were constant for all experiments. Total heat loss by evaporation was evaluated from a continuous record of the subjects' weight loss while resting on a sensitive platform scale. Two series of experiments were performed: (1) the change in evaporative loss with increasing heater wattage was observed, while the ambient temperature (T_a) was constant in the range 30 to 32°C; and (2) the subject was allowed to choose the heater wattage necessary for sense of comfort and thermal neutrality, while the ambient temperature varied over the range 15 to 30°C. From these two series, it can be shown: (1) a change in evaporative loss E corresponds to the radiant heat (H_r) absorbed by the body from the lamps; (2) the slope of the radiant heat (H_r) selected for comfort and neutrality when plotted against dropping ambient temperatures (T_a) is equal to the environmental constant, h. This constant describes how heat is lost by radiation plus convection from a skin surface at average temperature T_s to a uniform environment at temperature T_a. Thus, it is possible, by using the human body as a radiometer and as a null-point sensor of comfort-thermal neutrality, to describe quantitatively its heat exchange in a complex radiant environment and to evaluate the operative temperature. (Author) M.M.

A65-24077
VALIDITY OF FLIGHT BLOOD PRESSURE DATA.
James Roman (NASA, Flight Research Center, Edwards AFB, Calif.), James P. Henry (Southern California, University, School of Medicine, Dept. of Physiology, Los Angeles, Calif.; USAF, Systems Command, Aerospace Medical Div., Brooks AFB, Tex.), and John P. Meehan (Southern California, University, School of Medicine, Dept. of Physiology, Los Angeles, Calif.).
Aerospace Medicine, vol. 36, May 1965, p. 436-441. 11 refs.

Experimental investigation whereby one test subject was instrumented for arterial blood pressure (arterial catheter) and acoustic blood pressure (Korotkoff method) while piloting an F-100 jet fighter aircraft. The purpose of the experiment was to rule out gross errors in interpretation of the data obtained by an automatic instrument designed for flight and based on the Korotkoff method. The experiment showed that the automatic acoustic blood pressure device was, in this instance, sufficiently accurate for any of the applications in which such information is used, either clinically or in monitoring flight crews. The mean absolute error for both systolic and diastolic pressure was well below the mean respiratory variation in arterial blood pressure. (Author) M.M.

A65-24078
EFFECT OF EXTREMITY CUFF-TOURNIQUETS ON TILT TABLE TOLERANCE AFTER WATER IMMERSION.
Fred B. Vogt (Texas Institute for Rehabilitation and Research, Immobilization Study Unit, Houston, Tex.).
Aerospace Medicine, vol. 36, May 1965, p. 442-447. 31 refs.
NASA-sponsored research.

Experimental investigation of the tilt-table intolerance of four healthy adult young males in two water-immersion tests of 6-hours duration, in an effort to reproduce a previous study reporting a protective effect from cuff-tourniquets applied to the extremities during immersion. Body weight, fluid intake, urine output, and leg circumference measurements were made and recorded. After the first period of six hours of water immersion, three of the four subjects experienced syncope during a tilt-table test. Compared to pre-immersion tilt tests, all subjects experienced marked changes in heart rate or blood pressure during tilting after immersion. A significant diuresis was not noted. During the second period of immersion, cuff-tourniquets were applied to the four extremities and inflated to a pressure of 60 mm Hg, with a cycle of 1 min on, 1 min off. Some degree of protection against tilt-table intolerance after immersion was provided in the test; none of the three subjects experienced syncope or showed the marked blood pressure changes they had shown on the previous immersion test without cuffs. (Author) M.M.

A65-24079
STUDY OF EFFECT OF WATER IMMERSION ON HEALTHY ADULT MALE SUBJECTS - PLASMA VOLUME AND FLUID-ELECTROLYTE CHANGES.
Fred B. Vogt and Philip C. Johnson (Texas Institute for Rehabilitation and Research, Immobilization Study Unit; Baylor University, College of Medicine, Dept. of Rehabilitation and Dept. of Medicine; Methodist Hospital, Houston, Tex.).
Aerospace Medicine, vol. 36, May 1965, p. 447-451. 27 refs.
NASA-sponsored research.

Experimental investigation of four healthy adult males during two water-immersion experiments of 6-hours duration. During the second experiment, cuff-tourniquets were applied to all four extremities of each subject to test the effect in preventing or lessening the cardiovascular deconditioning associated with water immersion. The use of the cuff-tourniquets was found to be partially effective. Repeated plasma volume, hemoglobin, hematocrit and serum sodium, potassium, osmolarity, and protein determinations were performed and are reported. Measurements of fluid intake, urine output, and body weight are reported. An increased transfer rate of intravascular protein as well as of fluid and electrolytes into the extravascular compartment is suggested as one of the possible factors responsible for the symptoms observed during tilt-table tests after water immersion. (Author) M.M.

A65-24080
RESISTANCE TO MOTION SICKNESS THROUGH REPEATED EXPOSURE TO CORIOLIS STIMULATION.
Patrick J. Dowd (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aeromedical Indoctrination Branch, Vestibular Unit, Brooks AFB, Tex.).
Aerospace Medicine, vol. 36, May 1965, p. 452-455. 18 refs.

Discussion of information of a method of repeated self-induced Coriolis stimulation, using four conditions: chair tilt, head movements in the lateral plane, head movements in both lateral and frontal planes, and head movements only in the frontal plane, on the SAM biaxial stimulator. The subject, an Air Force Academy cadet, senior class, was evaluated for vestibular sensitivity after several incidents of motion sickness during flight training on the T-37 aircraft. Final testing after completion of this programed self-induced Coriolis stimulation indicated a resistance to motion sickness as determined from general autonomic reactions and data analysis of electronystagmograms. It is noted that the subject completed his solo-flight training on the T-37 aircraft without any report of motion sickness. (Author) M.M.

A65-24081
EFFECT OF CHANGING RESULTANT LINEAR ACCELERATION RELATIVE TO THE SUBJECT ON NYSTAGMUS GENERATED BY ANGULAR ACCELERATION.
Martin P. Lansberg (National Aeromedical Center, Soesterberg, Netherlands), Fred E. Guedry, Jr., and Ashton Graybiel (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).
Aerospace Medicine, vol. 36, May 1965, p. 456-460. 27 refs.
NASA-sponsored research.

Investigation of the effect of centripetal acceleration on nystagmus 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 deg/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. The results are discussed in terms of otolith modulation of sensory input from the semicircular canals. (Author) M.M.

A65-24082
DISTURBANCE OF OCULOMOTOR CONTROL IN FLIGHT.
G. Melvill Jones (McGill University, Dept. of Physiology, Defence Research Board Aviation Medical Research Unit, Montreal, Canada). (International Congress of Aviation and Space Medicine, 13th, Dublin, Ireland, Sept. 1964.)
Aerospace Medicine, vol. 36, May 1965, p. 461-465. 18 refs.

Consideration of an overall analysis of the physiological processes contributing to stabilization of the retinal image, which reveals four main sensory and three main motor information channels. The three motor outputs operate on three discrete anatomical platforms described as the eye-in-skull, the skull-on-body, and the body-in-space. Probably all of these are used in everyday life, although apparently different species of animals preferentially employed different platforms. Detailed consideration of the visual tracking and vestibulo-ocular mechanisms discloses a number of limitations imposed on the overall system by the flight environment. Specifically, those here considered are the limited-frequency response of visual tracking, virtual absence of visual tracking in the roll plane, the vestibular errors introduced by prolonged turning, and the predominance of an anticompensatory vestibulo-ocular response during rapid head rotation. (Author) M. M.

A65-24097
CIVIL AVIATION AND CONTACT LENSES.
Robert L. Wick, Jr. (Garrett Corp., Los Angeles, Calif.).
Air Line Pilot, vol. 34, May 1965, p. 8-11, 18. 11 refs.

Analysis of problems involved with a pilot's wearing of corneal contact lenses while flying an aircraft. Those who wear helmets, goggles, and oxygen masks would have none of the interference caused by spectacles, and pilots with aphakia, severe astigmatism, or a high degree of myopia would attain better vision than they could ever enjoy with spectacles. However, a contact lens can become displaced on the eye, or fall completely away. Severe pain can result from trapping of a foreign body under the lens, and it may be difficult to remove; the eye could be badly injured under such conditions. Nevertheless, most of a group of 100 ophthalmologist-pilots believe that contact lens use should be permitted for commercial and airline pilots. It is concluded that the present FAA policy on contact lens use is probably too conservative and should be changed. B.B.

A65-24146 #
THE AIR FORCE AVIONICS LABORATORY "IN-HOUSE" BIONICS RESEARCH PROGRAM.
Harry B. Kirkpatrick and Donald J. Boaz (USAF, Systems Command, Research and Technology Div., Avionics Laboratory, Bionics Branch, Wright-Patterson AFB, Ohio).
IN: NATIONAL AEROSPACE ELECTRONICS CONFERENCE, DAYTON, OHIO, MAY 11-13, 1964, PROCEEDINGS. [A65-24101 13-09]
Conference sponsored by the Professional Group on Aerospace and Navigational Electronics, Dayton Section of the Institute of Electrical and Electronics Engineers, and American Institute of Aeronautics and Astronautics.
Dayton, Institute of Electrical and Electronics Engineers, Dayton Section, 1964, p. 372-374.

Review of some work on the application of functional principles derived from biological systems to the solution of engineering problems (bionics). Emphasis is on adaptive property-filtering and decision-making, as typified by the activities of the brain. The development of "Artron" devices and of "Adaptive Sandwiches" for studying learning processes is discussed, as is the use of chemical systems as microscale switching networks. Other possible random-switching micro-networks noted are dislocation networks in crystals and dispersions of carbon black in hydrocarbon media. P.K.

A65-24147 #
A COMPUTER-AIDED INSTRUMENTATION SYSTEM FOR STUDIES IN TACTUAL PERCEPTION.
James C. Bliss and Hewitt D. Crane (Stanford Research Institute, Menlo Park, Calif.).
IN: NATIONAL AEROSPACE ELECTRONICS CONFERENCE, DAYTON, OHIO, MAY 11-13, 1964, PROCEEDINGS. [A65-24101 13-09]
Conference sponsored by the Professional Group on Aerospace and Navigational Electronics, Dayton Section of the Institute of Electrical and Electronics Engineers, and American Institute of Aeronautics and Astronautics.
Dayton, Institute of Electrical and Electronics Engineers, Dayton Section, 1964, p. 375-384. 9 refs.
Research supported by the National Institutes of Health, USAF, and NASA.

Description of a system for studying the human perception of spatial-temporal patterns displayed tactually. The system consists of a small digital computer, an array of airjet tactile stimulators, and associated electronic equipment. It can (1) present tactual patterns consisting of up to 96 stimulators according to several scan routines, (2) present a number of patterns in sequential order, and (3) record and tabulate the subject's responses. The results of some initial experiments on tactual pattern perception are described. (Author) P.K.

A65-24193
COMPRESSION OF BIOASTRONAUTICAL DATA.
H. H. Germond (Pan American World Airways, Inc., Guided Missiles Range Div., Patrick AFB, Fla.).
IN: NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 13-15, 1965, PROCEEDINGS. [A65-24191 13-07]
Conference sponsored by the Instrument Society of America, American Institute of Aeronautics and Astronautics, and Institute of Electrical and Electronics Engineers.
Edited by Lewis Winner.
New York, Lewis Winner, 1965, p. 17-24. 21 refs.

Description of a procedure for the compression of telemetered EEG data which have been received by a down-range site from a spacecraft and are to be transmitted back to a monitoring or control center. Moving-average bandpass filters are used to analyze the spectral distribution of the brain wave activity into the five classifications and frequency ranges commonly used in EEG studies. These data, transmitted at intervals, are displayed for the observation of a medical monitor. The actual EEG's would be transmitted less frequently, and possibly only on request of the monitor. Possible moving-average filters are analyzed, and spectrograms obtained and analyzed using the technique are described. The use of the method as a monitoring device, to warn of departures from the general profile of a normal alert spectrogram, is discussed. P.K.

A65-24200
APPLICATION OF TELEMETRY TECHNIQUES TO HARD LINE TRANSMISSION OF BIOMEDICAL INFORMATION ON THE 50-FOOT HUMAN CENTRIFUGE.
M. Freed (U.S. Naval Air Development Center, Johnsville, Pa.).
IN: NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 13-15, 1965, PROCEEDINGS. [A65-24191 13-07]
Conference sponsored by the Instrument Society of America, American Institute of Aeronautics and Astronautics, and Institute of Electrical and Electronics Engineers.
Edited by Lewis Winner.
New York, Lewis Winner, 1965, p. 56-58.

Description of procedures for transmitting biomedical data obtained in simulation studies with a 50-ft human centrifuge. A signal-conditioning system using small solid-state operational amplifiers is described, and data acquisition and reduction techniques are reviewed. Among the procedures discussed are those used in simulations of the Gemini flight. P.K.

A65-24201
AN OPERATIONAL PORTABLE BIOMEDICAL MONITORING SYSTEM.
D. G. Simons and W. E. Prather (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
IN: NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 13-15, 1965, PROCEEDINGS. [A65-24191 13-07]

Conference sponsored by the Instrument Society of America, American Institute of Aeronautics and Astronautics, and Institute of Electrical and Electronics Engineers.
Edited by Lewis Winner.
New York, Lewis Winner, 1965, p. 59-64. 21 refs.

Description of a portable biomedical monitoring system for determining the response patterns which identify changes in the arousal of the central nervous system under aerospace flight stresses. The five-channel personalized radio-telemetry unit transmits respiration, ratio of base skin resistance and galvanic skin response, blood pressure, EKG and EEG. The analog data are recorded in a form that facilitates processing with a general-purpose, high-speed digital computer. P. K.

A65-24202
TELUS - TELEMETRIC UNIVERSAL SENSOR FOR SPACE AND TERRESTRIAL APPLICATIONS.
W. G. Glenn and W. E. Prather (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
IN: NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 13-15, 1965, PROCEEDINGS. [A65-24191 13-07]
Conference sponsored by the Instrument Society of America, American Institute of Aeronautics and Astronautics, and Institute of Electrical and Electronics Engineers.
Edited by Lewis Winner.
New York, Lewis Winner, 1965, p. 65-67. 6 refs.

Description of a Telemetric Universal Sensor (TELUS) for monitoring electrical or electromagnetic outputs from field-sensing instruments. The TELUS quantitates these data into readout instruments while simultaneously distributing the data signals to other laboratories. A four-channel input TELUS system is described which accepts electrical and electromagnetic signals and distributes and tapes the output while displaying it simultaneously on a dual oscilloscope and a strip-chart recorder. The system was designed and developed entirely from commercial components. P. K.

A65-24203
BIOMEDICAL DATA COMPRESSION.
D. F. Specht and P. E. Drapkin (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
IN: NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 13-15, 1965, PROCEEDINGS. [A65-24191 13-07]
Conference sponsored by the Instrument Society of America, American Institute of Aeronautics and Astronautics, and Institute of Electrical and Electronics Engineers.
Edited by Lewis Winner.
New York, Lewis Winner, 1965, p. 68-74.

Description of redundancy-reduction techniques for reducing the bandwidth of biomedical data. Two techniques are discussed. The first, polynomial curve fitting, is a general technique applicable to all kinds of data. It provides compression ratios as high as 30 to 1, requires simple instrumentation, and can serve as the basis for a general-purpose data compressor for all measurements in a vehicle. Each biomedical measurement would require only one memory-storage location. The second technique, called cycle-to-cycle redundancy reduction, is applicable only to repetitive waveforms such as EKG. However, it provides compression ratios as high as 1800 to 1. This system requires additional hardware as well as the use of additional memory locations in the general-purpose data compressor. (Author) P. K.

A65-24224 #
SPACECRAFT STERILIZATION STANDARDS AND CONTAMINATION OF MARS.
Carl Sagan (Harvard University; Smithsonian Institution, Smithsonian Astrophysical Observatory, Cambridge, Mass.) and Sidney Coleman (Harvard University, Lyman Laboratory of Physics, Cambridge, Mass.).
Astronautics and Aeronautics, vol. 3, May 1965, p. 22-27.

Description of a procedure for calculating the level of spacecraft sterility required to avoid the biological contamination of Mars by an entry vehicle. To avoid contamination, it is necessary that the number of viable micro-organisms, σ, deposited on the surface of Mars by each entry spacecraft be kept at a low value. A probability p, close to unity, is specified that N biological experiments are performed on Mars before biological contamination occurs. Using standard probability techniques, it is found that $p = 0.999$ and $N = 10^3$ can be achieved for $\sim 2 \times 10^{-4}$. P. K.

A65-24296 #
A PROTEINOGRAM OF BLOOD SERUM DURING CHRONIC X-RAY IRRADIATION [PROTEINOGRAMMA SYVOROTKI KROVI PRI KHRONICHESKOM RENTGENOVSKOM OBLUCHENII].
K. V. Fomichenko and N. A. Dis'ko (Akademiia Nauk Belorusskoi SSR, Institut Fiziologii, Laboratoriia Biokhimii; Belorusskii Gosudarstvennyi Universitet, Minsk, Belorussian SSR).
Akademiia Nauk BSSR, Doklady, vol. 9, Mar. 1965, p. 199-201.
8 refs. In Russian.

Investigation of the effect of chronic X-ray irradiation on the protein composition of the blood serum of white rats exposed to an irradiation dose of 760 r for one month. Chronic irradiation is seen to be accompanied by considerable changes in the electrophoretic picture of the serum proteins, these changes manifesting themselves mainly in a decrease in the relative quantity of albumins and an increase in the γ-globulin level. The observed changes are found to be of persistent nature, since they do not disappear even three months after irradiation. A. B. K.

A65-24390 #
APOLLO PORTABLE LIFE-SUPPORT SYSTEM - DEVELOPMENT STATUS.
William C. Kincaid (NASA, Manned Spacecraft Center, Crew Systems Div., Apollo Portable Life Support Systems Office, Houston, Tex.).
American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-45. 6 p.
Members, $0.50; nonmembers, $1.00.

Description of a major change in the basic design of the Apollo spacesuit assembly to include a personal liquid-cooling approach developed at the British Royal Aircraft Establishment (Farnsborough, England). The primary purpose of the portable life-support system (PLSS) is to condition and replenish the atmosphere inside the spacesuit; it maintains oxygen pressure at 3.7 ± 0.2 psia and controls temperature, carbon dioxide, odor, and moisture levels inside the suit, for average metabolic rates of 1200 to 1600 Btu/hr and short-term peaks of up to 2000 Btu/hr. Each of the two PLSS units carried to the lunar surface is rechargeable from spacecraft supplies to permit multiple excursions. The system is designed to operate for periods of up to 4 hr without recharging, with 3 hr for nominal excursion and 1 hr reserved for contingency operations. The original PLSS design relied entirely upon gas cooling (oxygen at flow rates of 15 to 17 actual ft^3/min) to absorb metabolic and external heat loads. This reliance on evaporative cooling produces high rates of perspiration which, although tolerable, impose serious thermal discomfort, reducing performance efficiency at a time when the mental and physical faculties are most needed. Moreover, if the lost water is not replaced dehydration can result, and the soaked skin becomes susceptible to maceration and bacterial infection. There are also such physical discomforts as thirst, perspiration in the eyes, etc. The modified PLSS retains the gas ventilation loop at greatly reduced flow rates and incorporates a liquid pump, heat exchanger, and associated controls. Details of the design are described and the performance capabilities are discussed. The advantages of the liquid concept are outlined particularly as it affects system weight, volume, and thermal capacity. W. M. R.

A65-24391 #
DEVELOPMENT STATUS OF A PROTOTYPE INTEGRATED REGENERABLE LIFE-SUPPORT SYSTEM.
R. C. Armstrong, G. L. Drake, and J. R. Burnett (General Dynamics Corp., General Dynamics/Astronautics, San Diego, Calif.).

American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-25. 14 p. 30 refs.
Members, $0.50; nonmembers, $1.00.

Description of the development status at the three-quarter mark of a regenerable life-support system currently in preparation for an integrated-systems test in a two-compartment test bed. The prototype system is an advanced design compatible with zero-g operation, employs physical-chemical processes, including oxygen and water regeneration, and is sized to sustain a four-man crew during ground simulation of extended space flights. At the conclusion of the 18th month of the program (December 1, 1964), subsystem bench test was complete, system assembly 90% complete, and installed subsystem checkout approximately 40% complete. At this point in the program, all of the functions required in atmospheric control, thermal control, and nutrition and hygiene have been achieved and demonstrated. The major portion of the problems experienced to date have been associated with process efficiencies and, to a lesser degree, apparent life limitations with some of the newly developed elements. Fully integrated testing is scheduled for completion during the first quarter of 1965. W.M.R.

A65-24446 #
A PRELIMINARY APPRAISAL OF THE CORNUCOPIA CONCEPT.
C. J. Swet (Johns Hopkins University, Applied Physics Laboratory, Space Development Div., Silver Spring, Md.).
(American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-213.)
Journal of Spacecraft and Rockets, vol. 2, May-June 1965, p. 431-436. 9 refs.

A65-24447 #
TOLERANCE TO VEHICLE ROTATION OF SUBJECTS USING TURNING AND NODDING MOTION OF THE HEAD WHILE PERFORMING SIMPLE TASKS.
Ralph W. Stone, Jr. and William Letko (NASA, Langley Research Center, Space Mechanics Div., Hampton, Va.).
(American Institute of Aeronautics and Astronautics, Annual Meeting, 1st, Washington, D.C., June 29-July 2, 1964, Paper 64-218.)
Journal of Spacecraft and Rockets, vol. 2, May-June 1965, p. 437-442. 7 refs.

A65-24457 #
THERMAL VAPORIZATION FOR RECOVERY OF WATER FROM URINE.
J. A. Denzel and George Thodos (Northwestern University, Evanston, Ill.).
Journal of Spacecraft and Rockets, vol. 2, May-June 1965, p. 460, 461.

Description of an experimental unit for the continuous vaporization of water from urine without boiling followed by the direct condensation of the vapors produced. The inability of the vapor and liquid to separate out in a zero gravity field limits the possible use of direct boiling for water recovery in space. The experimental vaporizer was operated at a temperature somewhat lower than ambient but, of course, higher than that of the condenser. A mechanical forepump evacuated the system to remove noncondensable gases. The recovered water was clear but possessed an odor that was still characteristic of urine. A small quantity of carbon black was found effective in eliminating the odor. The pH of the untreated water varied with each run from 7.95 to 9.65. After treatment with activated charcoal, the pH approached 9.65 in all cases. W.M.R.

A65-24779
GEOELECTRIC EFFECT AND GEOTROPIC CURVATURE.
R. R. Dedolph, J. J. Breen, and S. A. Gordon (Argonne National Laboratory, Div. of Biological and Medical Research, Argonne, Ill.).
Science, vol. 148, May 21, 1965, p. 1100, 1101. 8 refs.
NASA-supported research.

Study of a transverse electrical potential which develops in many plant organs after they are changed from a vertical to a horizontal position. This factor has been the basis not only for a geoelectric hypothesis of geotropic curvature but also for its later refutation. A causal relationship has been assumed in both arguments between the potential and curvature. However, curvature and potential can occur independently, so it is concluded that both the hypothesis and its refutation are erroneous. (Author) B.B.

A65-24831
FUNCTIONAL RELATION BETWEEN STIMULUS INTENSITY AND PHOTICALLY EVOKED CEREBRAL RESPONSES IN MAN.
Herbert G. Vaughan, Jr. and Richard C. Hull (Massachusetts Institute of Technology, Dept. of Psychology, Cambridge, Mass.).
Nature, vol. 206, May 15, 1965, p. 720-722. 13 refs.
Research supported by the Hartford and Rockefeller Foundations; National Institutes of Health Grants No. MH-06723-02; No. NB 03356-03; Grants No. NsG 496; No. AF AFOSR 354-63; U.S. Public Health Service Grant No. M-5673.

Experimental investigation of the possibility that latency of human visual evoked response (VER) might serve as an objective index of brightness perception. It is known that cerebral responses produced by discrete photic stimuli may be reliably recorded through the intact skull by summation or averaging techniques. Summed VER's to 10-μsec stimuli subtending a nominal visual angle of approximately 4° were recorded from three normal adult subjects. The EEG's were recorded from subdermal needle electrodes, and VER's were recorded consisting of complex wave forms. The transformations of latency, amplitude, and configuration of the component wave forms under varying stimulus intensity are discussed in some detail. It is concluded that an expression, which is presented, satisfactorily depicts the psychophysical relation between stimulus luminance and subjective brightness over the range within which reliable measurement of VER latency may be made. F.R.L.

A65-25030 #
SPACE LABORATORY INTEGRATED LIFE-SUPPORT SYSTEMS - ENGINEERING AND DEVELOPMENT TESTS.
D. E. Havens and T. C. Secord (Douglas Aircraft Co., Missile and Space Systems Div., Advance Biotechnology Dept., Santa Monica, Calif.).
American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-19. 15 p. 14 refs.
Members, $0.50; nonmembers, $1.00.
Research supported by the Douglas Independent Research and Development Program.

Description of what is reputed to be one of the most realistic space cabin simulators yet devised to test advanced life-support subsystems for future manned spacecraft. A specially constructed double-walled space chamber which duplicates space-cabin conditions was used to evaluate the performance of integrated life-support subsystems that will be used in future manned space laboratories and vehicles. Advance life-support subsystems including a regenerative CO_2-removal unit, toxin burner, zero-g humidity and temperature-control system, commode, and other life-support equipment were installed in the space-cabin simulator and operated by a four-man crew. The crew was included in the tests to obtain realistic life support-system performance and to evaluate crew repair, maintenance, and operational requirements for advance life-support subsystems under space-laboratory conditions. The results of the engineering development and test program are used to upgrade equipment and methods, including a specially designed generalized life-support computer program that will be usable for future subsystem design, optimization, and design specifications. (Author) W.M.R.

A65-25075
THE THERMOSTAT IN MAN. II [DER THERMOSTAT IM MENSCHEN. II].
Theodor Benzinger (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.).
Bild der Wissenschaft, vol. 2, Mar. 1965, p. 232-240. In German.

Discussion of the physiological temperature-control mechanism of the human body, lately located after a long search in the front section of the hypothalamus. This center, discovered as early as 1884 and believed to perform the function of a nerve-pulse switch, is found to be actually the "temperature eye" of the organism, an organ of sense as the retina of the eye is for light. A survey of the experimental studies which led to this result and a description of the functions of the temperature-controlling "thermostat in man" are given. V. Z.

A65-25097 #

RESULTS OF AN INVESTIGATION OF THE BIOLOGICAL EFFECTIVENESS OF SEVERAL SPACE-FLIGHT FACTORS [REZUL'TATY ISSLEDOVANIIA BIOLOGICHESKOI EFFEKTIVNOSTI RIADA FAKTOROV KOSMICHESKOGO POLETA].

V. V. Parin, V. V. Antipov, B. I. Davydov, E. F. Panchenkova, G. A. Chernov, and A. I. Nesterenko.

(Mezhdunarodnyi Astronavticheskii Kongress, 15th, Warsaw, Poland, Sept. 7-Oct. 12, 1964.)
Kosmicheskie Issledovaniia, vol. 3, Mar.-Apr. 1965, p. 315-324. 43 refs. In Russian.

Experimental data on the biological effectiveness of vibration, acceleration, and γ radiation and of the combined effect of radiation and the dynamic flight factors. The serotonin and ceruloplasmin levels were measured in the blood of mice, rats, guinea pigs, dogs, and monkeys before and after exposure. Serotonin (5-hydroxytryptamine) is known to play an important role in metabolism and in the regulation of the autonomic nervous system, and strongly affects the tonus of the smooth musculature; it increases the resistance of an organism to hypoxia, a common result of ionizing radiation. Ceruloplasmin, a cupriferous enzyme, exhibits oxidase activity toward serotonin and several other amines, among them histamine and adrenalin. The experimental results suggest that assays of serotonin and ceruloplasmin alone can provide a sensitive test of the compensatory-adaptive state of an organism under the various stresses of the space environment. W. M. R.

A65-25098 #

BIOLOGICAL EFFECT OF COSMIC RADIATION IN EXPERIMENTS MODELING AN EARTH-MOON TRAJECTORY UNDER CONDITIONS OF A SOLAR FLARE [BIOLOGICHESKOE DEISTVIE KOSMICHESKOI RADIATSII V USLOVIIAKH VOZNIKNOVENIIA SOLNECHNYKH VSPYSHEK NA TRASSE ZEMLIA-LUNA V MODEL'NYKH EKSPERIMENTAKH].

V. S. Morozov, V. V. Antipov, B. I. Davydov, N. N. Dobrov, P. P. Saksonov, and V. S. Shashkov.

Kosmicheskie Issledovaniia, vol. 3, Mar.-Apr. 1965, p. 325-329. 10 refs. In Russian.

Statement of the requirement and the possibilities of estimating the biological effect of ionizing radiation through a scale-model of the environment to be encountered on a lunar mission. Preliminary results are given of experiments with 80 white male mice of no particular breed exposed to various doses of Co-60 radiation for periods of 7 to 10 days under conditions of vibration, heavy g-loading, confinement, and alteration of the atmosphere. W. M. R.

A65-25099 #

CHAMBER SIMULATING MARTIAN CONDITIONS FOR MICROBIOLOGICAL INVESTIGATIONS [KAMERA, IMITIRUIUSHCHAIA USLOVIIA MARSA, DLIA MIKROBIOLOGICHESKIKH ISSLEDOVANII].

A. I. Zhukova and I. I. Kondrat'ev.

Kosmicheskie Issledovaniia, vol. 3, Mar.-Apr. 1965, p. 330-333. 6 refs. In Russian.

Description of a chamber (100 x 150 x 180 cm) and the electrical circuit used to simulate the environment on Mars (temperature drop from -30 to -60°C; composition of the atmosphere 95.5% N, 0.25% CO_2, 0.25% Ar) with the exception of the gravitational, magnetic-field, and charged-particle-radiation effects. Preliminary observations of the growth of various cultures of fungi and bacteria (Aspergillus niger, Mucor plumbeus, Strain 1339, Micrococcus aurantiacus, Bacillus subtilis, etc.) in the chamber are reported. W. M. R.

A65-25180

HUMAN INFORMATION-PROCESSING CONCEPTS FOR SYSTEM ENGINEERS.

Richard W. Pew (Michigan, University, Dept. of Psychology, Human Performance Center, Ann Arbor, Mich.).

IN: SYSTEM ENGINEERING HANDBOOK.
Edited by R. E. Machol, W. P. Tanner, Jr., and S. N. Alexander. New York, McGraw-Hill Book Co., 1965, p. 31-3 to 31-19. 49 refs. Contract No. AF 49(638)-1235.

An investigation of a point of view or philosophy for including human operators in systems and some applications of this viewpoint. Recent developments in the study of human performance and the accumulating experience of human-factors designers suggest that an important unifying concept for the design of man-machine systems lies in the view of man as a single-channel, limited-transmission-capacity, information-processing system. This view regards man as an information channel in the cybernetic sense rather than as an energy converter or power supply. The human information-processing system has been broken down into four subsystems: read-in, memory or storage, information processing or decision making, and read-out. These four human subsystems are analyzed, followed by a discussion of integrated system operation. Human capabilities are discussed in terms of system requirements and concepts. D. P. F.

A65-25202

DESCRIPTION OF THE HUMAN OPERATOR IN CONTROL SYSTEMS.

George A. Bekey (Southern California, University, Electrical Engineering Dept., Los Angeles, Calif.).

IN: MODERN CONTROL SYSTEMS THEORY.
Edited by C. T. Leondes.
New York, McGraw-Hill Book Co., 1965, p. 431-462. 38 refs.

Mathematical description of the input-output behavior of a human operator acting as an element in a closed-loop control system. The characteristics of the human operator in a control system are defined. Quasi-linear continuous models and sampled-data models with random inputs are considered, using the techniques of Fourier analysis and spectral analysis. An experiment showing how the parameters of the models were obtained and comparing the performances of the models and the human operator is described. The use of model-matching techniques, in which the model parameters are adjusted until an adequate match between the behaviors of the model and the system is achieved, is illustrated in the case of continuous model-matching and model-matching with orthogonal filters. A. B. K.

LC ENTRIES

A65-81089
LIGHT SENSITIVITY IN BIOLOGICAL SYSTEMS. PHOTOTOXICITY AND PHOTOALLERGY RELATED TO VISIBLE LIGHT.
Rudolf L. Baer and Leonard C. Harber (N.Y.U. School of Med., New York City).
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement No. 14), p. S-15–S-21. 33 refs.
Contract DA-49-193-MD-2275.

Three major categories of photobiological reactions to long ultraviolet and visible light are described: (1) reactions after topically applied or symmetrically administered small molecular weight photosensitizers contained in certain drugs, household substances and agents used in manufacturing processes; (2) reactions due to the photosensitizing effect of endogenous substances; and (3) reactions due to allergic sensitization to autologous substances formed or released upon exposure to visible light. The mechanism of action in photosensitivity may be phototoxic or photoallergic. The experiments showed that the lethal photobiological effect on certain plants could be significantly inhibited by the presence of cysteine, but not cystine.

A65-81090
BIOLOGICAL SENSITIVITY TO RADIO-FREQUENCY AND MICROWAVE ENERGY.
Sven A. Bach (U.S. Army Med. Res. Lab., Fort Knox, Ky.)
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-22–S-26. 8 refs.

Three possible mechanisms of interaction of radiofrequency (rf) and microwave energy with the biologic target were considered. First, thermal effects—Regardless of mechanism, factors influencing the absorption of energy are the radiation pattern, the frequency, and polarization of the radiation; the size, shape, orientation, electrical characteristics; and anatomic arrangement of the target. This makes even a thermal interaction a rather complicated problem for assessment. A second possible mechanism is demodulation of pulsed signals within various organs and tissue because of the electrical nonlinearity of certain regions of the body, particularly the brain and spinal cord. A third mechanism yet to be proven might be termed molecular. Certain bacterial exotoxins have been attentuated by rf energy. The endotoxin of Salmonella typhosa has been enhanced in its physiological effect by exposure to rf energy, and human gamma globulins have been altered in their electrophoretic and antigenic properties. Recently, the enzyme alpha amylase has been deactivated to a great degree by frequencies around 12 Mc/second.

A65-81091
LASERS AND MASERS—HEALTH HAZARDS AND THEIR CONTROL.
Roswell G. Daniels and Bernard Goldstein (Dept. of Army, Office of Surg. Gen., Washington, D. C.)
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-27–S-30. 14 refs.

The biological effects of laser radiation can be divided into two categories: general effects on all tissues and organ-specific responses, such as applied to the eye. The general effects include pigmentation of tissues, vascularity of blood circulation (acting as homeostatic mechanism for temperature maintenance), and spectral absorption of energy. The most relevant factors concerning the eye are: (1) pupil size, (2) convergence power of cornea and lens, (3) distance from lens to retina, and (4) attenuation of energy transmitted through the eye to the retina. The possible biological damage depends upon specific characteristics of a particular beam. In order to control any possible radiation hazards it is necessary to determine a threshold level for each factor, which would give an acceptable level of exposure without resultant physiological loss or pathology. In addition to dose-response relationship, the assessment of variables influencing these hazards are necessary, such as the manner of handling lasers in the laboratory.

A65-81092
INTERACTION OF LASER RADIATION WITH BIOLOGIC SYSTEMS. I. STUDIES ON INTERACTION WITH TISSUES.
S. Fine, E. Klein, W. Nowak, R. E. Scott, Y. Laor, L. Simpson, J. Crissey, J. Donoghue, and Y. E. Derr Northeastern U., Boston, Mass.; Roswell Park Mem. Inst., Buffalo, N. Y.; and Martin Co., Orlando, Fla.)
Federation Proceedings, vol. 24, Jan.–Feb. 1965, (Supplement no. 14), p. S-35–S-45. 24 refs.
Contracts DA-49-193-MD-2436; DA-49-193-MD-2437.

Studies on interaction of laser radiation with body tissues were carried out at wavelengths between 6934 A and 6943 A with ruby laser units and at 10 600 A with neodymium-in-glass units. Normal animals were used including hamsters, mice, and monkeys. Skin flaps and single cells were also used. The purpose of the studies was: (1) elucidation regarding the nature of interaction of laser radiation and biological systems; (2) determination of short- and long-term effects of interaction of laser radiation with skin and underlying normal and tumor tissue; (3) determination of thresholds for gross and histological changes; (4) study of biological pigments as factors in the interaction; and (5) evaluation of short- and long-term hazards associated with laser radiation.

A65-81093
LASER VERSUS LIGHT COAGULATOR: A FUNDUSCOPIC AND HISTOLOGIC STUDY OF CHORIORETINAL INJURY AS A FUNCTION OF EXPOSURE TIME.
Walter J. Geeraets, William T. Ham, Jr., R. C. Williams, Harold A. Mueller, Jean Burkhart, DuPont Guerry III, and Johannes J. Vos (Va. Med. Coll., Richmond).
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-48–S-61. 14 refs.
Contracts DA-49-193-MD-2241; DA-49-146-XZ-102

Comparative studies of funduscopic, histological, and histochemical aspects of chorioretinal lesions as a function of exposure time and applied energy were carried out on rabbits. Lesions were produced with an electronically pulsed light coagulator and a ruby laser. The clinical and histological appearance for severe lesions produced in microsecond ranges with the light coagulator and with the non-q-switched laser were very similar. However, minimal lesions produced with the laser were not as uniform because of nonuniformity of the laser beam. Funduscopic, histologic, and histochemical findings showed different features for lesions produced in nanosecond ranges (q-switched laser) and those produced in microsecond ranges (laser or light coagulation). The difference in funduscopic and histopathologic appearance as well as mathematical evaluation of the part played by thermal conductance seem to indicate a different mechanism involved in the production of the nanosecond-exposure lesions.

A65-81094
ANALYSIS OF FACTORS OF LASER RADIATION PRODUCING RETINAL DAMAGE.
Milton M. Zaret (N. Y. U. Med. Center, New York City; and Zaret Found., Scarsdale, N. Y.)
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-62–S-64.

Analysis of laser radiation factors resulting in the production of retinal damage show they are primarily based on thermal injury, which is influenced by the characteristics of the laser beam, the optical qualities of the eye, and the extent of absorption in the retinal pigment epithelium and adjacent tissues. Secondarily, many exotic types of biophysical phenomena must also be considered.

A65-81095
FLASH BLINDNESS AS A FUNCTION OF WAVELENGTH SPECIFICITY.
H. G. Sperling (Honeywell, Inc., Minneapolis, Minn.)
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-73–S-77. 19 refs. NSF supported research.
Contract DA-49-193-MD-2457.

Data on the effects of adaptation to spectral bands of light on human foveal spectral sensitivity show that where very narrow adapting bands in the upper range of intensities of normal vision are used, extreme changes in the shape of the function result. This finding indicates that sensitivity might be preserved in parts of the spectrum, while permitting continuous viewing through special eye-protective filters. The results further indicate an approach to isolating the spectral response components of normal color vision and the magnitude of their response to light adaptation.

A65-81096
ANATOMIC AND HISTOCHEMICAL CHANGES IN SKIN AFTER LASER IRRADIATION.
Elson B. Helwig, Wallace A. Jones, Jude R. Hayes, and Elmar H. Zeitler (Armed Forces Inst. of Pathol., Washington, D. C.)
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-83–S-91. 6 refs.
Contract 3A012501A802-01.

Anatomic and histochemical changes in skin after laser irradiation were studied in pigs. The preliminary study was designed to evaluate the laser-induced alterations of structure and enzyme activity in the mammalian skin at different energy exposures. For demonstration of enzyme activity, biopsies were obtained from exposed and unexposed areas. Histological and biochemical changes are given in detail.

A65-81097
DERMATOLOGIC MANIFESTATIONS OF LASER RADIATION.
Leon Goldman (Cincinnati U., Laser Labs., Ohio; and Children's Hosp. Res. Found., Cincinnati, Ohio).
Federation Proceedings, vol. 24, Jan.–Feb. 1965 (Supplement no. 14), p. S-92–S-93. 5 refs. John A. Hartford Found. supported research.
Grant PHS OH-00118

Effects of single and repeated laser beams on normal and pathologic skin were studied. Destruction of skin from absorption of the incident laser beam varied with the type of laser, exit energy, and the duration and area of impact. Other factors included color of keratin and amount and degree of destruction of melanin and hemoglobin. With high-energy lasers, significant destruction of tissue not colored by melanin or hemoglobin also occurred. Skin protection, especially from high-energy lasers, should be considered in safety programs of personnel. More basic studies on the effects of absorption, transmission, and reflectivity of the incident beam of existing lasers are needed.

A65-81098
EFFECTS OF LASER RADIATION ON TYROSINASE.
Jon M. Igelman and Thomas Rotte (Cincinnati U., Med. School, Laser Labs.; and Children's Hosp., Res. Found., Cincinnati, Ohio).
Federation Proceedings, vol. 24, Jan.-Feb. 1965 (Supplement no. 14), p S-94-S-96. John A. Hartford Found. supported research.
Grant PHS OH-00118.

Laser radiation effect on tyrosinase activity was determined. Studies were conducted in two ways: (1) by exposing tyrosinase solutions to varying amounts of laser radiation and then analyzing them for tyronase activity, and (2) by exposing human skin in vivo to laser radiation and then analyzing it for changes in the tyrosine-melanin system. Ruby, neodymium, and helium-neon gas lasers were used. No appreciable effects on tyrosinase activity were noted in any one of the experiments.

A65-81099
CENTRAL NERVOUS SYSTEM EFFECTS OF LASER RADIATION.
Kenneth M. Earle, Stirling Carpenter, Uros Roessmann, Martin A. Ross, J. R. Hayes, and Elmar Zeitler (Armed Forces Inst. of Pathol., Washington, D. C.)
Federation Proceedings, vol. 24, Jan.-Feb. 1965 (Supplement no. 14), p. S-129-S-139.
Contract 3A012501A802-01.

Experiments were designed to determine the effects of focused and unfocused laser radiation upon the scalp, cranium, and brain parenchyma of experimental animals (albino mice, rats, and one Cebus monkey). The findings suggest that human hair, scalp, and skull would be sufficiently thick and dense to protect the brain from focused and unfocused laser radiation up to 40 joule output and probably much higher energies. But the brains of small animals such as rats and mice can be severely damaged by a focused beam which is partially transmitted through the scalp and skull.

A65-81100
SERIAL CHOICE REACTION-TIME AS A FUNCTION OF RESPONSE VERSUS SIGNAL-AND-RESPONSE REPETITION.
Paul Bertelson (Bruxelles U., Lab. of Psychol., Belgium).
Nature, vol. 206, Apr. 10, 1965, p. 217-218.

Four male subjects performed a two-response, self-paced task where more than one signal was associated with each response. In such situations the relationship of a cycle to the preceding cycle is that of identity (same signal), of equivalence (different signal but same response), or of difference (different response). The reaction times (RT) to identical signals were slightly shorter than RT's to equivalent signals. The main effect, however, was linked to the repetition of response, since majority of errors occurred on the different cycles, where the error consisted of repeating the response when the other response was required instead.

A65-81101
ROENTGEN STUDIES IN MAN ON THE RELATIONSHIP OF UNEQUAL PULMONARY VENTILATION TO GRAVITY.
Edgar L. Surprenant (UCLA Center for the Health Sci., Dept. of Radiol., Los Angeles, Calif.)
Radiol. Society of North Am., 50th Ann. Meeting, Chicago, Ill., Nov. 29-Dec. 4, 1964).
Radiology, vol. 84, Apr. 1964, p. 663-669. 16 refs.

Relative ventilation of different lung segments is affected by body position. Radiologic data are presented which demonstrate greater ventilation in the dependent segments of the lung, regardless of body position. A hydrostatic pressure gradient has been shown within the pulmonary vasculature and pleural cavity. An analog demonstrates a mechanism by which this pressure may contribute to unequal pulmonary ventilation. The unequal excursion of the hemidiaphragms when the chest is in the lateral decubitus position also appears to be due to hydrostatic forces. Unequal pulmonary ventilation is effected by gravity; hydrostatic pressure appears to be a significant factor.

A65-81102
FLYING HIGH.
Richard L. Collins.
Air Facts, vol. 28, May 1965, p. 31-45.

In experiments conducted at the Civil Aeromedical Research Institute, subjects whose blood alcohol level was at all measurable showed deterioration in the ability to perform tasks associated with driving a car or piloting a plane, and a slowdown in the brain waves. However, below a blood alcohol factor of 0.040 deterioration was not severe. The 0.040% level was reached by a 180 lb man after drinking 2 ounces of 100-proof whiskey, or two 12-ounce bottles of beer. This level produced the same effect of drowsiness which comes after eating lunch. At higher levels (up to 0.100%), the deterioration in this ability progressed rapidly and was in direct proportion to the amount of alcohol in the blood. However, the experiments showed that alcohol at high altitudes up to 12 000 feet did not increase the hypoxic effect. In experiments performed elsewhere, it was noted that alcohol did not affect the driving ability but impaired judgment. A hangover state reduced performance, but judgment was more conservative. The question of drug influence on flying has not yet been solved.

A65-81103
MEDICAL PROBLEMS OF SPACE FLIGHT.
T. M. Fraser and A. H. Schwichtenberg (Lovelace Found., Dept. of Aerospace Med. and Bioastronautics, Albuquerque, N. M.)
Modern Medicine, vol. 33, Apr. 26, 1965, p. 102-117.

Medical personnel supervising space flights are concerned to a greater or lesser degree with four major areas of activity—man-machine interrelationships (human factors-engineering); man-environment relationships (environmental medicine); health maintenance, which includes aspects of selection, training, and safety monitoring of astronauts; and, finally, management of intercurrent illness and injuries.

A65-81104
BINAURAL SUMMATION OF THERMAL NOISES OF EQUAL AND UNEQUAL POWER IN EACH EAR.
R. J. Irwin (Auckland U., New Zealand).
American Journal of Psychology, vol. 78, Mar. 1965, 57-65. 11 refs.

The relation between binaural and monaural loudness was studied by determining what binaural combinations of noises of equal and unequal power—measured in decibels above threshold—were judged equivalent in loudness to a comparative monaural stimulus. Four subjects, men, made judgments of equality at each of four levels of the comparison noises—levels equivalent to binaural noises of 10-, 30-, 50-, and 70-db sound level. Contours of constant loudness, for each of the levels of the comparison-stimulus, indicated that the advantage of binaural over monaural listening was greater at high levels than at low. The advantage was also greater, at any comparison-level, when the binaural noise had about the same power in each ear. At high levels with equal binaural stimuli, the total binaural power was about one-third of that of the equally loud monaural stimulus, and at low levels it was about four-fifths. As the difference between the two components of the binaural stimulus was increased, the powers of equally loud binaural and monaural noises gradually coverged. The superiority of binaural over monaural listening was interpreted to be similar in nature to the increment in loudness that is observed when the bandwidth of a monaural noise is increased beyond a critical value.

A65-81105
EFFECT OF FLICKER-PERIODICITY UPON PERFORMANCE AND AROUSAL DURING A ROTARY-PURSUIT TASK.
George H. Zimny (Marquette U., Milwaukee, Wis.)
American Journal of Psychology, vol. 78, Mar. 1965, p. 75-82. 18 refs.
Comm. on Res. of Marquette U. supported research.

Each of 24 subjects, college women, carried out a rotary-pursuit task for 5 min. under either a periodic or an aperiodic flickering light while measures of performance and arousal were obtained from them. The flicker conditions had no differential effects upon either performance or arousal. Performance improved during the task. All measures of heart-rate and skin-resistance indicated that arousal was greatest during the initial minute of the task, then dropped to a lower level, but still above the base, and remained there for the duration of the task, i.e., the last 4 minutes. Differences between heart-rate and skin-resistance as indicants of arousal were also considered.

A65-81106
CHANGE IN REACTION-TIME AS A FUNCTION OF KNOWLEDGE OF RESULTS.
Russell M. Church and David S. Camp (Brown U., Providence, R. I.)
American Journal of Psychology, vol. 78, Mar. 1965, p. 102-106. 6 refs.
Grant NIH M-2903.

The purpose of this experiment was to study the permanence of the decrease in reaction time (RT) produced by knowledge of results. Forty subjects were given 1250 RT-trials in a period over 5 days. The results were: (a) subjects with knowledge were faster than those without knowledge; (b) subjects with a warning signal of fixed duration were faster than those with a warning signal of variable duration; and (c) the RT's decreased as a function of practice. There was no evidence of any lasting effect of knowledge on subsequent performance. Knowledge of results seemed to be effective only during periods in which it was given.

A65-81107
INFLUENCE OF LIGHT TO DARK RATIO, FOR 24-HOUR CYCLE, ON LOCOMOTOR ACTIVITY OF RABBITS.

W.-J. Rietveld, W. E. M. Tordoir, and M. W. Van Hof (Leyden U., Dept. of Physiol., Psychophysiol. Div., The Netherlands).
Acta Physiologica et Pharmacologica Neerlandica, vol. 13, Jan. 1965, p. 87–95.

Locomotor activity of rabbits was recorded under conditions of discontinuous artificial illumination (24-hour cycle; L/D ratios of 9/15, 12/12, 15/9 and 18/6; abrupt changes from light to dark and from dark to light). The activity minimum in the early afternoon appears to be coupled to the light-off signal rather than to the light-on signal; activity in the dark is markedly greater than activity in the light only for the lowest L/D ratio investigated; overall activity, averaged over the 24-hour cycle, is not systematically dependent on L/D ratio; the light-on peak appears to depress the light-off peak; this depression is the more marked as the light-on peak is higher and as the intervening light period is shorter. An anticipation effect is always present prior to light-off, and in the majority of cases also before light-on; its presence or absence does not depend on the length of the preceding dark period.

A65-81108
THE SIGNIFICANCE OF THE ELECTROCARDIOGRAPHIC PATTERN FOR ASSESSMENT OF THE DEGREE AND TYPE OF LEFT VENTRICULAR HYPERTROPHY: CORRELATION OF HAEMODYNAMIC STATE TO ELECTROCARDIOGRAM AT REST AND DURING WORK.
Irene Brann (Karolinska sjukhuset, Thoracic Clin., Lab. of Clin. Physiol., Stockholm, Sweden).
Cardiologia, vol. 46, 1965, p. 3–24. 48 refs.

Left ventricular systolic pressure, pressure gradient over the aortic valve, the degree of aortic regurgitation, and heart enlargement in aortic incompetence were compared in three groups of patients of different ages. It was found that the electrocardiogram during rest and after work could not be taken as an appropriate indicator of the degree of left ventricular hypertrophy. The theory of a different ECG pattern in left ventricular systolic overloading as compared with left ventricular diastolic overloading could not be verified.

A65-81109
EAR PROTECTORS: THEIR USEFULNESS AND LIMITATIONS.
Paul L. Michael (State Coll., Pa.)
(Ind. Hyg. Found., 29th Ann. Meeting, Mellon Inst., Pittsburgh, Oct. 21–22, 1964).
Archives of Environmental Health, vol. 10, Apr. 1965, p. 612–618. 20 refs.

The effects of noise on man may be divided into three broad categories: (1) effects on the hearing mechanism, (2) effects on communication, and (3) effects on behavior. All these effects may be reduced by lowering the noise level. It is not always practical to reduce the noise at its source. In many cases the most practical barrier consists of ear-protective device worn on the head. They may be either plug- or muff-types. Sounds can still reach the inner ear, when ear protectors are worn, by: (1) seal leaks, (2) material leaks, (3) protector vibration, and (4) conduction through bones and tissues. Reluctance to wear ear protectors may be attributed to the fact that communication is better without ear protectors in quiet environments, or because of discomfort due to irritation of the tender ear canal lining by the device. However, high noise levels may produce permanent hearing loss. The American Standards Association has formed an Exploratory Committee on Performance Standards for Ear Protective Devices to attempt to find better methods of evaluating the noise hazards or supplementing present standards.

A65-81110
METHODS OF DIABETES DETECTION IN AEROMEDICAL EXAMINATIONS.
L. Offerhaus.
Aeromedica Acta, vol. 9, 1963–1964, p. 9–17. 12 refs.

In the course of 14 794 medical examinations of aircrews performed at the Dutch National Aeromedical Center, the method for the detection of urinary glucose was changed from Fehling's reagent to "Clinistix", and Hagedorn and Jensen's method for the determination of blood sugar was replaced by a "true glucose" method. This change resulted in an appreciable gain of time; but as a result of the increased sensitivity of the tests used, three times the number of glucose tolerance tests had to be done. Statistical analysis of the results obtained during the years 1963 to 1964 showed that the increase in workload could be obviated by a single determination of blood glucose exactly two hours after oral load of 50 grams of glucose. Values over 110 mg% are indicative of diabetes.

A65-81111
THE INFORMATIVE VALUE OF LANDING STRIP LIGHT PATTERNS [DE INFORMATIEVE WAARDE VAN VERSCHILLENDE PATRONEN VAN LANDINGSBAANVERLICHTING].
J. Kylstra and J. Hoogerheide (RVO/TNO, Inst. for Sensory Physiol., The Netherlands).
Aeromedica Acta, vol. 9, 1963–1964, p. 21–29. 6 refs. In Dutch.

Commercial pilots, looking at a television screen, on which were presented moving dots or bars, simulating an approach to a visual landing system, were asked to discriminate between level flight or flight with altitude alteration in the sense of a descent. There were 4 patterns of light markings: single-row, double-row, single crossbars, and double crossbars. Alterations in altitude were significantly better observed in the double patterns than in the single patterns (angle a is larger than angles a' and a" and the larger the angle the more increase by the same amount of descent). For the same reason it is obvious, the single crossbars are better than the single-row. At first glance it is not clear why the double-row turned out to be better than the double crossbars. Possibly in the latter pattern the less valid angle a' was more conspicuous to the observer than the also available larger angle a.

A65-81112
CHANGES IN RESISTANCE OF ALTERNATING CURRENT IN THE HUMAN BODY, PARTICULARLY IN THE LOWER EXTREMITIES AS A RESULT OF G-LOADS ACTING THEREON [VERANDERINGEN VAN DE WISSELSTROOMWEERSTAND IN HET MENSELIJK LICHAAM, MET NAME IN DE ONDERSTE EXTREMITEITEN, TENGEVOLGE VAN DAAROP INWERKENDE G-KRACHTEN].
J. Kylstra (RVO/TNO, Inst. for Sensory Physiol., The Netherlands).
Aeromedica Acta, vol. 9, 1963–1964, p. 31–44. 6 refs. In Dutch.

Experiments on a human centrifuge and tilt table were conducted to explore the distribution of blood volume under acceleration and its relationship to changes in the electric resistance of the organism. G-forces directed along the longitudinal axis of the organism result in a decrease of resistance in the lower half and an increase of resistance in the upper half of the body. The magnitude of these changes during accelerations up to ± 3 g parallels the increase in g force. At, or just before, the onset of gray-out and/or blackout there is a sudden, marked fall of resistance in the lower extremities with the converse taking place in the head area. This phenomenon may be used for objective determination of an individual's acceleration tolerance. If the body is exposed to accelerations greater than 3 g, the changes in resistance persist for a while after exposure.

A65-81113
EYE AND OTOLITHS.
A. Colenbrander.
Aeromedica Acta, vol. 9, 1963–1964, p. 45–91. 24 refs.

This study attempts to provide supportive quantitative evidence to the hypothesis that a sliding movement of the otoliths constitutes an adequate stimulus in man. The otolith organ is well suited to indicate moderate deviations from the normal head positions, but its sensitivity declines as the angle of head tilt increases. The two mechanisms compensating for the effects of head tilt on the subjective vertical, i.e., the counterrolling of the eyes and perceptive compensation, act independently of each other. With an increase in gravity up to 2 g and up to 60° head tilt, a simple linear proportion prevails between the outward shearing force of the otoliths on the utricular macculae and the counterrolling response. The counterrolling of the eyes is controlled by the otolith signal in all head positions and is affected little by other factors. Perceptive (retinal) compensation seems to be regulated by otolith signals for small angles of head tilt and by non-otolith information for larger angles of head tilt. It is subject to considerable adaptational effects.

A65-81114
THE VALIDITY OF EWALD'S FIRST LAW AND THE IMPORTANCE OF THE DIFFERENT DERIVATIONS WITH REGARD TO ELECTRONYSTAGMOGRAPHY [LA VALIDITE D'EWALD I ET L'IMPORTANCE DES DERIVATIONS DIVERSES EN ELECTRONYSTAGMOGRAPHIE].
M. P. Lansberg, Fred. E. Guedry, and Ashton Graybiel (Naval School of Aviation Med., Pensacola, Fla.)
Aeromedica Acta, vol. 9, 1963–1964, p. 93–95. 8 refs. In French.

Counter-clockwise rotation normally produces nystagmus toward the left. The nystagmus is more intense and lasts for the entire period when the individual is simultaneously pitched forward. With simultaneous backward pitching, the nystagmus toward the left is quickly reversed to the right. The modifying effect of linear acceleration on the nystagmus produced by centrifugation is considered contradictory to Ewald's first law, since there appears to be an otolith-induced modification of sensory input from the semicircular canals.

A65-81115
THE EFFECT OF CHANGING THE RESULTANT LINEAR ACCELERATION RELATIVE TO THE SUBJECT ON NYSTAGMUS GENERATED BY ANGULAR ACCELERATION.
M. P. Lansberg, Fred. E. Guedry, Jr., and Ashton Graybiel.
Aeromedica Acta, vol. 9, 1963–1964, p. 97–122. 26 refs.

The effect of adding centripetal acceleration was investigated with the subjects fixed in one of several positions relative to the plane of rotation of the Pensacola human centrifuge. In some positions the planes of the semicircular canals remained unchanged relative to the plane of rotation although the otolith system changed in orientation relative to the tangential and centripetal components of the total acceleration deriving from the rotation. A total of 28 subjects was investigated. Eye movements were recorded by the corneo-retinal potential method. Comparison of nystagmus responses showed a reversal of response which could not be explained as an artifact.

Several hypotheses are discussed. A tentative conclusion is reached that nystagmus initiated by semicircular canal stimulation can be modulated by otolithic stimulation.

A65-81116
PHONEMIC COMPLETION AND THE SOCIAL EVALUATION OF A HEARING-LOSS.
M. P. Lansberg.
Aeromedica Acta, vol. 9, 1963–1964, p. 123–127. 8 refs.

Realistic appraisal of the social handicap suffered from hearing loss is complicated by the phenomena of phonemic completion (abnormally keen discrimination for spoken language) and phonemic regression (poorer than normal speech discrimination). A case history is included to illustrate this point.

A65-81117
THE DYNAMIC VISUAL ACUITY OF 30 SELECTED PILOTS.
L. F. W. de Klerk, J. Th. Eernst, and J. Hoogerheide.
Aeromedica Acta, vol. 9, 1963–1964, p. 129–136. 15 refs.

Dynamic visual acuity (visual acuity measured when there is relative movement between the observer and the object) was investigated as a factor that may be related to flying skills. The subjects were 30 military pilots who were assessed as to their flight performance on the basis of practical and flying tests, and expert ratings. It was possible to divide them into three groups: average, above average, and below average. Static and dynamic visual acuities were obtained. A significant difference was found between the dynamic and static visual acuities. There were no significant differences in dynamic and static visual acuities among the three groups. Correlations of dynamic and/or static visual acuity with shooting scores, night flying, instrument flying, and formation flying failed to reach statistical significance.

A65-81118
PRELIMINARY REPORT CONCERNING PERIPHERAL DYNAMIC VISION.
J. Hoogerheide.
Aeromedica Acta, vol. 9, 1963–1964, p. 139–145. 13 refs.

Peripheral dynamic vision is defined as the perception of moving objects in the periphery of the visual field (extrafoveal part of the visual field). Experimental data indicate that in the far periphery dynamic visual acuity is better than the static one. It seems that at each degree of periphery there is a given speed of motion at which dynamic visual acuity is at an optimum. This optimum speed at which the image is moving across the retina may be connected in some way with the number of percipient units per surface unit. It is concluded that visual acuity found at the optimum angular speed may form a more reliable parameter for the comparison of structure and function of that part of the retina than the static visual acuity.

A65-81119
EQUATIONS FOR MEASURING BLOOD FLOW BY EXTERNAL MONITORING OF RADIOISOTOPES.
Kenneth L. Zierler (The Johns Hopkins U. and Hosp., Dept. of Med., Baltimore, Md.)
Circulation Research, vol. 16, Apr. 1965, p. 309–321. 6 refs. Muscular Dystrophy Assoc. of America, Inc. supported research.
Grant NIH AM-05524.

It is possible by external monitoring alone to measure blood flow per unit volume through any vascular bed accessible to external monitoring of the radioactive tracer if either the tracer input function or the quantity of tracer entering the system is known. The methods proposed exploit the fact that the mean transit time through the system is the flow per unit volume of distribution of tracer. The equations are free of assumptions that require solutions as exponentials or any other specified frequency function transit times. If the input function is known, measurement of the concentration of tracer in blood leaving the part sensed by the external detector, combined with external detection of radioactivity, can lead to measurement of absolute blood flow.

A65-81120
THE PREDICTION OF MAXIMUM OXYGEN UPTAKE (AEROBIC CAPACITY) WITH SPECIAL REFERENCE TO RADIOLOGICAL HEART AREA AND THORACIC ACID.
P.D. Seaward, W.A. Odendaal, B. Van Lingen, and I.M. Kennedy (South African Council for Sci. and Ind. Res., Physiol. Div., Pneumoconiosis Res. Unit, Johannesburg, South Africa).
South African Journal of Laboratory and Clinical Medicine, vol. 10, Nov. 28, 1964, p. 101–107. 39 refs.

It has been shown that maximum oxygen uptake is significantly related to radiological thoracic area and heart area, which have been used as a measure of the size of these organs. Although the inclusion of radiological thoracic area and heart area with weight improved the relationship with maximum oxygen uptake, as opposed to weight alone, this improvement was not marked. A similar but statistically insignificant improvement resulted when the pulse rate at 500 kg-m./min. work was combined with thoracic area and heart area. However, the justification for including thoracic area and heart area into regression equations for the prediction of maximum oxygen uptake is dependent upon the fact that disease of the heart and lungs is commonly associated with enlargement of these organs. Normally there is a bigger maximum oxygen uptake with increase in the size of these organs. However, when enlargement results from disease, there is a reduction in the maximum oxygen uptake. This discrepancy accentuates the differences between health and disease and is of value in the diagnosis of impaired physical capacity and an estimation of the degree of disability.

A65-81121
THE INFLUENCE OF AGE ON LATENCY TIME OF INVOLUNTARY (GALVANIC SKIN REFLEX) AND VOLUNTARY RESPONSES.
Walter W. Surwillo and Reginald E. Quilter (Natl. Inst. of Health, Natl. Heart Inst., Bethesda, Md.; and Baltimore City Hosp., Md.)
Journal of Gerontology, vol. 20, Apr. 1965, p. 173–176. 21 refs.

The relation between age and latency time of involuntary and voluntary responses was studied in groups of young (Mn = 38.0 years), middle-aged (Mn = 57.0 years), and old (Mn = 74.0 years) subjects. Irregular movements of the pointer on a Mackworth Clock served as stimuli in a vigilance situation. Results supported the hypothesis that latency of the GSR (Tarchanoff effect) increases with advancing age. Latency of voluntary responses (the reaction time) to the same stimuli showed no increase with advancing age.

A65-81122
AN AGE-DECREMENT IN THE ABILITY TO IGNORE IRRELEVANT INFORMATION.
Patrick Rabbitt (Med. Res. Council Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Journal of Gerontology, vol. 20, Apr. 1965, p. 233–238. 22 refs.

Groups of old and young subjects were timed at a card-sorting task in which they searched either for two or for eight letters of the alphabet among varying numbers of irrelevant letters. Old subjects took longer than young to discriminate between relevant and irrelevant letters in both conditions. Results suggest that young people process several letters simultaneously as a group when searching for only two items (Condition 1), but sample letters in smaller groups when searching for eight items. The performance of old subjects suggests that they sample letters in smaller groups than do young people. If the size of the perceptual sample-space diminishes with increasing age, it may be assumed that old people are at a disadvantage in a wide range of perceptual skills, for example, probably in reading. The possible contributions to this effect made by three different types of decrement in perceptual function are discussed.

A65-81123
SENESCENCE AND VISUAL IDENTIFICATION OF TACTUAL-KINESTHETIC FORMS.
Larry W. Thompson, Seymour Axelrod, and Louis D. Cohen (Duke U., Durham, N. C.)
Journal of Gerontology, vol. 20, Apr. 1965, p. 244–249. 15 refs.
Duke U. Reg. Center supported research.
Grants PHS MH-900; PHS GM-05385; NIH M-2109; NIH H-3582.

On the basis of previous findings, which demonstrated that senescent subjects have more difficulty than young subjects in identifying visual copies of tactual-kinesthetic (TK) stimuli, two questions were raised. First, since old subjects complained of being unable to palpate the stimuli thoroughly, would similar results be obtained with TK forms designed to minimize the importance of tactile acuity? Second, did the abstractness of the visual array relative to the TK stimuli contribute to the age-related deficit? Thirty old and 30 young subjects were required to palpate 26 planimetric forms and identify them on a visual array. Subjects were randomly divided into three subgroups, and one of three arrays which differed in abstractness was presented to each under two conditions. In the successive condition, the subject first palpated a form until he thought he could identify it. He was then shown the appropriate array and requested to select the form. In the simultaneous condition the subject searched the appropriate array at the same time he palpated the stimuli. While there was no difference in palpation time, old subjects took significantly longer in searching the visual arrays and made consistently more errors than the young. Search time increased more for the elderly than the young as the forms increased in difficulty. There was no significant array or age-by-array effect. The results suggested a selective impairment of "searching behavior" with senescence. Other studies are discussed from this point of view.

A65-81124
DEVELOPMENT OF A PAINT SCHEME FOR INCREASING AIRCRAFT DETECTABILITY AND VISIBILITY.
Arthur I. Siegel and Philip Federman (Appl. Psychol. Serv. Wayne, Pa.)
Journal of Applied Psychology, vol. 49, Apr. 1965, p 93–105. 11 refs.
Contract N156-38581.

Five studies were performed in order to derive a paint coloration scheme which will allow maximum aircraft visibility and detectability. It was found

that maximum visibility may be expected from a large, square, unbroken, fluorescent, red-orange area and a secondary area possessing color and brightness contrast with the fluorescent red-orange.

A65-81125
EXPERIMENTAL EVALUATION OF BINARY PURE-TONE AUDITORY DISPLAYS.
S. A. Mudd (Purdue U., Lafayette, Ind.)
Journal of Applied Psychology, vol. 49, Apr. 1965, p. 112-121.
Purdue Res. Found. and NSF supported research.

The frequency, intensity, duration and interaural difference (direction) dimensions of pure tone were evaluated singly and in combination at three comparable levels of discriminability in order to determine their relative effectiveness as binary cuing stimuli for an instrument monitoring task. The use of such signals decreased search time and reduced tendencies to be differentially attentive to the various sectors of the information display. No further reduction in search time occurred with 3- and 4-dimensional displays than with 2-dimensional displays. Frequency proved to be the most effective dimension for purposes of cuing. Intensity was least effective. Direction and duration were of moderate effectiveness.

A65-81126
WIT, CREATIVITY, AND SARCASM.
Ewart E. Smith and Helen L. White (Serendipity Assoc., Los Angeles, Calif.)
Journal of Applied Psychology, vol. 49, Apr. 1965, p. 131-134. 12 refs.
Contract AF 49(638)-1216.

A study was conducted using 156 airmen at their base to test the hypotheses that wit and creativity are positively correlated; that defensiveness and creativity are negatively correlated; and that "wits" are effective leaders. The effects of sarcastic versus nonsarcastic wit were explored. The first two hypotheses were supported. "Wits" were not effective leaders but were associated with less defensiveness and more effective group problem-solving. Most of the positive relationships with wit were found, more specifically, to be associated with sarcastic wit.

A65-81127
THE HEMODYNAMIC RESPONSE OF THE LOWER EXTREMITIES TO EXERCISE.
L. T. King, D. E. Strandness, Jr., and J. W. Bell (Wash. U., School of Med., Dept. of Surgery; and V. A. Hosp., Surgical Serv., Seattle, Wash.)
Journal of Surgical Research, vol. 5, Apr. 1965, p. 167-171. 13 refs.

After moderate exercise the normal arterial circulation is able to maintain ankle blood pressure with only a transient decrease in digit blood flow. If exercise is made more severe by increasing the strength of contraction, arterial inflow is impeded, resulting in ischemia. The extent of arterial inflow impedance is directly related to the strength of contraction and the pressure in the nutrient artery supplying the muscle. The resulting ischemia is sufficient to result in a marked decrease in resistance and an increase in vascular capacitance to the degree that mean pressure falls and distal foot flow is shunted to the muscle. Except for the amount of exercise involved, these hemodynamic changes are identical to those seen in patients with obstructive arterial disease.

A65-81128
EFFECT OF FASTING ON THE CONCENTRATIONS OF CHOLESTEROL, TOTAL FATTY ACIDS AND POLYENOIC ACIDS IN PLASMA AND HEART OF THE RAT.
Jens G. Norby (Arhus U., Dept. of Biochem., Denmark).
British Journal of Nutrition, vol. 19, 1965. p. 35-40. 19 refs.
Council UK supported research.

Food was withheld from 26 adult male rats for various periods. The rats were killed and the concentrations of cholesterol, total fatty acids (TFA), and polyenoic fatty acids were measured in their plasma and hearts. Fasting for 0 to 26 hours had no influence on the concentrations of cholesterol, TFA, or polyenoic acids in the heart. TFA concentration in plasma fell from about 16 to about 8 milliequiv/kg, and cholesterol concentration fell slightly during the first 10 hours of fasting. The proportion of dienoic acid (equiv/100 equiv TFA) was independent of the length of the fasting period, and the same seemed to be true for trienoic, pentaenoic, and hexaenoic acids. The proportion of tetraenoic acid (equiv/100 equiv TFA) increased with decreasing TFA concentration, the coefficient of regression for log tetraenoic acid (equiv/100 equiv TFA) on log TFA (milliequiv/kg) being -0.78 ± 0.09. The concentration of tetraenoic acid in milliequiv/kg was nearly constant.

A65-81129
EFFECTS OF IN VIVO HYPEROXIA ON ERYTHROCYTES. II. HEMOLYSIS IN A HUMAN AFTER EXPOSURE TO OXYGEN UNDER HIGH PRESSURE.
Charles E. Mengel, Herbert E. Kann, Jr., Albert Heyman, and Earl Metz. (Duke U. Med. Center, Durham, N. C.)
Blood, vol. 25, May 1965, p. 822-829. 26 refs.
Grants PHS CRTY-5042; PHS CA-06542; PHS HE-07896.

During the course of an investigation of the effects of in vivo hyperoxia on erythrocytes, one patient developed hemolytic anemia following a rather brief exposure to oxygen under high pressure. Special studies carried out on the erythrocytes revealed them to be normal in terms of the usual oxidoreduction transformation system components. However, his cells did demonstrate an unusual in vitro sensitivity to hydrogen peroxide and formed unusually high levels of lipid peroxides during incubation with hydrogen peroxide. The similarities between his erythrocytes and those from vitamin E-deficient rodents were noted and the implications of these findings in terms of mechanisms for hyperoxic hemolysis were discussed.

A65-81130
TESTING AND EVALUATING HEARING PROTECTORS.
Fred P. Beguin (Am. Opt. Co., Southbridge, Mass.)
(Am. Opt. Co., Ind. Noise Symposium, Mar. 24, 1964, Des Plaines, Ill.)
American Association of Industrial Nurses Journal, vol. 13, Apr. 1965, p. 11-12.

The American Standard Association's method for measurement of real-ear attenuation of ear protectors at threshold is the accepted procedure for evaluation of a hearing protector. This standard specifies the physical requirements, the psychophysical procedures and means of reporting results for measuring real-ear attenuation at threshold of any device designed to protect man's hearing against excessive noise. However, even when this is accomplished with the proper method, the variations from one testing period to another will be significant. The American Optical Company has been working on an artificial head, which permits objective determination of the attenuation characteristics. It gives results which are closely correlated with those received at some subsequent time. This method can be considered more representative of actual performance because it is accomplished not at threshold levels but at high intensity levels. Excellent correlation has been obtained with the artificial head and the psychophysical tests conducted by the ASA method.

A65-81131
THE EFFECT OF HYDRAZINE AND CONGENERS ON $C^{14}O_2$ RESPIRATORY PATTERN OF VARIOUS METABOLIC SUBSTRATES.
Joseph S. Amenta and Abel M. Dominguez (Armed Forces Inst. of Pathol., Washington, D. C.)
Toxicology and Applied Pharmacology, vol. 7, Mar. 1965, p. 236-246. 14 refs.
NASA Contract A-31086; Proj. 6X99-26-001-09.

A method is described that permits a rapid screening of oxidative pathways that may be affected by toxic chemicals in the intact animal. A large amount of nonlabeled substrate, added to the labeled substrate, is injected intravenously into rats, and expired $C^{14}O_2$ is collected for three half-hour intervals directly into vials containing a combined trapping-scintillator solution. Significant differences were obtained in the ability of hydrazine-treated animals to oxidize glycine-1-$C^{14}O_2$ as compared with control animals similarly tested. No differences were found in the ability of these hydrazine-treated rats to oxidize acetate-1-C^{14} to $C^{14}O2$. These findings agree with previous in vitro studies. Similar observations were noted with the hydrazine derivatives monomethyl-hydrazine (MMH), 1, 1-dimethylhydrazine (UDMH), and, to a lesser degree, with 1,2-dimethyl hydrazine (SDMH) and iproniazid. The conversion of glucose-C^{14} (UL) to $C^{14}O_2$ was depressed in hydrazine- and UDMH-treated rats. The large loading dose, in contrast to that used in studies in which only a small amount of substrate was injected into the animal, manifests to a much greater degree the depression in the amino acid oxidation effected by the toxic chemicals. Intragroup variation of the data is also significantly reduced by this loading technique.

A65-81132
HEAT REACTIONS OF MALE AND FEMALE CAUCASIANS.
C. H. Wyndham, J. F. Morrison, and C. G. Williams (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
Journal of Applied Physiology, vol. 20, May 1965, p. 357-364. 5 refs.

Thirty male and 26 female Caucasians were tested at work levels of 1.0 liters O_2 consumption in 90° F wet-bulb temperature, 93° F dry-bulb temperature, and 80 ft/min air velocity for comparative heat reactions in the unacclimatized state. The females had more severe physiological and psychological reactions. Rectal temperatures of 104° F and heart rates of 180 beat/min were reached more rapidly than in the male. The females sweated less and their oxygen consumptions were lower than those of the males. Ten males and four females were then acclimatized to the same extent at the same work rate in 93° F wet-bulb temperature. At the end of the period their reactions were closely similar, although the females responded slower to the acclimatization procedure. Both groups ended with heart rates of 140 beat/min and rectal temperatures of 102° F. The females, however, continued to sweat less. In a retest at 90° F wet-bulb temperature, both groups had heart rates of 130 to 140 beat/min and rectal temperatures of 101° F. Females still sweated less. The results demonstrate the fact that females react more severely on exposure to severe heat and work conditions. Once acclimatized, however, the temperature and circulatory reactions of both sexes are closely similar, but the females sweat less than males.

A65-81133
SUDOMOTOR AND VASOMOTOR RESPONSES TO CHANGING ENVIRONMENTAL TEMPERATURE.
R. D. McCook, R. D. Wurster, and W. C. Randall (Loyola U., Graduate School and Stritch School of Med., Dept. of Physiol., Chicago, Ill.)
Journal of Applied Physiology, vol. 20, May 1965, p. 371-378. 24 refs.
Grants NIH HE-0862-01 and NIH TI GM 999-01A1.

Male subjects clad only in shorts were exposed in a climate chamber to slowly rising ambient temperature while sweating; cutaneous volume pulses and skin, tympanic membrane, and oral temperatures were simultaneously recorded. Mean skin temperature was continuously computed electronically. After sweating and vasodilatation had become well established, the copper screen bed on which the subject reclined was rapidly moved from the hot chamber into another, 20° to 30° C cooler. The onset of neither sweating nor vasodilatation could be accurately correlated with tympanic membrane temperature since the latter was observed to be either increasing, unchanged, or even falling during the period of recruitment. In some experiments vasodilatation preceded sweating, while in others, it followed. When the subject was rapidly moved from the hot environment to the cold, sweating promptly stopped on all of the test areas and profound vasoconstriction appeared on the palm. Nonpalmar areas, however, showed little or no immediate change in the amplitude of the volume pulses. Mean skin temperature invariably started to fall, but only a few tenths of a degree when cessation of sweating and palmar constriction occurred. Tympanic membrane temperature during the same period continued to rise for 1 to 3 min and thus seemed unrelated to either vasomotor or sudomotor control under these circumstances.

A65-81134
PREACCLIMATIZATION OF MEN TO HEAT BY TRAINING.
R. W. Piwonka, Sid Robinson, V. L. Gay, and R. S. Manalis (Ind. U., Dept. of Anat. and Physiol., Bloomington).
Journal of Applied Physiology, vol. 20, May 1965, p. 379-383. 19 refs.
Grants DA-MEDDH-G-91; PHS GM-1233-01.

During April 1963, five distance runners from the Indiana University track team and one champion swimmer performed 85-min walks on a treadmill at 5.6 km/hr up a 5.6% grade in a hot environment (40°C, 25% relative humidity). Although none had been exposed to the heat since the preceding summer, the runners made responses typical of heat-acclimatized men. Untrained subjects exposed to the same stresses and the swimmer failed to regulate body temperatures effectively. Although sweat rate was less in the runners than in the untrained men, it was 2.4 times greater per degree rise of rectal temperature for the runners. The runners produced 8% less metabolic heat per square meter of body surface than did the untrained men, and they also had much higher tissue heat conductance values. The swimmer's difficulty in adjusting to the heat stress was largely due to his relatively high metabolic cost in walking on the treadmill. It is thought that the preacclimatized state of the trained men probably resulted from the daily elevations of central temperature in their strenuous workouts during the preceding months.

A65-81135
HEPATIC CLEARANCE OF INDOCYANINE GREEN IN MAN UNDER THERMAL AND EXERCISE STRESSES.
Loring B. Rowell, John R. Blackmon, Richard H. Martin, John A. Mazzarella, and Robert A. Bruce (Wash. U., School of Med., Div. of Cardiol., Dept. of Med., Seattle).
Journal of Applied Physiology, vol. 20, May 1965, p. 384-394. 29 refs.
Wash. State Heart Assoc. supported research.

At 78° and 110° F, hepatic clearance of indocyanine green (ICG), O_2 intake, heart rate, blood lactate, and rectal temperature were measured on nine men unacclimatized to heat during treadmill exercise, requiring 45% to 95% of maximal O_2 intake (max V_{O_2}). Percentage of resting ICG clearance was inversely proportional to percentage of maximal O_2 intake at 78° F ($r = -0.78$) and 110° F ($r = -0.81$). Clearance of ICG was 20% less at 110° F than at 78° F at all metabolic rates above 26% of maximal V_{O_2}. Measurements of hepatic blood flow in three men at 110o F validate these estimates of percentage decrements in hepatic blood flow. Submaximal and maximal V_{O_2} and maximal heart rates were unaltered by heat, but maximal heart rates were reached during submaximal work at 110° F. Decreased work capacity at 110° F was unrelated to rectal temperature or blood lactate; the latter was unaffected by temperature. The liver and kidneys may divert to the skin sufficient blood to obviate the need for additional increments in cardiac output during work at high temperature. Maximal decrements in hepatic blood flow at lower work intensities may contribute to diminished work capacity at 110° F.

A65-81136
FREE FATTY ACID RESPONSES TO TILTING AFTER WATER IMMERSION.
Jack K. Goldman (Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 20, May 1965, 395-397. 11 refs.

Water immersion is accompanied by decreased urinary excretion of noradrenaline and is followed by orthostatic intolerance. The latter was postulated to result from impaired noradrenaline metabolism. Such an impairment would produce, in addition, a diminished rise in plasma free fatty acids in response to tilting. This response was measured in normals after office control, water immersion, and exposure to a thermal environment identical to that found in the immersion facility. The plasma free fatty acid response to a tilt is impaired after water immersion as would be expected if sympathetic nervous system dysfunction is involved in postimmersion orthostatic intolerance.

A65-81137
THERMOREGULATION AND COLD ACCLIMATION IN A HIBERNATOR. CITELLUS TRIDECEMLINEATUS.
Hermann Pohl and J. Sanford Hart (Natl. Res. Council, Div. of Biosci., Ottawa, Canada).
Journal of Applied Physiology, vol. 20, May 1965, p. 398-404. 33 refs.

In the 13-lined ground squirrel, Citellus tridecimlineatus, the maintenance of body temperature and oxygen consumption in the cold is improved by acclimation to 18° and 6° C in the laboratory. Heat production at -30° C was greater in animals acclimated to 6° C, whether or not they had been previously hibernating, than in squirrels kept at 28° C. Oxygen consumption was correlated to body weight. This relationship was not significantly affected by changes in ambient temperature. Local heat flow from the dorsal thorax was similar at a given temperature in all acclimation groups but the thermal conductance was greater and the cardiac-subcutaneous temperature difference was smaller in squirrels acclimated to 6° and 18° C. Although shivering was equally high in warm- and cold-acclimated ground squirrels in the cold, nonshivering thermogenesis occurred in curarized cold-acclimated animals exposed to cold or injected with noradrenaline. The results of the study suggest that ground squirrels are regularly exposed to cold or temperatures in their natural habitat which induce considerable cold acclimation.

A65-81138
TEMPERATURE REGULATION AND COLD ACCLIMATION IN THE GOLDEN HAMSTER.
Hermann Pohl (Natl. Res. Council, Div. of Biosci., Ottawa, Canada).
Journal of Applied Physiology, vol. 20, May 1965, p. 405-410. 32 refs.

Characteristics of cold acclimation in the golden hamster, Mesocrioetus auratus, were (1) higher metabolic rate at -30° C, (2) less shivering when related to ambient temperature or oxygen consumption, and (3) higher differences in body temperature between cardiac area and thoracic subcutaneous tissues at all ambient temperatures tested, indicating changes in tissue insulation. Cold-acclimated hamsters also showed a rise in temperature of the cardiac area when ambient temperature was below 15° C. Changes in heat distribution in cold-acclimated hamsters suggest higher blood flow and heat production in the thoracic part of the body in the cold. The thermal conductance through the thoracic and lumbar muscle areas, however, did not change notably with lowering ambient temperature. Marked differences in thermoregulatory response to cold after cold acclimation were found between two species, the golden hamster and the 13-lined ground squirrel, showing greater ability to regulate body temperature in the cold in hamsters.

A65-81139
EFFECTS OF CORE TEMPERATURE UPON DURATION OF HIBERNATION OF CITELLUS LATERALIS.
John W. Twente and Janet A. Twente (Utah U., Div. of Biol. Sci., Salt Lake City).
Journal of Applied Physiology, vol. 20, May 1965, p. 411-416. 8 refs.
Grant Inst. of Arthritis and Metab. Diseases AM-5942; and Utah U. Res. Comm. supported research.

Continuous recordings of core temperatures by permanent thermocouples in 31 golden-mantled ground squirrels (Citellus lateralis) during the hibernating season indicate: (1) hibernating periods persisted longer at lower core temperatures, periods averaged approximately twice as long at 2° as at 11°C; (2) the duration of hibernating periods was relatively constant and predictable for individuals at given temperatures; (3) when two core temperatures were experienced during a single hibernating period and the time spent at each temperature expressed as a percent of the predicted duration for each temperature, the sum of these percentages approximated 100%; and (4) less stimulus was required to evoke arousal as a hibernating period progressed. Based upon the time-temperature relationship, increased irritability as periods progressed and individual consistency, the termination of hibernating periods (arousal) was thought to be a triggering of the autonomic nervous system by an accumulation or depletion of factors exceeding the limits of the hibernating hemeostasis.

A65-81140
EFFECTS OF COLD EXPOSURE AND EXERCISE IN A WET, COLD ANTARCTIC CLIMATE.
G. M. Budd (Sydney U., School of Public Health and Trop. Med., Environ. Health Sect., Australia).
Journal of Applied Physiology, vol. 20, May 1965, p. 417-422. 28 refs.

Six men were studied before and after six weeks of strenuous outdoor work and cold exposure—often in wet clothing—on Heard Island in the Antarctic. Physical fitness increased significantly, while subcutaneous fat and arterial blood pressure decreased significantly. The response of rectal temperature and shivering to a 2-hr period of whole-body cooling did not change significantly (although shivering tended to decrease), suggesting that the reduction in insulation caused by loss of fat was balanced by an increase in the insulation of other tissues. Finger temperature fell more rapidly, there was less cold vasodilatation, and the gradient of skin temperature between elbow and finger increased significantly, suggesting that heat was conserved by means of countercurrent heat exchanges and enhanced vasoconstriction. Discomfort from cold did not change. These results support those of a previous study at Mawson, Antarctica. Frostbite of one subject's hands, which grossly impaired touch sensation and caused marked intolerance to cold, produced no obvious changes in the response to cold of finger temperature.

A65-81141
EFFECTS OF EXERCISE IN THE COLD ON BLOOD CLOTTING AND PLATELETS.
Annette Finkel and G. R. Cumming (Manitoba U.; and Children's Hosp., Winnipeg, Manitoba, Canada).
Journal of Applied Physiology, vol. 20, May 1965, p. 423–424. 11 refs.
Manitoba Heart Found. supported research.

The tendency to blood clotting as measured by Lee–White clotting time (CT), partial thromboplastin time (PTT), and platelet adhesiveness (PAC) was studied in 10 normal subjects before and after a standardized bicycle exercise done at 25° C inside and at an average temperature of –20° C outside. Inside exercise caused a shortening of CT from 674 to 465 sec, of PTT from 88 to 78 sec, and PAC increased from 65,000/mm^3 to 185,000/mm^3; $P < .05$ for all tests, suggesting an increased tendency to blood clotting. In contrast, exercise done in the cold produced no significant changes in these parameters. Heart rate, rectal temperature, and changes in plasma proteins were similar for both types of exercise.

A65-81142
AEROBIC WORK CAPACITY IN YOUNG NORWEGIAN MEN AND WOMEN.
Lars Hermansen and K. Lange Andersen (Inst. of Work Physiol., Oslo, Norway).
Journal of Applied Physiology, vol. 20, May 1965, p. 425–431. 19 refs.

An assessment of the range of variability in work capacity of young adult Norwegians was attempted. Successful male athletes average 4.8 l/min or 71 ml/min per kg body weight for a group of sedentary living men. Female athletes average 3.3 l/min per kg body weight, compared to 2.3 l/min or 3.8 ml/min per kg body weight for sedentary women. Oxygen cost of but with a clear sex difference, the females possessing a better work efficiency. The linear relationship between heart rate and oxygen uptake becomes curved in the least fit subjects (the sedentary women) when the exercise loads approach the maximal niveau. The maximal heart rate was found lower in athletically trained subjects. The exercise-induced hyperventilation takes place at an oxygen uptake corresponding to 70% to 80% of the capacity, this being the same in both sexes and uninfluenced by athletics.

A65-81143
AEROBIC WORK CAPACITY IN MIDDLE-AGED NORWEGIAN MEN.
K. Lange Andersen and Lars Hermansen (Inst. of Work Physiol., Oslo, Norway).
Journal of Applied Physiology, vol. 20, May 1965, p. 432–436. 6 refs.

Maximum oxygen uptake and related respiratory and circulatory functions were measured in sedentary and well-trained middle-aged men. Maximal oxygen uptakes averaged 2.63 l/min in sedentary men and 3.36 l/min in well-trained men, the latter value being essentially the same as found in young untrained students. The heart rate/oxygen uptake relationship was found to be the same for sedentary-living men, regardless of age, but maximal heart rate was lower in older men. The maximal heart rate is probably the same in well-trained as in sedentary middle-aged men, this in contrast to what has been observed in younger age groups, where training reduces maximal heart rate. The exercise-induced hyperventilation takes place at an oxygen uptake corresponding to 70% to 80% of the capacity, this being the same in trained and untrained, and essentially the same as found in young adult subjects.

A65-81144
INITIAL HEMODYNAMIC RESPONSES TO MILD EXERCISE IN TRAINED DOGS.
Harold Smulyan, Richard P. Cuddy, William A. Vincent, Udomporn Kashemsant, and Robert H. Eich (N. Y. State U., Upstate Med. Center, Dept. of Med.; and V. A. Hosp., Syracuse, N. Y.)
Journal of Applied Physiology, vol. 20, May 1965, p. 437–442. 18 refs.
Grant PHS TI-HE-5410.

The transient changes in cardiac output at the onset of mild exercise were measured in dogs trained to walk on a treadmill. Cardiac output was obtained using a krypton 85 infusion method, which permitted frequent determinations of flow. The first 90 sec of exercise were marked by a prompt rise and overshoot of heart rate and cardiac output, whereas increases in stroke volume occurred later after the onset of exercise, and to a lesser extent than heart rate. At rest, the right atrium was electrically driven at rates slightly faster than heart rates attained spontaneously with exercise and the studies repeated. Changes in cardiac output, with exercise were similar to those in unpaced animals, but when the heart rate was fixed, stroke volume increased immediately. These studies show a consistent rise in heart rate and cardiac output in the initial reaction to exercise, but when the prompt rise in heart rate was prevented by pacing from the right atrium, increases in stroke volume provided a comparable response in cardiac output.

A65-81145
HEART RATE RESPONSE TO HELD LUNG VOLUME.
Alfonso Angelone and Norman A. Coulter, Jr. (Ohio State U., Dept. of Physiol., Columbus).
Journal of Applied Physiology, vol. 20, May 1965, p. 464–468.
Grant NIH HE-0781-02.

It has been shown that respiratory sinus arrhythmia correlates fundamentally with lung volume changes. The correlation with thoracic circumference changes is incidental and quantitatively unreliable. Extensive measurements on one subject and limited measurements on four other subjects demonstrate the existence of a systematic relationship between heart rate and lung volume under reasonably static conditions, a high heart rate corresponding to the expiratory position and a low heart rate to the inspiratory position. This relation has been described successfully with an exponential equation.

A65-81146
EFFECTS OF EXTERNAL ELASTIC AND THRESHOLD LOADING ON BREATHING IN MAN.
S. Freedman and Stephen A. Weinstein (Johns Hopkins U., Depts. of Environ. Med. and Psychiat., Baltimore, Md.)
Journal of Applied Physiology, vol. 20, May 1965, p. 469–472.
Grants PHS HE-01929, PHS TG-HTS-5453, and PHS HE-06945; and Contract ONR NR 102-101.

Conscious human subjects, seated in a soundproof chamber, were made at intervals to inspire through external elastic or threshold loads for from 4 to 15 breaths. With threshold loading of -5 to -15 cm H_2O initially, the first loaded breath was smaller than preceding breaths with tidal volume returning to normal within 6 breaths. With further presentations, tidal volume returned to control values sooner. After 6 presentations, 10 subjects had no diminution in tidal volume on the first loaded breath. With elastic loading, of 10 cm H_2O/liter (5 subjects) and 19.5 cm. H_2O/liter (4 subjects) a different type of adaptation occurred. This was characterized by decreased tidal volume and increased frequency. With the larger load, after three presentations frequency was increased during loaded breathing, due to a conscious effort by the subjects. The results show that repeated presentation of an elastic or threshold load leads to a change in the response to the load in a manner analogous to the learning of voluntary motor acts.

A65-81147
ELECTRODE SIZE AND TISSUE pO_2 MEASUREMENT IN RATS EXPOSED TO AIR OR HIGH PRESSURE OXYGEN.
Dana Jamieson and H. A. S. Van Den Brenk (Cancer Inst. Board, Radiobiol. Res. Unit, Melbourne, Australia).
Journal of Applied Physiology, vol. 20, May 1965, p. 514–518. 14 refs.

A comparison has been made of values of pO_2 recorded in several rat tissues with 60-μ or 330-μ flexible gold electrodes. Although qualitatively both sizes of electrodes give similar results, the quantitative values of pO_2 differ. Such large differences as are found in some cases between electrodes varying only in physical dimensions are thought to reflect the amount of trauma caused in the tissue under investigation due to electrode insertion. Errors in pO_2 estimations due to tissue damage are considered to outweigh any other errors such as those due to electrode calibration. Soft, highly vascular tissues, such as liver, kidney, and spleen which show macroscopic bruising over quite a large area when electrodes are inserted, show the greatest difference in estimations of the pO_2 value. Recordings of tissue pO_2 were made while animals breathed air and when compressed to 4 or 5 atm in pure oxygen, and the pattern of response of tissue pO_2 to such exposure of the animal to high pressures of oxygen is described.

A65-81148
RESTING PULMONARY DIFFUSING CAPACITY FOR CO AND O_2 AT HIGH ALTITUDE.
F. Kreuzer and P. Van Lookeren Campagne (Nijmegen U., Dept. of Physiol., The Netherlands).
Dutch Found. for Basic Res. (ZWO) supported research
Journal of Applied Physiology, vol. 20, May 1965, p. 519–524. 27 refs.
Grant NIH HE-06446-02.

The possible increase of pulmonary diffusing capacity at high altitude is still controversial. During an expedition on Monte Rosa, Italy, experiments were performed on 5 male subjects, 27 to 44 years of age, at rest

after a sojourn of 7 to 10 days at an elevation of 4560 m, using two independent methods. Pulmonary diffusing capacity for CO (D_{LCO}) was determined with the steady-state method at 3 levels of oxygenation with inspiratory O_2 pressures of 80, 150, and 400 mm Hg both at sea level and at altitude. The evaluation of the O_2 pressure diffusion gradients in hypoxia, obtained from the alveolar arterial O_2 pressure gradients and the arterio-alveolar CO_2 pressure gradients in hypoxia, permitted the estimation of the diffusing capacity for O_2 (D_{LO_2}). There was no significant difference between sea level and high altitude in D_{LCO} at the 3 levels of oxygenation, in the O_2 diffusion gradient, and in D_{LCO_2} with hypoxia.

A65-81149
METABOLISM AND THE PROTECTION BY ANESTHESIA AGAINST TOXICITY OF O_2 AT HIGH PRESSURE.
John W. Bean and Dominic Zee (Mich. U., Dept. of Physiol., Ann Arbor).
Journal of Applied Physiology, vol. 20, May 1965, p. 525–530. 23 refs.
Grant NIH H-1646.

Experiments were performed on rats to determine whether the protection which anesthesia (sodium pentabarbital) affords against convulsions in oxygen at high pressure (OHP) of 70 to 75 psi extends to the pulmonary damage and, if so, whether such protection is due simply to the depression of general metabolism. These experiments showed that anesthesia protected against both the pulmonary damage and the convulsions and that this protection was equally well pronounced whether the metabolic depression was or was not counteracted and elevated by dinitrophenol, L-thyronine, or direct tetanic stimulation of muscle. The results support the conclusion that such protection is not due simply to the depression of general metabolism as has been claimed. They also imply that the potentiation of pulmonary damage in OHP by thyroid and CO_2 is not a direct effect but rather is of central origin. The close association between the pulmonary damage and convulsions in OHP justifies the inference that these effects are not separate entities, as has been claimed, and point to the importance of central and neurogenic factors in the causation of this pulmonary damage.

A65-81150
EFFECT OF DIMERCAPROL ON OXYGEN TOXICITY IN RATS.
Peter V. Van Tassel (Fla. U., Coll. of Med., Dept. of Physiol., Gainesville).
Journal of Applied Physiology, vol. 20, May 1965, p. 531–533. 15 refs.
Contract AF 41(609)-1553.

Six groups of 10 male Holtzman rats were given doses of 10, 25, 40, 50, 75, and 100 mg/kg dimercaprol, respectively. Both times of onset of the first convulsion and survival times of treated animals exposed to 6 atmospheres of oxygen were measured and compared with 50 untreated controls. As the dose of dimercaprol increased to 40 mg/kg, both the time of onset of convulsions and the survival time increased to a maximum, and then decreased with further increase in dosage until they reached control levels at a dose of 100 mg/kg. Other animals were given equivalent doses of the vehicle in which the dimercaprol was dissolved, while still others received an inactive analog of dimercaprol (glycerol). Neither the vehicle nor the inactive analog produced the protective effect seen with dimercaprol.

A65-81151
AN APPARATUS FOR PRODUCTION OF GAS MIXTURES OF CONTROLLED COMPOSITION.
Stephen A. Weinstein and Richard H. Shepard (Johns Hopkins U., Depts. of Environ. Med., Med. and Pavlovian Lab., Baltimore, Md.)
Journal of Applied Physiology, vol. 20, May 1965, p. 552–554. Stanley Dunlop Mem. Fund supported research.
Grants PHS HTS-5453; PHS HTS-1929; NIH AM-05524.

A device is described for the inspiration of gaseous mixtures whose compositions are precisely known and can be changed easily by electric signal. There is a mixing chamber where carbon dioxide and oxygen are delivered by a series of tubes. Ten different concentrations can be obtained. When there is a 15 tube apparatus, carbon monoxide, carbon dioxide, and oxygen can be varied in concentration in 5 steps each. The apparatus as built is for small animals, and birds, but can be enlarged for bigger animals. A diagramatic drawing is shown and a complete description of the apparatus plus theoretical considerations is given.

A65-81152
CONTINUOUS SAMPLING OF ARTERIAL BLOOD OF UNANESTHETIZED ANIMALS.
Robert W. Hamilton, Jr. (Kan. U., Med. Center, Dept. of Physiol., Kansas City).
Journal of Applied Physiology, vol. 20, May 1965, p. 555–557. 8 refs.
Contract AF 41(657)-400; and Grant PHS 1-F1-GM16, 493-01A1.

Implanted arterial catheters permit recording, sampling, and injecting when used in unanesthetized and undisturbed dogs or cats. The catheters are made of silicone rubber tubing fitted to plastic Luer hubs which terminate in resealing rubber serum caps. The catheters are inserted into the descending aorta via the carotid artery and are brought out through the skin on the back of the neck. Results indicate that they can be expected to function for several weeks.

A65-81153
CONTINUOUS RECORDING OF $C^{14}O_2$ EXCRETION AND O_2 CONSUMPTION BY RATS.
M. W. Simpson-Morgan (Australian Natl. U., Dept. of Expt. Pathol., Canberra).
Journal of Applied Physiology, vol. 20, May 1965, p. 558–560.

An apparatus is described with which the O_2 consumption and $C^{14}O_2$ excretion of small laboratory animals can be recorded and integrated continuously during the course of experiments with C^{14}-labeled compounds. In addition, the total CO_2 production throughout intervals can be determined and the respiratory quotient calculated. The oxygen consumption apparatus is simple, inexpensive, and sensitive, and can be used in any closed metabolism system.

A65-81154
A DIGITAL INTEGRATOR FOR ON-LINE PULMONARY COMPLIANCE MEASUREMENTS.
Tamotsu Shinozaki, John Abajian, John S. Hanson, and Burton S. Tabakin (Vt. U. Coll. of Med., Mary Fletcher Hosp., Dept. of Med., Cardiopulmonary Lab. and Dept. of Surg., Div. of Anesthesia, Burlington).
Journal of Applied Physiology, vol. 20, May 1965, p. 561–563.
Contract AF 33(657)-10899; and Grants NIH HE-04010-06 and NIH K-1-HE-7248.

Standard methods of electronic integration employing RC circuits with output taken across a capacitor have always presented problems of stability in application to quantitation of physiological variables. Drift and the long time interval for amplifier stabilization have been particularly disturbing, especially in instruments of moderate cost. The present communication gives the theoretical basis for a low-cost integrating computer which overcomes these difficulties. The circuitry was developed for rapid and accurate calculation of inspiratory–expiratory volumes from pneumotachograph flow during pulmonary compliance measurements. Numerous other adaptations are feasible.

A65-81155
SONAR SYSTEM OF THE BLIND: SIZE DISCRIMINATION.
Charles E. Rice and Stephen H. Feinstein (Stanford Res. Inst., Menlo Park, Calif.)
Science, vol. 148, May 21, 1965, p. 1107–1108
Grant NIH NB-04738.

Measurements were made of the ability of 4 blind subjects to use echoes to discriminate between objects of different sizes placed in front of them. Threshold estimates indicate that objects with area ratios as low as 1.07/1 could be discriminated.

A65-81156
BRAIN TELESTIMULATOR WITH SOLAR CELL POWER SUPPLY.
Bryan W. Robinson, H. Enger Rosvold (Natl. Inst. of Mental Health, Lab. of Psychol., Bethesda, Md.), and Harold Warner (Gen. Elec. Co., Space Technol. Center, Missile and Space Div., Philadelphia, Pa.)
Science, vol. 148, May 21, 1965, p. 1111–1113

A telestimulator has been constructed which is suitable for mounting on the heads of medium-sized Macaca mulatta or larger primates. It differs from previous units in that the battery supply is continuously recharged from ambient light by means of solar cells. The system features remote control of all stimulus parameters, constant current output, and remote selection of any of 11 electrodes. If additional transmitters are employed, simultaneous and independent stimulation of a number of primates in the same group is possible. A shielded room with a terminated antenna system is used to produce a homogeneous radio-frequency field for laboratory use.

A65-81157
PARADOXICAL SLEEP: DEPRIVATION IN THE CAT.
Jerome Siegel and Thomas P. Gordon (Del. U., Dept. of Psychol., Newark).
Science, vol. 148, May 14, 1965, p. 978–980 7 refs.
U. of Del. Res. Found. supported research.
Grant NSF GB 1965.

In cats, the paradoxical phase of sleep (characterized by low-voltage high-frequency waves on electroencephalogram and rapid eye movements) occupies about 33% of the total sleeping time. Cats which were deprived of paradoxical sleep, by being awakened at its onset, required an increased number of awakenings on successive days of deprivation in order to prevent paradoxical sleep. On the first day of recovery after deprivation, when sleep was not experimentally interrupted, the paradoxical phase occupied 53% of the total sleeping time.

A65-81158
EVOKED POTENTIALS AND CORRELATED JUDGMENTS OF BRIGHTNESS AS FUNCTIONS OF INTERFLASH INTERVALS.
Neil R. Bartlett (Ariz. U., Tucson) and Carroll T. White (U.S. Navy Electron. Lab., San Diego, Calif.)
Science, vol. 148, May 14, 1965, p. 980–981
Grant NSF GB-231. Navy Electron. Lab. supported research.

Computer-averaged evoked potentials were recorded from subjects presented with pairs of flashes having equal light energy but differing in duration of the brief interval separating the flashes. For the experimental conditions studied, the pair was always subjectively fused. Although the brightness did not change noticeably as the interval was varied, the use of the forced-choice psychophysical technique showed that apparent brightness declined with increase in the interval. Analysis of the evoked potentials revealed a correlated change in amplitude and waveform previously demonstrated for changes in flash flux alone.

A65-81159
IS THERE VEGETATION ON MARS?
R. Smoluchowski (Princeton U., Solid State and Materials Program, N. J.)
Science, vol. 148, May 14, 1965, p. 946-947. 10 refs.
NSF and Higgins Fund supported research.

At least some of the changes in the color of Mars at different seasons are caused by color centers produced by electromagnetic and corpuscular solar radiation in solids on the surface. Calculated radiation flux, at appropriate energies and known temperature variation, could account for seasonal formation of color centers and bleaching if a simple trap model is assumed. In certain kinds of rhyolite (SiO_2, $NaAlSi_3O_8$), which has been suggested as one of the possible constituents of the martian surface, color centers can be produced. No color centers are expected in limonite, $Fe_2O_3 \cdot 3H_2O$, the other likely constituent.

A65-81160
APOLLO SUIT SUBSTANTIALLY REDESIGNED.
Heather M. David.
Missiles and Rockets, vol. 16, Apr. 26, 1965, p. 26-31.

The apollo spacesuit has been completely redesigned, with the exception of the water-cooled thermal control system and the basic environmental control system, in an effort to get around some of the restrictions of spacesuit use. The new features are as follows: (1) joints changed to increase mobility; (2) joints in wrists and ankles added; (3) new designs of neck openings, gas connections, and other features to minimize leakage; (4) better fitting and decreased bulkiness of the suit; (5) decreased volume; (6) absence of silver-white color of the outer layer because requirements for reflective material is no longer needed; (7) fishbowl design of helmet; (8) a special coating for the visor; (9) all-soft construction for boots; (10) better gripping capability for the gloves; (11) integration of thermal and micrometeoroid protection covering; and (12) addition of an emergency oxygen backpack incorporated in the thermal control system.

A65-81161
AIR FORCE SEEKING DATA ON TOXICITY OF MATERIALS FOR USE IN SPACE CABINS.
Heather M. David.
Missiles and Rockets, vol. 16, Apr. 12, 1965, p. 28, 31.

Proposed tests to be conducted by the Air Force on toxic effects of various materials in space cabin atmospheres include: (1) effect of reduced pressure on the toxic effect of carbon tetrachloride, nitrogen dioxide, and ozone; (2) a 12-month test concerning the effects of pure oxygen at 1/3-atmosphere on the monkey organism; (3) 90 day period experiments on the effect of fuel reservoir leakage and outgassing on various animals; (4) egress and air-lock construction; and (5) monitoring devices in safety measures.

A65-81162
GT-4 CREW TO WEAR EVA SPACESUITS.
Jinx Mercer.
Missiles and Rockets, vol. 16, Apr. 19, 1965, p. 24.

An extravehicular space suit identical with the type to be worn by the GT-4 crew during the second Gemini mission has been tested at NASA's Manned Spacecraft Center (MSC). In rigorous MSC chamber tests the suits endured -300° F temperatures at a simulated space altitude of 240 000 ft. Recently final tests were performed to exercise the extravehicular activity under rapid decompression. The micrometeoroid and thermal protective layers are now integrated. Heat leaks around fittings are kept to a minimum with pouchlike cups to shield the metal from direct solar radiation. The base visor has a thermal coating and has been increased to 0.125 in. in order to resist impact during reposition for splashdown. The sun visor could be made from polycarbons for partial filtering of infrared and ultraviolet radiation. Flame protective materials should be utilized to resist plume impingement from thrusters contained in the backpack propulsion unit.

A65-81163
ALGAL CULTURES AND PHYTOPLANKTON ECOLOGY.
G. E. Fogg (London U., Westfield Coll., Dept. of Botany, Great Britain).
Madison, Wis., U. of Wisconsin Press, 1965, xiii + 126 p. refs.
$5.50.

The author outlines the principal features of growth of algae in cultures and discusses the helpful information gained from these studies in understanding plankton ecology in general. Both fresh water and marine phytoplankta are considered because it is reasonable to suppose that factors controlling plankton growth are basically similar in fresh and salt water. The characteristics of algal growth in cultures of limited volume and in continuous and synchronous culture are discussed. Variability in metabolic activity under laboratory conditions has been observed. The general features of phytoplankton growth in lake and sea and in temperate spring waters are reported. Aspects of phytoplankton periodicity, distribution, and seasonal succession are discussed.

A65-81164
THE PHYSICS OF THE EAR.
T. S. Littler (King's Coll. Hosp. Med. School, Wernher Res. Unit on Deafness, London, Great Britain).
Oxford, Great Britain, Pergamon Press, 1965, ix + 378 p. refs.
$10.00.

The physical properties of the ear form only a small part of the complete mechanism involved in the interpretation and assessment by the central nervous system of the origin of disturbances which affect the ear. A factual outlook on ear functioning is presented including the following aspects: (1) the receiving and conducting mechanisms, and the perceptive analytical and assessing systems; (2) sensitivity range of the ear; (3) physical characteristics of speech; (4) binaural hearing; (5) methods and devices of audiometry; (6) auditory adaptation and fatigue; (7) abnormal hearing; (8) theory of hearing; and (9) autocorrelation analysis.

A65-81165
SOME ASPECTS OF ELECTROENCEPHALOGRAPHIC FINDINGS IN STUDENT PILOTS [O NEKIM ASPEKTIMA ELEKTROENCEFALOGRAFSKIH NALAZA KOD UCENIKA-PILOTA].
Nikola Gazivoda (Aviation Med. Inst. Div. of Clin. Neuropsychiat. and Psychol., Zemun, Yugoslavia).
Vojnosanitetski Pregled, vol. 22, Apr. 1965, p. 230-234. 10 refs. In Serbo-Croatian.

Physiological stresses encountered in piloting produce various effects on the electroencephalogram. Among the factors frequently leading to loss of consciousness or disorientation are hypoxia, acceleration, hypoglycemia, and hyperventilation. In the selection of student pilots, the reaction of the electroencephalogram to induced hyperventilation (hypocapnia) is particularly valuable. The principal changes which may occur consist of the appearance of a slow rhythm (2 to 3 cps) or increase of the amplitude of an already existing slow rhythm; increase of the amplitude of the alpha rhythm without change of its frequency; or appearance of a fast rhythm (more than 14 cps). The development of delta waves during hyperventilation must be interpreted in relation to the age of the subject, as they are seen in about one half of the normal, healthy individuals between the ages of 16 and 20 years. Above 20 years the number of individuals developing delta waves declines and falls to about 10% after the age of 50 years. Electroencephalographic tracings taken before, during, and after hyperventilation are reproduced.

A65-81166
STIMULUS DETERMINANTS OF CHOICE BEHAVIOR IN VISUAL PATTERN DISCRIMINATION.
Jaques Kaswan, Stephen Young, and Charles Y. Nakamura (Calif. U., Los Angeles).
Journal of Experimental Psychology, vol. 69, May 1965, p. 441-449. 8 refs.
Grants NSF G-9598; PHS 5-F1-MH-19,664-02.

Five subjects participated in a forced-choice, pattern-recognizing study. In each of a total of 10 sessions, subjects were required to identify tachistoscopic presentations from a set of 3 or 2 patterns. In separate sessions each subject received 1 set of 3 patterns and 3 subsets of 2 patterns, the latter containing all the possible combinations of the 3-alternative set. It was assumed that spatial distance characteristics of the patterns and exposure duration were stimulus dimensions which help determine the perception of these patterns. This assumption was used to predict (a) the order of response probabilities to each pattern at different levels of exposure duration, (b) the accuracy of pattern identification as a function of exposure duration, and (c) the response probabilities to each pattern in 2-alternative sets from the responses to these patterns in the 3-alternative set. The predictions were generally confirmed, indicating that these stimulus dimensions may contribute substantially to the determination of choice behavior.

A65-81167
EFFECTS OF DELAYED AUDITORY FEEDBACK ON MORSE TRANSMISSION BY SKILLED OPERATORS.
Aubrey J. Yates (Western Australia U., Perth).
Journal of Experimental Psychology, vol. 69, May 1965, p. 467-475. 9 refs.

Three experiments were carried out on the effects of delayed auditory feedback (DAF) on the transmission of letters by 6 skilled Morse code operators. In the first experiment, random sequences of 8 letters were transmitted under 3 conditions (each letter transmitted separately, continuously at preferred rate, or continuously as fast as possible) at a constant delay time of 180 msec. In the second experiment, the same sequences were

transmitted as fast as possible at delays varying from 30 to 300 msec as well as under no delay. In the third experiment, meaningful material was transmitted as fast as possible under a delay of 180 msec. The results showed that DAF produces a great increase in the number of errors made; that the errors almost always involve an additional symbol or symbols; and that letters involving 3 or 4 symbols produce many more errors than letters involving 1 or 2 symbols.

A65-81168
LOUDNESS, A PRODUCT OF VOLUME TIMES DENSITY.
S. S. Stevens, Miguelina Guirao, and A. Wayne Slawson (Harvard U., Lab. of Psychophys., Cambridge, Mass.)
Journal of Experimental Psychology, vol. 69, May 1965, p. 503–510.
9 refs.
Grants NSF G-10716; NIH B-2974.

Experiments were designed to determine the relation between loudness and two other auditory attributes, volume (apparent size) and density (apparent compactness or concentration). Two sets of stimuli, quarter-octave bands of noise covering a wide range of center frequencies and sound pressure levels, were presented through earphones to observers who made magnitude estimations of one or another of the attributes. The loudness estimations were plotted against loudness level and found to agree with the sone scale. A plot of the estimations of loudness against the product of the estimations of volume times the estimations of density produced a slope of 1.0 in log-log coordinates. Loudness is therefore proportional to volume times density. This relation was confirmed by experiments involving magnitude estimations of the inverse attributes, softness, smallness, and diffuseness.

A65-81169
EFFECT OF STIMULUS VARIABLES ON CHOICE REACTION TIMES AND THRESHOLDS.
J. Kaswan and S. Young (Calif. U., Los Angeles).
Journal of Experimental Psychology, vol. 69, May 1965, p. 511–514.
Grant NSF G-9598.

For 8 different groups of subjects, individual patterns from sets of either 4-, 3-, or 2-alternative patterns were shown to each subject under two conditions in a forced-choice recognition task. In one condition, exposure duration was varied by experimenter and thresholds were determined for each pattern. In the other condition, choice reaction times (CRT) were obtained, measured from stimulus onset to subjects key press. It was predicted and found that the order of CRT's would parallel the order of thresholds in each combination of patterns. This finding supports the assumption that the time required to receive spatial information sufficient to distinguish patterns is an identifiable component of CRT.

A65-81170
HUMAN ENGINEERING GUIDE FOR EQUIPMENT DESIGNERS.
Wesley E. Woodson (Gen./Dyn. Astronautics, San Diego, Calif.) and Donald W. Conover (NASA, Manned Spacecraft Center, Houston, Tex.)
Berkeley, Calif., University of California Press, 1964, 473 p.
$10.00.

This revised edition includes a new chapter on design philosophy with a special section on bionics, cybernetics, and neuro-engineering concepts. Chapter 2 on Design of Equipment and Work Space has been greatly expanded. The chapter on Body Measurement has been revised and made more practical from the designer's point of view. Revisions in other parts (Vision, Audition, Other Factors, and Recommended Human-Engineering Basic Reference Shelf) reflect changes ensuing from more recent research particularly in the area of man-in-space and in industrial applications.

A65-81171
THORACIC DUCT LYMPH AND LYMPHOCYTES DURING PRIMARY HYPOXIA AND REBOUND.
D. A. Evans, R. A. F. Garnett, and J. M. Yoffey (Bristol U., Dept. of Anat., Great Britain).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1243–1246.
32 refs.

Thoracic duct lymph flow and lymphocytes were first studied in 18 normal guinea pigs. Similar studies were then made on (a) 25 guinea pigs placed in a decompression chamber at a simulated altitude of 14 000 ft for times ranging from 1 to 5 days, this being the period of "primary hypoxia" during which erythropoiesis is stimulated and polycythemia develops, and (b) 25 guinea pigs exposed to primary hypoxia for 5 days, then kept in room air for times ranging from 1 to 5 days, this period of post-hypoxic polycythemia being known as "rebound". By the end of rebound the polycythemia had almost disappeared. The flow of thoracic duct lymph increased significantly from a control level of 0.86 ± 0.21 ml/hr to 1.23 ± 0.1 ml/hr by the 5th day of primary hypoxia, and to a peak of 1.89 ± 0.23 ml/hr by the 3rd day of rebound, when it was still markedly above control level. The total cell content of the lymph also rose significantly, from $34.5 \pm 10.3 \times 10^6$ lymphocytes/hr in the control animal to $59.1 \pm 8.9 \times 10^6$/hr on the 5th day of primary hypoxia, and to a peak of $93.8 \pm 23.0 \times 10^6$ on the 3rd day of rebound.

A65-81172
EFFECT OF HYPOTHERMIA ON MYOCARDIAL METABOLISM.
Clem Russ and John C. Lee (Albert Einstein Med. Center, Dept. of Physiol., Philadelphia, Pa.)
American Journal of Physiology, vol. 208, Jun. 1965, p. 1253–1258.
32 refs.
Contract AF 41(657)-417; Grants NIH HE-07847-01 and NIH HE-K3-17921.

Effect of hypothermia of 25° C for 24 hr was determined on myocardial metabolism and efficiency in dogs fasted for approximately 15 hr 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 after 12 hr of cooling when pyruvate utilization stopped in negative balance. After 24 hr 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 hr of cooling, suggesting a relative state of myocardial hypoxia. The appearance of hypoxia and glycolysis during the late hours of cooling suggests that the limit of tolerance of the heart to cooling was near.

A65-81173
CARDIAC METABOLISM IN THE HYPOTHERMIC GROUND SQUIRREL AND RAT.
Marilyn L. Zimny and Steve Taylor (La. State U. School of Med., Dept. of Anatomy, New Orleans).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1247–1252.
25 refs.
Grants A-2027 and PHS G-TI-GM 399.

A biochemical and electrocardiographic study of cardiac function during hypothermia in the ground squirrel (7° to 17° C) and the rat (11° to 19° C) revealed that, in the ground squirrel heart, adenosine triphosphate (ATP) and phosphocreatine (PC) each decreased significantly 60% thus maintaining their ratio (2.6/1), whereas in the rat heart ATP decreased 61%, PC decreased 48%, and lactate increased 194%. Histochemical studies demonstrated an increase in succinic dehydrogenase and a decrease in triphosphopyridine nucleotide diaphorase in the rat heart. As rectal temperature decreased in the ground squirrel the components of the electrocardiogram lengthened and voltage was maintained. In the rat, voltage decreased with decreasing rectal temperature and the electrocardiographic pattern reflected myocardial anoxia. The metabolic integrity of cardiac muscle cells and the membrane potential are apparently maintained in the ground squirrel during hypothermia. In the rat, however, this is not so and conduction difficulties become evident at 20° to 15° C. Disruption of mitochondrial morphology, presently being investigated, is thought to be responsible for the metabolic and conduction problems which occur in the rat heart during hypothermia.

A65-81174
SKELETAL RESPONSE OF RATS EXPOSED TO REDUCED BAROMETRIC PRESSURE.
Roger A. Hunt and Harald Schraer (Pa. State U., Dept. of Biophys., University Park).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1217–1221.
21 refs.
Grant PHS A-1292.

The response of the rat skeleton to hypoxia (380 mm. Hg.) was investigated. The femur images in calibrated radiographs taken at 2-week intervals were analyzed photodensitometrically. Femurs were also excised from other rats to obtain density and volume measurements by displacement methods. Hematocrit values and body weights were recorded. Differences between femur densities and between femur dry weights (hypoxic group 3 and 20% less, respectively) developed during the first 31 days. Differences between femur volumes, between body weights, and between hematocrit values (hypoxic group 8% less, and 60% more, respectively) developed during the first 15 days. However, the difference between marrow cavity volumes (hypoxic group 22% more) developed between days 15 and 31. The interpretation is that during the first 15 days when marrow cavity volumes did not differ, the large hematocrit value was caused by increased hemopoietic activity of marrow present at the onset of hypoxia. Subsequently, marrow cavities become 22% larger than normal, facilitating production of blood at a more nearly normal activity.

A65-81175
EFFECT OF HYPOXEMIA AND HYPERCAPNIA ON REGIONAL DISTRIBUTION OF MYOCARDIAL BLOOD FLOW.
William D. Love and Myra D. Tyler (Miss. U. School of Med., Dept. of Med., Jackson).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1211–1216.
21 refs.
Grants PHS HE-07628; PHS HE-06234; LIMRF G-64-48.

The effect of hypoxia and hypercapnia on regional coronary blood flow and vascular resistance (CVR) was studied in dogs without thoracotomy. Gas tensions were varied by ventilation at controlled rates with gas mixtures containing 4% to 100% O_2 and 0% to 24% CO_2. After 10 minutes intravenous infusion of Rb^{86}, the animals were killed and the heart isotope content determined. Blood flow to the left ventricle was calculated by the Fick principle from the isotope uptake and the mean difference in radioactivity of arterial and coronary sinus blood. Patterns of flow elsewhere were estimated from the rates of regional Rb^{86} clearance. Myocardial Rb^{86} clearance in the right and left ventricles has been previously shown to be closely related to the rate of coronary blood flow. Hypoxemia and severe hypercapnia (pCO_2 above 100 mm Hg) both produced a profound fall in CVR. With hypoxemia this decrease was more marked in the right ventricle. Elevation of pCO_2 exaggerated the normal difference in Rb^{86} uptake between inner and outer thirds of the wall of the left ventricle, while hypoxemia reversed the normal gradients. Hypercapnia did not affect these gradients in the right ventricle, but hypoxemia significantly reduced them.

A65-81176
EFFECTS OF O_2, CO_2, AND DRUGS ON ESTIMATING CORONARY BLOOD FLOW FROM RB^{86} CLEARANCE.
William D. Love, Myra D. Tyler, Ralph E. Abraham, and Robert S. Munford (Miss. U. School of Med., Dept. of Med., Jackson).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1206–1210. 12 refs.
Grants PHS HE-07628; PHS HE-06234; LIMRF G-64-48.

The accuracy of predictions of myocardial blood flow based on Rb^{86} clearance rates was determined in dogs receiving vasoactive drugs or subjected to hypoxemia or hypercapnia. In controls, the highest rate of coronary blood flow was 16.5 ml/g myocardium per 10 min. Flow could be predicted from clearance (tissue Rb^{86} uptake/arterial blood Rb^{86} concentration) with a mean error of 7.8% in this group. With hypoxemia estimates of flow averaged 13.8% too low when arterial blood was from 50% to 75% saturated with oxygen, and were more unreliable at lower values. Carbon dioxide tension had no effect in the range from 20 to 60 mm Hg but at higher levels estimates of flow were frequently much too low. Reserpine slowed the pulse and resulted in predicted rates of flow which averaged 13.7% below actual rates. Angiotensin, l-norepinethrine, dipyridamole, and digitoxin had no significant effect on the prediction of flow from clearance in the range of flow observed in controls. Thus Rb^{86} clearance is a valid index of coronary flow in the range of CO_2 tension, arterial oxygen saturation, and drug effects commonly observed.

A65-81177
EFFECTS OF HYPOXIA ON IN VIVO GLYCINE-C^{14} INCORPORATION INTO PANCREATIC CELL PROTEINS.
M. Don Turner and Anne C. Turner (Miss. U. Med. Center, Depts. of Surg. and Physiol., Jackson).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1177–1182. 22 refs.
Grant PHS AM-04568.

The effects of graded hypoxia on glycine-C^{14} incorporation into subcellular components were measured in the intact mammal. Groups of 3 fasted male rats were injected intraperitoneally with 5 μc of glycine-2-C^{14} and sacrificed at 5 (or 10), 15, 20, 30, and 45 min. by decapitation. In 1 experimental series the environmental pO_2 was maintained at 35 mm Hg for 2 hours before injection and throughout the experiment. In 3 other experimental series, the pO_2 in the sealed chamber was maintained at 58, 48, and 38 mm Hg for 45 min before injection and for the duration of the experiment. The whole pancreases were rapidly removed, cooled, homogenized, and pooled before separation of cell fractions by ultracentrifugation. The specific activities (counts/min. per μg of amino acid or protein N) were obtained for plasma and supernatant fraction (cell sap) amino acids and for the purified proteins of zymogen granule, mitochondrial, microsomal, and cell sap fractions from micro-Kjeldahl analyses and liquid-scintillation counting. No detectable changes were found in the turnover of plasma amino acids during graded hypoxia. Amino acid incorporation into the proteins of all cell fractions was depressed stepwise with increasing degrees of hypoxia.

A65-81178
ROLE OF SEMICIRCULAR CANALS IN POSITIONAL ALCOHOL NYSTAGMUS.
K. E. Money, W. H. Johnson, and B. M. A. Corlett (Defence Res. Med. Labs., Toronto, Ontario, Canada).
American Journal of Physiology, vol. 208, Jun. 1965, p. 1065–1070. 10 refs.

Following unilateral labyrinthectomy or inactivation of one horizontal semicircular canal in cats, a horizontal positional nystagmus was observed when the cat, after ingesting alcohol, was held with the head up or with the head down. This nystagmus was toward the operated ear in the head-up position and away from the operated ear in the head-down position. It disappeared following inactivation of the horizontal canal of the other ear. In cats with both horizontal canals discretely inactivated, there was no horizontal alcohol nystagmus in any position, but the vertical and rotary components of positional alcohol nystagmus were still present. It was concluded that positional alcohol nystagmus is initiated by the action of gravity on receptors of the semicircular canals. No conclusion could be drawn concerning the site or mechanism of the action of alcohol.

A65-81179
IMPEDANCE MEASUREMENT OF TIDAL VOLUME AND VENTILATION.
L. H. Hamilton, J. D. Beard, and R. C. Kory (Marquette U. School of Med., Depts. of Physiol. and Med., and Wood Veterans Admin. Center, Res. Serv., Milwaukee, Wis.)
Journal of Applied Physiology, vol. 20, May 1965, p. 565–568. 6 refs.
Grant NIH TI-HE5366.

Thoracic impedance changes have been used to measure tidal volume and ventilation in normal subjects. Tidal volume was measured directly and total ventilation was accumulated with a diode voltage pump. The size, shape, and placement of the electrodes affected the reliability with which the system measured ventilation. A high correlation was demonstrated between transthoracic resistance or capacitance changes and ventilation when special narrow ridged electrodes were applied bilaterally on the thorax. The variability between accumulated impedance changes and ventilation measured with a spirometer had a standard deviation less $\pm 6\%$ of the ventilation. A linear relationship was demonstrated between lung volume change and impedance change of subjects in the standing, sitting, or supine positions, whether the breathing pattern was normal, predominantly thoracic, or predominantly abdominal.

A65-81180
HYPOXIA.
Edward S. Van Liere and S. Clifford Stickney.
Chicago, Ill., University of Chicago Press, 1963, x+381 p.
$8.75.

Research covering various aspects of hypoxia is presented. The following are included: (1) introduction (comprising historical background, definition of terms, classification of hypoxia, expression of the degree of hypoxia, and variables of responses to hypoxic conditions), (2) experimental methods of producing hypoxia, (3) effect of hypoxia on the blood, (4) chemical changes in the blood during hypoxia, (5) effect of hypoxia on the heart and circulation, (6) effect of hypoxia on blood pressure, (7) effect of hypoxia on lymph and on vessel permeability, (8) effect of hypoxia on respiration, (9) mountain sickness and altitude sickness, (10) acclimatization to hypoxia, (11) effect of hypoxia on the alimentary tract, (12) hypoxia and the secretion of urine, (13) effect of hypoxia on the endocrine glands, (14) metabolism and hypoxia, (15) hypoxia and heat regulation, (16) effect of anoxic hypoxia on water distribution in the body, (17) hypoxia and nutrition, (18) effect of hypoxia on the nervous system, and (19) resistance to hypoxia.

A65-81181
BLOOD HISTAMINE AND HISTIDINE DURING HEMODYNAMIC CHANGES DUE TO HIGH TEMPERATURE OF THE ENVIRONMENT [ZACHOWANIE SIE STEZENIA HISTAMINY I HISTYDYNY W KRWI U LUDZI PODCZAS ZMIAN HEMODYNAMICZNYCH WYWOLANYCH WYSOKA TEMPERATURA OTOCZENIA].
Franciszek M. Spioch and Danuta Pawlowicz.
Polski Tygodnik Lekarski, vol. 19, Nov. 16, 1964, p. 1755–1758. 20 refs.
In Polish.

Hemodynamic responses in men exposed for two hours to an environment of high temperature and humidity were investigated. A significant fall of blood systolic pressure (10%) and diastolic pressure (35%), an increased pulse rate (34%), and an increased blood histamine and histidine content (41 and 42%, respectively) were observed. The increased histamine level was related to the rise of body temperature. The histamine/histidine ratio remained nearly constant before and after the experiment. The importance of elucidating the mechanism of histamine liberation is discussed as related to its physiology, physiopathology, pathogenesis, and some allergic states.

A65-81182
DISASTER HANDBOOK.
Solomon Garb (Mo. U., School of Med.) and Evelyn Eng (U. Hosp., Columbia, Mo.)
New York, Springer Publishing Co., Inc., 1964, viii+248 p. refs.
$5.00

This handbook, planned primarily for doctors and nurses, could benefit anyone interested in disaster casualty prevention and management. The book is divided into four main sections: basic features (including psychology, leadership, organization of disaster teams, communications, evacuation, first aid, etc.), nursing in disasters, major types of disaster (including airplane crashes, avalanches, explosions, fires, floods, etc.), and thermonuclear disaster. In chapter 26, the frequency and area of occurrence of major airplane crashes, with examples since 1947 for the U.S. and from 1956 from other nations, probable causes, preventive measures, warning signs, and main mechanisms of death and injury are briefly presented.

A65-81183
EFFECT OF RESTRAINT ON FREE FATTY ACID MOBILIZATION IN RATS.
Joseph D. Sapira, Richard Lipman, and Alvin P. Shapiro (Pittsburgh U. School of Med., Dept. of Med., Psychophysiol. Lab., Pa.)
(Ann. Meeting of Am. Psychosomat. Society, San Francisco, Calif., Apr. 4, 1964.
Psychosomatic Medicine), vol. 27, Mar.-Apr. 1965, p. 165-170. 7 refs.
United Fund of Allegheny County supported research.
Grant PHS (HE-05711).

In this report the free fatty acid (FFA) reserve, operationally defined as the amount of free fatty acids measured in the blood after the administration of a saturating dose of L-norepinephrine, is suggested as a measure of chronic noxious stimulation. Evidence is presented that the FFA reserve is reduced in animals subjected to restraint for 18 hr and seems less sensitive to nutritional manipulations, such as fasting and refeeding, than to behavioral manipulations. The possibility that alterations in FFA reserve are actually due to changes in norepinephrine responsivity is discussed, and several mechanisms are suggested.

A65-81184
EVOKED RESPONSE OF THE HUMAN VISUAL CORTEX: SPECTRAL SENSITIVITY.
Carl R. Cavonius (Eye Res. Found., Bethesda, Md.; and Human Sci. Res., McLean, Va.)
Psychonomic Science, vol. 2, Apr. 1, 1965, p. 185-186. 8 refs.
Grant Nonr - 562 (21)

Responses evoked by visual stimuli were recorded from the human scalp over the visual cortex. At low intensities response amplitude is linear with log stimulus energy. Spectral sensitivity of the cortical response resembles that of the electroretinogram elicited by similar stimuli but shows maximum sensitivity at about 560 mμ, indicating a largely photopic origin.

A65-81185
FUNCTIONAL SIGNIFICANCE OF A LOW PULMONARY DIFFUSING CAPACITY FOR CARBON MONOXIDE.
Robert L. Johnson, Jr., Harold F. Taylor, and Arthur C. Degraff, Jr. (Tex. U. Southwestern Med. School, Dept. of Internal Med., Cardiopulmonary Div., Dallas).
Journal of Clinical Investigation, vol. 44, May 1965, p. 789-800. 29 refs.
Grants PHS HE-07744; PHS HE-06296

If diffusing capacity of the lungs is reduced enough by disease, alveolar capacity block results, causing maximum oxygen consumption to be curtailed by a sharp fall in arterial oxygen saturation. In patients suspected of having alveolar capillary block, the pulmonary capillary blood flow, capillary blood volume (V_c), and membrane diffusing capacity for CO (D_{MCO}) were measured at full inspiration, both at rest and exercise. From these measurements the fall of oxygen saturation of arterial blood was predicted by the oxygen consumption increase at a given alvelor tension. D_{MCO} and V_c were translated into terms of oxygen transport. It was assumed that D_{MCO} was equal formly distributed with respect to diffusing surface. These predictions were close to experimental findings. The reason for some discrepancy which occurred is discussed. In general this theory also indicates that above 10 000 feet diffusing capacity should become important as a limit of oxygen consumption in normal subjects.

A65-81186
TREATMENT OF HYDROFLUORIC ACID BURNS.
John M. Wetherhold and Frederick P. Shepherd (E. I. du Pont de Nemours and Co., Inc., Penns Grove, N. J.)
Journal of Occupational Medicine, vol. 7, May 1965, p. 193-195.

The use of cold to restrict lymph and blood flow, thus inhibiting the development of edema, has been established as useful in the treatment of burns of all types. Hydrofluoric acid burns are to be set apart as having particular requirements as to treatment. The use of cold in conjunction with Hyamine 1622 has served to meet some of these special requirements. However, the mechanism through which this quarternary amine neutralizes or counteracts hydrofluoric acid in the tissues remains uncertain. Nonetheless the combination of cold and Hyamine (0.2%), in the form of iced Hyamine baths or soaks, has yielded by far the best results in the treatment of over 100 cases of hydrofluoric acid burns.

A65-81187
INJURY PRODUCED BY SEAT BELTS.
Peter Fisher.
(Am. Assoc. of Automotive Med., Ann. Meeting, Louisville, Ky., Oct. 1964).
Journal of Occupational Medicine, vol. 7, May 1965, p. 211-212. 10 refs.

Accounts of injuries to two passengers, each wearing a three-point combination of lap and diagonal belt are given. One occupant was critically injured, as a result of moderate collision, suffering rib fractures and ruptured spleen. It is suggested that the device could have been improperly applied. A safer design is proposed, such as a full shoulder harness restraint, which distributes the forces of collision more evenly.

A65-81188
ON THE EFFECT OF LOW OXYGEN PARTIAL PRESSURES ON RESPIRATION IN CHRONIC HYPOXEMIA [UBER DIE WIRKUNG NIEDRIGER O_2 PARTIALDRUCKE AUF DIE RESPIRATION BEI CHRONISCHER HYPOXAMIE].
R. Mürtz (Med. Akad., I. Med. Klin., Dusseldorf, West Germany).
Zeitschrift fur die gesamte experimentelle Medizin, vol. 139, 1965, p. 58-69. 49 refs. In German.

Studies on pulmonary ventilation were carried out in 12 patients with chronic hypoxemia and 6 subjects without hypoxemia breathing air with 10.2% oxygen. In the normal subjects ventilation increased 32% in response to acute hypoxia; in patients with chronic hypoxemia the increase amounted to 8% above the rest values, which were already elevated by 46% due to the chronic hypoxemia. In both groups there was hypoventilation for 4 to 5 minutes after the cessation of the hypoxic stimulus. The decrease was 16% in normals and 12% in the patients. In connection with an associated study of hypoxia in a patient with chronic hypoxemia before and after corrective surgery, it is concluded that after adaptation to chronic hypoxemia the chemoreceptor drive is still an important factor in the regulation of respiration.

A65-81189
A DEVICE FOR CONTINUOUS REGISTRATION OF PULSE ACTIVITY [EIN GERAT ZUR FORTLAUFENDEN REGISTRIERUNG DER PULSTATIGKEIT].
W. Bachmann and H. Südow.
Zeitschrift für Psychologie, vol. 170, Jan. 1965, p. 124-134. 6 refs. In German.

A stationary apparatus is described for continuous registration of pulse rate, amplitude, mean level, and rhythm. The use of an ear clip instead of a cuff makes it particularly suitable for studies in work physiology and psychology. Photographic recording of pulse waves for prolonged periods is possible by attaching an oscillograph to the apparatus.

A65-81190
PECULIARITIES OF THE PROTECTIVE EFFECT OF BETA-MERCAPTOETHYLAMINE DURING THE FORMATION OF CHROMOSOME ABERRATIONS IN LIVER CELLS OF MAMMALS IRRADIATED WITH GAMMA-RAYS. [OSOBENNOST' PROIAVLENIIA ZASHCHITNOGO EFFEKTA MERKAPTOETILAMINA PRI OBRAZOVANII KHROMOSOMNYKH ABERRATSII V KLETKAKH PECHENI MLEKOPITAIUSHCHIKH, OBLUCHENNYKH GAMMA-LUCHAMI].
N. I. Nuzhdin and I. S. Kurnishkov (USSR, Acad. of Sci., Inst. of Genet., Moscow).
Zhurnal Obshchei Biologii, vol. 26, Jan.-Feb. 1965, p. 3-13. 24 refs. In Russian.

Sexually mature males of nonlinear albino mice were irradiated with γ-rays of Co^{60} at a dose of 300 r (dose rate 269 to 207 r/min.) with or without β-mercaptoethylamine (MEA) employed. During various intervals after irradiation (3 to 180 days) when liver cells were stimulated with CCl^4 to divide, the animals were sacrificed. The frequency of cells with chromosome aberrations (dicentric bridges and acentric fragments) was studied. In the liver of mice irradiated without MEA protection the percentage of cells with chromosome aberrations remained constant during 6 months. In mice irradiated with MEA protection a distinct protective effect could be revealed during 10 days after irradiation. After this period of time the MEA protective effect did not manifest itself and the percentage of liver cells with aberrations was equal for protected and unprotected animals. It is concluded that the MEA administration before irradiation delays the transition of latent damages of chromosomes in true breakages.

A65-81191
CHANGES OF BIOELECTRIC CEREBRAL ACTIVITY AND CERTAIN VEGETATIVE VASCULAR REACTIONS RESULTING FROM THE ACTION OF NOISE [IZMENENIE BIOELEKTRICHESKOI AKTIVNOSTI GOLOVNOGO MOZGA I NEKOTORYKH VEGETATIVNO-SOSUDISTYKH REAKTSII PRI VOZDEISTVII SHUMA].
E. A. Drogichina, L. E. Milkov, and D. A. Ginzburg (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor and Profess. Diseases, Moscow).
Gigiena i Sanitariia, no. 2, Feb. 1965, p. 29-33. 8 refs. In Russian.

Under laboratory conditions, the authors studied the effects of high frequency noise of 110 dB on two groups of persons – the one working in noisy shops, the other a control group. Brain potentials, blood pressure, including the temple zone, pulse rate, critical frequency of noise bursts, oculocardiac and orthostatic reflexes, and dermographs, were recorded. The findings indicate that the most specific and normal reactions of the nervous system consisted in a fall of the functional mobility of the auditory analyzer and changes in bioelectric cerebral activity. In comparison with the control group, the workers in the noisy shops showed more stable levels of blood pressure, but greater increases in the pulse rate in response to primary effects of noise.

A65-81192
IN THE FLYING LABORATORY [V LETAIUSHCHEI LABORATORII].
N. Gurovskii and M. Cherepakhin.
Aviatsiia i Kosmonavtika, no. 3, Mar. 1965, p. 34-36. In Russian.

A study of sensory reactions of man to acceleration stress and weightlessness was conducted on a group of male subjects who had passed the physical examination by a special medical commission. The subjects were flying a jet plane on a parabolic curve. The acceleration stress up to 2 g lasted 5 to 10 seconds and was followed by a state of weightlessness lasting 18 to 25 sec. The results of the experiments were based entirely on written reports submitted by the subjects. The most severe reactions were produced during transition from gravitational stress to weightlessness. The degree of discomfort varied with the individuals. The general response was characterized by loss of orientation, detachment from the outside world followed by a sensation of helplessness. Some subjects, however, became euphoric, showing excessive mobility and self-assurance. The majority of subjects experienced nausea toward the end of the experiment. Repeated subjection to the same experience usually resulted in adaptation to these conditions. However, some subjects did not show such adaptation because of an established psychological effect.

A65-81193
CLINICAL APPLICATION OF THE TELEMETERING METHOD.
Kazuo Kitamura (Junten U., School of Med., Tokyo, Japan).
Japanese Journal of Medicine, vol. 3, Jul. 1964, p. 205–212. 13 refs.

Results of telemetering obtained in clinical medicine in Japan are presented. Both wired and wireless methods are included. Wired telemetering has been used in ward monitoring of pulse and temperature readings and for telephone transmission of electrocardiographic data. Wireless telemetering has been used in transmitting electrocardiographic recordings, heart sounds and pulse waves, electroencephalograms, and for measuring pH and temperature changes using radio capsules internally. A temperature capsule has also been used to locate bleeding regions within the gastrointestinal tract.

A65-81194
HYDROGENASE IN CHLORELLA: QUALITATIVE DIFFERENCES IN QUINONE COMPOSITION.
M. D. Henninger (Purdue U., Dept. of Biol. Sci., Lafayette, Ind.)
Biochemical and Biophysical Research Communications, vol. 19, Apr. 9, 1965, p. 233–236. 6 refs.
Grant NSF GB-567.

The quinone composition of glucose grown Chlorella pyrenoidosa, which can carry out both photosynthesis and photoreduction, is described and compared with that of autotrophically grown cells, which are not capable of photoreduction. Quinone analysis of glucose grown cells showed a general decrease of at least 60% from the concentration of quinones found in normal Chlorella cells, including PQ A, PQ B, PQ C, PQ D, vitamin K, and tocopherylquinones. In contrast to the decrease of these quinones, about five times as much coenzyme Q_{10} was found in the glucose grown cells, and a new naphthoquinone appeared, which was not found in Chlorella cells grown on inorganic media and has similar properties with a hydroxynaphthoquinone recently found in one blue-green alga.

A65-81195
ESTIMATION OF LIGHT STIMULATOR POSITION AND EYE MOVEMENTS [OB OTSENKE POLOZHENIIA SVETOVOGO RAZDRAZHITELIA I DVIZHENIIAKH GLAZ].
L. I. Leushina (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Leningrad).
Biofizika, vol. 10, 1965, p. 130–136. 31 refs. In Russian.

The experiments were conducted on human subjects in order to establish eye movement relationship to estimation of the position of a light stimulus source. The results showed that the period of time it took the subject to estimate the correct position of the light source was proportionate to the precision achieved. The latent period of eye movement increased while the period of time for the subject's decision remained unchanged. In 25% of the cases the decision was reached before the eye movement stopped. During the effort to estimate the position the variability coefficient decreased. The results indicate that eye movement is not instrumental in but a result of estimating visual distance.

A65-81196
SOME INFORMATION ON EYE WATCHING SYSTEM [NEKOTORYE SVEDENIIA O SISTEME SLEZHENIIA GLAZA].
A. I. Lauringson and L. P. Shchedrovitskii (USSR, Acad. of Sci., Inst. of Autom. and Telemech., Moscow).
Biofizika, vol. 10, 1965, p. 137–140. 6 refs. In Russian.

The eye movement following a moving object is a continuous one interrupted by a single quick motion. The experiments were performed on subjects who retained binocular vision, although only movements of one eye were registered. The subjects watched a point of light on the screen moving as follows: (1) at constant velocity in one direction; (2) at changing velocity and direction; and (3) on parabolic or exponential curves. The results indicate that continuous eye movement following a moving object is determined only by the velocity of the moving object.

A65-81197
REACTIONS OF COSMONAUTS DURING PARABOLIC FLIGHTS ON BOARD OF AIRPLANES [REAKTSII KOSMONAVTOV VO VREMIA PARABOLICHESKIKH POLETOV NA SAMOLETAKH].
I. I. Kas'ian, I. A. Kolosov, V. I. Lebedev, and B. N. Iurov.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 2, Mar.–Apr. 1965, p. 169–181. 33 refs. In Russian.

Reactions of cosmonauts were studied during parabolic flights in airplanes during a period of weightlessness, which lasted 40 to 45 secs. It was found that during acceleration stress preceding weightlessness unstable and reversible functional changes occurred in the cardiovascular and respiratory systems. In the state of weightlessness physiological data approached the levels recorded during horizontal flights. The rate at which physiological functions under conditions of weightlessness returned to normal levels depended mainly upon individual adaptability of the cosmonauts.

A65-81198
THE DAILY RHYTHM OF VEGETATIVE FUNCTIONS DURING THE COSMIC FLIGHT [SUTOCHNAIA RITMIKA VEGETATIVNYKH FUNKTSII V KOSMICHESKOM POLETE].
G. V. Altukhov, P. V. Vasil'ev, V. E. Belai, and A. D. Egorov.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 2, Mar.–Apr. 1965, p. 182–187. 14 refs. In Russian.

The data on the daily rhythm of pulse frequency and systolic index of the cosmonauts A. G. Nikolaev, V. F. Bykovsky, and V. V. Tereshkova are given. By means of mathematical analysis of the corresponding data registrated at the same time of the day during the period before flight and during the orbital flight some disturbances of the daily rhythm of vegetative functions in the cosmic flight are established. The authors consider that the changes in the daily rhythm of pulse frequency and systolic index observed in the cosmonauts are connected with the specific influence of weightlessness, as well as with the neuro-emotional stress.

A65-81199
OCULOMOTOR ACTIVITY IN COSMONAUTS DURING ORBITAL FLIGHTS [GLAZODVIGATEL'NAIA AKTIVNOST' U KOSMONAVTOV VO VREMIA ORBITAL'NYKH POLETOV].
I. T. Akulinichev, M. D. Emel'ianov, and D. G. Maksimov.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 2, Mar.–Apr. 1965, p. 274–278. 9 refs. In Russian.

Electrooculograms (EOG) of four Soviet astronauts (A. G. Nikolaev, P. R. Popovich, V. F. Bykovski, and V. V. Tereshkova) were registered during their orbital space flights. Analyses of each subject's EOG showed that none of the astronauts suffered lasting eye coordination disturbances during weightlessness. Two astronauts showed considerable abnormalities in asymmetric oculomotor reactions, and nystagmus. The short durations and weak manifestations of these conditions indicated adaptation to unusual conditions encountered during flight.

A65-81200
THE EFFECT OF ANGULAR AND CORIOLIS ACCELERATIONS ON SOME FUNCTIONS OF THE ORGANISM OF MAN [VLIIANIE UGLOVYKH I KORIOLISOVYKH USKORENII NA NEKOTORYE FUNCTSII ORGANIZMA CHELOVEKA].
S. S. Markarian.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 2, Mar.–Apr. 1965, p. 278–284. 13 refs. In Russian.

Vestibular nystagmus and illusions of counterrotation were studied in persons subjected to angular acceleration from 60° to $240^{\circ}/sec^2$. An increase in angular acceleration and in exposure time resulted in an increase in duration of vestibular nystagmus and counterrotation illusion. During the period of angular acceleration, and some time after, the ability of a subject to read instruments and identify signs on standard charts was diminished. Repeated exposure to acceleration led to general fatigue and equilibrium disturbance. Pulse rate and respiration increased. Coriolis effect was noted, which increased with an increase in rotation rate and head movements. The results indicate a disturbance in vestibular apparatus functions.

A65-81201
EXPLOSIVE EAR LESIONS [EKSPLOZIVNE POVREDE UHA].
Antun Rišavi (Inst. of Aviation Med., Zemun, Yugoslavia).
Vojnosanitetski Pregled, vol. 22, Mar. 1965, p. 155–161. 9 refs. In Serbo-Croatian.

Five cases of ear lesions caused by explosive blast are analyzed by otoscopic examination, audiogram, rotatory and caloric tests, and in part by a modified Romberg test. The following conclusions are reached: The lesions are caused by the mechanical action of the positive phase of the blast wave. The middle ear injuries consist of damage to the tympanic membrane, the chain of auditory ossicles, and the mucous lining of the tympanic cavity. The inner ear lesions involve damage to the sensory cells of the static and auditory apparatus, caused by the increased pressure transmitted through the oval and round fenestrae. The auditory part of the labyrinth is more liable to injury than the static part. Ear defenders which protect the ear

against high-intensity sound are effective also against explosive blast. To avoid secondary infection after blast injury to the ear, no plugs should be inserted into the auditory meatus at the time of rendering first aid.

A65-81202
EFFECTS OF DRUGS AND HYPERBARIC OXYGEN ENVIRONMENT ON EXPERIMENTAL KEROSENE PNEUMONITIS.
Seymour I. Schwartz, Roger C. Breslau, Fredric Kutner, and Douglas Smith (Rochester U. School of Med. and Dentistry, Dept. of Surg., N. Y.)
(Am. Coll. of Chest Physicians, 30th Ann. Meeting, San Francisco, Calif., Jun. 18–22, 1964).
Diseases of the Chest, vol. 47, Apr. 1965, p. 353–359. 16 refs.

The effect of drugs and hyperbaric oxygenation on experimentally induced kerosene pneumonitis have been investigated. Antibiotic therapy and pretreatment with cortisone had little effect on the mortality associated with this lesion. Pretreatment with ephedrine sulfate diminished the initial bronchospasm associated with the insult. When 0.2 ml. of kerosene was administered intratracheally, 3 atmospheres absolute (ATA) 100 percent oxygen did not alter the 24-hour survival, but did increase the average duration of survival. When the extent of insult was diminished by decreasing the dose of kerosene, survival statistics were not altered by exposure to 3 ATA 100 percent oxygen, but were significantly improved with 4 ATA 100 percent oxygen.

A65-81203
DETERIORATION OF MENTAL AND MOTOR FUNCTIONS IN HYPERBARIC AIR.
John Adolfson (Goteborg U., Psychol. Lab.; and Office of Surg. Gen., Naval Staff, Stockholm, Sweden).
Scandinavian Journal of Psychology, vol. 6, 1965, p. 26–32. 23 refs.
Min. of Defence, Sweden supported research.

The effects of hyperbaric air on manual dexterity and arithmetic calculation capacity were studied in 15 subjects at ambient pressures of 4, 7, 10, and 13 ATA (atmospheres absolute) at rest, and at 4, 7, and 10 ATA during exercise (300 kpm/min). A significant reduction of the performance in both tests was observed at 10 and 13 ATA at rest. During exercise in manual dexterity the reduction was significant at 4, 7, and 10 ATA and in arithmetic calculation capacity at 7 and 10 ATA. At 13 ATA (at rest) a number of marked behavioral symptoms were observed, including changes in mood, impairment of consciousness, disturbance of perception, and deterioration of motor functions. These changes were readily reversible as soon as the pressure was lowered.

A65-81204
CARDIOVASCULAR AND BLOOD GAS RESPONSES TO HYPERBARIC OXYGENATION.
Robert E. Whalen, Herbert A. Saltzman, David H. Holloway, Jr., Henry D. McIntosh, Herbert O. Sieker, and Ivan W. Brown, Jr. (Duke U. Med Center, Depts. of Med. and Surg., Durham, N.C.)
American Journal of Cardiology, vol. 15, May 1965, p. 638–646. 22 refs.
N. C. and Am. Heart Assoc. and Council for Tobacco Res.-U.S.A. supported research.
Grants PHS HE-07896-01; PHS HE-07563-02; PHS H-4807.

Ten normal subjects were studied while they breathed air and 100% oxygen at 1 and 3.04 atmospheres. Oxygen inhalation at 3.04 atmospheres was associated with a significant increase in arterial and venous oxygen tension pO_2 and O_2 content. Hemoglobin in the venous circulation was completely saturated in 8 of 10 subjects. Oxygen inhalation at 3.40 atmospheres produced a small but significant increase in venous carbon dioxide tension presumably due to the loss of the buffering effect of reduced hemoglobin. Heart rate and cardiac output fell significantly with little change in stroke volume during oxygen inhalation at 3.04 atmospheres, indicating that the decrease in cardiac output was rate-dependent. There was little change in mean arterial pressure but an increase in calculated peripheral resistance during oxygen inhalation at 3.04 atmospheres. Two subjects who demonstrated signs of acute oxygen intoxication did not differ significantly from the group as a whole either in terms of blood gas values or patterns of hemodynamic response.

A65-81205
ON SEVERAL CASES OF OCCUPATIONAL POISONING BY HYDROGEN SULFIDE AND CARBON DIOXIDE WITH FATAL RESULTS [UBER EINIGE FALLE BERUFLICHER VERGIFTUNGEN MIT SCHWEFELWASSERSTOFF UND KOHLENDIOXYD BEI TODLICHEM AUSGANG].
M. Spassowski, E. Lambrewa, G. Bobew, and J. Tschalakow (Inst. für Wiss. Forsch. über Arbeitsschutz und Berufskrankh., Sofia, Bulgaria).
Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 11, Mar. 1965, p. 202–205. In German.

Several case histories of lethal industrial and miner poisoning with hydrogen sulfide and carbon dioxide are described. An analysis is made of the environmental conditions leading to excess concentrations of the above gases. Prophylactic sanitary measures are suggested, including gas probe kits, oxygen or air breathing apparatus, and first aid techniques for poisoning.

A65-81206
BEHAVIORAL BIOPHYSICS.
Allan H. Frey (State Coll., Inst. for Res., Pa.)
Psychological Bulletin, vol. 63, May 1965, p. 322–337. 77 refs.
Contracts Nonr-3303(00); Nonr-4169(00).

Electromagnetic energy is an important factor in the biophysical analysis of the properties and function of living systems. Due to technical advances in electronics, this energy is now being used as a research tool, both by study of its emission by living organisms and also by applying it to the organism. In this paper, the nature of the energy is sketched. Then, data on fingertip detection of color, neural emission of infrared energy, the use of electron paramagnetic resonance techniques to detect neural activity, brain impedance shifts and behavior, and the influence of uhf energy on behavior are considered. It is concluded that, though these areas are in the embryonic stage of development, most are potentially of great significance in the understanding of the nervous system and behavior.

A65-81207
A PROPOSED FRAMEWORK FOR THE ANALYSIS OF STRESS IN THE HUMAN ORGANISM.
Alan Howard and Robert A. Scott (Hawaii U., Honolulu; and Russel Sage Found., New York, N.Y.)
Behavioral Science, vol. 10, Apr. 1965, p. 141–160. 81 refs. Human Ecol. Fund supported research.

Stress comes from many different sources and affects us all in one way or another. Viewing human functioning as a problem-solving phenomenon, stress is here explained in terms of tension that results from the organism's inability to master problems present and its consequent need to devote excess energy and resources to maintenance activities. This encompassing theoretical scheme proposes to reduce the conceptual barriers between various biochemical, physical, psychological, and sociocultural models of stress.

A65-81208
WIRELESS TRANSMISSION OF PULSE-RATE [BEZDRATOVY PRENOS TEPOVE FREKVENCE].
Václav Seliger and Jan Hrolička (Karlova U., Fac. of Phys. Educ. and Sport, Prague, Czechoslovakia).
Pracovni Lekarstvi, vol. 17, Apr. 1965, p. 109–111. 20 refs. In Czech.

The authors describe a telemetric device, used at the chair of physiology at the Institute of physical training and sport in Prague. The transmitter is transistorized 100 X 100 X 30 mm. in size, it works on officially alloted 83.4 M band and has a reliable range up to 300 m. Miniature 9 V accumulators allow for continuous 4-hour running. The whole apparatus with the current source weighs 320 gm. The transmitter may relay either yes–no signals, or pulse rate by means of cardiac action potentials (electrocardiogram), with some adjustment also muscle potentials (electromyogram), the heart sound (phonocardiogram), respiratory frequency, etc. The apparatus was tried under terrain conditions in various sports activities and in very severe climatic conditions. The telemetric device was used particularly for transmission of cardiac action potentials in order to evaluate changes of the pulse rate.

A65-81209
PROTECTIVE ACTION OF SOME ANAESTHETICS AGAINST ANOXIA.
Bendt J. Wilhjelm and Ingrid Arnfred (Copenhagen U., Dept. of Phar., Section of Exptl. Anaesthesiol., Denmark).
Acta Pharmacologica et Toxicologica, vol. 22, 1965, p. 93–98. 6 refs.

Several anaesthetics have been investigated for their effect on the tolerance of mice to anoxia. True protective action was demonstrated for thiopentone (thiopental), halothane, and cyclopropane (flurothane) Moderate prolongation of survival time was demonstrated for chloroform, trichlorethylene, and methoxyflurane, presumably due to anoxia not being associated with convulsions during anaesthesia.

A65-81210
FURTHER INVESTIGATIONS INTO THE PROTECTIVE ACTION OF ANAESTHETICS AGAINST ANOXIA IN MICE.
Bendt J. Wilhjelm (Copenhagen U., Dept. of Pharm., Section of Exptl. Anaesthesiol., Denmark).
Acta Pharmacologica et Toxicologica, vol. 22, 1965, p. 131–134.

Investigations showed that anesthetics tested (urethane, hydrozydione, detrovel, and thiopentone) prolonged the survival of mice exposed to anoxia, as compared with survival time for nonanesthetized animals. The action of the compounds is assumed to consist in preventing death caused by convulsions. A protective action has been demonstrated when urethane, hydroxydione, and detrovel were given separately. A combination of halothane and thiopentone has been shown to have a corresponding protective action. However, from these experiments the authors could not come to a definite conclusion that the protective action was of the same nature.

A65-81211
THE EFFECTS OF METHAMPHETAMINE AND PENTOBARBITAL ON THE RUNNING MEMORY SPAN.
George A. Talland and Gardner C. Quarton (Harvard U. Med. School, Cambridge; and Stanley Cobb Labs. for Psychiat. Res., and Mass. Gen. Hosp., Boston, Mass.)

Psychopharmacologia, vol. 7, 1965, p. 379–382.
Grants PHS MH-03996, PHS MH-15418 PHS M-1608.

The effects of methamphetamine and pentobarbital on the running memory span were tested in 18 young men who served as their own control under double blind conditions. The subjects were tested on strings of digits, varying in length from 8 to 20 items, the first 8 presented at the rate of one item per second, another 8 at the rate of one every four seconds. The instruction was to reproduce the last 5 items in the original order. Performance at the slower rate confirms the conclusion of an earlier experiment, namely, that pentobarbital narrows and methamphetamine exerts no detectable effect on the running digit span. No significant drug effects were found at the fast rate of presentation. It is proposed that two components determine the running digit span; one involves shifts of attention as the input changes, the other its organization, rehearsal, and other strategies by which the information is stored and made available for recall. Pentobarbital, in the dose used and under the conditions of this study, impairs the latter and does not affect the former.

A65-81212
REDUCING THE ANNOYANCE FROM AIRCRAFT NOISE.
F. B. Greatrex (Rolls-Royce, Ltd., Derby, Great Britain).
Discovery, vol. 26, May 1965, p. 26–31.

Solution of problems of aircraft noise requires technical, economic, and political efforts. It is not only the total energy of noise which affects the sensation of loudness, but also the range of frequencies present. High frequency noises sound louder than middle frequency noises of the same energy. This partly accounts for the extra impact of the noise from a jet engine aircraft. Reduction of jet noise to manageable proportions requires consideration on the part of engine and aircraft manufacturers, but such redesign is costly and not entirely satisfactory. The second solution may be in relocating airports away from the residential areas, which, however, would create a set of secondary problems.

A65-81213
NEW FORMS OF OUTPUT.
I. A. M. Watson and K. G. Dobson (Royston Instr., Byfleet, Surrey, Great Britain).
Discovery, vol. 26, May 1965, p. 42–44.

In aircraft design, the space permitted for instrumentation is very limited. Therefore, the over-riding criteria for design must be to fulfill the requirements of the operator correctly and accurately and to provide information in the simplest and most logical form. The amount of instrumentation required for operating a recent model aircraft can be overwhelming. The ideal instrument set is the one which can make all computations, whatever their complexity, so that the operator would receive a bare statement of facts, which can permit him to make an immediate decision.

A65-81214
NOISE AND HEARING ABILITY.
Jaakko S. Lumio (Inst. of Occupational Health, Helsinki, Finland).
Industrial Medicine and Surgery, vol. 34, May 1965, p. 404–406.
Finnish Occupational Med. Found. and Sigrid Juselius Found. Supported Research.

Results of examinations made of 10 394 persons at their work sites amid noisy surroundings carried out by the Institute of Occupational Health, Helsinki, Finland, are presented. Anamnestic information, especially regarding earlier ear diseases and injuries, together with the exposure to noise, was carefully elucidated. Subjects were divided, in accordance with the stage of seriousness, into four groups, I to IV, of which Group I comprised persons with normal hearing and Group IV those whose sum of deficiency for frequencies 500 to 2000 cps exceeded 50 dB. Noise was the sole cause of hearing defects in 43% of cases in the metal industry, followed by 31% in weaving, 29% in mining, and 23% in papermaking. A distinction was made in the results concerning pure noise defects, where the average hearing deficiencies at sound frequencies 500-1000-2000 cps was in the better ear by at least 50 dB, and their appearance was compared in the different forms of industry. These occurred proportionately most in the metal and mining industries.

A65-81215
PATHOLOGY AND TOXICOLOGY OF REPEATED DOSES OF HYDRAZINE AND 1, 1-DIMETHYLHYDRAZINE IN MONKEYS AND RATS.
Roman L. Patrick and Kenneth C. Back (Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Industrial Medicine and Surgery, vol. 34, May 1965, p. 430–435. 10 refs.

Twelve rhesus monkeys received daily doses of hydrazine ranging from 5 to 20 mg/kg and totaling from 4 to 20 injections of 1,1-dimethylhydrazine (UDMH) at 10 mg/kg. All animals lost weight during the experiment. In the hydrazine-treated group of monkeys, serum glutamic oxaloacetic transaminase and bilirubin rose with doses of 20 mg/kg, with more than a twentyfold increase of serum glutamic oxaloacetic transaminase in two animals. Most of those receiving 20 mg/kg exhibited loss of appetite, vomiting, lethargy, and severe weakness. Microscopic examination revealed lipid accumulation in the liver, myocardium, kidney, and skeletal muscle. Massive liver necrosis was observed in one animal. In those monkeys receiving UDMH, blood glucose rose significantly toward the end of the experiment. Some lipid was deposited in the heart, liver, and kidney, but to a much lesser degree than was observed with hydrazine, and it could be demonstrated only with special fat stain. Rats given from 3 to 23 doses of 10 or 20 mg/kg/day hydrazine did not show marked fatty changes as observed in the monkeys.

A65-81216
OPHTHALMOLOGIC AND HISTOLOGIC CHANGES IN RABBIT EYES INDUCED BY ULTRASOUND.
Jozef Jankowiak, Helena Majewska, and Czeslaw Majewski (Balneoclimatol. Inst., and J. Strus City Hosp., Dept. of Pathol. Anat., Poznan, Poland).
American Journal of Physical Medicine, vol. 44, Apr. 1965, p. 70–77. 6 refs.

Exposure of the right eyeballs of a group of rabbits to ultrasound of 100 kc produced distinct clinical symptoms and histological changes: superficial erosions of corneas showed pupillary reactions to light, indistinct structure of the ocular funds, and small foci of extravasation. The histological findings consisted of shallow defects in the epithelium covering the corneas and atrophy of the horizontal fibers of the nervous layer of the retina. In some animals these changes were also found in the left eyes which were not exposed to the direct action of ultrasound. In addition scattered foci of demyelimization of the fibers of both optic nerves were observed in some animals.

A65-81217
THE CHANGES OF GASTRIC HISTIDINE DECARBOXYLASE ACTIVITY DURING FASTING AND FEEDING.
A. Castellucci (Ist. Farmacobiol. Malesci, Florence, Italy).
Experientia, vol. 21, May 15, 1965, p. 219–221.

Experiments on rats showed that histidine decarboxylase in the stomach undergoes a rapid increase in response to refeeding, and returns to basal values within several hours. The mechanism determining rapid enzymatic induction is unknown. It may be supposed that the increase in free histamine or the reduction its bound fractions are triggers of induction. In fact, the concentration of total gastric histamine is reduced one hour after refeeding. Probably, the distinction of the gastric histamine pool in free and bound amine at different times of fasting and feeding may furnish an answer to the above hypothesis.

A65-81218
VISUAL ILLUSIONS OF MOVEMENT.
J. C. D. Whiteside (R.A.F. Inst. of Aviation Med., Farnborough, Great Britain) A. Graybiel, and J. I. Niven (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Brain, vol. 88, 1965, p. 193–210. 22 refs.

Visual illusions of movement were shown to be related to involuntary eye movements, occurring either spontaneously as in the autokinetic illusion, or in response to the special stimuli associated with oculogyral and oculographic illusions. During fixation the visual sensation of movement seems to be produced by, or related to, the pattern of efferent activity aimed at the group of extraocular muscles which will act as antagonists to the involuntary eye movement referred to. Under certain circumstances, when the stimulus change is rapid, an eye movement may be detected before the fixation reflex has time to operate. Since the sensation can be caused by the pattern of antagonist efferent activity, it can arise during fixation with no demonstrable responsible eye movement. The displacements of a visual afterimage as a result of the involuntary eye movements, are predominantly in the direction of agonist activity.

A65-81219
HUMINOIDS ON OTHER PLANETS ?
Robert Bieri.
American Scientist, vol. 52, Dec. 1964, p. 452–458. 16 refs.

Arguments are presented suggesting that if life has evolved on other planets in other solar systems and if some population has reached the level of conceptual thought, it is highly probable that the organisms so endowed will bear a strong resemblance to Homo sapiens. This is based on the premise that the physical properties of the elements, the forms of energy available, and the environmental conditions which allow life to arise and evolve are such that severe limitations are imposed on the number of routes available to evolving forms. Animals and plants on earth have independently evolved not only similar structures but also similar biochemical systems and behavioral patterns as solutions to the same fundamental problems. If we fail to communicate with conceptualizing beings on other planets it will not be because they are fundamentally different from us but because they have either far surpassed our state of technology and have no interest in communicating with us or have not yet reached our state of advancement.

A65-81220
PHYSIOLOGY OF MUSCULAR ACTIVITY.
Peter V. Karpovich (Springfield Coll., Mass.)
Philadelphia, Pa., W. B. Saunders, Co., 1965, xii + 305. 559 refs.

This book presents a review of more current work done on various aspects of the physiology and metabolism of physical exercise, and is slanted toward the student of physical education. There are basic chapters on muscle activity and nerve control. Discussions are presented of energy costs of various exercises, mechanical efficiency of work, and a review of effects of drugs on physical exercise. Chapters of more pertinency to aerospace medicine are those on respiration, oxygen metabolism, breathing mechanics, physical fitness tests, and physiology of the cardiovascular system during physical exercise.

A65-81221
A GENERALIZED EXPRESSION OF AUDITORY SENSITIVITY.
F. Dittrich and S. Fumeaux (Geneva U., Phys. Lab. and Otol. Clin., Switzerland).
Ergonomics, vol. 8, Apr. 1965, p. 143–149. 6 refs.

A statistical study with 400 subjects, male and female, equally divided in 7 age groups (I– 15–19 years; II– 20–29 years, etc.) has confirmed the classical data given by Bunch (1929, 1931), Leisti (1942), Sataloff (1953) and others on presbyacusis or auricular senescence. Hearing loss in decibels (dB) observed by age and by frequency, calculated statistically, corresponds to the values determined by them. At the same time a mathematical relation has been established expressing in a general manner the variations of auditory sensitivity.

A65-81222
EFFECT OF COLD AND RAIN UPON THE VIGILANCE OF LOOKOUTS.
E. C. Poulton (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain), N. B. Hitchings, and R. B. Brooke.
Ergonomics, vol. 8, Apr. 1965, p. 163–168.

Sixteen men performed lookout duties twice at sea in winter on an open bridge, once in the Arctic (mean temperature 28° F) and once in a more temperate clime (mean 37° F) in counterbalanced order. The 2 signal sources were separated by an angle of 75° and presented 7 signals each in an irregular order and at irregular intervals during a 30-minute watch. The lookout had to respond as soon as he saw a signal. There were reliably more response times of 2.0 seconds or longer in the rain than in the cold ($p<0.01$). There was a reliable increase in the number of long response times during the watches in the cold ($p<0.01$) accompanied by a mean fall in oral temperature of 1.2° F.

A65-81223
INTERMITTENT DISPLAY PRESENTATION IN COINCIDENCE JUDGEMENTS.
A. H. Tickner (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 8, Apr. 1965, p. 169–172.

An account is given of an experiment to investigate the effect of the intermittent presentation inherent in a filmed display used for a coincidence judgment. Three conditions were investigated: (1) a display drawn on paper; (2) a film of (1); and (3) the display used in (1) viewed through a rotating shutter. No significant difference was found between the three conditions.

A65-81224
EFFECT OF AN INTERMITTENT LIGHT STIMULATION ON THE CRITICAL FUSION FREQUENCY.
Paule Rey and Jean-Pierre Rey (Geneva U., Inst. of Physiol., Lab. of Physiol. of Work, Switzerland).
Ergonomics, vol. 8, Apr. 1965, p. 173–180. 5 refs.

The effect of intermittent light stimulation (ILS) on the critical fusion frequency (CFF) has been studied. Some stimulation frequencies (effective frequencies) induced a drop in the CFF. These frequencies are lower than the initial CFF and higher than 2 cps. The maximum drop was obtained for a frequency equal to about half of the CFF on the subject. The relation between the drop of the CFF and the frequency of stimulation can be expressed as a U-shaped curve. It can be mathematically formulated for each subject with three constants which varied remarkably little from subject to subject. The time course of the drop for a given frequency as well as the kinetics of recovery were exponential. The time constant was independent of the frequency of the ILS. If the stimulus consisted in printed letters read by the subject, a drop of the CFF followed by a recovery was observed, both with an exponential time course. The influence of these effects on the techniques used to measure the critical fusion frequency has been discussed. The value of a CFF decrease as a criterion of mental fatigue has been questioned.

A65-81225
PROBLEM SOLVING ON A STOCHASTIC PROCESS.
L. H. Shaffer (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 8, Apr. 1965, p. 181–192.

The study is concerned with man–computer cooperation in which the computer initiates decisions and the man monitors and can alter these. The task used involved controlling an information process by making decisions at each of a sequence of points. The problem of control was to find an optimal procedure that jointly minimized two variables. The solutions of subjects developed over a series of trials were compared with that of an optimal program under different conditions. Subject performance was nearly always inferior to that of the program, it was impaired by increasing the rate of the information input and failed to benefit from reduction of uncertainty in the input. Giving trial knowledge of results helped convergence towards an optimal solution. Subjects who had gained experience in the task were given computer solutions to monitor. They degraded optimal solutions and improved inferior solutions towards their own level of performance and failed to benefit from this experience in subsequent tests.

A65-81226
THE EFFECT OF WHOLE-BODY VIBRATION ON A VISUAL PERFORMANCE TASK.
J. P. Dennis (Coll. of Technol., Dept. of Liberal Studies, Portsmouth, Great Britain).
Ergonomics, vol. 8, Apr. 1965, p. 193–205. 17 refs.

The effect of whole-body vibration upon a task requiring the reading of printed numbers has been investigated at two levels of peak-to-peak acceleration of 1/2 g and 1 g over a frequency range of 5 to 37 cps. Head movement in the vertical plane was measured during performance of the visual task. Movement of the head showed progressive attenuation as frequency of vibration was increased, the transmission factor being approximately 100 percent at 5 cps and 10 percent at 37 cps. Changes in frequency of vibration had considerable effects on visual performance; e.g., similar amounts of deterioration in visual performance being produced at head movements of 0.200 in. and 0.0006 in. at 5 and 37 cps respectively. These results support previous theories of resonance of eyeball and/or facial tissue to account for the impairment of vision found with very small head movements in the upper frequencies. Changes in amplitude of head movement appeared to have more effect at the lower and middle frequencies (7 to 19 cps) than at 27 cps. This also was in accordance with previous theory.

A65-81227
A MODEL DESCRIPTION OF THERMAL EXCHANGE FOR THE NUDE MAN IN HOT ENVIRONMENTS.
Alan H. Woodcock and John R. Breckenridge (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.)
Ergonomics, vol. 8, Apr. 1965, p. 223–235. 21 refs.

A theoretical model based on the physical laws of heat and moisture exchange is developed to describe the energy exchange between nude man and a hot environment. Equations are presented which express the heat loss from a heated moistened skin in terms of ambient temperature, humidity, and wind. Two different situations are considered: the first, where secreted sweat is all evaporated and cooling depends on the amount secreted; and the second, where the skin is wet and cooling limited by the amount of sweat which can be evaporated. In the first case, heat dissipation depends on air temperature and amount of sweat secretion, which varies among individuals. In the second, wet-bulb temperature is shown to be a determining factor, as has already been observed in studying man's tolerance to heat. Graphical presentation is used to demonstrate the individual factors and to interpret the experimental results of other investigators.

A65-81228
THE EFFECTS OF TWO PSYCHO-STIMULANT DRUGS ON MUSCULAR PERFORMANCE IN MALE ATHLETES.
G. T. Adamson (Leeds U., Dept. of Phys. Educ., Great Britain) and S. E. Finlay (Leeds U., Dept. of Student Health, Great Britain).
Ergonomics, vol. 8, Apr. 1965, p. 237–241

Two psycho-stimulant drugs, WIN.19,583 (d-threo-α-benzyl-N-ethyltetrahydrofurfurylamine hydrochloride) and amphetamine were compared with respect to their effect on static muscular strength and local muscular endurance of athletes. Twelve subjects ranging from 19 to 37 years participated in a double blind trial. The drugs produced a significantly better performance in the dynamometrical strength tests, but not in muscular endurance. Individual differences in response to the drugs were noted. There was no placebo effect. The trial suggests an objective method of testing the efficacy of short acting psycho-stimulant drugs.

A65-81229
CHANGES IN RESPIRATORY SYSTEM, CIRCULATION SYSTEM, AND BLOOD OF YOUNG PEOPLE DURING 80 MINUTES OF AN EXPERIMENTAL COURSE OF PHYSICAL EXERCISES [ZMIANY W UKLADZIE ODDECHOWYM, W UKLADZIE KRAZENIA I WE KRWI U MLODZIEZY W CZASIE 80-MINUTOWYCH CWICZEN W RAMACH DOSWIADCZALNEGO TOKU CWICZEBNEGO].
E. Preisler, D. Kruk, U. Pankowska, M. Tycowa, St. Wasilewska, and F. Ziembinska.
Wychowanie Fizyczne i Sport, vol. 9, 1965, p. 33–53. 5 refs. In Polish.

Eighty minutes of physical exercise (gymnastic type) was performed by male and females (17 to 23 yrs). Cardiovascular responses, respiratory measurements, and metabolic changes in blood components were observed. Measurements were made before, during, and after exercise. Lung ventilation showed stepwise rises during exercise but returned to normal value 5 to 10 min after exercise. The pulse rate and blood pressure curves were similar.

Pulse rate during exercise averaged between 120 and 160 beats/min, and pressures were maintained at between 120 and 150 mm Hg. The concentrations of glucose, lactic acid, and alkali reserve in the blood did not show marked deviations. On the basis of their investigations the authors state that the intensity of effort in the exercising individual has a mean value, but approaches, and in some instances exceeds the upper limit of that value. The intensity of effort curve reflected in the physiological changes investigated has a rather uniform shape in all varieties of the exercise course examined. But the intensity of effort is highest during motoric game type exercises.

A65-81230
ABOUT "SKIN VISION" OF R. KULESHOVA [O "KOZHNOM ZRENII" R. KULESHOVOI].
M. M. Bongard and M. S. Smirnov (USSR, Acad. of Sci., Inst. of Biophys.; and Inst. of Probl. Commun., Moscow).
Biofizika, vol. 10, 1965, p. 148–154. 33 refs. In Russian.

The authors report the results of experiments they conducted in 1963 in an effort to determine the nature of "skin vision" of a subject named R. Kuleshova. The subject was blindfolded and by touching objects could recognize colors within the visible light spectrum, but could not distinguish monochromatic radiation from the mixed wavelength equivalent to it. This aspect is also characteristic for normal optical vision. The subject could also follow changes in color contrast, estimate the rapidity of flash changes, the degree of resolution of light patterns, and shapes of color designs. This ability was lost in darkness. The authors conclude that R. Kuleshova has a skin extraordinarily photosensitive within the limits of the visible light spectrum.

A65-81231
TECHNIQUES OF IDENTIFICATION APPLIED TO 81 EXTREMELY FRAGMENTED AIRCRAFT FATALITIES.
Russell S. Fisher, Werner U. Spitz, Rudiger Breitenecker, and John E. Adams.
Journal of Forensic Sciences, vol. 10, Apr. 1965, p. 121–135.

The organization and procedures utilized in effecting the identification of 81 persons (73 passengers including 2 infants, and 8 crew members) killed in an airplane crash in Cecil County, Maryland on December 9, 1963 are described. Individual cases illustrating various identification criteria, and techniques are described. The investigation discussed indicates the need for detailed information concerning physical characteristics, personal habits, clothing, medical history, and any other potentially useful information about each person whose presence on the aircraft is to be inferred or proved.

A65-81232
SURVIVAL OF MICRO-ORGANISMS IN SPACE.
John Hotchin, Peter Lorenz, and Curtis Hemenway (N.Y. State Dept. of Health; and N. Y. State U., Albany).
Nature, vol. 206, May 1, 1965, p. 442–445.
Grant NsG-155-61

The first successful direct exposure of unprotected terrestrial microorganisms to the space environment and their recovery is described. Two flight experiments, one using a rocket for short-term exposure at high altitude, the other a balloon for longer exposure at lower altitude, are included. Laboratory experiments were also performed. Poliovirus type III (wild), Penicillium mold, and Escherichia coli bacteriophage T_1 were the microorganisms used. Rocket and balloon flight samples were shielded by sheets of aluminum foil of 38 and 2 mm thickness, respectively. Control samples were not shielded. The greater survival of the samples during the long-term exposure on the balloon seems to reflect the greatly reduced flux of ultraviolet light and soft X-ray at balloon flight altitudes. The results of the laboratory experiments indicate that T_1-phage was not screened by the Millipore filter membrane from ultraviolet light of wavelengths close to 2537 Å (as emitted mainly by germicidal lamps) even though the average pore size was greater (10 times) than the phage head diameter. Thus it is difficult to account for the observed inactivation of T_1-phage in the exposed rocket sample, on the basis of medium and long wavelength-ultraviolet light. Furthermore, the laboratory results indicate that the germicidal ultraviolet light reduced the titer of dried T_1-phage by a factor of approximately 10^2 only and that the addition of 5% RNA appeared to decrease the factor to about 10, whereas purified wet T_1-phage is completely protected by 5% RNA. It appears that the observed inactivation of T_1-phage was due to electromagnetic radiation from the sun, of wavelength shorter than 2600 A, but not sufficiently energetic to penetrate 38μ of aluminum foil.

A65-81233
EVIDENCE OF LIFE PROCESSES IN A SEDIMENT TWO AND A HALF BILLION YEARS OLD.
T. Belsky, R. B. Johns, E. D. McCarthy, A. L. Burlingame, W. Richter, and Melvin Calvin (Calif U., Dept. of Chem., Lawrence Radiation Lab. and Space Sci. Lab., Berkeley).
Nature, vol. 206, May 1, 1965, p. 446–447. 18 refs. U.S. Atomic Energy Commission supported research.
Grant NsG-101-61.

Results from the analysis of: (a) the Soudan Iron Formation of Minnesota (dated isotopically at not less than two and a half billion years); (b) the Antrim Shale (considered about 265×10^6 years); and (c) the San Joaquin Oil (approximately 30 million years old). In addition to the isoprenoids $C_{18}H_{38}$, $C_{19}H_{40}$ (pristane), and $C_{20}H_{42}$ (phytane) previously recognized in the Nonesuch samples, the presence of the $C_{21}H_{44}$ isoprenoid was established in the Soudan by its isolation and identification from its mass spectrometric fragmentation pattern. C_{18}, C_{19} (pristane), and C_{20} (phytane) isoprenoids were identified from Antrim Shale and San Joaquin Oil samples. These biological markers, which are found in a variety of contemporary animals, have been shown to be present in samples ranging in age to greater than 2.5×10^9 years. Hydrocarbons identified to the present time are listed. If these molecules are as old as the rocks, the time available for the generation of the complex biosynthetic sequences which give rise to these specific hydrocarbons (polyisoprenoids) is reduced to less than two billion years. They provide a not unreasonable basis for believing that indigenous hydrocarbons of the Precambrian sediments are of biological origin, but equally important, that the use of biological markers will provide a valid approach in evaluating the significance of the hydrocarbons isolated from meteorites with respect to the question of their biological or abiological origin.

A65-81234
IS THE EARLY EVOLUTION OF LIFE RELATED TO THE DEVELOPMENT OF THE EARTH'S CORE?
Carl Sagan (Harvard U. and Smithsonian Astrophys. Obs., Cambridge, Mass.)
Nature, vol 206, May 1, 1965, p. 448 16 refs.

R. J. Uffen in an earlier communication (Nature, vol. 198, p. 143. 1963) suggested that the surface magnetic field strength was vanishingly small some 3×10^9 years ago, as a consequence of the hypothesized slow growth of the fluid metallic core of the earth; and that incident charged particles from the sun were not deflected by the geomagnetic field. He proposed that a consequent intense flux of charged particles at the surface of the earth made the origin and evolution of life prior to 2.5×10^9 years ago impossible. He also suggested that, even in later epochs, the evolution of life was rendered difficult by the massive dumping of trapped particles from the earth's Van Allen radiation belt, as the number of stable convective cells in the earth's fluid core increased with time. Data are presented in this study suggesting that even if the earth's magnetic field was inconsequential in Archaean times, the effect on the development of life on the planet earth would not have been deleterious, but probably beneficial.

A65-81235
PROTECTION OF LYMPHOCYTES IN THE THYMUS OF X-IRRADIATED RATS BY CYSTEAMINE.
Y. Tanaka and R. H. Rixon (Atomic Energy of Canada Ltd., Chalk River Nuclear Labs., Biol. Branch, Chalk River Ontario).
Nature, vol. 206, Apr. 24, 1965, p. 418–419. 12 refs.

A neutralized solution of cysteamine (2-mercaptoethylamine hydrochloride) or saline was injected intraperitoneally into female hooded rats 15 min before X-irradiation. Both control and treated rats were confined in separate sectors of a rotating lucite container during the exposure to 300-kV X-rays. The thymus was excised 6 hours after the beginning of irradiation and rendered into both tissue sections and smeared cell suspensions. The protective effect of cysteamine in the thymus was almost wholly confined to the radiosensitive lymphocytes of the cortex, little effect being observed among the radioresistant lymphocytes of the medulla. The percentage of pycnosis in the cortex was reduced by cysteamine about 6% to 22% as the dose was increased from 200 to 800 R and about 17% to 10% from 1,000 R to 3,000 R. Although a protective effect of cysteamine was observed in smear preparations, it was smaller (a dose reduction factor of about 1.6) than that seen in the cortical regions of the thymus. An overall reduction in the apparent effect of cysteamine by the use of smear preparations and of a relatively low dose of X-rays (300 R), may account for the negative result previously reported by sulphydryl agents in vivo.

A65-81236
PSYCHOLOGICAL ASPECTS OF ANTARCTIC LIVING.
Paul D. Nelson (U.S. Navy Med. Neuropsychiat. Res. Unit, San Diego, Calif.)
(Assoc. of Military Surg., 71st Ann. Meeting, Oct. 20–22, 1964, Washington D.C.)
Military Medicine, vol. 130, May 1965, p. 485–489.

This is a survey of the research conducted by the Navy on the psychological problems of living in small groups in a physically and socially restricted environment, such as the Antarctic stations. There appear to be three major dimensions of adaptation—man's work performance, his social compatibility, and his emotional composure. One interesting difference in adaptation between small stations and large stations is that the individual who needs to have many avocational pursuits (hobbies, reading, etc.) does less well at the former than at the latter. With respect to emotional symptoms there is a trend for complaints of insomnia, mild depression, and irritability to increase with the onset of winter and to decline towards the end of the year. Work is the primary orientation at the small stations. Impossibility of maintaining physical and interpersonal distance demands a particular skill of a leader in matters of decision-making and social relations.

A65-81237
TOXICOLOGICAL ASPECTS OF MISSILES AND NUCLEAR SUBMARINE WARFARE.
H. David Baldridge, Jr. (Bur. of Naval Weapons, Spec. Proj. Office, Washington, D. C.)
Assoc. of Military Surg., 71st Ann. Meeting, Oct. 20–22, 1964, Washington, D.C.)
Military Medicine, vol. 130, May 1965, p. 505–511. 8 refs.

Military chemists and toxicologists have become members of weapon research and development teams in an effort to insure that hazardous chemicals will be controlled in the deployment of such weapons to the limit permitted by operational requirements. Participation of these scientific disciplines in the hardware design phases of military research and development programs minimizes the possibility of later perhaps very costly substitutions of material or modification of operational doctrine. In rocket operations where laws of gas dynamics require the use of large quantities of types of chemical compounds which are inherently hazardous to man, the role of the chemist and toxicologist is primarily one of crew protection against an acute hazard potential. With closed atmospheres such as those aboard submarines and other encapsulated weapons systems where emphasis is on possible chronic inhalation toxicity, greater consideration is given to actual selection of chemical materials by design engineers and to the conditions of usage. Out of such experiences in the development and operational deployment of weapons and from laboratory studies which attempt to define the limit of man's ability to endure chemical manipulation of his natural environment, there will continue to be laid down a firm foundation upon which design parameters for future weapons and closed ecological systems will be based.

A65-81238
HAZARDS OF MILITARY PARACHUTING.
Frank W. Kiel (Armed Forces Inst. of Pathol., Washington, D.C.)
Military Medicine, vol. 130, May 1965, p. 512–521. 20 refs.

Parachuting has existed for 180 years but has gained military prominence only in recent years. Several hundred thousand parachutists have been trained in the armed services. Although parachuting is a potentially hazardous activity, injuries of a nature to keep one from duty are not common, being less than 1 per 300 jumps. Fatalities associated with jumping are rare—approximately 1 in 50,000 jumps. Most of the injuries have involved the weight-bearing areas of the body—legs and back. Fatalities, though usually thought of as the multiple extreme injuries of abrupt ground deceleration, have many other causes. Deaths have occurred from wind dragging, landing in water, head injury, collision with airplanes, and electrocution on a power line. A few miraculous escapes are known in parachuting—survival of a fall from great height without the aid of a parachute. Such events usually have the benefit of a long decelerative interval because of landing in plowed fields, trees or snow and an optimal diffusion of body impact such as landing on the back in a spread-eagle position.

A65-81239
CEREBRAL EVOKED RESPONSE TO AUDITORY STIMULI IN WAKING MAN.
Tokuro Suzuki and Kiichiro Taguchi (Shinshu U., Faculty of Med., Dept. of Otolaryngol., Matsumoto, Japan).
Annals of Otology, Rhinology and Laryngology, vol. 74, Mar. 1965, p. 128–139. 27 refs.

Evoked response from the waking human brain to auditory stimuli was studied with the aid of an average response computer of the analog type. The subjects were 19 adults, 10 older children ranging in age from 11 to 15 years, and 12 younger children aged 6 to 10 years. Pure tones of 500, 1,000, 2,000 and 4,000 cps were used as the stimuli. As a rule, 50 single runs were averaged by the computer. With the adult subjects, the response was detected in 25, 70, and 100 percent of the total observations when the stimulus intensities were at 0, 10, and 20 dB above their subjective thresholds respectively. On the other hand, with the younger children, the response was recognized in only 58 percent of the subjects at 20 dB above their subjective thresholds, but more than 90 percent of the subjects showed the response when the stimulus intensity was 40 dB above threshold. The typical waveform of the V potential (Vertex)was triphasic; the most prominent negative deflection (N_1) was followed by a positive (P_2) and a slow negative deflection(N_2). Their mean peak latencies in the adult subjects were 123, 199, and 291 msec respectively with the stimulus intensity at 20 dB. A slight prolongation in the peak latencies was found in the young children at the intensity level of 20 dB. The mean amplitude from N_1 to P_2 was 10.8 microvolts per single stimulus at 20 dB in the adult subjects, whereas it averaged only 6.9 microvolts in the young children. The amplitude of the response was a linear function of the stimulus intensity in decibel values.

A65-81240
RELATIONSHIP OF PURE TONES TO SPEECH RECEPTION THRESHOLD.
Marvin Engelberg
Annals of Otology, Rhinology and Laryngology, vol. 74, Mar. 1965, p. 234–240. 10 refs.

The relationship between the speech reception threshold and the two-best and the three-frequency air conduction averages was investigated. The results showed that: (1) The percentage of auditory patterns in which one of the two air conduction averages was within 5 to 10 dB of the SRT ranged from 93.7% at ±5 dB to 98.8% at ±100 dB; (2) those patterns in which the test differences were greater than 5 dB were classed into ten different categories. It is advocated that a ±5dB or less difference between the SRT and either the two-best or three-frequency air conduction averages be considered as acceptable agreement between the two tests.

A65-81241
LIFE-FORMS IN METEORITES AND THE PROBLEM OF TERRESTRIAL CONTAMINATION: A STUDY IN METHODOLOGY.
Paul Tasch (Wichita U., Dept. of Geol., Kansas).
Annals of the New York Academy of Sciences, vol. 105, Sept. 9, 1964, p. 927–950. 20 refs.

Exclusive of objects found on both control slides and meteorite slides and hence classifiable as contaminants added to the samples during processing, a variety of other objects were found. These occur only on meteorite slides and therefore were not added to the sample during processing. Among the objects of origin and organization found only on meteorite slides are the following: Objects similar to Apollinarisphaera meteoricola Claus and Nagy, Stemmatopila uniporata Claus and Nagy, yellow-green algae, objects similar to Caelestites sexangulatus Staplin, Staplin's Tissue A, Clausisphaera fissa Staplin, and Ancilicula vetusta Claus and Nagy. An alga-bearing process reminiscent of Ross' process was also found. Previously unreported material found on meteorite slides include: a brown object shaped like an Erlenmayer flask of sheaf of wheat, a red-brown object with numerous projections, fungal mycelial network with hyphae embracing opening 12 to 22μ diameter and incorporated in large, brown mineral grains, and alga with elongated processes and an object having two spherical bodies surrounded by distinct tubular, segmented wall.

A65-81242
THE PHOTONYSTAGMOGRAM: A SIMPLE METHOD OF RECORDING EYE MOVEMENTS.
Arnold L. Colman (Laguna Honda Hosp. and Rehabil. Center, San Francisco, Calif.)
American Journal of the Medical Sciences, vol. 249, May 1965, p. 534–536.

A method is described which illustrates a simple means of recording nystagmus and blinking frequency by utilizing a standard electrocardiograph. This would make it available for use by the physician outside large research centers. A selenium photocell is placed a few millimeters from the eye at the limbus cornae. Nystagmoid movements of the eye alternately expose the photocell aperture to the lighter and darker areas, thus varying the electrical output of the photocell and recording a wave on the electrocardiograph. The resulting photonystagmogram allows evaluation of the frequency and amplitude of nystagmus as well as the clinically observed features such as direction, form, duration, degree, and association or dissociation of movement.

A65-81243
AN ESTIMATION OF THE RADIOPROTECTIVE EFFICIENCY OF MEXAMINE [KOTSENKE RADIOZASHCHITNOI EFFEKTIVNOSTI MEKSAMINA].
B. Bychkovskaia and A. V. Bogatyrev
Doklady Akademii Nauk SSSR, vol. 161, 1965, p. 704–706. 6 refs. In Russian.

Experiments on white mice showed that the protective action of mexamine against radiation damage differs according to type of radiation damage. The findings indicate that the effect cannot be explained only on the basis of lowering of effective radiation dose, but depends upon the systems affected. Intraperitoneal injections of mexamine (75 g per 1 g wt) decreased the effective dose of radiation by 30% to 40% when the animals were exposed to 600 to 700 R causing bone marrow damage. Larger doses (900 to 1100 R) caused gastrointestinal damage and faster death. In this case the same amount of mexamine decreased the effective radiation dose only by 10%.

A65-81244
INTERVENING NEURAL ACTIVITY IN VISUAL PERCEPTION: A HYPOTHETICAL CONSTRUCT.
O. P. Tayal (Lucknow U., Dept. of Psychol., India).
Journal of General Psychology, vol. 72, Apr. 1965, p. 199–219. 14 refs.

For intervening neural activity in visual perception, a mathematical formulation has been advanced. It states that the intervening neural activity may be conceived to involve two opposite processes going on simultaneously: one, a positive process leading to an increment; the other, a negative process leading to a decrement. Further, the increment in neural activity per unit of time is proportional to X^n, where X is the intensity of the stimulus and n is an appropriate constant; and decrement per unit of time is proportional to the level of the neural intensity at that time. The theoretical relevancy of the formulations has been discussed with respect to absolute thresholds, differential thresholds, intensity of the fused field, and flicker-fusion phenomena. It is concluded that the general nature to findings with respect of each one of the above phenomena is very much in correspondence with our derivations. Such correspondence provides an adequate theoretical basis for further research and a more rigorous verification in this direction.

A65-81245
CREATIVE AND CONSTRUCTIVE IDEA MEN AND THEIR PARTICIPATION IN ACTIVITIES.
Warren R. Graham (U.S. Army Personnel Res. Office, Washington, D.C.)
Journal of General Psychology, vol. 72, Apr. 1965, p. 383–391.

Two samples of 373 senior Air Force officers were used in a replicated correlation design. The hypothesis tested was that diversity of activity participation is significantly related to ability to produce a creative idea. Activities participated in were reported on a checklist called the Activities Summary. Ability to produce a creative idea was estimated by the experimenter from written protocols (Activities Description Form). The protocols required descriptions of activities in answer to questions involving the nature of the activity, results or products, ideas contributed, and formal recognitions. Separate item analyses for each sample identified activity participations that were significantly related to creativity of ideas. These items were then used as a basis for a key to obtain the correlation between creativity and participation. Each correlation was replicated on the sample not used to produce the key. Three subkeys were constructed to include: (a) hobby activities, (b) job activities, and (c) generalized ideas. For both samples, all correlations (.40 to .70) were significant beyond the .01 level for all keys and subkeys.

A65-81246
THE EFFECT OF GRAVITY ON GASTRIC EMPTYING WITH VARIOUS TEST MEALS.
J. N. Hunt, M. T. Knox, and A. Oginski (Guy's Hosp. Med. School, Dept. of Physiol., London, Great Britain; and Nowa Huta, Krakow, Poland).
Journal of Physiology, vol. 178, May 1965, p. 92–97. 6 refs.

Eight subjects were given test meals containing 50 mN trisodium citrate, 35 mN hydrochloric acid, or 560 mN glucose. During the tests subjects sat, lay supine and horizontal, or lay supine with the body tilted to 45° feet up, head down. The head-down position slowed the gastric emptying of the meals containing trisodium citrate and hydrochloric acid but had no systematic effect on the gastric emptying of the meals containing glucose. These results are explained on the grounds that the head-down position mechanically interferred with the effectiveness of the stomach as a pump. With the meal containing glucose, which was a powerful stimulus to the duodenal receptors, withdrawal of duodenal inhibition of gastric activity balanced the gravitational disadvantage under which the stomach was working.

A65-81247
CHANGES IN PERIPHERAL BLOOD OF RATS IRRADIATED IN THE STATE OF HYPOTHERMIA [IZMENENIE PERIFERICHESKOI KROVI U KRYS, OBLUCHENNYKH V SOSTOIANII GIPOTERMII].
L. G. Kon'kova (N. I. Lobachevskii Gor'kii State U., USSR).
Radiobiologiia, vol. 5, 1965, p. 198–201. 12 refs. In Russian.

In white rats exposed to ionizing radiation when their body temperature was lowered to 20° to 22° C, the decrease in leucocyte count in the peripheral blood was less than in animals irradiated at normal body temperature. The drop in number of lymphocytes was more pronounced than the decrease in number of neutrophiles. In hypothermic animals the decrease in hemoglobin content was less than in animals irradiated at normal body temperature. The results indicate that at low body temperature the damaging effect of radiation on the peripheral blood in an animal organism is less than at normal body temperature.

A65-81248
PERSONALITY CORRELATES OF PHYSIOLOGICAL REACTIVITY TO STRESS: A STUDY OF FORTY-SIX COLLEGE MALES.
Joseph Schachter, Thomas A. Williams, Richard Rowe, Judith S. Schachter, and Jean Jameson (N. Y. State Psychiat. Inst., Presbyterian Med. Center, Human Behavior Lab., New York).
(Am. Psychiat. Assoc., 120th Ann. Meeting, Los Angeles, Calif., May 4–8, 1964).
American Journal of Psychiatry, vol. 121, May 1965, p. xii-xxiv. 27 refs.
David M. Levy Fund supported research.
Grant PHS 2M-5999906.

This study examined the relationship between personality and psychophysical response to stress with particular attention to the function of phantasy. Forty-six college men, average age 19 years, served as subjects. Physiological measures monitored were: heart rate, skin conductance, respiratory rate, digital heat output, digital blood pressure, mean digital blood pressure/digital heat output, plethysmograph variability, and visual-motor responses. Psychological measures included: (1) intimacy and involvement ratings, (2) day-dream questionnaire, (3) Scheier and Cattell Situational Anxiety Inventory, and (4) self-ratings of anxiety and anger after the experiment. The experimental procedure consisted of a 15-minute pretest wait in partial sensory deprivation with anxiety-producing instructions on the first day and anxiety-lessening instructions on the second day. Six subjects with the highest intimacy and involvement ratings showed the greatest reactivity to stress on physiological measures. A tendency toward superior visual-motor performance and lesser defensiveness in report of cognitive activities suggests adaptive reactivity and greater anxiety tolerance.

A65-81249
PLANE-CRASH RESEARCH LEADS WAY TO LOWER LIFE LOSS.
James W. Turnbow (Ariz. State U., Tucson), Joseph L. Haley, Jr. (Flight Safety Found., Inc., Aviation Safety Eng. and Res. Div., Phoenix, Ariz.)
Stanley R. Mohler, John J. Swearingen, Ernest B. McFadden, J. D. Garner (FAA, Civil Aeromed. Res. Inst., Oklahoma City), Bernard C. Doyle, Sr., and John J. Carroll.
SAE Journal, vol. 73, Jun. 1965, p. 38–44.

The following recommendations are presented for reducing life loss in aircraft accidents: Seats and restraint harness strength must be adequate in order to sustain the loads. The present-day transport seats designed for a 9 g forward load were found to be insufficient. Seat strengthening must be accomplished by a small amount of floor strengthening with a small attendant weight increase. Provisions must be made for plastic energy absorption. The seat belts should be placed at an angle of 45° to 55° with respect to the seat cushions. The centerline of the belt should be located between 2 and 4 in. forward to the seat back position. The seat belts should be anchored with flexible joints in alignment with the resultant load. Buckles should not slip under the load during impact. Seats should be constructed from riveted ductile sheet metal, and should fold forward. Exits should be properly located to allow passenger evacuation within 2 min, have proper openings, adequate lighting, and must be easily opened by passengers. Telescopic escape mechanism should be provided. Escape and survival briefing of passengers must be arranged, and adequate equipment for survival must be on board.

A65-81250
HUMAN RESPONSE TO MEASURED SOUND PRESSURE LEVELS FROM ULTRASONIC DEVICES.
C. P. Skillern (Gen. Elec. Co., Occupational Hyg. Operation, Richland, Wash.)
American Industrial Hygiene Association Journal, vol. 26, Mar.–Apr. 1965, p. 132–136.
Contract AT(45-1)-1350.

Measurements of noise levels were made in the vicinity of ultrasonic devices used for cleaning, welding, and drilling. These devices had operating frequencies from 15,000 to 80,000 cps. At levels of 80 to 90 dB subjective intolerance was manifest; above 90 dB ill effects and pain began. There was indication of narrow band sensitivity at 22,400 to 28,000 cps. The greater annoyance from ultrasonic drills was also related to the longer periods of actual operation.

A65-81251
THE MAINTENANCE OF A LIFE SUPPORT ATMOSPHERE IN SEALED SYSTEMS.
M. Schneider and S. Tobey (North Am. Aviation, Inc., Los Angeles Div. Res. and Develop. Div., Life Sci. Group., Calif.)
(Am. Ind. Hyg. Assoc. Natl. Conf., Philadelphia, Pa., Apr. 30, 1964).
American Industrial Hygiene Association Journal, vol. 26, Mar.–Apr. 1965, p. 177–186. refs.

Two feasibility studies described here explored the conditions necessary for a life support system suitable for a manned space vehicle. White rats were placed in a closed system with a recirculating air loop. Solid potassium superoxide was used as a combination oxygen generator and carbon dioxide absorber, and potassium hydroxide was used as a supplemental carbon dioxide absorber. At the conclusion of the 25-day test period the rats remained alive and healthy. A thorough chemical analysis was performed to determine the average animal respiratory quotient and chemical system efficiencies. Three human subjects were maintained for 14 days in a sealed environment life support system with dual air regeneration loops. The air regeneration system was evaluated at various oxygen and carbon dioxide partial pressures and relative humidities. At the conclusion of the test period, the subjects were examined and judged healthy.

A65-81252
THE SOVIETS IN SPACE — AN HISTORICAL SURVEY.
Gerald Gilbert Govorchin (Miami U., Fla.)
Spaceflight, vol. 7, May 1965, p. 74–82.

A historical survey is presented of Russian contributions to space flight. A brief review is given of their pioneering efforts beginning with Tsiolkovsky until the end of World War II. From that point to the present, Russian developments in rocketry and manned space flight are reported in detail. By 1953, when the first official announcement of their plans for outer space exploration was published, the USSR had a significant lead over the western countries. This was based on both their own technology and contributions made by the Germans. After the success of the Sputniks in 1957 and 1958, the Russians developed a more powerful rocket capable of flying to the moon. The Soviet Man-in-Space program is covered in detail, and the significant test flights are discussed. The various manned flights are reviewed and the significance of the three-man orbital flight is discussed.

A65-81253
SOME BEHAVIOURAL FACTORS AFFECTING ASTRONAUTS.
R. D. Francis (U. Coll., Wollongong, New South Wales, Australia).
Melbourne Branch, British Interplanetary Society, and Galton Society Meeting, U. Melbourne, Australia, 1964).
Spaceflight, vol. 7, May 1965, p. 85–87. 9 refs.

The author discusses the following behavioral factors affecting astronauts during space missions: (1) quality and quantity of the tasks the astronauts are expected to perform; (2) weightlessness; and (3) isolation. Perhaps the most difficult problem is that of isolation. A great number of studies carried out on isolation have produced results at variance with each other. Some facts, however, seem to have emerged consistently: (1) after isolation the subjects reported feelings of irritation and hostility, although there were individual differences; (2) subjects reported a feeling of being unable to concentrate on any one topic or carry out a chain of reasoning; (3) some perceptual disorganization seems to take place; and (4) knowledge by the subjects that they are being watched and cared for, and that there was an escape route available made their isolation more tolerable. Sex or previous experience seems to play no role in toleration of isolation.

A65-81254
INVESTIGATIONS ON THE ACTION OF NATURAL IONIZING RADIATIONS ON THE GROWTH OF UNICELLULAR ORGANISMS [RECHERCHES SUR L'ACTION DES RADIATIONS IONISANTES NATURELLES SUR LA CROISSANCE D'ETRES UNICELLULAIRES].
Hubert Planel, Jean-Pierre Soleilhavoup, and René Tixador (Fac. of Med., Lab. of Histol., Toulouse, France).
Comptes Rendus de l'Academie des Sciences, Paris, vol. 260, Mar. 29, 1965, p. 3770–3773. In French.

Cultures of Paramecium caudatum under normal conditions or under protection with a lead screen(5% cm)were exposed to natural ionizing radiation over a period of 10 days. During the first days a decrease in growth was observed in the lead-protected cultures. The number of P. caudatum living under lead was less than that found in normal cultures. When a 10 cm lead screen was used to protect the cultures, highly significant results were obtained. The level of growth inhibition was 35% for cultures protected by 5 cm of lead and 50% for cultures protected by 10 cm of lead. Included are representative histograms and curves of paramecium growth during protection with variable lead screens. It is concluded that natural ionizing radiations exercise, in spite of their weak intensity, an effect on living things and probably create a state of ionization apparently indispensible for the multiplication of protozoa.

A65-81255
THE PHYSIOLOGY OF BLOOD COAGULATION IN EXPERIMENTAL LEAD POISONING: EXPERIMENTAL FINDINGS AND PATHOGENIC CONSIDERATIONS [IL COMPORTAMENTO DELLA COAGULAZIONE DEL SANGUE NELLA INTOSS CAZIONE SPERIMENTALE DA PIOMBO].
R. Raddi, V. D'Angelo, and L. Pengue (Florence U., Inst. di Med. del Lavoro, Italy).
Lavoro Umano, vol. 16, Nov. 1964, p. 578–588. 27 refs. In Italian.

Coagulation tests on the blood of rabbits experimentally poisoned with lead revealed the following: (1) progressive lengthening of the reaction time (r); (2) an increase in coagulation velocity (k); (3) a high r/k ratio; (4) a decrease in maximum amplitude; (5) progressive increase in the recalcification and Quick times; and (6) a decrease of fibrinogen. It is postulated that these coagulation changes may be related to impaired liver function induced by lead poisoning.

A65-81256
ON THE CHANGES OF THE NUMBER AND AGGLUTINABILITY OF PLATELETS DURING EXPERIMENTAL POISONING. PART III: THE BEHAVIOR OF THE PLATELETS DURING EXPERIMENTAL LEAD POISONING [SULLE MODIFICAZIONI DEL NUMERO E DELL'AGGLUTINABILITA DELLE PIASTRINE IN CORSO DI INTOSSICAZIONI SPERIMENTALI. NOTA III: IL COMPORTAMENTO DELLE PIASTRINE IN CORSO DI INTOSSICAZIONE SPERIMENTALE DA PIOMBO].
R. Raddi, V. D'Angelo, and O. Marras (Florence U., Ist. di Med., del Lavoro, Italy).
Lavoro Umano, vol. 16, Nov. 1964, p. 626–629. 15 refs. In Italian.

A slight decrease was found in the number of blood platelets and an insignificant deficit of agglutinability in rabbits experimentally poisoned with lead acetate. These factors were not considered responsible for the blood coagulation changes induced by experimental lead poisoning.

A65-81257
REMARKS ON THE ELECTROCARDIOGRAM OF SUBJECTS PERFORMING HEAVY WORK AND COMPARISON WITH THE ELECTROCARDIOGRAM OF TRAINED ATHLETES [RILIEVI SULL'ELETTROCARDIOGRAMMA DI SOGGETTI CHE SVOLGONO ATTIVITA LAVORATIVA PESANTE E COMPARAZIONE CON L'ELETTROCARDIOGRAMMA DELL'ATLETA ALLENATO].
Gabriele Sequi, Paolo Turchetto, and Lino Coltro (Padua U., Ist. di Med. del Lavoro, Italy).
Layoro Umano, vol. 16, Nov. 1964, p. 630–638. 28 refs. In Italian.

The electrocardiograms (EKG) of 25 stevedores working at the job for at least five years, trained athletes, and subjects performing sedentary work were studied. In comparison with the other two groups, the EKG of stevedores displayed signs of ventricular hypertrophy. This was considered a manifestation of their intense muscular activity during the working period. The different EKG morphological features in the examined groups are evaluated and tabulated.

A65-81258
HEARING LOSS: DIAGNOSIS AND ANATOMIC CONSIDERATIONS.
C. J. Holmberg (Minn. U., Clin. Dept of Otolaryngol., Minneapolis).
IN: THE FAST RANGE CLINICS SYMPOSIUM ON NOISE EFFECTS IN INDUSTRY.
(Symposium on Noise Effects and Hearing Conserv. in Ind., East Range Clin., Virginia, Minn., Jun. 4–5, 1964).
Journal of Occupational Medicine, vol. 7, Apr. 1965, p. 138–144. 5 refs.

A great number of industrial employees suffer temporary, noise-induced hearing loss, from which the ear recovers within a specific number of hours. The temporary elevation of auditory threshold which results from one day's exposure to noise levels of 100 decibels or more may vary from no-shift to 35 decibels of loss. Exposure to typical noise produces the largest temporary loss at 4,000 and 6,000 cps. The major portion of the temporary loss is produced during the first one or two hours of exposure. The amount of temporary loss is about the same for the same person from day to day, but varies with individuals. It also varies in accordance with the amount and frequency location of permanent loss. Normally hearing persons, who had not been exposed to noise for long periods of time, show more temporary threshold shifts than those who had previous experience.

A65-81259
RADIATION ACCIDENTS AND EMERGENCIES IN MEDICINE, RESEARCH, AND INDUSTRY.
Lawrence H. Lanzl, John H. Rust (Chicago U., Ill.), and John H. Pingel (Argonne Natl. Lab., Ind. Hyg. and Safety Div., Ill.) Eds.
Edited by Lawrence H. Lanzl, John H. Rust, and John H. Pingel. Springfield, Ill., Charles C. Thomas, 1965, xiii + 328 p. Proceedings of Symp. on Radiation Accidents and Emergencies in Med., Res., and Industry, Chicago, Dec. 19–20, 1963.

The symposium was organized in an attempt to cover most of the pertinent aspects of emergency and accident situations arising from the application of ionizing radiation in medicine, research, and industry. It included the following topics: (1) scope of the problems, explanation of terms, and historic background; (2) handling of emergencies at the scene; (3) medical role in decontamination of uninjured persons and treatment of the injured; (4) decontamination methods, equipment, and materials; (5) specific problems which include radiation monitoring and nonnuclear weapons accidents; (6) emergency organization, legal liability, and reporting radiation accidents; (7) federal and state agency regulations of radiation emergencies; and (8) social aspects of radiation hazards.

A65-81260
MOLECULAR EVOLUTION AND THE ORIGIN OF LIFE [L'EVOLUTION MOLECULAIRE ET L'ORIGINE DE LA VIE].
Jules Duchesne (Liège U., Belgium).
Ciel et Terre, vol. 81, Jan.–Feb. 1965, p. 1–5. In French.

A theory is presented that evolution of the first living ancestor was not from actual forms but from their precursors, the simple molecules, which by slow and continuous transformation gave them their origin. This elementary phase is identified with what is called molecular evolution as advanced by Haldane and Oparin. The primitive atmosphere was thought to contain hydrogen, methane, ammonia, and water. Interaction of ultraviolet radiation, spatial ionizing radiation, and natural radioactivity with this primitive medium were possibly instrumental in producing some molecular origins of life. Reviewed are molecular evolution studies made in the laboratory including the effect of radiations on the primitive atmosphere; synthesis of amino acids, sugars, fatty acids, urea, and heterocyclic compounds from the primitive medium; and the synthesis of desoxyribose, desoxyribonucleic acid, polypeptides, nucleic acids, proteins, and coacervative globules from various media. These substances are postulated by various researchers to be the primordial molecules from which life originated. Mention is made of the primitive photosynthetic system which was possibly instrumental in initiating reactions in the primitive atmosphere to produce molecular substances during the origin of life.

A65-81261
THE RISKS OF HIGH PRESSURE OXYGEN THERAPY.
A. S. Jarrett (R.A.F. Inst. of Aviation Med., Farnborough, Great Britain).
Proceedings of the Royal Society of Medicine, vol. 57, Sep. 1964, p. 820–823. 11 refs.

Risks attending high pressure oxygen therapy are listed and discussed. The following are included: (1) barotrauma, (2) decompression sickness, (3) aseptic bone necrosis, (4) nitrogen narcosis, (5) fire hazard, (6) toxic substances (e.g., carbon dioxide), and (7) oxygen toxicity.

A65-81262
VENTILATION OF THE NORMAL AND BLOCKED MIDDLE EAR: A REVIEW OF MECHANISMS.
Richard A. Davison (Patrick AFB, Fla.)
Annals of Otology, Rhinology and Laryngology, vol. 74, Mar. 1965, p. 162–173. 28 refs.

The middle ear can be ventilated by various methods. The Valsalva maneuver, currently recommended by the Air Force as a method for inflating the middle ear, is described and its shortcomings for use in modern aviation are pointed out. Although the Valsalva maneuver serves adequately to ventilate the blocked ear in most cases, its predisposition to cause syncope and its relative inefficiency warrant reevaluation of alternate methods. It is proposed that the rather lengthy name of "nasopharyngeal positive pressure maneuver" be replaced by the shorter term "Frenzel maneuver", placing it in its rightful category beside the Valsalve and Toynbea maneuvers. If further studies bear out its greater efficiency, it might be advantageous to the Air Force to adopt the Frenzel maneuver as a recommended means for voluntary middle ear inflation. The reason given for this proposal is threefold: (1) the eustachian tube opens at a lower pressure with the Frenzel maneuver than with the Valsalva; (2) equal or higher maximum pressures can be developed with the Frenzel maneuver, giving an additional safety factor; and (3) accomplishment of the Frenzel maneuver is entirely independent of intrathoracic pressure and phase of respiration. Thus, there is no tendency for production of syncope during performance of the Frenzel maneuver. In addition, end-expiratory performance of the Frenzel maneuver may facilitate the equilibration of gases within the middle ear with the ambient atmosphere. This is of considerable advantage in the prevention of oxygen-absorption barotitis. The Frenzel maneuver may also be of benefit in the treatment of chronic serous otitis media. The relative advantages and disadvantages of the Toynbee maneuver, politzerization, and eustachian tube catheterization are also discussed.

A65-81263
LIFE IN OTHER SOLAR SYSTEMS.
Frederick I. Ordway, III.
New York, E. P. Dutton and Co., Inc., 1965, 96 p.

The author presents facts of contemporary knowledge about the structure and function of our universe, and outlines scientific speculations on the possibility of extraterrestrial life. Upon this frame he superimposes original ideas with the aid of a "relative handful of astronomers, biologists, mathematicians, and other scholars from many parts of the world who have applied their knowledge and their energies to the intriguing concept of life beyond the solar system and, through a combination of fearless, profound and brilliant reasoning, have helped transfer the subject [Life in Other Solar Systems] from the pages of science fiction to the realm of legitimate scientific inquiry".

A65-81264
THE RELATIONSHIP BETWEEN OXYGEN CONSUMPTION AND HEART RATE IN CARDIOVASCULAR FUNCTION EVALUATION [IL RAPPORTO FRA CONSUMO DI OSSIGENO E FREQUENZA CARDIACA NELLA VALUTAZIONE FUNZIONALE CARDIO-CIRCOLATORIA].
G. Janigro (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 27, Oct.-Dec. 1964, p. 447-466. 8 refs. In Italian.

A study was made of the oxygen consumption/heart rate ratio during maximum muscular work performed by 480 untrained young pilot candidates. The subjects were subdivided into various groups depending on the amount of work performed. The existence of a close positive correlation was found between behavior of this ratio and the classical parameters considered reliable indexes of respiratory and cardiac function (maximum pulmonary ventilation, maximum oxygen consumption, calories/pulmonary ventilation according to Margaria). Use of the oxygen consumption/heart rate ratio is considered valuable for the continuous evaluation of training levels of athletes involved in sports competitions, or for the objective evaluation of respiratory and cardiovascular function in the selection of persons for work demanding much physical effort.

A65-81265
ON HISTOLOGICAL CHANGES TAKING PLACE IN SOME ORGANS OF MICE TWICE IRRADIATED WITH Co^{60} AND GRAFTED WITH HOMOLOGOUS BONE MARROW [SULLE MODIFICHE ISTOLOGICHE CHE SI VERIFICANO IN ALCUNI ORGANI DI TOPI PER DUE VOLTE IRRADIATI CON Co^{60} E TRAPIANTATI CON MIDOLLO OSSEO OMOLOGO].
G. Mazzella and G. Paolucci (Centro di Studi e Ric. di Med. Afron. e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 27, Oct.-Dec. 1964, p. 467-485. 14 refs. In Italian.

Histological studies were made of the liver, spleen, and bone marrow of five groups of mice spontaneously killed after being exposed to 930 roentgens of cobalt 60 irradiation in either air or anoxia and subsequently grafted intravenously with homologous bone marrow. This treatment was repeated a second time in some of the groups. Histological changes were found in the groups irradiated and grafted one and two times, in comparison to those irradiated only once. Furthermore, significant histological changes were observed in irradiated and grafted animals whereas only slight changes were found in animals grafted once or several times in air or anoxia, i.e. vacuolar degeneration, hystiocytic reaction, and the presence of cellular clumps in the liver; splenic hemorrhage, congestion, and metaplasia; and rarification of bone marrow elements. Included are representative histophotographs.

A65-81266
INFLUENCE OF INDOLYLALKYLAMINES AND OF SOME OTHER COMPOUNDS ON THE ABILITY OF MICE TO STAND LOW BAROMETRIC PRESSURE [VLIIANIE INDOLILALKILAMINOV I NEKOTORYKH DRUGIKH VESHCHESTV NA VYNOSLIVOST' MYSHEI K PONIZHENNOMU BAROMETRICHESKOMU DAVLENIIU].
P. G. Zherebchenko.
Radiobiologiia, vol. 5, 1965, p. 285-286. 9 refs. In Russian.

White mice were given intraperitoneal injections of antiradiation compounds prior to subjecting them to anoxic hypoxia at simulated high altitudes in a pressure chamber. The results show that inoltylalkylamines and mercaptoalkylamines given in radioprotective doses produced a different degree of increasing the hypoxic effect caused by low barometric pressure. Tryptamine and 6-methoxytryptamine lowered considerably the animals' tolerance to induced hypoxia. Mercamine and S-β-aminoethylisothiuronium bromide hydrobromide produced the same effect, although to a lesser degree. The results indicate that the radiation protecting compounds caused a state of hypoxia in the animals which increased under conditions of low pressure. The author calls attention to the fact that 6-methoxytryptamine reduced the animals' tolerance to hypoxia even to a greater degree than mercamine and S-β-aminoethylisothiuronium bromide hydrobromide although it possesses no radioprotective action.

A65-81267
FORMATION OF METHEMOGLOBIN IN RABBITS BY INJECTION OF CHEMICAL RADIOPROTECTORS [METGEMOGLOBINOOBRAZOVANIE U KROLIKOV PRI VVEDENII SREDSTV KHIMICHESKOI ZASHCHITY OT IONIZIRUIUSHCHEI RADIATSII].
N. I. Bichetkina
Radiobiologiia, vol. 5, 1965, p. 293-294. 6 refs. In Russian.

Intravenous injections of sodium nitrite, paraaminopropiophenon and paraaminobutyrophenon in rabbits induced considerable methemoglobemia, which was equal in characteristics and duration for all three radioprotectors. The maximum concentration of methemoglobin was reached 10 to 30 min after injection. The same picture of methemoglobin production was observed when the animals were subjected to an 800 r dose of gamma radiation 10 min after the injection of these compounds. After irradiation alone, methemoglobin was produced in small amounts, the concentration reaching 6% to 15% at the end of 1 1/2 hr. The mechanism of the prophylactic action of sodium nitrite and paraaminopropiophenon is known to be due to the hypoxic state of the tissues, which causes formation of methemoglobin.

A65-81268
RESEARCH PERTAINING TO A TABLE FOR THE EVALUATION OF ACCIDENTS DUE TO DEFECTIVE VISUAL ACUITY [ALLA RICERCA DI UNA TAVOLA PER LA VALUTAZIONE INFORTUNISTICA DEI DANNI NELLA ACUTEZZA VISIVA].
Georgio Betocchi and Alberto Monticelli.
(First Natl. Conv. of Social Ophthalmol., Naples, May 28-30, 1964).
Rassegna di Medicina Industriale e di Igiene del Lavoro, vol. 33, Nov.-Dec. 1964, p. 650-657. In Italian.

Briefly reviewed are tables used for evaluating accidents due to visual acuity disorders. In order to obtain positive results when evaluating these disorders in relation to the accident ratio, a table is presented of the disorders categorized on a percentage basis according to (a) monocular damage; (b) binocular damage; (c) binocular damages differing between the two sides; and (d) binocular damages differing between the two sides and other combinations. This table may be of value in elaborating statistical tables used for the evaluation of reduced visual acuity with reference to the general reduction of work output.

A65-81269
THE RELATIVE EFFECT OF ISOMETRIC AND DYNAMIC TRAINING ON THE ENDURANCE DURING DYNAMIC WORK [DIE RELATIVE WIRKUNG ISOMETRISCHEN UND DYNAMISCHEN TRAININGS AUF DIE AUSDAUER BEI DYNAMISCHER ARBEIT].
K. Kogi, E. A. Müller, and W. Rohmert (Max Planck-Inst. für Arbeitsphysiol., Dortmund, West Germany).
Internationale Zeitschrift für Angewandte Physiologie, vol. 20, 1965, p. 465-481. 15 refs. In German.

Isometric training on a hand ergometer in 12 different crank positions was carried out with three subjects. Maximal isometric muscle strength increased in all positions until a constant was reached. The relative strength initially amounted to 70.1%. After dynamic training carried out with two subjects, the maximum strength decreased by 10% of the constant reached before. Both types of training increased maximum endurance for work on a crank ergometer at loads of 12 and 37 mkp/sec, with the greatest increase after dynamic training. The work pulse curve is flattened by dynamic training, but unchanged by isometric training. The work pulse rate is lowered by both types of training, but more markedly by dynamic training.

A65-81270
WORK PULSE RATE AS AN INDICATOR OF PROLONGED MUSCLE FATIGUE [DIE ARBEITSPULSFREQUENZ ALS INDICATOR FUR LANGFRISTIGE MUSKELERMUDUNG].

E. A. Müller and K. Kogi (Max Planck-Inst. für Arbeitsphysiol., Dortmund, West Germany).
Internationale Zeitschrift für angewandte Physiologie, vol 20, 1965, p. 493–497. In German.

Serial investigations of muscle fatigue and recovery were undertaken with three subjects (ages 17, 25, and 31 years) over two separate three-week periods. At first the subjects practiced 6 weeks for 30 minutes a day on a two-hand crank ergometer. The experimental series consisted of one week with regular 30-minute work periods; the second week the work was extended to 60 minutes; and the third week was as before with 30 minute work periods. Pulse rate before, during, and after work was used as an index of fatigue. Doubling of the work period resulted in elevated daily work pulse in the presence of normal rest pulse. Return to 30 minute work resulted in regression of work pulse to previous values. Marked individual differences were noted.

A65-81271
THE INFLUENCE OF DIFFERENT RESTING LENGTH OF THE MUSCLE ON THE RATE OF INCREASE IN STRENGTH THROUGH ISOMETRIC TRAINING [DER EINFLUSS VERSCHIEDENER RUHELANGE DES MUSKELS AUF DIE GESCHWINDIGKEIT DER KRAFTZUNAHME DURCH ISOMETRISCHES TRAINING].
W. Rohmert and H. Neuhaus (Max Planck-Inst. für Arbeitsphysiol., Dortmund, West Germany).
Internationale Zeitschrift für angewandte Physiologie, vol. 20, 1965 p. 498–514. 25 refs. In German.

Isometric training was carried out on four muscle groups of the arm in two different elbow positions with varied resting muscle length. Eleven men and six women participated in 135 isometric training series, each lasting approximately 10.5 weeks. The results show that the rate of increase in strength through isometric training depends on muscle length at rest. It is significantly faster when the same muscle group is trained in a position with the smaller muscle length at rest. If different muscle groups with relatively similar resting muscle lengths are trained isometrically, (a) the rate of increase in strength does not depend on the muscle group trained and, (b) sex is not a statistically significant factor in the rate of development of muscle strength. In quantitative grading of isometric training loads, the resultant end strength should be experimentally established and included in the calculation in addition to the currently used rate of increase in strength.

A65-81272
GAS BUBBLE FORMATION IN ORGANISM IN EXPLOSIVE DECOMPRESSION [GASBLASENBILOUNG IN ORGANISMUS BEIM DRUCKFALL].
K. G. Müller and S. Ruff (Versuchsanstalt für Luft- und Raumfahrt, Inst für Flugmed., Bad Godesberg, West Germany).
Internationale Zeitschrift für angewandte Physiologie, vol. 20, 1965, p. 521–544. 11 refs. In German.

Decompression results in an overload of gas in solution which is removed slowly. This transport is best described by a flow chart. During the transport, gas bubbles may develop from gas nuclei present in the vascular endothelium and tissue. The flow chart is extended to include bubble formation. The size of bubbles and the pressure of the tissues are recognized as physiologically active magnitudes beyond certain threshold values. Below a threshold value gas bubbles are inactive. Inactive gas bubbles are unavoidable in any decompression scheme. The formation of bubbles after explosive decompression is surpassed in a short time by circulatory removal of the gas. The maximum values for the volume and the elastic partial pressure of the bubbles have to be compared with the critical magnitudes. Processes of bubble formation and removal through circulation depend on the time constants for transport, solubility, and tissue elasticity. The effect of the parameters is illustrated by numerical examples for different decompression schemes.

A65-81273
INFLUENCE OF UPRIGHT POSTURE ON METABOLISM [UBER DEN EINFLUSS DER AUFRECHTEN HALTUNG AUF DEN STOFFWECHSEL].
P. van Uytvanck and J. Vrijens (Gent U., Inst. für Leibeserziehung, Belgium).
Internationale Zeitschrift für angewandte Physiologie, vol. 20, 1965, p. 545–549. 13 refs. In German.

In 25 male adolescents (ages 13 to 15 years) metabolism was higher in the standing position than in the supine position; in the military stance it was higher than in the at rest position. Investigation of habitual posture showed that with the asthenic posture the upright position demands a 22% increase in oxygen consumption, while with the normal posture there is only a 3% increase in oxygen consumption. Weak abdominal musculature resulting in abdominal ptosis upon standing with a higher energy expenditure for assumption and maintenance of the proper posture is considered to be a factor.

A65-81274
INFLUENCE OF SUPINE POSTURE ON MECHANICAL WORK OF BREATHING.
J. Troquet, J. Damoiseau, and J. M. Petit (Inst. Léon Fredericq and Inst. Ernest Malvoz, Liege, Belgium).
Internationale Zeitschrift für angewandte Physiologie, vol. 20, 1965, p. 550–554. 15 refs.

In order to verify the influence of the mediastinal artifact on the mechanical work of breathing, measurements by esophageal balloon method and determinations by air interruption technique are simultaneously carried out in sitting and supine postures. The results obtained in the normal subjects demonstrate that the mechanical work of breathing is never overestimated, in spite of the mediastinal artifact.

A65-81275
POTASSIUM PALLADO SULFITE METHOD FOR CARBON MONOXIDE DETECTION.
Leslie Silverman and George R. Gardner (Harvard U., School of Public Health, Dept of Ind. Hyg., Boston, Mass.; and Bacharach Ind. Instr. Co., Pittsburgh, Pa.)
American Industrial Hygiene Association Journal, vol. 26, Mar.–Apr. 1965, p. 97–105. 13 refs.

This paper describes an improved method for directly measuring low concentrations of carbon monoxide in air. Carbon monoxide reacts with potassium pallado sulfite impregnated on a chemically inert gel contained in sealed glass tubes. Length of discoloration caused by conversion of yellow sulfite to dark brown palladium or its oxide is an exponential function of CO concentration. Data are presented on the measurement of carbon monoxide in air as well as in oxygen-deficient or oxygen-free atmospheres. Applications are given relative to interfering and noninterfering gases and vapors as well as temperature correction data covering range of -50° to 120° F and ambient pressure correction.

A65-81276
SPACEFLIGHT SIMULATORS FOR ASTRONAUT SELECTION AND TRAINING.
H. F. Huddleston (R.A.F. Inst. of Aviation Med., Farnborough, Great Britain). (Space Environ. Simulators Symposium, Northampton Coll. of Advanced Technol., Great Britain, Nov. 17, 1964).
Spaceflight, vol. 7, May 1965, p. 88–97. 135 refs.

Critical aspects of spaceflight can be simulated for selection purposes and familiarization with some of the mood experiences involved before undertaking the task itself. Two things must be emphasized: the individual's lack of knowledge concerning his relationship to space, and the fact that psychology can hardly be forced into convenient categories divorced from physiological considerations. Although separate stresses have been studied, such as isolation or situational ones, there is a need for considering multiple stresses, which on occasion may leave opposing effects. The near and distant possibilities of living in space may bring out barely touched topics, such as: (1) motion sickness produced when artificial gravity is maintained by rotation of the vehicle; (2) undesirable side effects produced by the use of psychopharmacological agents against stress; (3) long-term hibernation effects on early and specialized skill training; (4) close association with "cyborgs" or "telepuppets"; and (5) possible communications with alien organisms, and possible colonization of planets.

A65-81277
RESPIRATORY ARRYTHMIA AND RESPIRATORY ATRIOVENTRICULAR BLOCK IN HYPERCAPNIA AND HYPOXIA [DYKHATEL'NAIA ARITMIIA I DYKHATEL'NAIA ATRIOVENTRIKULIARNAIA BLOKADA PRI GIPERKAPNII I GIPOSKII].
L. S. Ul'ianinskii and L. A. Dzhuraeva (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Lab. of Clin. Physiol., Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 51, Mar. 1965, p. 340–349. 19 refs. In Russian.

In tracheotomized dogs, hypercapnia induced by breathing air containing 10% to 15% CO_2 decreased heart action and increased the vagus reflexes connected with respiration, that is, caused respiratory arrythmia and respiratory atrioventricular block. These changes were due to an increase of vagus tonus. During hypoxia, caused by inhalation of air containing 5% to 10% O_2, cardiac rhythm was increased, and the vagus reflexes connected with respiration disappeared. This effect was due to a lowering of the central vagus tonus and to excitation of the sympathetic nervous system.

A65-81278
MECHANISM OF THERMAL RECEPTORS [O NEKOTORYKH SPORNYKH VOPROSAKH TERMICHESKOI RETSEPTSII].
O. P. Minut-Sorokhtina (Petrozavodsk State U., Dept. of Physiol., USSR).
Fiziologicheskii Zhurnal SSSR, vol. 51, Mar. 1965, p. 251–258. 16 refs. In Russian.

Oscillograms from small nerves of the skin of the hip, leg, and body, containing fibers from many receptors, showed various amplitudes in rabbits and cats. Thermal stimulation of these areas caused a surge of impulses, which persisted during the period of stimulation. This response can be attributed to the mechanoreceptors of the skin. The fact that in nerves conducting impulses from different types of receptors the skin receptors predominate over the vascular receptors could be demonstrated by the experiments when heating or cooling small areas of the skin did not evoke any blood temperature changes in the peripheral vessels.

A65-81279
A SIMPLE MICROMANIPULATOR FOR INSERTION OF ELECTRODES INTO THE BRAIN [PROSTOI MIKROMANIPULIATOR DLIA POGRUZHENIIA ELEKTRODOV V MOZG].
A. M. Melekhova and V. L. D'iakonov (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Lab. of Electrophysiol., Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 51, Mar. 1965, p. 278–280. 7 refs.
In Russian.

A simple micromanipulator for insertion of electrodes into the brain of experimental animals is described. It requires only a small orifice in the skull and can be implanted and maintained in unanesthetized animals.

A65-81280
THE GEMINI PROGRAM.
Daniel D. McKee (A.F. Systems Command Field Office, NASA Manned Spacecraft Center, Houston, Tex.)
Air University Review, vol. 16, May–Jun. 1965, p. 6–15.

Although Gemini design is based on Mercury technology, there are differences in capability. The major steps forward in the Gemini basic design include the following: (1) astronaut control of abort modes while on the launch pad and during the boost phase of flight; (2) the capability to perform translation maneuvers in space, in addition to the attitude control which was possible in Mercury; (3) the ability to rendezvous and dock rigidly with another vehicle in space by the use of radar tracking, astronaut judgment, and spacecraft maneuverability; (4) adequate electrical power, attitude control fuel, and life-support equipment to remain in orbit for long durations; (5) equipment and procedures to allow an astronaut to engage in extravehicular activity, which includes egress from the spacecraft during orbital flight, demonstration of the ability to perform useful tasks while outside the pressure capsule, and spacecraft ingress; (6) controlled atmospheric reentry to improve recovery accuracy.

A65-81281
MANNED ORBITING SPACE STATIONS.
John M. Coulter and Benjamin S. Loret (Headquarters AF Systems Command, Washington, D.C.)
Air University Review, vol. 16, May–Jun. 1965, p. 33–41. 5 refs.

The Extended Apollo Program envisions three programs (listed in order of increasing capability and technological complexity) presently under study: (1) the Apollo Orbital Research Laboratory; (2) the Medium Orbital Research Laboratory; and (3) the Large Orbital Research Laboratory. Step modifications will consist of: (1) increasing the vehicles' space capacity and crew number; (2) replacement of some subsystems, such as a solar cell electrical power source for the present fuel cell system; (3) docking operations which will permit entry into unmanned spacecraft by crews ferried to space stations; and (4) artificial gravity to permit longer presence of man in space. The space station development will promote the scientific exploration of space, and provide for national security in the near-earth space arena.

A65-81282
RAPID ESTIMATION OF PLASMA CARBON DIOXIDE TENSION FROM pH AND TOTAL CARBON DIOXIDE CONTENT.
Jerome P. Kassirer and Howard L. Bleich (Tufts U. School of Med., Dept. of Med., Medford; and Pratt Clin.-New England Center Hosp., Renal Lab., Boston, Mass.)
New England Journal of Medicine, vol. 272, May 20, 1965, p. 1067–1068.
PHS supported research.

A method for estimating carbon dioxide tension (pCO_2) from blood pH and total carbon dioxide content is presented. It does not require complicated formulas, logarithm tables, slide rules, or normograms. This method, applicable in the presence of a wide variety of acid–base disorders, uses an arithmetic conversion of pH to hydrogen ion concentration, followed by the use of this derived value in a simple calculation which yields pCO_2. The value of pCO_2 derived by this method closely approximates the value derived with the Henderson–Hasselbalch equation.

A65-81283
AN OPERATIONAL PORTABLE BIOMEDICAL MONITORING SYSTEM.
D. G. Simons and W. E. Prather (USAF School of Aerospace Med., Brooks AFB, Tex.)
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p. 59–64. 21 refs.

This portable biomedical monitoring system recorded five physiological measures on magnetic tape under a variety of aerospace stress conditions. It included respiration, base skin resistance/galvanic skin response, blood pressure, electrocardiogram, and the electroencephalogram. The transmitter portion was small and light, easily applied without interfering with crew duty performance. The recording portion of the portable system may be located anywhere within a hundred feet of the subject. The scaling of each measure was carefully considered. Range switches, when necessary, accommodated a wide variety of subjects under many stress conditions which included laboratory stress tests, simulated flight stress, and in-flight monitoring. Three phases of calibration procedure insured full utilization of bandwidth and low-noise biomedical data. Continuous data monitoring helped to maintain its quality, and helped to identify difficulties promptly. The preprocessing and computer analysis of these data for patterns of system arousal remain central, and patterns of stress response emphasized the importance of optimizing the signal-to-noise ratio in the original recorded data. The use of this single instrumentation system for collecting data under a variety of aerospace stress conditions, and the same computer programs for analyzing the data permits comparison of stress response patterns under conditions that could not previously be related with confidence.

A65-81284
AN INTER-HOSPITAL PHYSIOLOGICAL MONITORING SYSTEM.
S. A. Wilber (Tex U., and M. D. Anderson Hosp. and Tumor Inst., Houston).
IN: PROC. OF THE 1965 NATL. TELEMETERING CONF., HOUSTON, TEX., APR. 1965.
New York, Lewis Winner, Apr. 1965, p. 130–132. 10 refs.

The interhospital monitoring system in the Texas Medical Center relies in concept on the advances being made in the monitoring of chronically ill patients in a rehabilitation hospital. A wide spectrum of patient response to physiological stresses can be investigated. The heart of the system is an automatic communications network (with provision for manual override) which simultaneously measures and records all physiological data desired. On addition, the clinical changes that result from anesthesia and surgical manipulation will be noted in true time to coincide with measurement of the vital signs and other variables representing physiological activity. It is anticipated that calibration feedback signals from instrumentation to the computer system will serve to correct operating baseline shifts or inform the observer that artifact and noise has entered the system. The role of telemetering such a system remains to be shown in relation to safety and accuracy.

A65-81285
HETEROTROPHIC GROWTH AND PRODUCTION OF XANTHOPHYLLS BY CHLORELLA PYRENOIDOSA.
Robert J. Theriault (Abbott Labs., Dept. of Microbial Chem., Chicago, Ill.)
Applied Microbiology, vol. 13, May 1965, p. 402–416. 28 refs.

Chlorella pyrenoidosa grown heterotrophically in illuminated shaken flasks on glucose monohydrate (190 g) as the sole carbon source produced 450 mg/l of total xanthophylls from 190 g/l dry cell weight in 168 hrs. Higher concentrations of glucose decreased yields. Fructose and galactose added to the glucose medium were readily assimilated. Galactose alone could be used as a sole carbon source only after six vegetative passages. Light of proper intensity and duration increased the total xanthophyll yield by 35%. Erythromycin was essentially stable throughout the fermentation and nontoxic up to 25 mg/m with only slight toxicity at higher levels. Erythromycin and ristocetin were effective in controlling a high incidence of bacterial contamination in 30-liter fermentors. Continuous-feed runs yielded a dry cell weight of 302 g/l, and total xanthophylls of 650 mg/l from 500 g/l of glucose. The type of chlorella cells was an important consideration with respect to the availability of the xanthophylls in pigmenting egg yolks and broiler tissues when the algae were utilized as a source of xanthophylls.

A65-81286
NATURE AND ROLE OF BACTERIAL CONTAMINANTS IN MASS CULTURES OF THERMOPHILIC CHLORELLA PYRENOIDOSA.
Richard J. Blasco (Gen. Dyn./Elec. Boat, Chem. Eng. Lab., Groton, Conn.)
Applied Microbiology, vol. 13, May 1965, p. 473–477. 8 refs.
Contract NASw-95.

A study was made of bacterial contaminants isolated from an algal mass-culture unit. The study was performed specifically to determine the dependence of the size of bacterial population on algal density and the nature of any association of the contaminants with the algal cell. Growth of the bacterial contaminants on standard medium was also investigated. An estimate was made of the O_2 uptake of the bacterial population under normal operating conditions of the algal massculture system. Viable numbers of bacteria tended to increase with increased algal density. Bacteria were found imbedded in the surface of algal cells when the cultures of algae were characterized by subnormal rates of growth and photosynthetic gas exchange. Bacterial isolates failed to grow in standard medium alone, thus implying a dependency of bacterial growth on materials produced by the algae. A slight inhibitory effect on algal growth was noted in the case of two of three of the bacterial isolates. Manometric studies demonstrated that the bacterial population normally found in the algal cultures did not appreciably affect total gas exchange.

A65-81287
SURVIVAL AND GROWTH OF TERRESTRIAL MICROORGANISMS IN AMMONIA-RICH ATMOSPHERES.
S. M. Siegel and C. Giumarro (Union Carbide Res. Inst., Tarrytown, N. Y.)
Icarus, vol. 4, Apr. 1965, p. 37–40. 9 refs.
Contract NASw-767.

Various bacteria, and ascomycetes were demonstrated to have grown on specimens of Euphorbia xylophylloides and other xerophytes after 2 months in atmospheres containing NH_3 with CH_4, H_2, or air. NH_3 levels of at least

50,000 ppm far exceeded conventional upper safe limits for human toxicity. Extreme performance was shown by a stress-adapted Penicillium brevicompactum which grew slowly in 95% NH_3/5% CH_4. The significance of these observations for the origin and current existence of microbial life on Jupiter is noted briefly.

A65-81288
HYPOTHALAMO-HYPOPHYSEAL NEUROSECRETION IN MICE UNDERGOING STARVATION WITH OR WITHOUT WATER DEPRIVATION.
H. S. S. Sarajas, L. K. J. Karlsson, and J. I. Hirvonen (Helsinki U., Dept. of Physiol. and Coll. of Vet. Med., Dept. of Physiol., Helsinki, Finland).
Annales Academiae Scientiarum Fennicae, Series A, 1964, p. 1–8. 29 refs.
Sigrid Juselius Found. and Finnish Med. Res. Council supported research.

In mice deprived of food for three days with or without water deprivation aldehydefuchsin-positive neurosecretory material was found in normal amounts in the neurohypophysis while the material was present in increased amounts in the supraoptic and paraventricular nuclei including the cell bodies and axons of the neurons. The nuclei of the neurons did not, however, show any enlargement or other signs of neurosecretory activation. In mice deprived of water alone there was, as previously reported, depletion of neurosecretory material in the whole hypothalamo–neurohypophyseal system, in addition to which signs of hypersecretion were discernible in the nuclei of the supraoptic and paraventricular neurons. The observations are discussed in view of some endocrine, metabolic, and circulatory readjustments typical of starvation and dehydration.

A65-81289
INFLUENCE OF ULTRASOUND ON THE PERMEABILITY OF THE BLOOD-EYE BARRIER AND OF THE REFRACTIVE MEDIA OF THE EYE.
R. K. Marmur (V. P. Filatov Ukrainian Exptl. Sci. Res. Inst. of Eye Diseases, Odessa).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, May 1964, p. 55–58).
Bulletin of Experimental Biology and Medicine, vol. 57, May 1964, p. 578–580. Translation.

In experiments carried out on rabbits a study was made of the permeability of the blood-eye barrier and of the ocular refractive media after a course of irradiation with tolerable intensities of ultrasound. A marked increase of permeability was found; there was also an increase of the sorptive properties of the cornea, lens, and vitreous body, both in the irradiated and in the other eye.

A65-81290
A MODEL APERIODIC BALLISTOCARDIOGRAPH AND A DESCRIPTION OF AN APERIODIC BALLISTROCARDIOGRAM OF A HEALTHY INDIVIDUAL.
IU. A. Vlasov, V. S. Gurfinkel', and M. L. Shik (USSR, Acad. of Sci., Siberian Div., Inst. of Exptl. Biol. and Med., Lab. of Physiol. and Inst. of Biophys., Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Jun. 1964, p. 103–106).
Bulletin of Experimental Biology and Medicine, vol. 57, Jun. 1964, p. 750–753. 11 refs. Translation.

An analysis of blood shifts in an aperiodic ballistocardiogram during the different phases of cardiac contraction showed intervals corresponding precisely to the phases of the discharge of blood from the left ventricle into the aorta. Intervals I and II were the phases of rapid discharge, interval III was the phase of delayed discharge during which the pressure wave was distributed along the arterial bed, and period IV was the period of diastole. The use of an aperiodic ballistocardiograph makes it possible to record curves which may be analyzed quantitatively and interpreted physiologically.

A65-81291
ULTRASTRUCTURE OF THE OTOLITH ORGANS IN SQUIRREL MONKEYS AFTER EXPOSURE TO HIGH LEVELS OF GRAVITOINERTIAL FORCE.
Heinrich H. Spoendlin (Zurich U., Otorhinolaryngol. Klin. and Poliklin., Switzerland) Harold F. Schuknecht (Harvard Med. School; and Mass. Eye and Ear Infirmary, Dept. of Otolaryngol., Boston), and Ashton Graybiel (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 36, Jun 1965, p. 497–503. 32 refs. NASA supported research.

Eleven squirrel monkeys were exposed to gravitoinertial force of either 5.43 or 10.92 g units for periods up to 10 minutes in different body (head) positions. Three animals died. The nature of the head support was believed to be responsible in two and headward (negative) acceleration in the other. Gross examination of the brains revealed no pathological changes. Following centrifugation some of the monkeys manifested ataxia and other disturbances which disappeared in minutes or hours. Human subjects have experienced some of the manifestations following high g loadings. The ultrastructure of the maculae, as revealed by electronmicroscopy, was not altered in any of the animals exposed to high g stress. A detailed account of the findings in these and normal control animals is given and includes some new observations. It was concluded that exposure to gravitoinertial forces greater than 10.92 g units is necessary before physical alterations in fine structures of the macula can be demonstrated in squirrel monkeys. The possibility was not ruled out that the clinical manifestations had their genesis in the semicircular canals. If the g loadings in this experiment are not exceeded in orbital space flights, alterations of the macula would be ascribable to other causes, including the prolonged deafferentation associated with weightlessness.

A65-81292
HEART RATE PATTERNS OBSERVED IN MEDICAL MONITORING.
David G. Simons and Robert L. Johnson (USAF School of Aerospace Med., Flight Med. Branch and Internal Med. Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, Jun. 1965, p. 504–513. 23 refs.
NASA supported research.

Heart rate records were observed from several hundred individuals under a wide variety of aerospace flight-stress situations including sleep, quiet wakefulness, clinical stress testing, simulated aircraft flight, and F-100 aircraft flight. Automated beat-by-beat heart rate analysis recorded at 1 mm per second clearly demonstrated a variety of heart rate patterns. Base heart rate values which reflected homeostatic levels were distinguished from heart rate reflex activity identified as transient disruptions of homeostasis. Reflex patterns were divided into respiratory heart rate and slow wave heart rate reflex activity. Slow waves were identified as cardioaccelerator, balanced, and cardiodecelerator waveforms. The discussion includes physiologic mechanisms contributing to the observed heart rate reflex patterns.

A65-81293
RISK AND RESPONSIBILITY AS FACTORS AFFECTING HEART RATE IN TEST PILOTS: THE FLIGHT RESEARCH PROGRAM-II.
James Roman (NASA Flight Res. Center, Office of Biol. Res. and Med. Operations, Edwards AFB, Calif.)
Aerospace Medicine, vol. 36, Jun. 1965, p. 518–523. 8 refs.

In 37 flights in a two-place high-performance aircraft, or 35 hours of instrumented flying time, physical risk or danger did not appear to be a primary causative factor in producing the high heart rates frequently seen in high-performance vehicle operation. Responsibility for the mission appeared to be a more potent factor. It is recognized that the responsibility factor is not clearly defined and encompasses many variables.

A65-81294
INFLUENCE OF BEDREST ON PLASMA LEVELS OF 17-HYDROXYCORTICOSTEROIDS.
David Cardus, Carlos Vallbona, Fred B. Vogt, William A. Spencer, Harry S. Lipscomb, and Kristen B. Eik-Nes (Baylor U. Coll. of Med., Tex. Inst. for Rehabil. and Res., Depts. of Rehabil., Physiol. and Pediat., Houston, Tex.; and Utah U., Coll. of Med., Dept. of Biol. Chem., Salt Lake City).
Contracts NAS9-1461; NAS9-1294

Plasma levels of 17-hydroxycorticosteroids at 0800, 1200, 1600, 2000, and 2400 hours were determined on 6 healthy subjects who were submitted to two 3-day periods of bedrest. During the first period the subjects were in bedrest only. During the second a program of isometric exercises was added to bedrest. The determinations of 17-hydroxycorticosteroids in plasma were made with a modification of the Peterson method and the Porter-Silber technique. During bedrest the peak level at 0800 seemed a little lower than the peak values observed while the subjects were ambulatory but the difference was not statistically significant. Bedrest did not modify the circadian rhythm of 17-hydroxycorticosteroids in plasma. During the period that isometric exercises were added to bedrest the rhythm and the levels of 17-hydroxycorticosteroids were normal. One to two days bedrest has no effect on the circadian rhythm of 17-hydroxycorticosteroids.

A65-81295
FUNCTIONAL STATES OF ALTERED AWARENESS DURING FLIGHT.
Don E. Flinn (USAF Office of the Surg. Gen., Washington, D.C.)
Aerospace Medicine, vol. 36, Jun 1965, p. 537–544. 29 refs.

Occasionally transient states of altered awareness which are not organic or physiological in origin are seen in flyers. These include lapses of attention, trance states, dream-like states, and related subjective experiences. These are often minor disorders of the type which in a more severe form are known clinically as dissociative reactions. Various factors are implicated in their onset, including the monotonous aspects of the flying environment, anxiety, fatigue, sensory overload, narrowed attention, and underlying psychopathology in the individual. In the past 7 years 21 patients have been referred to the USAF School of Aviation Medicine because of episodes of this type. While these conditions are not always a significant threat to flying safety it may be difficult to differentiate them from disorders which are hazardous. Decision regarding return to flying status in these cases must be made individually, based upon the demonstrated degree of interference with performance and the underlying emotional suitability of the individual.

A65-81296
FATIGUE-STUDIES ON OVERSEAS FLIGHTS.
H. Bruener, K. E. Klein, S. Ruff, and H. M. Wegmann (Inst. fur Flugmed. (DVL), Bad Godesberg, Germany).
(XIII Internatl. Congr. of Aviation and Space Med., Dublin, Ireland, Sept. 14, 1964).
Aerospace Medicine, vol. 36, Jun. 1965, p. 552–553. 14 refs.

Studies were made on aircrew personnel during transatlantic flights from Frankfurt to New York and return. A "natural" depression of the circulatory parameters in the diurnal fluctuation was found during the night hours. It is probably caused by vagotonia. A depression found after long hours of mental work should have the same cause, a relative vagotonia, and should be an expression of a relative state of fatigue. This interpretation would best explain and also agree with the results we obtained with other physiological parameters. However, the practical significance of this conclusion is not within the field of study of this report.

A65-81297
RESPONSE TO CARBOHYDRATE LOADING AS A CRITERION IN COMMERCIAL PILOT SELECTION.
G. F. Catlett and G. J. Kidera (United Airlines, Med. Dept., Chicago, Ill.)
Aerospace Medicine, vol. 36, Jun. 1965, p. 554–557. 13 refs.

Diabetes mellitus is a major cause of medical grounding among pilots employed by United Air Lines, yet the disease is seldom discovered in pilot selection examinations. This study was designed to evaluate the feasibility of screening latent diabetes by use of a single blood glucose determination after administration of a loading dose of carbohydrate and to compare this method with the traditional random urinalysis. The procedure was performed on 157 pilot applicants who were without history of metabolic disease and whose initial urines were sugar free. Seventeen of the group showed glycosuria or elevated blood sugar after loading and of these seven demonstrated sufficient carbohydrate intolerance to warrant rejection. The random urinalysis appears inadequate as a selection test and should be replaced by some evaluation of glucose tolerance.

A65-81298
LAKEFRONT AIRPORT, AN EPIDEMIOLOGIC APPROACH.
John D. Dougherty (Harvard School of Public Health, Boston, Mass.)
Aerospace Medicine, vol. 36, Jun. 1965, p. 558–561. 7 refs.

With the increasing number of aviation-wise physicians, airports offer a productive opportunity for accident studies. Epidemiological evaluation of New Orleans Lakefront Airport provides an example for interested physicians. The unique physical location of New Orleans Lakefront makes spatial disorientation a common occurrence to aircraft in the traffic pattern at night and/or on reduced visibility. Proficiency varied widely among pilots of fatal crashes. Several common factors, such as low visibility, darkness, and type of aircraft, are considered. Traffic pattern operations by a noninstrumented pilot indicated a method by which coriolis may be induced in the traffic pattern. Two accidents, typical of spatial disorientation, are noted, as was the high fatality rate/1,000,000 for night operations for this airport. Local aviation medical examiners are suggested to be ideally equipped to compile and analyze longitudinal studies of airport safety.

A65-81299
RESPONSES OF COLD- AND WARM-ADAPTED DOGS TO INFUSED NOREPINEPHRINE AND ACUTE BODY COOLING.
Tetsuo Nagasaka and Loren D. Carlson (Ky. U., Dept. of Physiol. and Biophys., Lexington).
American Journal of Physiology, vol. 209, Jul. 1965, p. 227–230. 17 refs.
Contract AF 41(609)-2193.

Oxygen consumption, heart rate, and colonic, pinna, and paw temperatures were recorded continuously in warm-adapted (W-A) and cold-adapted (C-A) dogs anesthetized with pentobarbital sodium (30 mg/kg), paralyzed with Flaxedil (5 mg/kg per hr), and mechanically ventilated. The dogs were infused with norepinephrine (1.25 μg/kg per min) for 20 min at 30° C and after 45 min of acute cold exposure to 5° C. Oxygen consumption of C-A dogs increased with a slight increase in the heart rate during the initial 18 to 20 min of body cooling. O_2 consumption decreased continuously during cold exposure in W-A dogs. Calorigenic effects of infused noradrenaline were similar in C-A and W-A dogs at 30° C and 5° C. Heart rate increased in W-A dogs at 30° and 5° C. These results show that nonshivering thermogenesis is well developed by cold acclimation in dogs, and suggest that the increase may be due to an increase in noradrenaline in blood rather than to increased sensitivity of the animals to the calorigenic effects of noradrenaline.

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