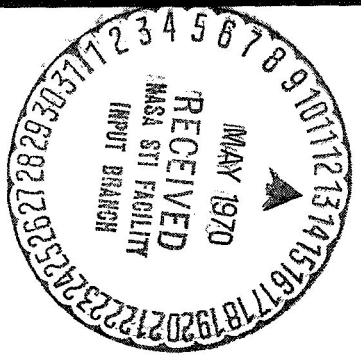
NASA SP-7011 (74)



AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (74)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Scientific and Technical Information Division
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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.

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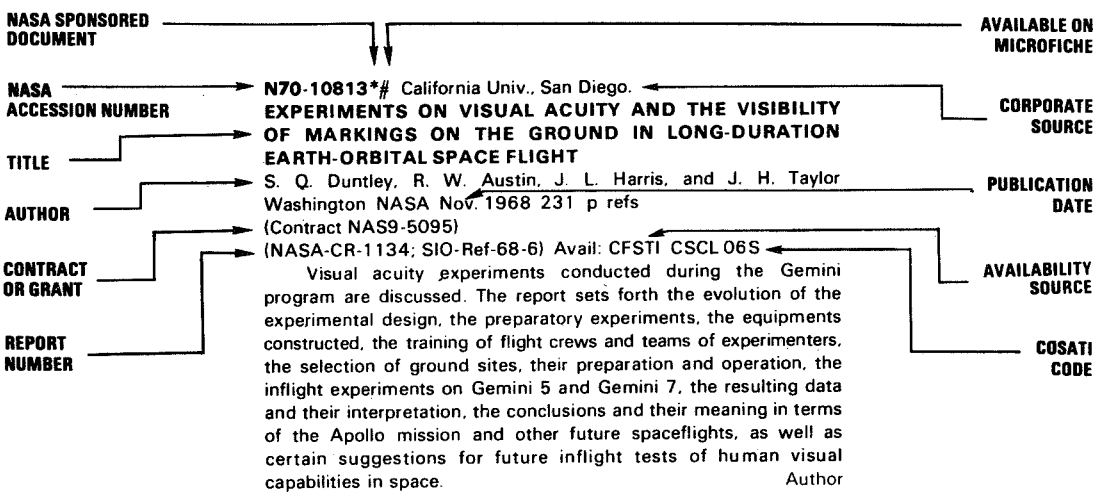

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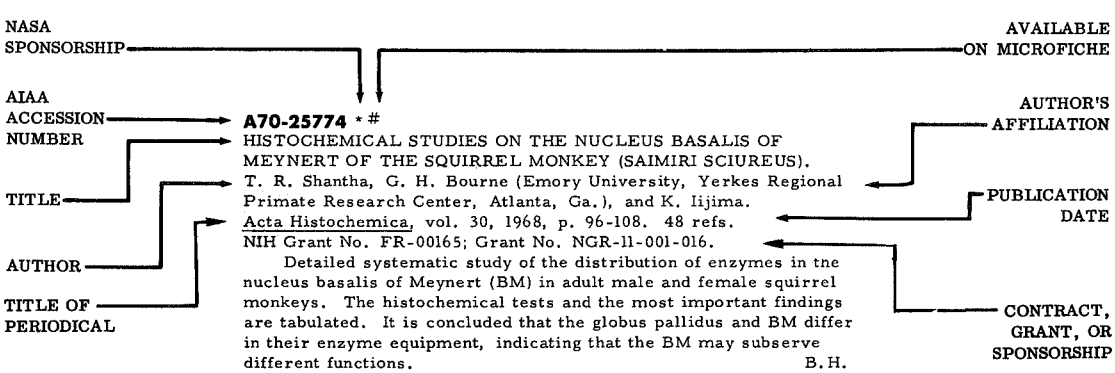

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography MARCH 1970

STAR ENTRIES

N70-12762*# General American Transportation Corp., Niles, Ill. Research Div.

PERFORMANCE TESTS OF AN ORGANIC AMINE CARBON DIOXIDE REMOVAL SYSTEM *Final Report*

A. J. Glueckert and G. A. Remus Dec. 1969 85 p refs

(Contract NAS1-8360)

(NASA-CR-66847) Avail: CFSTI CSCL 06K

An experimental evaluation was conducted on a regenerable two-bed carbon dioxide removal system which utilized an organic amine sorbent. This sorber formulation absorbs CO2 in the presence of H2O vapor and thus does not require pre-drying the gas stream. The primary objective of the test program was to relate the system performance of CO2 removal rate, power, and water carry-over with CO2 during regeneration to the operating parameters of air flow rate through the bed, absorption-regeneration time, and bed cooling and heating rates. All other operating conditions were held constant. The Box–Wilson composite design was used in the experimental system, and to generate quadratic equations relating system performance to the operating conditions. Author

N70-12811# California Univ., San Francisco. Lab. of Radiobiology.

ON THE GENETIC EFFECTS OF IONIZING RADIATION

Sheldon Wolff [1969] 20 p refs Presented at 2nd Congr. of the Natl. Acad. of Mexico, Jan. 1969 Sponsored by AEC

(UCSF-10P2-71; Conf-690118-1) Avail: CFSTI

Data accumulated by various workers on the genetic effects of radiations on the fitness of animal populations are summarized. Emphasis is placed on criteria that help to distinguish between radioinduced chromosomal aberrations and point mutations. The difficulties of estimating the genetic hazards of radiations to human populations from the mutation rates calculated for animals are discussed. NSA

N70-12827# Brookhaven National Lab., Upton, N.Y.

RESPONSES IN MUTATION, GROWTH INHIBITION, TUMORIZATION, AND ISOZYME MULTIPLICITY FROM EXPOSING SEEDS TO IRRADIATION OF DIFFERENT LINEAR ENERGY TRANSFER

H. H. Smith, Y. Hirono, M. E. Conklin, and J. T. Lyman 1969 28 p Presented at the Symp. on the Nature, Induction, and Util. of Mutation in Plants, Pullman, Wash. Prepared in Cooperation with Adelphi Univ. and California Univ.

(BNL-13763; Conf-690703-6; SM-121/35) Avail: CFSTI

Seeds of a genetic stock of Arabidopsis thaliana and of three genotypes of Nicotiana were irradiated. The irradiations ranged in linear energy transfer (LET) from 2 keV/micron (250 kVp X-rays) to 1890 keV/micron (argon ions). The responses measured were somatic mutations, tumorization, various manifestations of growth inhibition, and the production of peroxidase isozymes. The relative biological effectiveness (RBE) for all criteria measured, including mutations, was highest at LET's of 74 to 172 keV/micron. This indicated a common primary target, the genetic material, for each effect. The RBE is inversely related to absorbed dose so that genotypes or criteria that are affected by low doses give relatively high RBE's and vice versa. The production of multiple forms (isozymes) of peroxidases is enhanced by irradiation, is dose dependent, is relatively more affected per unit dose by neutrons than by X-rays, and provides a readily measurable response to irradiation at a molecular level. Author (NSA)

N70-12865# Blume (John A.) and Associates Research Div., San Francisco, Calif.

MOTION PERCEPTION IN THE LOW-FREQUENCY RANGE

Jul. 1969 53 p refs

(Contract AT(26-1)-99)

(JAB-99-47) Avail: CFSTI

The results of human threshold of motion perception tests in the 1 to 5 sec period range are presented. Parameters which affect motion perception are the individual test subject, the period of motion, and the configuration of the test subject. Previous investigations had not included motion in frequencies above 1.0 sec. Because the natural fundamental mode periods of tall buildings and other large structures are usually longer than 1.0 sec, it is important to identify perception thresholds in the period range. Test results at and above 1 sec periods were compared with results of other investigations of threshold of human perception. The threshold of perception (in terms of acceleration) increases with frequency of motion, but approaches a constant value of 0.002g at long periods (>1.0 sec). Acceleration was found to be the best parameter for motion perception. Author (NSA)

N70-12910*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

GUIDELINES FOR EVA DEVELOPMENT

14 Dec. 1967 40 p

(NASA-TM-X-62554) Avail: CFSTI CSCL 06K

Projected guidelines for Apollo and post-Apollo EVA, based on Gemini experience, are briefly described. The development of techniques, methods, and hardware to extend capabilities, and the breaking down of major tasks into subtasks are mentioned. Implementation of the program is considered, and emphasis is

placed on life support systems, crew and equipment mobility, work site technology, and information dissemination. An EVA task analysis and plans for planetary surface exploration are included. N.E.N.

N70-12960# International Institute for Aerial Survey and Earth Sciences, Delft (Netherlands).
THE NEED FOR FOREST INVENTORIES
Donald A. Stellingwerf 16 Oct. 1969 19 p refs
Avail: CFSTI

The needs and uses of inventories, and methods of taking them are discussed. The benefits of controlled forests for the balance of nature and for industrial purposes are described, along with the trends of deforestration in developing countries and reforestration in developed countries. Methods of obtaining inventories are traced from Medieval times to the present statistical, and aerial and satellite photographic and photogrammetric techniques. It is pointed out that aerial photography is very useful for heterogeneous forests, but its use is restricted for homogeneous forests. Predicting wood needs, conservation activities, and forest fire fighting are also considered. N.E.N.

N70-12965*# University of Southern Calif., Los Angeles. Dept. of Physiology.
DEPARTMENT OF PHYSIOLOGY Progress Report, 10 Jul.–9 Oct. 1969
24 Nov. 1969 13 p ref
(Grant NSR-05-018-087)
(NASA-CR-107187) Avail: CFSTI CSCL 06P

During this reporting period the major efforts were concentrated toward developing an implantable cardiac sonomicrometer. Circuitry was designed and tested, several crystal probes were fabricated and the device was calibrated and tested by an acute measurement of dynamic atrial and vena cava dimensions in an experimental animal. Author

N70-12966# Grumman Aircraft Engineering Corp., Bethpage, N.Y. Life Sciences Section.
A REGRESSION ANALYSIS OF PILOT-INDUCED OSCILLATION RATINGS
Jay Eichler May 1969 26 p ref
(RM-444) Avail: CFSTI

Pilot-induced oscillation (PIO) ratings and step response data published previously were analyzed to determine the important variables in the step response and their correlation with the PIO ratings. A least square regression surface was fitted to various parameters of the step-response time-histories. The results have given direction to a larger study of handling qualities by indicating significant step-response parameters that correlate with PIO and the relative ordering of these parameters. Author

N70-12985# Japan Atomic Energy Research Inst., Tokai. Div. of Health Physics and Safety.
REMOVAL OF DEPOSITED PLUTONIUM FROM BODY BY CHELATING AGENTS: REVIEW
Junko Iwamoto and Minoru Fujita Sep. 1969 38 p refs In JAPANESE; ENGLISH summary
(JAERI-4048) Avail: CFSTI

For the purpose of removing plutonium from man, it is known that chelating agents, especially DTPA, are useful. However, the method of administration is not fully established and the effectiveness of the chemicals also is not clear. Therefore, this report attempts to survey the literature published from 1955 to 1968 and to summarize the present knowledge of the chelating agents which are being used for removal of plutonium. Author

N70-12998# Atomic Energy of Canada, Ltd., Chalk River (Ontario).
BIOLOGY AND HEALTH PHYSICS DIVISION Progress Report, 1 Apr.–30 Jun. 1969
30 Jun. 1969 47 p
(AECL-3430; PR-B-82) Avail: CFSTI; Atomic Energy of Can., Ltd., Chalk River: $1.50

A method for making fission fragment tracks visible to the eye is described. Etched film which has been irradiated is placed as an insulator between a plane high-voltage electrode and a grounded thin layer of aluminum. When voltage is applied sparks pass through the holes in the film and evaporate holes in the aluminum layer. At the conclusion of the discharge a pattern of holes in the aluminum provides a replica of the film pattern, with holes large enough to be seen by eye. Also included are reports in: biochemistry and molecular biology, environmental research, and health physics. F.O.S.

N70-13009# California Univ., Davis. Radiobiology Lab.
FALLOUT Cs-137 ACCUMULATION IN TWO SUBPOPULATIONS OF BLACK-TAILED DEER (ODOCOILEUS HEMIONUS COLUMBIANUS)
Steven Arnold Book (M.S. Thesis) Jun. 1969 61 p refs
(Contract AT(11-1)-34)
(UCD-34-P-104-14) Avail: CFSTI

Results are reported from an investigation of various parameters influencing the uptake of fallout Cs-137 in a wild population of Columbian black-tailed deer (Odocoileus hemionus columbianus) at the Hopland Field Station of the University of California. The variation in Cs-137 body burdens of deer living in relatively close proximity yet occupying different elevational habitats was studied in relation to rainfall, type and availability of forage species, foliar contamination by the radionuclide, and dietary preferences. Author (NSA)

N70-13015# Boeing Co., Wichita, Kans.
TEN YEARS OF HUMAN VIBRATION RESEARCH
J. E. Beaupeurt, F. W. Snyder, S. H. Brumaghim, and R. K. Knapp Aug. 1969 66 p refs
(Contract NONR-2994(00))
(AD-693199; D3-7888) Avail: CFSTI CSCL 6/19

The vibration research was organized around three main interest areas, (1) subjective reaction to vibration, (2) effects of vibration on sensory and motor processes, and (3) physical effects of vibration. The report briefly highlights these main interest areas, introducing methodological aspects, mentioning general results, and suggesting how the various aspects of the program fit together. TAB

N70-13174# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biological Acoustics Branch.
HUMAN AUDITORY RESPONSE TO AN AIR BAG INFLATION NOISE Research Report, Dec. 1968–Mar. 1969
Charles W. Nixon 7 Mar. 1969 43 p refs
(Contract PO-9-1-1151)
(PB-184837; HS-800-153) Avail: CFSTI CSCL 06S

An investigation was undertaken for the purpose of confirmation or denial of the interpretation that the system noise exposure caused by air-bag inflation does not constitute an acoustic hazard. The investigation considered various auditory responses including eardrum membrane response, temporary threshold shift (TTS), persistent TTS, inability to communicate verbally or perceive other acoustic signals due to TTS immediately following exposures and aural discomfort or pain. USGRDR

N70-13210# Joint Publications Research Service, Washington, D.C.
SPACE BIOLOGY AND MEDICINE, VOLUME 3, NO. 4
24 Nov. 1969 142 p refs Transl. into ENGLISH from Kosmich. Biol. i Med. (Moscow), v. 3, no. 4, 1969 p 3–91
(JPRS-49297) Avail: CFSTI

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4. PROBLEMS IN RADIATION SAFETY DURING MANNED FLIGHTS IN 'SOYUZ' SPACESHIPS Y. I. Vorobyev et al p 32–39 refs (See N70-13214 03-04)

5. COMPUTING THE JUSTIFIED RISK DOSE DURING PROLONGED SPACE FLIGHTS Ye. Ye. Kovalev et al p 40–44 refs (See N70-13215 03-04)

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10. EXPERIMENTAL APPROACHES IN STUDYING THE EFFECTIVENESS OF LOCAL BODY SHIELDING FOR COSMONAUTS G. M. Abramona p 77–84 refs (See N70-13220 03-04)

11. EXPERIMENTAL STUDY OF THE DIURNAL PERIODICITY IN PHYSIOLOGICAL FUNCTIONS AND HUMAN PERFORMANCE DURING DISRUPTION OF SLEEP AND WAKEFULNESS PATTERNS A. N. Litsov p 85–96 refs (See N70-13221 03-04)

12. CHANGE IN BONE SYSTEM TOLERANCE TO ACCELERATIONS AFTER PROLONGED WEIGHTLESSNESS S. A. Gozulov et al p 97–103 refs (See N70-13222 03-04)

13. EXCRETION AND BALANCE OF CERTAIN ELEMENTS DURING PROLONGED USE OF DEHYDRATED FOODS Y. I. Pokrovskaya et al p 104–111 refs (See N70-13223 03-04)

14. A CONTACTLESS METHOD FOR REGISTERING INDICES OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS R. M. Bayevskiy et al p 112–115 refs (See N70-13224 03-04)

15. EXPERIMENT IN USING METHODS OF MATHEMATICAL PLANNING FOR STUDYING THE PROCESS OF BIOLOGICAL MINERALIZATION I. M. Chirkov et al p 116–120 refs (See N70-13225 03-04)

16. THE PHYTOTRON IN STOCKHOLM V. P. Dadykin et al p 121–123 (See N70-13226 03-04)

17. REFLEX REACTIONS AND CONDITION OF SOME AUTONOMIC FUNCTIONS OF WHITE RATE SUBJECTED TO HYPOTHERMIA G. V. Altukhov et al p 124–126 (See N70-13227 03-04)

18. INCREASED BODY TOLERANCE TO HYPOXIA FROM ACID INJECTIONS A. Kh. Kogan et al p 127–128 (See N70-13228 03-04)

N70-13211# Joint Publications Research Service, Washington, D.C.
SOME RESULTS OF STUDY OF THE NATURE OF BODY TOLERANCE AND MECHANISMS OF ITS CHANGE
Z. I. Barbashova *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 6–14 refs (See N70-13210 03-04)
Avail: CFSTI

Studied was the nature of body tolerance and the mechanism of its change at tissue, cellular, an subcellular levels in animals by experimentally changing their resistance to hypoxia. Month long adaptation to hypoxia and to muscular work was reduced by the effects of an adrenalectomy, a direct correlation between body tolerance, the tolerance of its tissues and the characteristics of the course of biochemical processes in them was proven. During early adaptation, some animals showed a glycolysis stimulation in cerebral tissues. Best adaptation times to hypoxia for the various tissues was between 20 to 30 days. G.G.

N70-13212# Joint Publications Research Service, Washington, D.C.
RESPIRATION AND MINERAL NUTRITION OF HYPOTHETICAL MARTIAN ORGANISMS AND OTHER PROBLEMS IN MARTIAN BIOLOGY
K. A. Lyubarskiy *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 15–21 refs (See N70-13210 03-04)
Avail: CFSTI

Listed are the basic characteristics for a model of Martian organisms: (1) organisms are photosynthesizing; (2) pigment sensitizing photosynthesis has the main absorption band in the blue part of the spectrum; (3) organism epithelium contains hydrochrome pigments able to mask the fundamental color; (4) organisms are dense encrustations with unbroken surfaces; (5) biocolloid contents are small; (6) cell fluids contain large amounts of soluble substances; (7) moisture absorption occurs by epiphytic means or hoarfrost assimilation; (8) transpiration does not occur; (9) trivalent iron compounds are used as respiratory substrates; (10) mineral salts serve as nutrition; (11) pH content of cell juices is low; and (12) the external epidermic layers acquire coarser cellular structures during the spring-summer season. G.G.

N70-13213# Joint Publications Research Service, Washington, D.C.
EFFECT OF DEHYDRATED FOODS ON THE FUNCTIONAL STATE OF THE HUMAN BODY
V. P. Bychkov *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 22–31 refs (See N70-13210 03-04)
Avail: CFSTI

The possibility of long term use of dehydrated foods and of the effects of this ration on the metabolism of the human body was studied by feeding human volunteers in a six month experiment 3,100 Cal of dehydrated foods. Investigated diets differed somewhat in caloric content, chemical composition, and methods of preparation. Subjects remained healthy andmaintained their initial performance over the entire length of experimentation. However, some change in protein metabolism was noted: nitrogen balance levels decreased as did amino acids in the blood serum together with a change in the ratio of protein fractions. G.G.

N70-13214# Joint Publications Research Service, Washington, D.C.
PROBLEMS IN RADIATION SAFETY DURING MANNED FLIGHTS IN 'SOYUZ' SPACESHIPS
Ye. I. Vorobyev et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 32 39 refs (See N70-13210 03-04)
Avail: CFSTI

This paper presents the basic principles for maintaining radiation safety of manned "Soyuz-3, 4 and 5" flights. During all the missions radiation levels in the space cabin and along the spaceship trajectory remained within the admissible limits, as

indicated by on-board measurements and observations of geophysical effects. Analysis of the findings indicates that radiation safety was maintained during these three manned flights. Author

N70-13215# Joint Publications Research Service, Washington, D.C.

COMPUTING THE JUSTIFIED RISK DOSE DURING PROLONGED SPACE FLIGHTS

Ye. Ye. Kovalev et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 40 44 refs (See N70-13210 03-04)

Avail: CFSTI

This paper presents a procedure for calculating justified risk doses during chronic irradiation, depending on the exposure time. Processes of radiation repair in a living organism are described by means of a Blair model. Using the above procedure and adopted justified risk doses for flights of short duration, adequate levels for long-duration missions are evaluated. Author

N70-13216# Joint Publications Research Service, Washington, D.C.

HEMOPOIETIC CHANGES IN DOGS DURING PROLONGED FRACTIONAL IRRADIATION

M. F. Sbitneva et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 45 - 50 refs (See N70-13210 03-04)

Avail: CFSTI

Experiments on dogs were carried out to study the hemopoietic effects of prolonged fractional gamma irradiation (repeated four times with a dose of 50 R/day once a week) The exposure caused a short-term decrease in the leukocyte and thrombocyte content and a reduction in neutrophil phagocytic activity in the peripheral blood and a decrease in the number of megakaryocytes in bone marrow punctates. Tests with sodium nucleinate revealed that leukopoiesis activity remained sufficiently high. Author

N70-13217# Joint Publication Research Service, Washington, D.C.

SIGNIFICANCE OF IMMUNOBIOLOGICAL INDICES IN DETECTION OF RADIATION DAMAGE

G. M. Lvitsyna et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 51 56 refs (See N70-13210 03-04)

Avail: CFSTI

Immunobiological reactivity of dogs was studied during their single exposure to 126-MeV protons in doses of 55, 89 and 160 rads. Reflecting fine changes in the total reactivity of the living body, immunological tests indicated its high sensitivity even to nonlethal radiation doses. A correlation was established between changes in natural immunity factors and the magnitude of the absorbed energy and degree of shift in other biological indices. A short-term decrease of bactericidal properties of the skin and the absolute phagocytic index was found during a proton irradiation even with a dose of 55 rads. Earlier and more significant changes in immunobiological indices were detected as the dose was increased. Author

N70-13218# Joint Publications Research Service, Washington, D.C.

BIOLOGICAL EFFECT OF 50-MeV PROTONS ON INTESTINAL EPITHELIUM CELLS IN MICE

V. M. Mastryukova et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 57 - 63 refs (See N70-13210 03-04)

Avail: CFSTI

This paper presents the results of a study of the mitotic activity, number of chromosomal aberrations and number of cells in sections of crypts and villi of the intestinal epithelium of mice exposed to a total irradiation with 50-MeV protons in doses of 250, 500 and 750 rad. These indices revealed substantial shifts but they were reversed during a nine-day observation period. Author

N70-13219# Joint Publications Research Service, Washington, D.C.

MEDICAL STUDIES MADE DURING FLIGHTS OF 'SOYUZ-3,' 'SOYUZ-4' AND 'SOYUZ-5' SPACE SHIPS

Ye. I. Vorobyev et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 64 76 (See N70-13210 03-04)

Avail: CFSTI

This paper summarizes the preliminary results of medical observations made during the manned "Soyuz-3," "Soyuz-4" and "Soyuz-5" space flights. Changes in physiological reactions of cosmonauts when within space cabins were similar to those observed during previous flights. Medical data recorded during the emergence of cosmonauts from the spacecraft are described. Analysis of the collected data suggests that spacecrew members had no pathological changes throughout the entire mission. The observed physiological changes are regarded as adequate responses to exposure to spaceflight factors. Author

N70-13220# Joint Publications Research Service, Washington, D.C.

EXPERIMENTAL APPROACHES IN STUDYING THE EFFECTIVENESS OF LOCAL BODY SHIELDING FOR COSMONAUTS

G. M. Abramova *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 77 - 84 refs (See N70-13210 03-04)

Avail: CFSTI

An experimental method has been developed for making radiobiological studies of the effectiveness of local body shielding from ionizing radiation from beams of high-energy protons. In all the experiments carried out on dogs a shielding was placed on parts of the body equal to their weight. The restrained animals were exposed to irradiation for 10-15 minutes. The dose gradient did not exceed + or - 10%. The local body shielding provided a tenfold decrease of the dose effect in the shielded part of the animal body. Author

N70-13221# Joint Publications Research Service, Washington, D.C.

EXPERIMENTAL STUDY OF THE DIURNAL PERIODICITY IN PHYSIOLOGICAL FUNCTIONS AND HUMAN PERFORMANCE DURING DISRUPTION OF SLEEP AND WAKEFULNESS PATTERNS

A. N. Litsov *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 85 - 96 refs (See N70-13210 03-04)

Avail: CFSTI

A drastic alteration of work and rest cycles caused a gradual restructuring of physiological functions and the performance pattern of six healthy pilots used as test subjects. The restructuring included three stages: latent, apparent and deep. The rate with which different functions of the human body adjusted to a new environment varied: the EEG and simple motor reactions changed with the highest rate whereas autonomic functions and highly coordinated mental activity changed with the lowest rate. The restructuring of diurnal periodicity under experimental conditions was considerably affected by the pattern of physical and mental activity and the sleep of the test subjects and their motivation. The dynamics of restructuring of physiological functions, performance and sleep of human beings should be considered as the best indication of human adaptation to an altered pattern of their activity. Author

N70-13222# Joint Publications Research Service, Washington, D.C.

CHANGE IN BONE SYSTEM TOLERANCE TO

ACCELERATIONS AFTER PROLONGED WEIGHTLESSNESS
S. A. Gozulov et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 97 103 refs (See N70-13210 03-04)
Avail: CFSTI

On the basis of data available in the literature, the authors, the skeletal strength in humans exposed to long-term weightlessness was determined. It was found that a mineral decrease in the vertebral column by 10% can reduce acceleration tolerance by 15%. It is suggested that a reduction of acceleration tolerance may be more pronounced following long-term space flights. Author

N70-13223# Joint Publications Research Service, Washington, D.C.
EXCRETION AND BALANCE OF CERTAIN ELEMENTS DURING PROLONGED USE OF DEHYDRATED FOODS
Ye. I. Pokrovskaya et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 104 - 111 refs (See N70-13210 03-04)
Avail: CFSTI

Six subjects consumed dehydrated diets during a 120-day experiment. During the experiment there were no significant changes in excretion and the balance of potassium, magnesium, phosphorus, sulfur or nitrogen. During the last two months an insignificant calcium balance was detected. The assimilation of sulfur decreased somewhat during the course of the experiment and that of calcium was substantially reduced in the second half of the experiment. Analytical studies of the mineral balance were made using mineralization of biological samples in an oxygen atmosphere on a platinum spiral, in a calorimetric bomb and in a quartz tube. Procedures were established for the application of the indicator nitchromazto to evaluate the sulfur content in the urine, feces and diets. A method was devised for determining magnesium and calcium in biological samples, using the atomic absorption analysis method. Author

N70-13224# Joint Publications Research Service, Washington, D.C.
A CONTACTLESS METHOD FOR REGISTERING INDICES OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS
R. M. Bayevskiiy et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 112 - 115 refs (See N70-13210 03-04)
Avail: CFSTI

A method of contactless registry of cardiovascular and respiration functions based on dielectrography has been developed. The new apparatus operates through changes in the dielectric constant of different parts of the body in response to rhythmic fluctuations with a frequency of 10 Mc/sec. This method makes it possible to register physiological data by means of electrodes built into garments, requiring no direct contact with the skin. Author

N70-13225# Joint Publications Research Service, Washington, D.C.
EXPERIMENT IN USING METHODS OF MATHEMATICAL PLANNING FOR STUDYING THE PROCESS OF BIOLOGICAL MINERALIZATION
I. M. Chirkov et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 116 - 120 refs (See N70-13210 03-04)
AVAIL: CFSTI

A mathematical method for planning a multifactor experiment has been used in studying the relationship between basic parameters of the process of biological mineralization of human wastes. An equation describing a nonlinear relationship between the substrate concentration and air consumption has been derived. It is shown that optimization of the process can be achieved using the described method. Author

N70-13226# Joint Publications Research Service, Washington, D.C.
THE PHYTOTRON IN STOCKHOLM
V. P. Dadykin et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 121 - 123 (See N70-13210 03-04)
Avail: CFSTI

Briefly reviewed are the technical aspects of a phytotron designed for plant cultivation under regulated environmental conditions. The apparatus contains two vegetation areas, dark rooms, artificial humidity and lightning regimes as well as temperature regulators. Outside air enters the system through multiple filters at a specified rate and circulates through . During a ten month period this apparatus operated reliably and satisfactorily. G.G.

N70-13227# Joint Publications Research Service, Washington, D.C.
REFLEX REACTIONS AND CONDITION OF SOME AUTONOMIC FUNCTIONS OF WHITE RATS SUBJECTED TO HYPOTHERMIA
G. V. Altukhov et al *In its* Space Biol. and Med., Vol. 3, No 4 24 Nov. 1969 p 124 - 126 (See N70-13210 03-04)
Avail: CFSTI

Described are changes in conditioned reflex activity and autonomic functions of white rats during cooling of their bodies to 30 degrees in the course of 2, 6, 10 and 24 hours. A definite stereotype of conditioned reflexes to sonic and visual stimuli was produced in the animals by a motor-food method and the latent period of the conditioned reflex was registered by electronic watch and voltmeters. It was shown that general body cooling to 30 degrees caused definite changes with a weakening in principal cortical processes, excitation, and inhibition. This was expressed in the total absence of conditioned reflexes, disappearance of reflexes to individual stimuli, or considerable lengthening of the latent period and disinhibition of differentiations. Impairments of conditioned reflex activities in the same animals were greater after the first cooling than during repeated ones. Multiple cooling of the animals to 30 degrees with different durations caused no irreversible changes six to eight months after experimentation. G.G.

N70-13228# Joint Publications Research Service, Washington, D.C.
INCREASED BODY TOLERANCE TO HYPOXIA FROM ACID INJECTIONS
A. Kh. Kogan et al *In its* Space Biol. and Med., Vol. 3, No. 4 24 Nov. 1969 p 127 - 128 (See N70-13210 03-04)
Avail: CFSTI

Investigated was the increased tolerance of mice to hypoxia after heavy work loads. Animals were injected subcutaneously with lactic or hydrochloric acid in the abdominal cavity prior to the onset of hypoxia during stepped atmospheric rarefaction down to 90 mm Hg. Both acids increased mice tolerance to hypoxia; however, the lactic acid was somewhat more effective. Experimental data showed that acid with a pH of 2.4 in doses of 0.4 ml per 10 grams body weight increased tolerance to hypoxia in mice. G.G.

N70-13264# Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.
A STUDY OF VISION AS RELATED TO DARK ADAPTATION AND NIGHT VISION IN THE SOLDIER
Aug. 1969 165 p refs
(Contract DAHC19-68-C-0001)
(AD-693292) Avail: CFSTI CSCL 6/16

The report was prepared to provide the Army Research Office with a summarization of recent advances in the understanding of dark adaptation and night vision capability. The scope of the study included: current knowledge of the biochemical and physiological aspects of dark adaptation and night vision, the role of nutrition

as it affects dark adaptation, pharmacologically induced alterations of night vision, the effects of smoking and noxious environmental agents on night vision, and individual variability in dark adaptation and night vision capacity. Author (TAB)

N70-13447# Massachusetts Inst. of Tech., Cambridge.
HEALTH HAZARDS FROM ULTRASONIC ENERGY
Neil Goldstein and Anthony J. Sinzkey 28 Feb. 1969 214 p refs Prepared in cooperation with Northeastern Radiological Lab.
(PB-185963) Avail: CFSTI CSCL 06E

Ultrasound of therapeutic intensities can be hazardous even in the hands of the trained technician. A great deal of training is necessary for the proper use of ultrasound at these therapeutic levels. In cases where ultrasound emanates into air, the probability of damage to tissue is lower than in the case of direct contact since poor coupling is obtained between ultrasonic transducers and air. Equipment for the intentional use and production of ultrasound is widely available. Some of this equipment does not operate safely. The interactions of ultrasound in tissue have been studied. However, these interactions are amazingly complex. USGRDR

N70-13501# National Institutes of Health, Bethesda, Md. Translating Unit.
METHODOLOGIC TRIAL OF ANALYSIS OF THE SLEEP CYCLE
R. Tissot 4 Aug. 1969 31 p Transl. into ENGLISH from Encephale (French), 55:2, 1969 p 137–169
Avail: CFSTI

Mathematical analysis of the various stages of sleep indicates that paradoxic sleep is not a state as such, but is a function of that of the other classical stages. The accepted view of the antagonism of slow sleep in general and paradoxic sleep is questioned and a manifest antagonism is hypothesized between stages 3–4 and P; there is also probably a synergism of stages 2 and P. Based on the general equation of hyperbolas, equations are derived to calculate the curves of the sleep cycle and its variations under the influence of drugs. R.B.

N70-13526*# California Univ., San Diego.
SPACE RADIATION HAZARDS IN MAN Annual Report, 1 Oct. 1968–30 Sep. 1969
Norman A. Baily 30 Sep. 1969 19 p refs
(Grant NGR-05-009-103)
(NASA-CR-66871) Avail: CFSTI CSCL 06P

The research program being carried out can be classified in general as: (1) determination of the statistical distribution of the magnitudes of the energy losses by fast charged particles (protons) in tissue-like materials having biologically significant volumes; (2) radiobiological modeling; (3) experimental testing of the radiobiological models as to their capability for predicting radiation damage in human lymphocytes; and (4) development of an electronic system for recording, digitizing, and computer processing of biological indicators of radiation damage or other physiological changes incurred during space flight. All four phases have been given some effort during the past year with the bulk of the effort going into phase (a). Obtained were experimental data to assess the accuracy of available theoretical treatments for all energy losses having an occurrence probability of greater than 0.0001. Author

N70-13557# Florida Univ., Gainesville. Coll. of Medicine.
VISUAL CELLULAR STIMULATION BY HIGH-ENERGY QUANTA *Technical Progress Report*, 1 Dec. 1968–1 Sep. 1969
William W. Dawson 1 Sep. 1969 24 p refs
(Contract AT(40-1)-3599)
(ORO-3599-5) Avail: CFSTI

Techniques for localization of the retinal excitatory influence of ionizing radiation were further developed. It was demonstrated that in developing cat retinas where morphologically distinguishable receptors are not present, X-rays have approximately the same effect on signal production by visible light that they have in retinas where receptors are available for stimulation. The effectiveness of an inexpensive flash X-ray instrument for retinal stimulation was tested. Although dose rates (approximately 1 million R per second) were formidable, they were also misleading in that the actual doses available are in the milliroentgen range. This range is borderline for the production of usable retinal signals and should be considered threshold. Recommendations for suitable equipment for retinal stimulation are provided in the renewal request. New findings are reported on developing retinas with specific structural anomalies. Author (NSA)

N70-13588# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biological Acoustics Branch.
HUMAN AUDITORY RESPONSE TO AN AIR BAG INFLATION NOISE
Charles W. Nixon 7 Mar. 1969 33 p Sponsored in part by Natl. Highway Safety Bur.
(PB-184999) Avail: CFSTI CSCL 13L

Personal restraint systems employing the principle of rapidly expanding air bag (s) show promise of providing greater protection of occupants during motor vehicle impact than any other system or technique currently in use. This report describes the experimental program established and conducted to confirm or deny the judgment—' the restraint systems' acoustic impulse does not constitute a hazard to the auditory system of vehicle occupants'. Author (USGRDR)

N70-13598# Commissariat à l'Energie Atomique, Saclay (France). Centre d'Etudes Nucléaires.
BIOMETRIC STUDY OF SWINE KARYOTYPE [ETUDE BIOMETRIQUE DU CARYOTYPE DU PORC]
Jean Haag, Nancy Lacourly, and Pierre Nizza Oct. 1969 21 p refs In FRENCH; ENGLISH summary
(CEA-R-3852) Avail: CFSTI

The purpose of this study is to determine the swine karyotype as accurately as possible and to try and develop a method of automatic classification and to show its possibilities and limits. Author (ESRO)

N70-13620*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.
VARIATION OF MAN'S PLASMA VOLUME DURING IMMERSION IN A THERMO-INERT WATER BATH [AENDERUNG DES PLASMAVDUMENS DES MENSCHEN BEI IMMERSION IN EIN THERMOINDIFFERENTES WASSERBAD]
D. Kaiser et al Washington NASA Nov. 1969 9 p refs Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), v. 308, 1969 p 166–173
(Contract NASw-1692)
(NASA-TT-F-12422) Avail: CFSTI CSCL 06P

Urine flow, change in weight, plasma volume (Evan's Blue) and hematocrit were measured in 28 subjects before and after immersion up to the chin in a thermo-inert bath for 8 hours. A weight loss and a reduction in plasma volume occurred, although due to considerable scatter of the results no precise correlation between them was able to be established. Several other observations are discussed and tentatively explained. Author

N70-13657# Sheffield Univ. (England). Dept. of Probability and Statistics.
CONTROL OF A PEST POPULATION Research Report

N. G. Becker May 1969 17 p ref
(RR-63INGB-4) Avail: CFSTI

The growth of a pest population in a habitat is taken to be according to a simple birth, death and immigration process and the control of this growth is considered over a finite time interval. Optimal continuous control of the birth and death rates subject to a control cost is considered as well as the optimal spacing of a constant control treatment applied at discrete time points. Author

N70-13691# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
SEAT BELT INJURIES IN IMPACT
R. G. Snyder, W. M. Crosby, C. C. Snow, J. W. Young, and P. Hanson Mar. 1969 24 p refs
(AM-69-5) Avail: CFSTI

Although the seat belt was demonstrated to provide effective reduction of injuries and fatalities in automobile accidents by preventing ejection, a pattern of injuries directly attributable to impingement on the belt itself is becoming evident. This paper surveys the clinical evidence of restraint system injuries, discusses gross biomechanical mechanisms of trauma, and evaluates the potential of four principal types of restraint systems in producing injuries. New results are presented comparing the lap belt, diagonal, three-point, and double torso restraint systems in experimental primate impacts. The double shoulder harness (with lap belt) appears to offer the greatest protection of the systems compared, while the single diagonal belt (without lap belt) was demonstrated to be the most dangerous type in certain impact situations. A seat belt system properly installed and properly worn still offers the single best protection for the automotive occupant during an impact. Author

N70-13751# Puerto Rico Nuclear Center, Rio Piedras.
POTENTIAL USE OF TARGET ATOM IRRADIATION IN CONTROL OF MUTATION INDUCTION
F. K. S. Koo [1969] 10 p refs Presented at Symp. on the Nature, Induction, and Util. of Mutations in Plants, Pullman, Wash.
(Contract AT(40-1)-1833)
(CONF-690703-2) Avail: CFSTI

Preliminary results are presented on a method for specific mutation induction. Seeds of Arabidopsis thaliana were irradiated with monochromatic X rays (mainly 14.10 and 14.16 keV) receiving a total dose of 5.1Rad. Some of the seeds had been previously labeled at timed intervals with 5-bromouracil deoxyriboside (BUDR) to provide a target atom which would be incorporated into specific genes depending on which state of DNA synthesis the treatment was applied. Seedling mutations were scored in the second generation and included changes in color and form of cotyledons and first leaves. The frequencies of 13 seedling mutant types induced by the BUDR and X-ray combination are reported for the different treatment periods. Specific types of mutants were not limited to particular treatment periods but were spread over several. It is concluded that further research is needed for evaluation of the method. NSA

N70-13764# Bureau of Radiological Health, Rockville, Md.
BIOLOGICAL ASPECTS OF MICROWAVE RADIATION: A REVIEW OF HAZARDS
Wellington Moore, Jr. Jul. 1968 23 p refs
(PB-185964; TSB-68-4) Avail: CFSTI CSCL 06R

The report describes the principal uses of microwaves and presents information from a literature review pertaining to the nature of biological effects. The conclusions of a relatively large number of experiments and observations concerning biological effects are discussed. USGRDR

N70-13770# Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. für Flugmedizin.
THERAPY AND REGENERATION OF IMPACT LESIONS IN ANIMAL EXPERIMENTS [THERAPIE UND REGENERATION VON DRUCKSTOSSVERLETZUNGEN IM TIERVERSUCH]
Otto Wünsche and Gerhard Scheele Sep. 1969 37 p refs In GERMAN; ENGLISH summary
(DLR-FB-69-56) Avail: CFSTI

The general pathogenesis of shock wave injuries as well as the lesions seen in animals are described and the results of therapeutic measurements in shock wave injured guinea-pigs discussed. High pressure was applied therapeutically to overcome coronary and cerebral air embolism and increase the oxygenation of blood and tissue at the same time. Acute edema in the pulmonary alveoli and the peribronchium were treated with the 'Lasix' diuretic. The cardiovascular system which was particularly submitted to stress following lung injuries was supported by application of analeptica. Tranquillizers were used to sedate the animals. The results of the therapeutic measures were controlled by histological investigations of the tissue regeneration in the injured organs over a period of 60 days. Author (ESRO)

N70-13836# Nebraska Univ., Lincoln. Dept. of Horticulture and Forestry.
MECHANISMS OF WINDBREAK INFLUENCE ON MICROCLIMATE EVAPOTRANSPIRATION, AND PHOTOSYNTHESIS OF THE SHELTERED CROP Final Report
Kirk W. Brown and Normal J. Rosenberg May 1969 259 p refs
(Grant Cwb-WBG-54)
(PB-184789; PR-71) Avail: CFSTI CSCL 13M

It has been demonstrated that the use of a well designed windbreak often favorably influences crop productivity and water use efficiency. Although many studies of the influence of windbreaks on the microclimate have been made, only a few researchers have speculated on and even fewer have given evidence for the mechanism or mechanisms by which the windbreak is influential. These studies have generally been made in large uniform fields. Windbreaks interfere with the natural patterns of air flow over a field, thus creating a situation which is analytically not ideal. The microclimate of a field crop is a result of both the large scale meteorological phenomena and the characteristics of the crop surface. Author (USGRDR)

N70-13857# Naval Training Device Center, Orlando, Fla. Human Factors Lab.
EYE MOVEMENT RESEARCH PROGRAM Annual Report, Jan. – Dec. 1968
Stephen Jordan Jul. 1969 34 p refs
(AD-694465; NAVTRADEVCEN-IH-166) Avail: CFSTI CSCL 6/16

The first section of the report reviews the literature on technique and experimentation in eye movement research as it affects training device development. In the second section the current program of the Human Factors Laboratory is described. This includes the preliminary experimentation on visual guidance techniques and the refinement of the electro-oculographic method of recording eye position. Author (TAB)

N70-13960# Argonne National Lab., Ill.
THE EFFECT OF CATALASE AND CERTAIN OTHER FACTORS ON INDUCED REDUCTION AND THE ROLE OF HYDROGEN PEROXIDE OF ENZYMATIC ORIGIN IN THIS REACTION [O DEISTVII KATALAZY I NEKOTORYKH DRUGIKH FAKTOROV NA INDUTSIROVANNUYU REAKTSIYU A VOSSTANOVLENIYA I UCHASTIE NEI PEREKISI VODORUDA FERMENTATIVNOGO PROSKHOZHDENIYA]
A. A. Gurevich and T. V. Khripach Sep. 1969 8 p refs Transl.

into ENGLISH from Conf. Presented at Uppavlyaemyi Biosintez; Dokl. Na Konf. Po Upravlyaemomu Biosintezn I Biofizike Populyatsii, (Krasnoyarsk), 26 Jun. - 6 Jul. 1965
(PB-186067T; AN-TRANS-772) Avail: CFSTI CSCL 06A

Experiments were conducted which make it possible to establish the inhibition of induced hydrogen transfer under the influence of catalase in the presence of hydrogen peroxide. Most likely catalase with the assistance of hydrogen peroxide oxidizes the active free radicals of ascorbic acid (formed in its monovalent oxidation under the action of the peroxidase enzyme) to dehydroascorbic acid which no longer exhibits reducing properties. It seems evident from the research that a number of factors in a biological medium are of influence, having a possible regulatory effect on the course of induced hydrogen transfer in the aerobic organism. Catalase occupies an important place among these factors.
Author (USGRDR)

N70-14054# Battelle-Northwest, Richland, Wash.
PACIFIC NORTHWEST LABORATORY. VOLUME 2: PHYSICAL SCIENCES. PART 3: INSTRUMENTATION Annual Report, 1968
N. S. Porter and W. G. Spear Jul. 1969 48 p ref
(Contract AT(45-1)-1830)
(BNWL-1051-Vol-2-Pt-3) Avail: CFSTI

Research activities during 1968 centered on the determination of radionuclide uptake in biological systems, physiological parametric data acquisition techniques, and the calibration of radiation measuring instruments. The suppression of background noise in solid state detectors by pulse shape discrimination is described. Cross correlation methods and an alpha scintillation detector system are advocated for monitoring radon in vivo. Silicon detectors are used for accurate measurements on radiation wound depths and a control system for in vivo neutron activation measurements is depicted. Included is also a program to define irradiation effects of cobalt 60 on avalanche diodes biased near breakdown. G.G.

N70-14105# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A DIFFERENTIAL DC AMPLIFIER WITH VERY HIGH INPUT IMPEDANCE
Chun-Chiang Ch'en et al 21 May 1969 17 p refs Transl. into ENGLISH from Tien Tzu Hsueh Pao (Peking), no. 2, 1966 p 176-184
(AD-694881; FTD-HT-23-1163-68) Avail: CFSTI CSCL 6/2

A new differential d-c amplifier was designed to be used in conjunction with microelectrode techniques to record the electrical activity of a single biological cell. The differential d-c amplifier consists of a differential cascade and a negative feedback circuit. Specifications of the amplifier are given. The new amplifier has high anti-interference ability, and has been extensively used in a biological laboratory for more than 3 years. Operating experience shows the new amplifier has excellent performance and high stability and is easy to operate. TAB

N70-14152*+ New Mexico Univ., Albuquerque.
AN IMPROVED TECHNIQUE FOR MICROBIOLOGICAL SAMPLING OF SURFACES: AGAR SPRAY
F. W. Oswalt, L. W. Hughes, M. E. Morris, and J. W. Beakley Sep. 1968 12 p Prepared jointly with Sandia Corp.
(Grant NGR-09-019-040)
(NASA-CR-107357; PB-182177; SC-RR-68-593) Avail: CFSTI CSCL 06M

This report describes an improved technique for biological sampling of surfaces. While previous approaches have been limited to the removal of the microorganisms from the surfaces, the technique described herein deletes this often questionable operation and initiates growth and enumeration of the organisms in situ, i.e., without removing them from the surface. The method employs spraying molten (53 degrees C) agar media directly onto the surface to be sampled and incubating the microorganisms thereon. A description of the spray apparatus with drawings is provided. Test results and advantages of the technique are presented.
Author (USGRDR)

N70-14182# Junta de Energia Nuclear, Sacavem (Portugal). Lab. de Fisica e Engenharia Nucleares.
INTERNAL ACCUMULATION AND RETENTION OF CS-137 BY CARASSIUS AURATUS L [ACUMULACAO E RETENCAO DO CS-137 POR CARASSIUS AURATUS L EM CORPO INTEIRO]
Maria Carolina Vaz Carreiro 1969 22 p refs In PORTUGUESE *Its* Nota Interna no. 39
Avail: CFSTI

The accumulation and retention of Cs-137 in the body was studied using the fresh water species Carrassius auratus L. in laboratory experiments. The accumulation resulted from the direct assimilation of the Cs-137 from water solution. The results indicate two biological periods of retention, one of 0.66 days and the other 16.74 days. Transl. by F.O.S.

N70-14183# Junta de Energia Nuclear, Sacavem (Portugal). Lab. de Fisica e Engenharia Nucleares.
ABSORPTION OF CS-137 BY SPONDYLIOSOMA CANTHARUS L [ABSORCAO DO CS-137 POR SPONDYLIOSOMA CANTHARUS L]
Maria Carolina Vaz Carreiro 1969 21 p refs In PORTUGUESE *Its* Nota Interna no. 40
Avail: CFSTI

The metabolism of Cs-137 is studied in the edible species, Spondyliosoma cantharus L., of the Tejo River estuary. The purpose of this research was to determine the concentration of Cs-137 in the organs and tissues. Results are summarized in graphs showing the concentration factor plotted against time for various organs of the Spondyliosoma. Transl. by F.O.S.

N70-14255*# Techtran Corp., Glen Burnie, Md.
THE FUNCTIONAL STATE OF THE KIDNEYS IN WORKERS EXPOSED TO THE PROLONGED ACTION OF CHLORORGANIC CHEMICAL POISONS [FUNKTSIONALNOYE SOSTOYANIYE POCHEK U RABOTAYUSHCHIKH V USLOVIYOKH DLITELNOGO VOZDEYSTVIYA KHLORORGANICHESKIKH YADOKHIMIKATOVIN VRACHEBNOYE DELO]
N. G. Loganovskiy Washington NASA Dec. 1969 6 p Transl. into ENGLISH from Russian report
(Contract NASw-1695)
(NASA-TT-F-12669) Avail: CFSTI CSCL 06P

A study of 106 persons suspected of chronic intoxication with chlororganic chemical poisons, DDT, benzene hexachloride, ethersulphonate (ovotran), revealed that prolonged contact with the mentioned substances led to more or less distinct disorders of the renal functional capacity, the renal plasma flow being disturbed first. These renal disorders may be caused by direct effect of chlororganic substances on the kidneys and through their toxic effect on other organs and systems like the central nervous system, cardiovascular and endocrine systems, liver. Author

N70-14263*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
IONIZING RADIATION AND MAGNETIC FIELDS: A REVIEW OF THEIR EFFECTS ON THE NERVOUS SYSTEM
H. L. Galiana Feb. 1969 30 p refs

(Grant NGR-22-009-312)
(NASA-CR-107358; MVLS-69-1) Avail: CFSTI CSCL 06D

Data on the functional sensitivity of the nervous system to ionizing radiation and magnetic fields suggest caution in prolonged human exposure to similar environments. Unfortunately, the conditions investigated are also characteristic of those expected during a space flight. Studies are thus needed to determine the nature and mechanism(s) of the nervous system's reactions to these and other factors, and to investigate the degree to which the astronaut's performance capabilities may be affected. Such knowledge would also prove helpful in determining protection standards for occupationally exposed personnel and in medical research. Author

N70-14268*+ *National Aeronautics and Space Administration.* John F. Kennedy Space Center, Cocoa Beach, Fla.
APOLLO 11 WATER SERVICING
A. P. Buck 10 Nov. 1969 87 p
(NASA-TM-X-64027; GP-779) Avail: CFSTI CSCL 06K

Operational problems involved in launch countdown and altitude chamber test are discussed. Work done included verification of spacecraft water support systems by chemical, microbiological, and particulate analysis. Test data sheets are appended. J.M.C.

N70-14283*# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, OCTOBER 1969
Nov. 1969 123 p refs
(NASA-SP-7011(69)) Avail: CFSTI CSCL 06C

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

N70-14314# California Univ., Livermore. Lawrence Radiation Lab.
ESTIMATION OF INHALED PARTICLE SIZE OF PuO SUB 2-239 BASED ON THE NEW LUNG MODEL AND BIOASSAY RESULTS
D. S. Myers *In its* Hazards Control Dec. 1968 p 17–20 Sponsored by AEC (See N70-14310 04-24)
Avail: CFSTI

A technique is presented to estimate the aerodynamic particle size of inhaled Pu-239O2 from bioassay results by relating initial gastrointestinal tract clearance (days 1 and 2) to late gastrointestinal tract clearance (2 weeks after exposure). This technique is based on theoretical considerations of the new lung model. Author (NSA)

N70-14330# School of Aerospace Medicine, Brooks AFB, Tex.
REPRODUCIBILITY OF REPEATED TOTAL BODY WATER MEASUREMENTS WITH TRITIUM Final Report, Aug. 1968–Jan. 1969
Donald F. Logsdon, Jr., James F. Green, and John W. Harper Jul. 1969 13 p refs
(AD-695786; SAM-TR-69-36) Avail: CFSTI CSCL 6/18

The reproducibility of repeated measurements of total body water (TBW) in the same individual, by means of an isotope technic, was dependent on the percentage clearance of the isotope per week and the interval between determinations. Sudies of six normal subjects, with percentage clearances ranging from 41% to 80% per week, showed that a sample-to-background counting rate ratio of at least 2:1 was necessary to obtain reproducible values. The variance was found to be about 1%, or plus or minus 0.5 liter. The 2-week interval was the minimal time interval which gave reproducible values for individuals having a percentage clearance within normal limits (45% to 95%). Author (TAB)

N70-14331# School of Aerospace Medicine, Brooks AFB, Tex.
SEASONAL ADRENOCORTICAL TRENDS FOR MILITARY TRAINEES IN A SUBTROPICAL CLIMATE Final Report, Jun. 1963–Jun. 1965
Ira L. Shannon and Henry B. Hale Aug. 1969 14 p refs
(AD-695788; SAM-TR-69-43) Avail: CFSTI CSCL 6/16

Air Force recruits who were undergoing basic training at Lackland Air Force Base, Tex., were studied for evidence of climate-related adrenocortical change. The study was run over a 52-week period, with a different group of 10 or 11 trainees under study each week. Serum 17-OHCS determinations were made at 0730, 1130, and 1530 hours, with the subjects fasting, inactive, and at thermoneutrality. Urinary 17-OHCS measurements were carried out on 4-hour urine specimens collected at 1130 and 1530 hours. The seasonal variation found for serum 17-OHCS was statistically significant, but that found for urinary 17-OHCS was not. The patterns of variation over the seasons for serum 17-OHCS were not the same at different times of day ($P < .005$). The serum 17-OHCS data obtained at 0730 hours most distinctly indicated (a) equality for the winter and autumn groups, (b) mild adrenocortical hyperactivity for the spring group, and (c) mild adrenocortical hypoactivity for the summer group. Author (TAB)

N70-14355# Trinity Univ., San Antonio, Tex. Dept. of Biology.
DIFFERENTIAL EFFECTS OF LIGHT ON PHOTOSYNTHESIS AND NITROGEN METABOLISM IN CHLORELLA PYRENOIDOSA Final Report, Dec. 1965–Dec. 1967
Howell D. Cobb, Richard H. Hall, and Walter J. Costello Jul. 1969 16 p refs
(Contract AF 41(609)-3004)
(AD-695787; SAM-TR-69-40) Avail: CFSTI CSCL 6/3

A series of investigations was conducted to examine some of the differential effects of light on the photosynthetic reduction of carbon dioxide and on nitrogen metabolism in the unicellular alga, Chlorella pyrenoidosa. Nitrite uptake in the presence of, and in the absence of, carbon dioxide was measured. Similar measurements were made of nitrate uptake. Light intensities above the saturation level for photosynthesis reduced the rate of nitrite uptake but did not appear to affect the uptake of either carbon dioxide or nitrate. The rate of nitrite uptake at 20 m2./sq. cm. was approximately 50% of that at 8 mw./sq. cm., while over this same range of intensities the uptake of carbon dioxide and nitrate remained constant. At light intensities below the saturation level for photosynthesis, nitrate appeared to compete with carbon dioxide for light energy. In short-term experiments the assimilatory CO2/NO3 ratio at 0.50 mw./sq. cm. was one-third that observed at 8 mw./sq. cm., indicating that under these conditions nitrate uptake had priority over carbon dioxide assimilation. Author (TAB)

N70-14358# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Division
RADIATION INJURIES AND COMPENSATION OF DISTURBED FUNCTIONS
Yu. G. Grigorev 6 May 1969 198 p refs Transl. into ENGLISH from Luchevye Porzheniya I Kompensatsiya Narushennykh Funktsii (Moscow), 1963 p 1–203
(AD-695899; FTD-MT-24-323-68) Avail: CFSTI CSCL 6/18

The results of extensive clinical and experimental research on systemic reactions of the organism during exposure to radiation is presented. The investigations include: the biological effect of

small radiation doses as manifested in the initial reactions of the nervous system, functional reactions of the organism during irradiation with lethal doses, and special aspects of death in animals due to radiation. New methodological procedures used in the investigations are described. Problems of the compensation by the organism of functions disrupted by radiation injury are examined and the various compensatory reactions classified. Further experiments designed to explore the capacities of the organism for compensating radiation injuries are reported. Author (TAB)

N70-14411# Joint Publications Research Service, Washington, D.C.

RADIOTELEMETRY IN ANIMAL ECOLOGY: RADIO TRACKING OF ANIMALS

V. Ye. Sokolov et al 25 Nov. 1969 25 p refs Transl. into ENGLISH from Zool. Zh. (Moscow), v. 47, no. 1, Jan. 1968 p 20-35

(JPRS-49316) Avail: CFSTI

A review of foreign studies using radiogoniometry in animal tracking is presented. Radio tracking systems for animals are analyzed. Methods of fastening goniometric transmitters on animals are described. Recommendations are given on the elaboration of elements and systems for radio tracking animals, as well as methods for calculating technical characteristics of radiolines and evaluation of their efficiency under various natural conditions. Author

N70-14442# Brookhaven National Lab., Upton, N.Y. Medical Research Center.

THE MEDICAL USE OF CALIFORNIUM-252

Harold L. Atkins *In* Amer. Nucl. Soc. Californium-252 Jan. 1969 p 285-302 refs Sponsored by AEC (See N70-14429 04-24)

(BNL-12919) Avail: CFSTI

The development of encapsulated sources of Cf-252 suitable for interstitial application has provided a versatile tool for tumor therapy. These implantable sources are especially useful for certain applications, and have definite advantages over other sources of neutrons. The required amounts of Cf-252 are so small that the material can be electrodeposited on a very thin wire so that extreme flexibility in source design is possible. Some of the advantages of the Cf-252 source include; cost, reliability, facilities and personnel required, and the existence of a higher LET and presumably lower OER than neutrons produced by accelerator reactions. Before a therapeutic trial with Cf-252 it will be necessary to determine the following; the RBE for this form of irradiation compared to more conventional forms, the effects of protracted versus acute irradiation, the tolerance dose for normal tissues, and the OER. Because of the need for implantation of the Cf-252 source, only those tumors which are accessible can be considered for irradiation. NSA

N70-14464# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DECISION FUNCTIONS AND THE STATISTICAL NEURON MODEL

Vl. I. Belyakov-Bodin 10 Mar. 1969 17 p refs Transl. into ENGLISH from Akad. Nauk SSR, Vychislitelnyy Tsentr. Hroboty po Tekhn. Kibernetike (Moscow), 1967 p 24-36

(AD-695931; FTD-HT-23-1095-68) Avail: CFSTI CSCL 6/4

The author deals with theorems by means of which separating functions pertaining to the statistical teaching of artificial neuron models can be constructed in a simple manner in view of the possibility of constructing decision functions in which a statistical formulation of the pattern recognition problem is presented. TAB

N70-14550# Comitato Nazionale per l'Energia Nucleare, Rome (Italy).

METHOD FOR EVALUATING THE ABSORBED POPULATION DOSAGES IN CASE OF A NUCLEAR ACCIDENT [METODI DI VALUTAZIONE DELLE DOSI ASSORBITE DA UNA POPOLAZIONE IN CASO DI INCIDENTE IN UN IMPIANTO NUCLEARE]

A. Cardinale and A. Nardi 17 Jan. 1969 32 p refs In ITALIAN (RT/PROT(69)-17) Avail: CFSTI

Doses and reference levels to be used for evaluating the situations from nuclear accidents are calculated. In such situations, the risk due to the accident is evaluated and compared with the consequences of eventual radio-logical protection measures. The following subjects are considered: (1) fundamental and derived reference limits, and (2) irradiation, ingestion, inhalation and submersion risks. Author

N70-14583*# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.

PATTERN CLASSIFICATION APPLIED TO ELECTRO-ENCEPHALOGRAPHS

J. L. Poage and K. P. S. Prabhu Sep. 1969 60 p refs

(Grant NGR-22-007-143)

(NASA-CR-107449; TR-1) Avail: CFSTI CSCL 06L

Pattern classification techniques are employed to classify an electro-encephalograph (EEG) record into two parts—one part containing evoked responses to photic stimuli and the other part not containing such evoked responses. A feature reduction method is suggested to decrease the amount of data to be handled in the context of linear classificatory procedures. A sequential algorithm is presented to classify unknown samples into one of two linearly inseparable classes. The algorithm is formed from training sets of known classification. An estimate (on an expected value basis) of the probability of making an error classification is given. Author

N70-14587# Columbia Univ., Dobbs Ferry, N.Y. Hudson Labs.

DECISION MAKING NETWORKS IN PATTERN RECOGNITION

Leonard J. Grantner Apr. 1969 26 p refs

(Contract Nonr-266(66))

(AD-695413; ArtemiS-68) Avail: CFSTI CSCL 6/4

A feed forward switching network is described and then used as a basis for a pattern classifier. Rules associated with the network direct an arbitrary signal from a starting node to one of a group of terminal nodes, each of which is identified with a pattern class. The empirical distribution functions of a training set of pattern samples determine the manner in which the rules are constructed. The rules are functions of the input pattern binary variables. It is shown that, for a class of networks having the ordering property and statistically ordered rules at each node, increasing the size of the network decreases the probability of error. Author (TAB)

N70-14590# Human Engineering Labs., Aberdeen Proving Ground, Md.

NIGHT VISION WITH A BINOCULAR SYSTEM

Robert W. Bauer and David J. Florip Aug. 1969 17 p refs

(AD-695637; TN-3-69) Avail: CFSTI CSCL 17/8

Recovery of dark adapted acuity after the use of a night vision system was observed in two experiments within a flight simulation facility. The users of these two systems gave up about one log cycle in dark adaptation (luminance required) to gain about one log cycle in viewing objects 5 to 10 minutes or larger. One hundred percent recovery of rod dark adaptation required from 3.0 to 4.2 minutes. Because of their target brightness sensitivity, color characteristics and acuity ranges, these systems can be appropriately compared with human unaided dark adapted rod vision. Author (TAB)

N70-14628# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PATTERN RECOGNITION IN THE ABSENCE OF A LEARNING PROCESS

I. Sh. Torgovitskiy 2 Jan. 1969 14 p refs Transl. into ENGLISH from Russian Publ. "Akad. Nauk SSR. Nauchn. Sovet po Kompleksn. Probl. "Kibernetika". Vopr. Bioniki" Moscow, Nauka, 1967 p 107–113
(AD-693825; FTD-HT-23-1223-68) Avail: CFSTI CSCL 6/4

Methods of pattern recognition in the absence of learning are examined. Information on the input situations enters the recognizer in the form of an n-dimensional vector so that any situation corresponds to a point in an n-dimension space. A situation is related to one of the classes according to the sign of the decision function. Given the equation of a hyperplane it is shown that, when certain factors are unknown, it is possible to determine the unknown coefficients that ensure the best division of the criterion space into two classes. Other methods are discussed. Author (TAB)

N70-14629# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON ALGORITHMIZATION OF THE IMAGE RECOGNITION PROCESS
Yu. V. Vagin 14 Jul. 1969 9 p refs Transl. into ENGLISH of Russian publ. "Avtomaticheskoe Chtenie Teksta" Moscow, 1967 p 81–85
(AD-695947; FTD-MT-24-142-69) Avail: CFSTI CSCL 5/8

The development of an algorithm for the recognition process is discussed. It is assumed that in order to achieve recognition, the priori information must contain descriptions or images of classes which can be used to identify the unknown information. In the general case each class is determined with the aid of a set of parameters as a phenomena corresponding to certain probability conditions. The proposed method of constructing an algorithm is illustrated. TAB

N70-14661*# National Aeronautics and Space Administration, Washington, D.C.
THE INTERACTION OF LIVING SYSTEMS WITH THE SPACE ENVIRONMENT
Joseph F. Saunders *In* NASA. Marshall Space Flight Center Space Process. and Manuf. Meeting 21 Oct. 1969 p 195–215 (See N70-14651 04-15)
Avail: CFSTI CSCL 06C

Biosatellite experiments described sought to determine the effects of weightlessness alone as well as the combined effects of radiation and weightlessness on plants, bacteria, and animals. It was found that weightlessness altered the orientation as well as the growth of plants. Bacteria, insects, and plants exposed to gamma radiation while weightless confirmed that neutralization of gravity does change the effects of radiation on the cellular elements that control heredity; greater damage occurred to unpaired chromosomes such as the "X" or male chromosome. A primate showed physiologic deterioration attributed mainly to weightlessness. Changes occurred in central nervous systems function, cardiovascular performance, fluid and electrolytic metabolism, and circadian rhythms. Positive effects of space flight were observed in cell division and differentiation, growth and development, chromosome aberrations and mechanics, mutation, biochemical interaction, and decrement physiological function in organs and systems. Author

N70-14662*# General Electric Co., Philadelphia, Pa.
UNIT SEPARATION PROCESSES IN SPACE
L. R. Mc Creight and R. N. Griffin *In* NASA. Marshall Space Flight Center Space Process. and Manuf. Meeting 21 Oct. 1969 p 216–237 refs (See N70-14651 04-15)
(Contract NAS8-24683)
Avail: CFSTI CSCL 06E

Some unit separation processes used for purifying chemicals and biologicals (vaccines) are clearly affected by the earth's gravity and therefore might be improved by operation in space. Centrifugation and electrophoresis are the prime examples of such processes. Meanwhile other processes such as freeze drying and ultraviolet sterilization are desirable adjuncts in a spectrum of processes that could permit the complete preparation of vaccine or other materials in space. The freeze drying operation would take advantage of the low temperatures and vacuum of space. These processes are being considered as interrelated processes that could lead to the complete preparation of vaccine or to the preparation of materials to be used in other processes and products. Author

N70-14663*# Martin Marietta Corp., Denver, Colo.
INDUSTRIAL MICROBIOLOGICAL APPLICATIONS IN ZERO GRAVITY A VACCINE SATELLITE PROGRAM (VACSAT)
Russell T. Jordan *In* NASA Marshall Space Flight Center Space Process. and Manuf. Meeting 21 Oct. 1969 p 238–251 refs (See N70-14651 04-15)
Avail: CFSTI CSCL 06M

One of the primary objectives of Biosatellite II was to determine the effect of weightlessness on the ultrastructure and growth characteristics of microorganisms. The data from these experiments clearly show that bacterial cultures grown in a liquid medium produce significantly larger populations and have higher growth rates, as a result of space flight, than do identical control cultures on Earth. This paper will discuss some potential applications for manufacturing pharmaceuticals in an "Orbital Work Shop" and present a preliminary design for a "Zero G Fermenter" with a proposed method for the unprecedented utilization of weightlessness in industrial fermentation. Author

N70-14701# National Research Council of Canada, Ottawa (Ontario). Translations Section.
ESTIMATION OF AN INTERNAL CONTAMINATION WITH URANIUM FROM URINARY EXCRETION RATES [ABSCHAETZUNG EINER INTERNEN KONTAMINATION MIT URAN AUS DEN URINAUSSCHEIDUNGSRATEN]
W. M. Pusch 1969 27 p refs Transl. into ENGLISH from Atomkernenergie (Munich), v. 11, no. 9-10, 1966 p 404–413
(NRC-TT-1375) Avail: CFSTI

Previously studied works on the excretion of uranium by the human organism are compared and an attempt is then made to construct a mean excretion curve for the two most important cases. From still scant data that are available, the following are the principal conclusions drawn: In the case of single intakes (accidents) where the subject works with soluble uranium compounds, urine samples should be taken at least every 2 to 3 1/2 days, but this does not appear to be practical as a routine. For a more accurate estimate of the body burden from excretions of uranium in the urine, a knowledge of the time of the incident is absolutely necessary on account of the initially very strong change in the excretion rate. If an incident is discovered only as a result of a routine analysis of the urine, it is generally no longer possible to determine the time of that incident. As a consequence, the value of an investigation level for single intakes is greatly reduced, so that extremely careful supervision of working conditions appears all the more essential. Author

N70-14726# Atomic Energy Commission, New York.
USSR REPORTS ON NATURAL AND FALLOUT RADIOACTIVITY
1 Feb. 1969 176 p refs Transl. into ENGLISH from Akad. Nauk SSSR reports
(AEC-tr-7030) Avail: CFSTI

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12. CHARACTER OF THE VERTICAL DISTRIBUTION OF CS-137 IN SOIL IN CERTAIN AREAS OF THE SOVIET UNION, 1966-1967 G. A. Fedorov et al p 145–148 refs (See N70-14738 04-04)

13. CESIUM 137 CONCENTRATION IN HUMAN HAIR AS AN INDICATOR OF THE AMOUNT OF THIS ISOTOPE IN THE BODY P. V. Ramzaev et al p 149–151 refs (See N70-14739 04-04)

14. VERTICAL DISTRIBUTION AND EVALUATION OF THE MOBILITY OF FISSION PRODUCTS IN CERTAIN SOIL TYPES OF THE SOVIET UNION V. F. Brendakov et al p 152–156 ref (See N70-14740 04-04)

15. RADIOMETRIC APPARATUS FOR DETERMINING Sr-90 CONTENT OF SEA WATER S. M. Vakulovskii et al p 157–162 refs (See N70-14741 04-14)

16. POLONIUM 210 IN THE HUMAN BODY AND IN THE ENVIRONMENT A. P. Ermolaeva-Makovskaya et al p 163–170 refs (See N70-14742 04-04)

N70-14727# Atomic Energy Commission, New York.

PECULIARITIES OF THE MIGRATION OF TOTAL Cs-137 FROM SANDY PODZOLIC SOILS THROUGH THE FOOD CHAIN INTO THE HUMAN BODY

A. A. Moiseev et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 1–13 refs (See N70-14726 04-04) (A-AC-82/G/L-1187) Avail: CFSTI

Soil, hay, cereals, milk, meat, and total diet for the inhabitants of two populated sites were sampled in November, 1966, and the Cs-137 body burden of people of various age groups were measured with a portable single channel gamma spectrometer. Tables are presented to show results. On transferring from turf-podzolic sandy soils along the food chain, Cs-137 reaches higher levels in vegetation, in agricultural products (meat and milk), and in the body of the inhabitants of that district. Increased Cs-137 content in individual links of the soil-vegetation-cow-man chain is caused only by specific conditions of the soil in the given area, that fixes the fallout Cs-137 only weakly. The average body burden of Cs-137 of adults living in these areas is 55 micron Ci. The internal Cs-137 gonad doses to the adult population of the area fluctuated from 3 to 17 mrad/yr. NSA

N70-14728# Atomic Energy Commission, New York.

DIFFUSION OF STRONTIUM-90 IN SOILS

Yu. A. Polyakov et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 14–25 refs (See N70-14726 04-04) (A-AC-82/G/L-1242) Avail: CFSTI

The diffusion of Sr-90 was studied in several varieties of black earth and forested-steppe soils found within the arid steppe zone of Russia. Both field and laboratory observations were made. The physiochemical properties of these soils which were determined included the organic content, the pH of aqueous suspension, absorption capacity, and the composition of the absorbed bases. The laboratory methods used and the theoretical method for computing soil diffusion characteristics based on Fink's equation are explained. The Sr-90 studies showed that: the diffusion coefficients for the soils studied on the properties of the soil; the diffusion coefficient was constant only for homogeneously prepared soil samples, and, under natural soil conditions, the diffusion coefficient must be considered as variable; and, the methods developed for preparing soil samples and for solving Find's equation could be used for studying the diffusion of ions other than Sr-90. NSA

N70-14729# Atomic Energy Commission, New York.

Sr-90 IN BONE IN THE SOVIET UNION (1957–1967)

A. I. Marei et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 26–39 (See N70-14726 04-04) (A-AC-82/G/L-1244) Avail: CFSTI

Levels of Sr-90 produced by nuclear weapons tests in various populations of the Soviet Union during 1957 to 1967 were evaluated. Pathological specimens were obtained from 99 cities in various geographical districts chosen for climatic and other factors that might influence the uptake of Sr-90. Bone and teeth specimens were dried and ashed and measurements were made with low background counters. Results are shown by means of tables and graphs. Changes in Sr-90 concentration were characterized by a considerable rise during 1963 to 1966; in adults a tendency towards lower values was noted in 1967. The highest mean annual bone dose from Sr-90 was observed in 1964 for children born in 1962. NSA

N70-14730# Atomic Energy Commission, New York.

DIETARY INTAKE OF STRONTIUM 90 AND CESIUM 137 BY THE POPULATION OF THE USSR IN 1966–1967 AS A RESULT OF STRATOSPHERIC FALLOUT

E. V. Petukhova et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 40–48 refs (See N70-14726 04-04) (A-AC-82/G/L-1245) Avail: CFSTI

Quantities of radioisotopes consumed by the population were determined by radiochemical and spectrometric methods. The tabulated results show that there was a decline in the Cs-137 and Sr-90 levels in basic food products. The rate of decline was different for milk, bread, cereals, meat, fish, vegetables, fruits, and water. During the first half of 1967 some population groups received a third to a half less of these radioisotopes than during the same period of 1966. NSA

N70-14731# Atomic Energy Commission, New York.

MECHANISMS OF RADIOECOLOGICAL CONCENTRATION PROCESSES IN SEAS AND OCEANS

G. G. Polikarpov *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 49–64 refs (See N70-14726 04-04) (A-AC-82/G/L-1247) Avail: CFSTI

The mechanisms of absorption and accumulation of radioisotopes by aquatic organisms from the carriers in the water medium are discussed. The importance of the food chain in

migration of radioisotopes through the environment is pointed out. A discussion is presented of the significance of accumulation coefficients of radioisotopes in closely related species occurring in different seas and oceans for extrapolation of data on radioactivity of the organisms or of the medium. Tables are presented to show concentrations of Ce-144, Mn-54, Ru-106, and Sr-90 in Sargassum natans and coefficients of accumulation of Ce-144, Cs-137, Ru-106, and Sr-90 in larvae and adults of the crab, Planes minutus. Radioecological studies on fishes, mammals, seaweeds, and plankton from various regions of the Pacific, Atlantic, and Indian Oceans are reported. Radioecological surveys of the southern seas of the Soviet Union are described. Studies on coefficients of accumulation and isotopic mixing in the flora and fauna of the Black Sea are reported. Cytogenetic studies were conducted on fish of the Black Sea. NSA

N70-14732# Atomic Energy Commission, New York.
SR-90 AND CS-137 IN CERTAIN PARTS OF THE EXTERNAL ENVIRONMENT AND IN THE HUMAN BODY, 1958–1967
A. S. Zykova et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 65–74 (See N70-14726 04-04)
(A-AC-82/G/L-1248) Avail: CFSTI

Ten years of observations carried out in Moscow on the radioisotope content of air, certain foods, ground-level fallout and infants' bones are summarized. It was established that from 1958 to 1967, 52 mCi/sq km of Cs-137 and 33 mCi/sq km of Sr-90 were deposited on the surface of the earth in the Moscow area. The highest values for radioactive substances were observed during 1962 to 1963. When the 1967 measurements were compared with data from 1962 to 1963, it was found that the Cs-137 and Sr-90 content of milk decreased by factors of 13.3 to 14.3; of ground-level fallout by factors of 7.7 to 8.1; and of milk by factors of 7.6 and 3.0 respectively. Observations in 1965 to 1967 satisfactorily confirm the relation established earlier between the Cs-137 and Sr-90 contents of air and ground surfaces, ground surfaces and milk, and milk and children's bones. The Cs-137/Sr-90 ratio in air, surface fallout and milk is not the same. NSA

N70-14735# Atomic Energy Commission, New York.
THREE- AND FOUR-COMPONENT MODELS OF CESIUM METABOLISM IN RATS AND HUMAN BEINGS
G. P. Krasnoshchekova et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 119–130 refs (See N70-14726 04-04)
(A-AC-82/G/L-1251) Avail: CFSTI

A method of obtaining constants that characterize the processes of cesium exchange in warm blooded animals is described. The entire metabolic system is represented as a set of compartments joined by a number of transfer links. Diagrams and equations are presented for describing three and four compartment models of Cs-137 exchange. Consideration of the compartments may be of interest in protecting the human organism against radiation: for example, slowing down the process of cesium transition from the ionic state to the organically bound state, or accelerating the removal of the latter from intracellular fluid into extracellular fluid. The models might also be used for medical diagnosis of liver and other pathologies. NSA

N70-14736# Atomic Energy Commission, New York.
SOME QUANTITATIVE FEATURES OF ENVIRONMENTAL CONTAMINATION BY SR-90 DURING A PERIOD OF STRATOSPHERIC DEPOSITION
Yu. S. Stepanov et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 131–133 refs N70-14726 04-04)
(A-AC-82/G/L-1252) Avail: CFSTI

A study was made of Sr-90 uptake from soil and air by potatoes, grain, milk, and other dietary factors of the adult urban population in the entire Soviet Union following nuclear weapons tests. Mathematical models are given to represent these concentrations in the environment. The relation between the content of Sr-90 in bones of children up to one yr of age and that in the mother's diet exerts an influence both during the child's prenatal development and during the first ten months of life. After weaning contamination of cow's milk determines changes in the Sr-90 concentration in bones of children. A table is presented to show confidence limits of correlation coefficients for milk, potatoes, wheat, and bones of children. NSA

N70-14738# Atomic Energy Commission, New York.
CHARACTER OF THE VERTICAL DISTRIBUTION OF CS-137 IN SOIL IN CERTAIN AREAS OF THE SOVIET UNION, 1966-1967
G. A. Fedorov et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 145–148 refs (See N70-14726 04-04)
(A-AC-82/G/L-1256) Avail: CFSTI

The vertical distribution of Cs-137 in soil at four sites in the USSR was measured in 1966 and 1967 and compared with similar data acquired before 1961. The sampling and measurement procedures are described. The results indicate that Cs-137 activity decreases more rapidly with depth than does Sr-90 activity and is practically all concentrated in an upper layer 2 cm deep. 42 to 82% of all the Cs-137 activity, including that in the plant cover, was at a depth less than 6 mm. The relaxation lengths for Cs-137 in soil exceeded those observed before the 1961 to 1962 tests, and can be explained by the fact that the powerful 1961 and 1962 tests resulted in fallout deposition during 1963 to 1965 and by assuming that the Cs-137 deposited in 1966, unlike that produced in tests up to 1959, had not had time to migrate appreciably into the soil. Further studies of this time dependence factor and of the effects of other soil types is recommended. NSA

N70-14739# Atomic Energy Commission, New York.
CESIUM 137 CONCENTRATION IN HUMAN HAIR AS AN INDICATOR OF THE AMOUNT OF THIS ISOTOPE IN THE BODY
P. V. Ramzaev et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 149–151 refs (See N70-14726 04-04)
(A-AC-82/G/L-1257) Avail: CFSTI

Hair collected in Leningrad barber shops was analyzed for Cs-137 and potassium, and measurements were made of the Cs-137 content of the hair and body of reindeer herders. The tabulated results show a close correlation between amounts in the hair and body. Results suggested that the concentration of the isotope along the length of the hairs was the same only if the amount of Cs-137 remained constant in the body during the entire period of hair growth. It was concluded that analysis of hair for Cs-137 can be used only for a radiation health evaluation of the mean dose created by Cs-137 in the body of the inhabitants of a particular region. NSA

N70-14740# Atomic Energy Commission, New York.
VERTICAL DISTRIBUTION AND EVALUATION OF THE MOBILITY OF FISSION PRODUCTS IN CERTAIN SOIL TYPES OF THE SOVIET UNION
V. F. Brendakov et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 152–156 ref (See N70-14726 04-04)
(A-AC-82/G/L-1258) Avail: CFSTI

Samples of two types of undisturbed Russian soil, in 3 mm thick layers, were collected and examined during 1963 to 1966 to determine the vertical distribution and mobility of the following fission products: Ce-144, Cs-137, Ru-106, Sb-125 and Sr-90. The results showed over 76% of all the radioisotopes were in the top 20 mm soil layer with only traces below a depth of 150 mm, and that the transfer of the bulk of the radioisotopes did not exceed a few mm per year. NSA

N70-14742# Atomic Energy Commission, New York.
POLONIUM 210 IN THE HUMAN BODY AND IN THE ENVIRONMENT
A. P. Ermolaeva- Makovskaya et al *In its* USSR Rept. on Nat. and Fallout Radioact. 1 Feb. 1969 p 163–170 refs (See N70-14726 04-04)
(A-AC-82/G/L-1260) Avail: CFSTI

Determinations were made of the Po-210 content of the air, water, and food products in Leningrad. Food products analyzed were fish, meat, eggs, milk, wheat, barley, rye, tea, coffee, potatoes and green vegetables. From data on the content of Po-210 in urine and feces it was estimated that the people of Leningrad ingest about 4 pCi per day. Determinations were made of the Po-210 and sulfur content of the tissues of smokers and non-smokers. Analyses of bones of smokers showed that the Po-210 content was two to three times greater than that of nonsmokers. Ratios of the Po-210 content of the kidneys, muscles, and spleen to that of the liver were determined. Results are tabulated. NSA

N70-14743# Texas Christian Univ., Fort Worth. Inst. for Study of Cognitive Systems.
PARAMETERS OF HUMAN PATTERN PERCEPTION Semiannual Progress Report, 18 Mar.–18 Sep. 1969
Selby H. Evans 18 Oct. 1969 29 p refs
(Contract DAAD05-68-C-0176)
(AD-695715; SAPR-4) Avail: CFSTI CSCL 5/10

A methodology for directly determining the extent to which Ss utilize statistical properties of features is reported. Empirical progress in identifying the principles underlying selection of feature spaces and relevant encoding and storage processes is discussed. Support for both feature selection on the basis of statistical properties and the storage notion of schema plus correction is provided by these studies. The report also includes a discussion of experiments directed toward determining appropriate response modes for maximizing behavioral data. On the basis of these studies it appears that similarity ratings provide more refined information about pattern processing while not substantially effecting task performance. A study is presented which shows a modest correlation between IQ scores and performace on a schematic concept formation task. Possibilities for using the schematic concept formation task as a personnel selection device are considered. Finally, progress on two lines of theoretical development is described. Author (TAB)

N70-14844*# Naval Aerospace Medical Inst., Pensacola, Fla.
PROGRESSIVE ADAPTATION TO CORIOLIS ACCELERATIONS ASSOCIATED WITH 1-RPM INCREMENTS IN THE VELOCITY OF THE SLOW ROTATION ROOM
James T. Reason and Ashton Graybiel 17 Jul. 1969 20 p refs
(NASA Order R-93)
(NASA-CR-107475; NAMI-1081; Rept-164) Avail: CFSTI CSCL 06S

Specific questions relating to the design of an adaptation schedule effective in protecting against motion sickness in a rotating environment are discussed. Ten men with normal vestibular function executed controlled head and body movements at each of ten 1-rpm step increases in the velocity of the Pensacola Slow Rotation Room. On the completion of each movement, subjects were required to indicate whether or not they had detected sensations of vestibular or somatosensory origin. At each velocity step, the movements were continued until each of twenty four consecutive movements had elicited a negative response and the subject was judged to be symptom free. When this arbitrary adaptation criterion was reached, the angular velocity was increased by one rpm and the procedure repeated. On attaining the criterion at the terminal velocity (10 rpm), the rotation was stopped and the postrotatory phenomena were investigated using the same techniques. Author

N70-14860# Air Force Systems Command, Wright-Patterson AFB, Ohio.
EFFECT OF SPACELIGHT ENVIRONMENT ON SEEDS OF CERTAIN HIGHER PLANTS ON BOARD COSMOS 110
N. L. De Lone et al 12 Mar. 1969 9 p refs
(AD-693819; FTD-HT-23-1098-68) Avail: CFSTI CSCL 21/5

The reactions of dry seeds to ionizing irradiation and weightlessness are being studied to provide information on the mechanism of biologic effects of spaceflight factors, especially ionizing irradiation. Reactions to an integral dose of 12 RAD average dose rate 500 MRAD/Day irradiation in the Earth's radiation belts during the 22-day flight of Cosmos 110 are compared with data obtained from previous Vostok flights. The test and control seeds were subjected to cytological examination. Germination growth energy and the number of chromosome rearrangements in primary roots were compared in a variety of seeds–pine, wheat, barley, and pea. Reliable differences in rearrangements were determined only in the pine seeds. Despite the greater radiation dosage and longer weightlessness encountered on board Cosmos 110, the results did not differ significantly from those obtained in the Vostok flights. Some small physiological shifts were exhibited by the seeds during germination, and certain disturbances in their hereditary structures were noted. The need is pointed out for caution in evaluating these results some of the differences noted may be due to experimental errors. Author (TAB)

N70-14866*# Naval Aerospace Medical Inst., Pensacola, Fla.
AN ATTEMPT TO MEASURE THE DEGREE OF ADAPTATION PRODUCED BY DIFFERING AMOUNTS OF CORIOLIS VESTIBULAR STIMULATION IN THE SLOW ROTATION ROOM
James T. Reason and Ashton Graybiel 16 Jul. 1969 14 p refs
(NASA Order R-93)
(NASA-CR-107442; NAMI-1084) Avail: CFSTI CSCL 06S

A quantitative estimate was obtained of the degree of adaptation acquired as the result of different amounts of coriolis stimulation. Subjects executed a predetermined number of controlled 90 deg head motions at 5 rpm in the slow rotation room. Three measures of adaptation were used: (1) the number of perrotatory head movements evoking sensations due to the coriolis acceleration, (2) the direction and duration of the coriolis oculogyral illusion both during and immediately after the period of rotation, and (3) the number of postrotatory motions producing some detectable after-sensation. The first measure was included to provide an indication of individual differences in adaptability; the remaining two were designed to reveal treatment effects. Six conditions of exposure, ranging from 30 to 180 sequences of eight head motions each, produced no measurable differences in the degree of adaptation acquired. A positive and significant correlation was obtained between the number of perrotatory motions evoking a coriolis reaction (irrespective of the total number of sequences executed) and the number of postrotatory motions producing an after-sensation. Author

N70-14876*# National Aeronautics and Space Administration, Washington, D.C.
FOURTH ANNUAL NASA-UNIVERSITY CONFERENCE ON MANUAL CONTROL
1969 573 p refs Conf. held at Ann Arbor, Mich., 21–23 Mar. 1968
(NASA-SP-192) Avail: CFSTI CSCL 05H

Papers are presented on the following areas of investigation: quasi-linear describing function theory and applications; human performance theory; adaptive or higher order control processes; system identification, signal analysis, and performance measurement; effects of environmental variables on performance; control and display system design; models based on discrete signal processing; and neuromuscular a system analysis. For individual titles see N70-14877 to N70-14911.

N70-14877*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A MODEL FOR HUMAN CONTROLLER REMNANT
William H. Levison and David L. Kleinman *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 3–14 refs (See N70-14876 04-05)
(Contract NAS8-21136; NAS2-3080)
Avail: CFSTI CSCL 05H

A model of human controller remnant is developed and tested against measurements obtained from a variety of manual control experiments. Remnant is defined herein as that portion of the controller's output that is not linearly correlated with the input disturbance to the system. A number of potential sources of remnant are considered and the ability to distinguish between them is discussed. The proposed remnant model is expected to become an integral part of an analysis procedure for predicting the human's visual scanning and control behavior in complex, multivariable control situations. Author

N70-14878*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE HUMAN AS AN OPTIMAL CONTROLLER AND INFORMATION PROCESSOR
Sheldon Baron and David L. Kleinman *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 15–34 refs (See N70-14876 04-05)
(Contract NAS12-104)
Avail: CFSTI CSCL 05H

A mathematical model of the instrument monitoring behavior of the human operator is developed. The model is based on the assumption that the operator behaves as an optimal controller and information processor, subject to his inherent physical limitations. The resulting model depends explicitly on the control task and the control actions. Provision is made for the ability to obtain information from the peripheral visual field. There are no restrictions on signal coupling. The specific characteristics of the operator's visual sampling behavior are predicted by solving a nonlinear, deterministic optimization problem. A two-axis compensatory tracking example is investigated and the results exhibit the general characteristics expected of a human operator performing a similar task. Author

N70-14879*# Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
MEAN SQUARE ESTIMATION OF HUMAN PILOT TRANSFER FUNCTIONS
Richard F. Whitbeck and Frederick D. Newell *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 35–45 refs (See N70-14876 04-05)
Avail: CFSTI CSCL 05H

Mean square minimization (Wiener–Hopf) methods can be used as a complement to the remnant approach in the estimation of human pilot transfer functions. Moreover, the Wiener–Hopf approach is useful in that it offers a mathematically convenient tool for extending the definition of pilot transfer function to multiaxis input–output tasks. Author

N70-14880*# Systems Technology, Inc., Princeton, N.J.
MULTIMODALITY PILOT MODEL FOR VISUAL AND MOTION CUES
R. L. Stapleford *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 47–57 refs (See N70-14876 04-05)
(Contract NAS2-3650)
Avail: CFSTI CSCL 05H

A preliminary model for pilot control behavior when utilizing both visual and motion cues is presented. The model is based on a detailed review of all known data, including some unpublished data from recent experiments. Models for the three feedback paths (visual, angular motion, and linear motion) and integration of the various feedbacks are described. Author

N70-14881*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SYNTHESIS OF HUMAN RESPONSE IN CLOSED-LOOP TRACKING TASKS
James J. Adams *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 59–66 refs (See N70-)
Avail: CFSTI CSCL 05H

Experiments were conducted to determine the variability in a human subject's control stick response to displayed displacement and rate of change of displacement to aid in the implementation of the time variations to be included in the model. Also, additional tracking tasks were made to obtain a definition of the characteristics of the random noise to be added to the model. These two factors were then added to the model, and this composite model was placed in a control loop in place of the pilot. The results demonstrate that this composite model reproduces time-history characteristics and mean square system errors that more closely match the human subject than does the linear model. Author

N70-14882*# Systems Technology, Inc., Princeton, N.J.
APPLICATION OF A SYSTEMS ANALYSIS THEORY FOR MANUAL CONTROL DISPLAYS TO AIRCRAFT INSTRUMENT LANDING
W. F. Clement, H. R. Jex, and D. Graham *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 69–94 refs (See N70-14876 04-05)
(Contract N00014-66-C0072)
Avail: CFSTI CSCL 05H

An illustrative application is presented of a theory for manual control displays to the instrument landing approach of a large subsonic jet transport. A methodical procedure is disclosed for formulation of compensatory display/control systems. Manual approach height and lateral position control are treated in multiloop dynamic analyses so as to select preferred variables for measurement and display. Closed-loop system performance and pilot scanning and workload measures are also evaluated. The example concludes with the prediction of a preferred display arrangement. Comparison with an FAA category II instrument panel arrangement selected by an airline operating the example aircraft shows the predictions to be remarkably accurate. Author

N70-14883*# United Aircraft Corp., East Hartford, Conn. Research Labs.
AN ANALYSIS OF PILOT ADAPTATION IN A SIMULATED MULTILOOP VTOL HOVERING TASK
E. W. Vinje and D. P. Miller *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 95–117 refs (See N70-14876 04-05)
Avail: CFSTI CSCL 05H

The pilot model adaptable parameters were computed from rms hovering performance data measured in flight simulator experiments for a variety of VTOL aircraft configurations. Variations in the aircraft stability parameters affected both the dynamic and disturbance-response characteristics of the controlled element. The pilot's pitch-loop adaptation generally correlated with the frequency domain characteristics of the pitch response to turbulence and the pitch response to control inputs. Gain was adapted to provide a crossover frequency that was high enough to control the disturbances due to turbulence and provide satisfactory hovering performance. Lead compensation was adapted in the region of crossover frequency to provide closed-loop stability. The influence of the aircraft position-loop characteristics on pilot pitch-loop adaptation was important only for configurations that had small attitude disturbances. Results also show that the pilot preferred to adjust pitch-loop gain by changing control stick sensitivity rather than by changing his internal adapted gain. Author

N70-14884*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MEASUREMENT OF PILOT DESCRIBING FUNCTIONS FROM FLIGHT TEST DATA WITH AN EXAMPLE FROM GEMINI 10

Rodney C. Wingrove and Frederick G. Edwards *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 119–134 refs (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

It is well known that there is an error in identifying the pilot describing function from routine flight test records because the pilot's output noise is correlated with the input error signal. It is shown that this identification error can be reduced in the computer processing by shifting the input signal an amount equivalent to the pilot's time delay. This technique for reducing the identification error is analyzed with theory and is demonstrated with the identification of a simulated pilot model. This technique is also applied to flight test records obtained from the retrofire phase of the Gemini 10 mission. Author

N70-14885*# Systems Technology, Inc., Princeton, N.J.

MODELS FOR STEERING CONTROL OF MOTOR VEHICLES

David H. Weir and Duane T. Mc Ruer *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 135–169 refs (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

Driver control of an automobile is analyzed using feedback models for the system that consists of the driver, the vehicle, and the roadway environment. Three alternative models are evolved that satisfy the guidance and control requirements of the driver/vehicle system. They are: time-advanced lateral position, path angle plus lateral position, and heading angle plus lateral position. Although there may be other alternatives, these provide good performance, insensitivity to variations in the driver's dynamic adaptation, good predicted subjective opinion rating, etc.; and they are compatible with perceptual data from driving experiments. The resultant models give the highway and vehicle designer a tool that can be useful in analyzing the system and in optimizing its parameters for the safest and most efficient operation. Author

N70-14886*# California Univ., Berkeley.

MAN-MACHINE MODELS FOR CAR STEERING

E. R. F. W. Crossman and H. Szostak *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 171–195 refs Sponsored by PHS (See N70-14876 04-05)

(Grants AC-00260; UI-00016) Avail: CFSTI CSCL 05H

The driver steering task and its environment are briefly described and the known properties of driver, highway, and vehicle reviewed. A three-level, information-processing model for driver steering control is developed. Level 1 uses preview estimates of highway curvature as a basis for open-loop adjustment of vehicle path curvature. Level 2 uses relative heading, relative path-angle, or lateral position-rate to null out residual lateral position-rate errors. Level 3 uses lateral position itself in a low-frequency, low-gain loop to remove residual error. Evidence for each of these is briefly reviewed. An auxiliary routine for controlling vehicle velocity to meet constraints on lateral acceleration is proposed as an adjunct to the model. Author

N70-14887*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HUMAN INFORMATION PROCESSING RATES DURING CERTAIN MULTIAXIS TRACKING TASKS WITH A CONCURRENT AUDITORY TASK

T. E. Wempe and D. L. Baty *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 199–220 refs (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

A series of experiments were conducted to determine the information processing rates of several subjects performing one- and two-axis compensatory tracking tasks with a secondary auditory task. The experimental variables were the order of controlled element dynamics, the forcing function, and the addition of a secondary task. Human information processing rates decreased on each tracking channel with the addition of the second tracking channel or the secondary auditory task. Other than this effect, the information processing channels were additive like parallel channels until a limit in the total information processing rate was reached. This limit was related to the order of the controlled element. Author

N70-14888*# Massachusetts Inst. of Tech., Cambridge.

PREDICTION AND DECISIONMAKING IN MANUAL CONTROL

William R. Ferrell and Harry S. Cohen *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 221–229 Sponsored in part by General Motors Corp., Detroit (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

A simple model of human decision making can be applied to a common class of decision situations, a model sufficiently unrestrictive to have a good chance of representing actual behavior. Among the cases to which the model applies are those classed as signal detection, and a considerable body of experimental evidence substantiates the model's usefulness and its applicability to this and other psychophysical detection tasks. It appears possible to extend the model to include many examples of decision making of practical importance in manual control, those in which an operator seeks to detect not a signal but his own potential success in carrying out an action. Author

N70-14889*# National Research Council of Canada, Ottawa (Ontario).

THE EFFECT OF PSYCHOLOGICAL STRESS ON DECISION PROCESSES IN A TRACKING TASK

C. B. Gibbs *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 231–252 refs (See N70-14876 04-05)

Avail: CFSTI

The human brain is the most complicated control system on Earth , but little is known of the operational methods that are used within the central nervous system. However, recent research on biological control mechanisms has produced findings and inventions of potential social value in reducing accidents. Many forms of psychological stress impair a person's ability to control a machine and are undoubtedly major causes of accidents. Stress is defined as a force that can produce strain or distortion in a system. Psychological stress can be applied to human beings by the use of alcohol, drugs, or by fatigue, frustration, or many other influences. It is extremely difficult to detect impairment in actual performance because increased expenditure of energy or effort may mask the effects of stress on the aspects of behavior that are readily observed and measured. The precision of tracking movements made in a limited time is frequently measured in laboratory studies of stress. Precision is obviously important in controlling machines, but it is clear that incorrect decisions, rather than lack of precision in executing movements, are major causes of accidents. Author

N70-14890*# Michigan Univ., Ann Arbor.

PREDICTIVE COMPENSATION IN TIME-DELAY MANUAL CONTROL SYSTEMS

Eric A. King-Smith *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 253–274 refs (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

Almost since the birth of automatic control systems, the control of plants that include a pure time delay, or transport delay, has been a prime problem. There are several approaches through which adequate control of these plants may be implemented and the best controller selected in purely technological applications. Among these are the classic three-term controller, carefully selected data-sampling rates in conjunction with other linear or nonlinear compensation. Here we are going to consider the controller to be a human operator, in particular one employed in a visual-manual control task; this controller has fairly well-definable, adaptive characteristics if linearized, with bounds on the limits of adaptation of the various parameters determining the characteristics. With these limitations, supplementary compensation is generally necessary to enable the human operator to deal effectively with plants involving a time delay. A prime application example, of course, is the control of a vehicle on the Moon by an operator on Earth which involves a round-trip signal delay of 2.6 seconds. One particular group of compensation methods for time-delay systems makes use of another time delay as part of the equalizer for the improvement of system stability and performance. Particular interest will be focused here on the predictive control compensation. Author

N70-14891*# Pennsylvania Univ., Philadelphia. Systems Technology, Inc., Princeton, N.J.

PSYCHOLOGICAL AND PHYSIOLOGICAL SKILL DEVELOPMENT: A CONTROL ENGINEERING MODEL

Ezra S. Krendel and Duane T. Mc Ruer *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 275–288 refs Prepared in cooperation with Systems Tech., Inc., Princeton, N.J. (See N70-14876 04-05)

(Contract NAS2-2824)

Avail: CFSTI CSCL 05H

The application of servomechanism models to the description of human control behavior in either manual or physiological control has generally proceeded by creating circumstances under which behavior would be time stationary in an engineering sense over the duration of the measurements. Remarkably effective stationary steady-state models were achieved and applied with considerable success to the design of complex man-machine control systems. The problem is that conventional performance measures for human manual control or physiological control, interpreted in an invariant closed-loop configuration, are either relatively insensitive to human learning behavior or are inappropriate and misleading. A restructuring of the control configurations to enable the extracting of coherence and regularities from the input structures, either physically or conceptually, is the core of the model presented. Experimental data from many sources are presented to substantiate the model, and implications for system design and training are explored. Author

N70-14892*# University of Southern Calif., Los Angeles.

THE APPLICATION OF DISCRETE MODELING ELEMENTS TO THE SYNTHESIS AND IDENTIFICATION OF A DETERMINISTIC MODEL FOR THE VISUAL SCANNING BEHAVIOR OF HUMAN OPERATORS

M. J. Merritt *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 289–311 refs (See N70-14876 04-05)

(Grant NGR 05-018-022)

Avail: CFSTI CSCL 05H

A deterministic model for the visual scanning behavior of a human operator has been synthesized and partially identified. The applicability and generality of the proportional decision element and the multistate decision element to the modeling of discrete human operator behavior has been demonstrated. The hypothesis is advanced that the operator concentrated on one display, sampling the other only as often as needed. Whether this would have occurred if the operator generated continuous stick motions is impossible to say. Author

N70-14893*# Massachusetts Inst. of Tech., Cambridge.

STOCHASTIC MODELING OF HUMAN LEARNING BEHAVIOR

Jacob L. Meiry *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 315–321 refs (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

The application of a stochastic model of human learning behavior in manual control tasks is extended to the performance of the human operator in regulating all second order dynamic processes. In particular, human control decisions for optimal multiswitch and unstable dynamic systems are found to correlate well with responses recorded by the model in the study of simulated subjects. The universality of the model is discussed in the light of a series of compensatory task experiments. Author

N70-14894*# National Aeronautics and Space Administration, Washington, D.C.

CONTRIBUTIONS OF HUMAN BEHAVIOR AS A MULTILOOP CONTROLLER

G. Schweizer *In its* Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 323–340 (See N70-14876 04-05)

Avail: CFSTI CSCL 05H

Experiments were conducted to review the existing describing function models on human behavior for single channel tasks. Random appearing stationary forcing functions and disturbances were present and it was assumed that the operator established stationarity during all the tests. The results of the analyzed data indicated that a linear model with random time varying coefficients provided a good description of the operator's behavior. Studies were conducted to determine what modifications to the single variable model system are necessary for a good representation of multivariable manual control systems. The experiments show that a sample data system with random sample intervals seems to be necessary. The application of the concept of information theory has been tried to assess the performance of the human operator in multiloop tasks. With the knowledge of the internal dynamics of the operator, there is some hope of determining performance indexes for manual control systems with the information theory method. Author

N70-14895*# Systems Technology, Inc., Princeton, N.J.

PILOT'S RESPONSE TO STABILITY AUGMENTATION SYSTEM FAILURES AND IMPLICATIONS FOR DESIGN

David H. Weir and Walter A. Johnson *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 341–360 refs (See N70-14876 04-05)

(Contract NAS2-3607)

Avail: CFSTI CSCL 05H

The dynamic response of the human pilot is studied during sudden changes in the effective controlled dynamics caused by stability augmentation system failure. Experimental results from multiple loop fixed base studies are presented. A hypothesis of graceful degradation is shown to be valid which states that the pilot's transition response and performance are improved if the difference in controlled element dynamics at failure is reduced. The design implications of this principle are detailed. A model for the pilot's dynamic response is presented which accounts for his behavior during the several phases of transition. Author

N70-14896*# University of Southern Calif., Los Angeles.

MODEL OF THE ADAPTIVE BEHAVIOR OF THE HUMAN OPERATOR IN RESPONSE TO A SUDDEN CHANGE IN THE CONTROL SITUATION

A. V. Phatak and G. A. Bekey *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 361–381 refs (See N70-14786 04-05)

(Grant NGR-05-018-022)

Avail: CFSTI CSCL 05H

An adaptive model is presented to describe the behavior of the human operator in response to sudden changes in plant dynamics and transient disturbances. The plant simulated for tracking experiments is approximately second order and has rate and attitude feedback augmentation for increased stability. The failure of the rate sensor and/or the attitude sensor results in a sudden transition in the order and gain of the effective plant dynamics. These failures may be accompanied by hard over transient conditions in either the rate or attitude sensors. The adaptive model suggested has a variable structure, contains mode switching based on pattern recognition as evidence, and incorporates the decision control logic required for successful adaptation to failures. The model in effect attempts to mimic the control strategy or algorithm used by a trained operator. Author

N70-14897*# Systems Technology, Inc., Princeton, N.J.
ON THE DYNAMIC RESPONSE OF THE HUMAN OPERATOR TO TRANSIENT INPUTS
Anil V. Phatak and David H. Weir *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 383–392 refs (See N70-14876 04-05)
(Contract AF-33(615)-3652)
Avail: CFSTI CSCL 05H

A dual mode controller is used to describe the operator's dynamic response to inputs containing both deterministic (transient) and random appearing signals. It includes the usual quasi-linear describing function plus a feedforward path which produces the transient response. New data are presented for step responses with effective controlled elements of K, K/s, K/s squared, and K/s cubed. They indicate that previously hypothesized sample-data models are primarily valid for pure gain controlled elements. The data show that step responses for a trained operator have portions which are nearly time optimal, and that this is one possible idealization for the feedforward, transient-response path in the model. Author

N70-14898*# Massachusetts Inst. of Tech., Cambridge.
STATE-SPACE MODELS OF REMOTE MANIPULATION TASKS
Daniel E. Whitney and Thomas B. Sheridan *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 393–404 refs (See N70-14876 04-05)
Avail: CFSTI CSCL 05H

The state-space method has been shown to be capable of describing a wide variety of the logical and physical constraints which comprise manipulation. Using it, we can plan some nontrivial tasks and gain insight into the nature of tasks and commands. Combined with a flexible input language and carefully composed execution routines, it can provide a basis for supervisory controlled manipulation. Author

N70-14899*# University of Southern Calif., Los Angeles.
IDENTIFICATION OF SAMPLING INTERVALS IN SAMPLED DATA MODELS OF HUMAN OPERATOR
G. A. Bekey and C. B. Neal *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 407–412 refs (See N70-14876 04-05)
(Grant NGR-05-018-022)
Avail: CFSTI CSCL 05H

This paper develops two methods for the determination of an unknown sampling interval in closed-loop sampled-data systems. Both methods are based on a priori knowledge of the structure of the system to be identified and require that measurements be performed only on the system input and its (continuous) output. Author

N70-14900*# Systems Technology, Inc., Princeton, N.J.
CARDINAL RECONSTRUCTION THEORY: A TOOL FOR ESTIMATING EFFECTS OF DISPLAY SCANNING
Warren F. Clement *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 413–429 refs (See N70-14876 04-05)
(Contract N00014-66-C0072)
Avail: CFSTI CSCL 05H

A review of sampling processes and forms of continuous signal reconstruction therefrom has revealed several forms which may be useful in modeling the average display scanning behavior of the human operator. The most promising form appears to be cardinal reconstruction. Low frequency approximations to the effective time delay for linear reconstruction are only slightly greater than for truncated cardinal reconstruction. The influence of sampled first derivative and of sample dwell time appear analogous to the influence of sample prediction in reducing the effective reconstruction time delay. Since these reconstruction processes have similar low frequency responses, experimental attempts to isolate an effective reconstruction time delay in multidisplay control tasks may be confounded by the reconstruction process of the skilled operator or pilot. Indeed, the skilled pilot may exhibit little or no incremental reconstruction time delay beyond the basic reaction time delay in a single task to which continuous attention is given. Author

N70-14901*# National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
MOTION CUES IN MAN-VEHICLE CONTROL
Richard S. Shirley and Lawrence R. Young *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 435–445 refs Prepared for Mass. Inst. of Tech. (See N70-14876 04-05)
(Grant NSG-577)
Avail: CFSTI CSCL 05H

The human operator's use of roll-angular-motion cues in man-vehicle control is investigated. Extensive data for the human operator's describing function and remnant are taken for a wide range of vehicle dynamics under conditions of visual cues only, roll motion cues only, and simultaneous visual and roll motion cues. Addition of roll motion cues to visual cues permits the human operator to increase his phase lead at frequencies above 2 rad/sec, thereby allowing higher gain and crossover frequency and reduced tracking error. Author

N70-14902*# Boeing Co., Seattle, Wash.
MANUAL CONTROL SYSTEM PERFORMANCE WITH PREDICTIVE DISPLAYS
John De Shon Warner *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 449–457 refs (See N70-14876 04-05)
(Contract NASr-54(06))
Avail: CFSTI CSCL 05H

An experimental study of predictive displays was evaluated as a performance aid in a representative manual control task. Predictive information reduced the task complexity to the point where operator performance remained consistent at a high level, though expected variations in task oriented performance criteria were found as a function of several parameters of the controlled element. Author

N70-14903*# Ritchie and Associates, Inc., Dayton, Ohio.
SOME RELATIONS BETWEEN VISUAL AND KINESTHETIC DISPLAYS IN NORMAL DRIVING
Malcolm L. Ritchie *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 459–463 ref (See N70-14876 04-05)
(Contract PH-86-67-155)
Avail: CFSTI CSCL 05H

Where drivers have a free choice of speeds in curves they choose the speeds in such a way that lateral acceleration is an

inverse function of forward velocity. An expression is developed which fits the data in allowing for individual differences in g-levels and a common slope. Author

N70-14904*# Ohio State Univ., Columbus.
STUDIES IN DRIVER-AIDED CAR FOLLOWING
Robert E. Fenton and Charles L. Shaffer *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 465–479 refs Sponsored by the Ohio Dept. of Highways in cooperation with the Bureau of Public Roads (See N70-14876 04-05)
Avail: CFSTI CSCL 05H

Two studies, involving a kinesthetic-tactile driver aid built into the head of a control stick, were conducted to investigate driver aided car following. Two stick configurations, one front- and one side-mounted, were examined, and tests were conducted on both a well-traveled rural road and an unopened superhighway. The results of these tests and a discussion of the problems involved in stick control of an automobile are contained in this paper. Author

N70-14905*# Puerto Rico Univ., Mayaguez.
AN EXPERIMENTAL STEERING SIMULATOR FOR FARM VEHICLES
C. Saran and C. W. Suggs *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 481–486 refs Prepared for North Carolina State Univ. (See N70-14876 04-05)
Avail: CFSTI CSCL 05H

Steering of a vehicle can be considered as a problem of manual control systems. With a view to evaluate human performance in the steering of farm vehicles, a steering simulator described in this paper was designed and built. It is the only known attempt in the field. Uniqueness of this simulator lies in that the vehicle itself was disturbed while the target position was fixed. This situation represented a very close simulation of most steered farm vehicles. In most farm vehicles or manually controlled systems the target corresponds to a straight line visualized in a field or some physical object at or near the work area. The disturbances to the vehicle come from the terrain. Author

N70-14906*# Massachusetts Inst. of Tech., Cambridge.
A REVISED STOCHASTIC SAMPLED DATA MODEL FOR EYE TRACKING MOVEMENTS
L. R. Young, J. D. Forster, and N. Van Houtte *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 489–508 refs (See N70-14876 04-05)
(Grant NSG-577)
Avail: CFSTI CSCL 05H

Our sampled data model is revised by changing the pursuit system to be continuous and proportional to target rate. Transient responses of the model are shown to agree in detail with observed classes of eye movements. Target-synchronized and non-synchronized sampler control logic are compared. Predicted latency distributions of a nonsynchronized sampler with unknown intersample time distribution are analyzed, and saccade synchronizec input experiments are compared with predicted mean model responses. The results show properties of both types of sampler control logic. The assets, limitations, and extensions of the model are discussed. The sampled data model proves to be a useful tool for predicting eye response based on target movement only. Author

N70-14907*# Decision Science, Inc., San Diego, Calif.
MODELING THE HUMAN OPERATOR WITH FINITE-STATE MACHINES
Lawrence J. Fogel and Roger A. Moore *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 509–523 ref (See N70-14876 04-05)
Avail: CFSTI CSCL 05H

Use of finite state machines to represent arbitrary analog transducers and the human operator in his performance of flight control is considered, together with the use of evolutionary programming as a means for finding such representations. A series of tasks of increasing difficulty which demonstrate this capability are presented, ranging from the characterization of relatively simple linear analog "pilots," through more complex nonlinear analog "pilots," and on to the human pilot. Consideration is given to the tradeoff of worth in terms of the adequacy of representation against the resulting complexity of the input and output functions in terms of the size of the alphabet and the complexity of characterization of the logic of the given transducer. The investigation demonstrates that finite state machines do offer a suitable means for representing the human operator in terms of his stimulus response behavior with respect to nonconvergent tracking tasks. Author

N70-14908*# Systems Technology, Inc., Princeton, N.J.
A CLOSED-LOOP NEUROMUSCULAR SYSTEM EXPLANATION OF FORCE DISTURBANCE REGULATION AND TREMOR DATA
R. E. Magdaleno and D. T. Mc Ruer *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 527–541 refs (See N70-14876 04-05)
(Contract NAS2-2824)
Avail: CFSTI CSCL 05H

An adaptive model has recently been evolved to describe small perturbation operations of neuromuscular actuation systems involved in tracking tasks. This model is compatible with both high quality physiological component data and human operator describing function data of low variability and large dynamic range. The purpose of this paper is to use the model to explain force disturbance regulation data and limb tremor data as closed loop phenomena. This also serves to illustrate a key feature of the model, that the muscle spindles feed back an internal muscle length. Author

N70-14910*# Illinois Univ., Chicago.
EFFECTS OF EXTERNAL LOADING ON HUMAN MOTOR REFLEXES
Gyan Agarwal, Bradley Berman, Michael Hogins, Peter Loehnberg, and Lawrence Stark *In* NASA. Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 551–567 refs (See N70-14876 04-05)
Avail: CFSTI CSCL 06P

Achilles tendon reflex in normal human subjects is quantitatively studied from the viewpoint of multiinput, multioutput systems theory. Isometric and isotonic reflex have been elicited in the gastrocnemius-soleus muscle to study the relationship between the initial conditions (muscle tension or length), the stimulus (hammer force) and the reflex response (change in foot torque or angle). In the isometric case, foot–torque response is shown to be a function of initial foot torque. In the isotonic case with no external loading, the foot–angle response is strongly related to hammer force, and a plateau in the response is observed. In the isotonic case with external loading, the foot–angle response is strongly related to involuntary initial foot angle as well as the hammer force. Author

N70-14911*# Illinois Univ., Chicago.
MODELS OF MUSCLE PROPRIOCEPTIVE RECEPTORS
Gyan Agarwal, Gerald Gottlieb, and Lawrence Stark *In* NASA, Washington Fourth Ann. NASA-Univ. Conf. on Manual Control 1969 p 569–594 refs (See N70-14876 04-05)
Aail: CFSTI CSCL 06P

Three lumped parameter models of muscle stretch receptors are described quantitatively on the basis of data obtained from crustacean, amphibian, and mammalian muscle spindles. The first two of these models have single efferent (input) and single afferent (output) innervation. The third model is based on more recent

anatomical and physiological studies on mammalian muscle spindles showing two functionally distinct types of efferent innervation and two types of afferent innervation. Author

N70-14932# Florida State Univ., Tallahassee. Computer Assisted Instruction Center.
COMPARATIVE EFFECTS OF ABILITY AND PRESENTATION MODE IN COMPUTER ASSISTED INSTRUCTION AND PROGRAMMED INSTRUCTION
Walter Dick and Raymond Latta 1 Jul. 1969 22 p refs
(Contract N00014-68-A-0494)
(AD-694021; CAI-TM-5) Avail: CFSTI CSCL 5/9

The performance of 64 high and low ability students was compared on an instructional sequence in (significant figures,) a mathematical concept, which was presented via programmed instruction and computer-assisted instruction. The programmed test consisted of 52 linear frames. The CAI program which was presented on a cathode-ray tube terminal (CRT) had the same basic frames plus remediation for incorrect responses as well as remedial loops. The results on a posttest, retention test, and learning errors, indicated that high ability students performed better than low ability students; students using PI performed significantly better thar those using CAI, and in each case there was a significant ability by treatment interaction. The observed differences are attributed to the very poor performance of the low ability students who used the CRT terminal. It is suggested that low ability students may require hard copy memory aids to supplement CAI learning experiences. Author (TAB)

N70-14979*# George Washington Univ., Washington, D.C. Medical Center.
SCIENTIFIC PUBLICATIONS AND PRESENTATIONS RELATING TO PLANETARY QUARANTINE, VOLUME 5
Frank D. Bradley and Sandra G. Moritsugu Nov. 1969 73 p refs
(Contract NSR-09-010-027)
(NASA-CR-107455) Avail: CFSTI CSCL 06M

In the continuation of a sustained effort to compile a list of publications of NASA - Planetary Quarantine studies, this bibliography presents available reports issued in the calendar year 1968. The parameters of selection of material used in the 1966 and 1967 editions of this series, have been broadened to include some non-NASA funded but Planetary Quarantine oriented material. Also included are a few documents of earlier years; back-gathering of documents not previously listed will be continued in subsequent editions of this publication. Author

N70-15022*# Welson (B.) and Co., Inc. Hartford, Conn.
HANDBOOK OF GARMENT SELECTION CRITERIA FOR A SPACE STATION
Austin C. Morris [1968] 161 p
(Contract NAS9-9563)
(NASA-CR-102051) Avail: CFSTI CSCL 06K

With the flights of Mercury, Gemini and Apollo, the clothing of the flight crew members was selected on the basis of the immediate needs of the particular mission. Since the crews and mission lengths involved were relatively small, there was little impact in the selection of the garments of the crews. As the mission lengths increase and crew sizes grow in number, it is apparent that the penalty of the clothing and related systems of the crew members will no longer be negligible and will require investigation. The purpose of this handbook is to present the criteria by which a garment may be evaluated for use in a space station. It is not intended for use as the absolute criteria for design; rather, it is to familiarize persons of engineering discipline with the steps and rationale involved. Author

N70-15047*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
LIFE SUPPORT IN UNUSUAL ENVIRONMENTS Semiannual Status Report
L. R. Young Nov. 1969 10 p refs
(Grant NGR-22-009-312)
(NASA-CR-107451; MVLS-69-3; SASR-3) Avail: CFSTI CSCL 06K

Survey reports on atmospheres in life support, extravehicular, and water recovery systems are summarized. A literature survey on contaminant monitoring is cited. Areas of investigation under atmospheres in life support systems are storage of atmospheric gases, regenerative carbon dioxide removal systems, carbon dioxide removal in space suits, recovery of oxygen, and electrolysis of water. Subsystems of life support, power, communications, propulsion guidance, and stabilization are problem areas mentioned under extravehicular systems. Problems covered under water recovery systems include recovery requirements, potability, monitoring equipment, and recovery techniques for spacecraft recovery. Problem areas are recommended for graduate school research. J.M.C.

N70-15056# Retina Foundation, Boston, Mass. Dept. of Research.
ENHANCEMENT OF NIGHT VISION BY CORRECTION OF OPTICAL ABERRATIONS OF THE EYE Annual Summary Report, 1 Oct. 1968 – 30 Sep. 1969
Oleg Pomerantzeff, Harold Fish, Jacques Govignon, and Charles L. Schepens 1 Jul. 1969 24 p refs
(Contract DADA17-69-C-9030)
(AD-695718) Avail: CFSTI CSCL 6/16

An automatic program has been designed for computation of the optical model of any given eye. The program accepts as data a set of parameters which are measurable in the living eye. An apparatus has been designed and built for easy subjective and/or objective measurement of aberrations in the living eye. Author (TAB)

N70-15081# National Research Council of Canada, Ottowa (Ontario). Translations Section.
PHOTOCHEMICAL INVESTIGATION OF THE CYTOSTATICALLY ACTIVE URACIL DERIVATIVES [PHOTOCHEMISCHE UNTERSUCHUNGEN AN CYTOSTATISCH WIRKSMAN URACILDERIVATEN]
Kailash K. Gauri 1969 6 p refs Transl. into ENGLISH from Z. Naturforsch. (Tubingen), v. 22b, no. 6, 1967 p 685 – 686
(NRC-TT-1390) Avail: CFSTI

Dimerization reaction of uracil dervatives irradiated by ultraviolet light was investigated in vitro. Percentage absorption changes in uracil and its derivatives after ultraviolet irradiation were tabulated along with percentage dimerization of uracil derivatives compared with uracil and thymine. It is concluded that with an incorporation in nucleic acids, radiation sensitization will not take place to the same extent as with thymine. Photochemical dimerization methods are briefely discussed. J.A.M.

N70-15121# Air Force Systems Commmand, Brooks AFB, Tex. School of Aerospace Medicine.
EFFECTS OF DECABORANE ON LIVER GLYCOGEN CONTENT OF RATS AT GROUND LEVEL AND AT ALTITUDE Final Report, Sep. 1965 – Jan. 1966
Ralph E. Grandberry and Miguel A. Medina Aug. 1969 12 p refs
(AD-695789; SAM-TR-69-48) Avail: CFSTI CSCL 6/20

The effect of decaborane (15 mg./kg.) on the hepatic glycogen of male rats maintained at altitude (18,000 ft.) under normoxic conditions was compared with the effect on similarly injected, ground level controls. Results showed that decaborane decreased the glycogen level of fed rats at ground level, but did not affect glycogen levels in the fed, altitude group. The hepatic glycogen level

of fasted rats at altitude was the equivalent of that of fasted rats at ground level. These results indicate that the mechanism whereby decaborane produces a depletion of liver glycogen is altered under conditions of reduced pressure. Author (TAB)

N70-15131*# Astro Research Corp., Santa Barbara, Calif.
ANALYSIS OF LARGE BENDING DEFORMATIONS OF A FILAMENTARY TUBULAR SHELL TYPICAL FOR PRESSURE CONSTRAINT COMPONENTS OF SPACE SUITS
Odus R. Burggraf Washington NASA Jan. 1970 51 p refs
(Contract NAS7-728)
(NASA-CR-1507; ARC-R-331) Avail: CFSTI CSCL 06K

A theory is formulated for the bending deformation of a cylindrical, pressurized fiber shell. This type of structure is for pressure constraint components of space suits. The filament wound and linked fiber tube are considered in the postslip phase of bending, although any type of knots or fixed fiber nodes are permitted in the preslip phase. Inextensible fibers are assumed. Analytical formulas are derived for the bending stiffness in the range of small deformations, and numerical results are obtained for large deformations. The idealized frictionless fiber tube is unstable in bending. For the friction stabilized tube the effect of the variable mesh parallelogram in the preslip phase is to produce a wide linear range followed by a relatively flat moment characteristic for large bending angles. The effect of fiber slippage is to produce a rapid reduction of the bending moment required for deformation with ultimate destabilization as the bending angle increases. Author

N70-15208*# Naval Aerospace Medical Inst., Pensacola, Fla.
NUCLEAR EMULSION RECORDINGS OF HEAVY PRIMARIES ON APOLLO 7 AND 8
Hermann J. Schaefer and Jeremiah J. Sullivan Oct. 1969 15 p refs Sponsored by NASA
(NASA-CR-107565; NAMI-1091) Avail: CFSTI CSCL 06R

Data from Apollo 7 and 8, the former a 10.8-day orbital mission and the latter a 6.1-day lunar mission, are used for identifying the indicated difference of fluxes and energy spectra of galactic heavy primaries encountered on a lunar mission from those on a near-Earth orbital mission by measurements in the nuclear emulsions carried by the astronauts in their garments. A total of 84 track segments of Z > or = 20 was counted in 5.99 cm2 emulsion area for Apollo 7 and of 76 segments in 1.82 cm2 for Apollo 8. This represents a flux of 1.3 nuclei/(cm2 24 hours) for Apollo 7 and of 6.86/(cm2 24 hours) for Apollo 8. By applying QF factors as recommended by the ICRP to the absorbed doses of 0.42 millirad for Apollo 7 and 1.5 millirads for Apollo 8, the corresponding dose equivalents of 6.5 and 23.9 millirems, respectively, were obtained. These contributions constitute 4 per cent of the total mission dose equivalent for Apollo 7 and 12 per cent for Apollo 8. The results indicate that heavy nuclei contribute sizeably to the astronaut's radiation exposure on deep-space missions outside the magnetosphere. Author

N70-15343# National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
DETERMINATION OF TRACE QUANTITIES OF URANIUM IN BIOLOGICAL MATERIALS BY THE NUCLEAR TRACK TECHNIQUE
B. Stephen Carpenter *In its* Mod. Trends in Activation Analysis, Vol. 2 Jun. 1969 p 942–945 refs (See N70-15313 04-06)
Avail: SOD $8.50

Plans are to certify three biological Standard Reference Materials for trace elements: blood, tissue, and a botanical leaf sample. Of these materials, blood, plasma, and dried leaves, were used. Each sample was freeze-dried to remove most of the water, then ashed at a low temperature in an oxygen atmosphere using a low temperature dry asher. The residue was digested in nitric acid, filered, and diluted to a known volume. Controlled drops of sample solution, delivered from a micropipette, were placed on Lexan slides. The solutions were evaporated to dryness on a laminar flow clean bench. Standard samples containing known amounts of uranium were mounted on Lexan detectors in an identical manner to establish for specific irradiation conditions the relationship between the number of tracks observed and the weight of uranium present. The analyses of uranium in blood gave an average value of 86.1 parts per billion (ppb), with a standard deviation of 5.6 ppb. The average value of the uranium content of mammalian plasma was found to be 60.5 plus or minus 12.0 ppb. Author

N70-15371# New York Univ., N.Y. Inst. of Environmental Medicine.
REGRESSION ANALYSIS OF GAMMA-RAY SPECTROMETER DATA WITH AN APPLICATION TO THE ASSAY OF HUMAN RADIOACTIVITY BURDENS
Bernard Pasternack and Naomi Harley *In* Natl. Bur. of Std. Mod. Trends in Activation Analysis, Vol. 2 Jun. 1969 p 1220–1230 refs (See N70-15313 04-06)
(Contract AT(30-1)-3136)
Avail: SOD $8.50

A method which permits correction for gain and baseline discrepancies between the reference and mixture pulse-height distributions is described. The procedure involves an iterative transformation of reference pulse-height distributions until a best least-squares regression is obtained; the basic statistical model assumes that a background corrected pulse-height distribution for a mixture of nuclides is equal to some linear combination of individual characteristic distributions for the constituent nuclides. Included are typical pulse-height distributions taken from plots made by an IBM 1401 printer for specific nuclides and an arbitrary mixture of these nuclides, plots of normalized residuals resulting from analyses under various model conditions, and plots of two reference spectra of cesium 137. In addition, results of a biological sampling experiment are given to indicate recent application to total-body counting measurements. A.C.R.

N70-15387*# California Univ., San Diego. Visibility Lab.
FACTORS UNDERLYING VISUAL SEARCH PERFORMANCE
John H. Taylor Nov. 1969 27 p refs Presented at NATO Symp. on Image Evaluation Munich, Aug. 1969
(Grant NGR-05-009-020)
(NASA-CR-107574; SIO-69-22) Avail: CFSTI CSCL 06P

Visual search in man as a special case of image evaluation is studied from simple detection of an object to the complex detection and identification of hidden camouflaged military targets. The factors in evaluating images are listed as: properties of the human visual system, properties of objects and their backgrounds, and properties of the environment. The retina, muscular mechanism, visual fields, eye movement, and visual functions are discussed, and graphs are presented for contrast discrimination, fixation, and search time. F.O.S.

N70-15400*+ Battelle-Northwest, Richland, Wash.
INDUCED RADIONUCLIDES IN ASTRONAUTS Final Report, 15 Jun. 1967–1 Sep. 1968
R. L. Brodzinski, N. A. Wogman, and R. W. Perkins 1 Sep. 1968 56 p refs Sponsored in part by NASA
(NASA-CR-107583; BNWL-531-4) Avail: CFSTI CSCL 06R

Activity-dose energy relationships for Be7, N13, Na22, and Na24 activities induced in unshielded muscle tissue and tissue equivalent phantoms by bombardment of protons up to 580 MeV were measured, and the relationship between radiation dose and induced activity for any given proton bombarding energy is defined. The determination of the radiation dose received by an astronaut from cosmic radiation of unknown energy by measuring the concentration of the radioactive isotopes induced in his body is discussed. Measurements to define the excretion pattern of induced

radionuclides from proton irradiated patients, and studies of the cosmic-ray dose to high altitude pilots were also continued. Author (NSA)

N70-15407*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.
THE 24-HOUR RHYTHM OF CHLORINE SECRETION [DER 24-STUNDEN-RHYTHMUS DER CHLORAUSSCHEIDUNG]
F. Gerritzen Washington NASA Dec. 1969 8 p refs Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), v. 238, 1937 p 483–488
(Contract NASw-1692)
(NASA-TT-F-12705) Avail: CFSTI CSCL 06P

The results of an experiment on chlorine secretion which lasted 27 hours and in which 35 persons considered to be healthy took part are described. The subjects ate and drank the same each hour. They voided urine hourly. The amount of urine was measured and in each portion the chlorine content was determined according to Volhard's method. The mean value for each hour was calculated and plotted in a curve. The parallel between chlorine secretion and diuresis is clear. The rhythm in chlorine secretion is considered a liver rhythm. The peak in diuresis, which occurs at 12 p.m. and which is not followed by a rise in chlorine secretion, is connected with the change in body posture. The circumstance that excessive fluid is eliminated as urine is considered the first sign of heart insufficiency in young healthy persons; i.e., as pathological. On the basis of the fact that the maximum chlorine secretion precedes the maximum diuresis by two hours, the existence of the liver barrier assumed by Mautner and Pick is called into question. Author

N70-15415# *Electro-Optical Systems, Inc.*, Pasadena, Calif.
DISPLAY REQUIREMENTS ASSESSMENT FOR COMMAND AND CONTROL SYSTEMS
Rudolph L. Kuehn *In* AGARD Displays for Command and Control Centers Jul. 1969 p 81–92 refs (See N70-15408 04-08)
Copyright. Avail: CFSTI

The major underlying parameters of a command and control display depend to a great extent upon the basic attributes of the human visual mechanism. The latter are briefly reviewed in order to place the display system requirements in harmony with visual limitations. Resolution, amount of data displayed, display dynamics, coding and screen size are discussed. Illustrations are given by means of figures and tables of the interrelationship of certain of these criteria. Material is presented demonstrating that display specification and design need not be based upon intuitive judgment, but do have a foundation in sound scientific and engineering principles. The proper parametric designation of the command and control display system can lead to greater effectiveness and overall satisfactory performance. Author

N70-15416# Mitre Corp., Bedford, Mass.
STUDIES IN DISPLAY LEGIBILITY
C. V. Riche, Jr. and G. C. Kinney *In* AGARD Displays for Command and Control Centers Jul. 1969 p 93–103 refs (See N70-15408 04-08) Avail: CFSTI

The subject of this chapter is data display legibility and its related problems. It reports on work done on a new form of display specifications. The most unusual part of this form is a section on legibility testing procedure and acceptance standards for human performance. The newer specification overcomes several disadvantages of the conventional form which specifies only geometric and photometric properties of display details. This form has several advantages of its own which help it to accomplish all of the purposes of a display specification, and it shows promise for better displays in the future. Author

N70-15499*# California Univ., Berkeley. Space Sciences Lab.
FUNCTIONAL CONTRIBUTIONS OF BOOTLEGGING AND ENTREPRENEURSHIP IN RESEARCH ORGANIZATIONS
Todd R. La Porte and James L. Wood Sep. 1969 33 p refs *Its* Internal Working Paper 106
(Grant NGL-05-003-012)
(NASA-CR-107353) Avail: CFSTI CSCL 05K

Two activities used by professional scientists to alter their immediate work situation are discussed within the framework of organizational demands. Bootlegging consists of engaging in research projects not formally specified in the contract or grant funding the organizational work. Entrepreneurial activity is the attempt to gain resources for the researcher's project. Both activities permit the satisfaction of personal goals within the constraints of large organizations. Data collected from an industrial research laboratory, a nonprofit university laboratory, and a military defense laboratory were analyzed. The hypothesis that these activities contribute positively to problem solving in research organizations was supported. Both activities contributed most clearly to organizational integration, that is, cooperative relationships, by reducing role strain in scientists and role conflict between scientists and managers. Bootlegging and, to a lesser extent, entrepreneurship seemed to contribute to adaptation and goal attainment, and least to latent value maintenance. Opportunities to engage in either activity seemed to result in higher levels of professionally valued experience. M.H.E.

IAA ENTRIES

A70-12886 *
A STUDY OF ATRIOVENTRICULAR CONDUCTION IN MAN USING PREMATURE ATRIAL STIMULATION AND HIS BUNDLE RECORDINGS.
Anthony N. Damato, Sun H. Lau, Robert D. Patton, Charles Steiner, and Walter D. Berkowitz (U.S. Public Health Service, Hospital, Cardiopulmonary Laboratory, Staten Island, N.Y.).
Circulation, vol. 40, July 1969, p. 61-69. 18 refs.
NIH Grants No. HE-11829; No. HE-12536; NASA Contract No. T-22416.

Study of the effects of controlled premature atrial stimulation on atrioventricular conduction in 20 subjects, using an electrode catheter technique for recording electrical activity of specialized conducting fibers. The least common type of response observed was that in which A-V conduction delay was limited only to the A-V nodal region (type A). This type of response was obtained whenever the conduction delay in the A-V nodal region increased in direct proportion to the prematurity of a propagated atrial impulse. It was characterized by a progressive prolongation in the P-H interval, with ultimate failure of conduction occurring proximal to the His bundle. In type-B response, conduction delay occurred in both the A-V nodal and His-Purkinje systems. The recording of a characteristic A-V nodal potential permitted the localization of A-V nodal delay to the N-H interval. (Author)

A70-12887 *
A STUDY OF ATRIOVENTRICULAR CONDUCTION IN ATRIAL FIBRILLATION AND FLUTTER IN MAN USING HIS BUNDLE RECORDINGS.
Sun H. Lau, Anthony N. Damato, Walter D. Berkowitz, and Robert D. Patton (U.S. Public Health Service, Hospital, Cardiopulmonary Laboratory, Staten Island, N.Y.).
Circulation, vol. 40, July 1969, p. 71-78. 20 refs.
NIH Grants No. HE-11829; No. HE-12536; NASA Contract No. T-22416.

Study of seven patients with atrial fibrillation and six patients with atrial flutter, using the technique of His bundle recordings. All 13 patients received digitalis. In atrial fibrillation each QRS complex (except for premature ventricular beats) was preceded by a single His bundle deflection. Complete block distal to the His bundle was not observed. Thus, the zone of concealment could be localized to the region proximal to the His bundle. The clinical findings were confirmed in three animal experiments. In atrial flutter the non-conducted P waves were also blocked proximal to the His bundle. In atrial fibrillation aberrant ventricular beats were distinguished from premature ventricular beats by the presence of a preceding His deflection in the former and its absence in the latter. (Author)

A70-12888 *
ACUTE REJECTION FOLLOWING CARDIAC TRANSPLANTATION—PHONOCARDIOGRAPHIC AND ULTRASOUND OBSERVATIONS.
John S. Schroeder, Richard L. Popp, Edward B. Stinson, Eugene Dong, Jr., Norman E. Shumway, and Donald C. Harrison (Stanford University, School of Medicine, Palo Alto, Calif.).
Circulation, vol. 40, Aug. 1969, p. 155-164. 13 refs.
Research supported by the American Heart Association and PHS; NIH Grants No. HE-09058; No. HE-5709; No. HE-05866; No. HE-5107; Grant No. NGR-05-020-305.

Nine patients have undergone cardiac transplantation at Stanford University Hospital. Three of these showed no clinical evidence of rejection and had essentially normal physical and phonocardiographic findings. There were eight distinct early rejection episodes in the other six patients. Early rejection was accompanied by decreasing QRS voltage, an early diastolic gallop, and frequently a rightward shift of the mean electrical axis of the heart. If not treated, this progressed to severe heart failure with a right ventricular heave, biventricular gallop, marked elevation of venous pressure with rapid y descent, and severe dyspnea without orthopnea. Ultrasound measurements show increasing posterior wall thickness and overall heart diameter during the rejection episode. With aggressive therapy, all of these signs usually resolve rapidly, suggesting that dysfunction of the rejecting heart is secondary to the interstitial edema, vascular engorgement, and cellular infiltration, causing restriction of diastolic filling. These cardiovascular signs appear to aid detection of early cardiac rejection and allow treatment at an earlier stage of the rejection process. (Author)

A70-12889
A NEW SIMPLE MODEL FOR THE SYNTHESIS OF THE ELECTROCARDIOGRAM.
Herman N. Uhley (Mount Zion Hospital and Medical Center, Dept. of Medicine, San Francisco, Calif.).
Circulation, vol. 40, Aug. 1969, p. 173-178. 13 refs.
Research supported by the Carrie B. Browning Fund.

Description of a simple, inexpensive apparatus that can be constructed and programmed to simulate normal as well as abnormal depolarization and repolarization of the heart and to reproduce an electrocardiogram. The device utilizes a modulated light beam, a series of differential photocells, a patch cord programmer, and a synthesizer consisting of an array of dipoles in a saline conductor. Changes occurring on a cellular level are simulated, programmed, and distributed in proper temporal sequence to the multiple dipoles, thereby forming a resultant spatial generator of QRS and T complexes. (Author)

A70-12890
A CRITICAL APPRAISAL OF THE ELECTROCARDIOGRAPHIC CRITERIA FOR THE DIAGNOSIS OF LEFT VENTRICULAR HYPERTROPHY.
Donald W. Romhilt, Kevin E. Bove, Robert J. Norris, Emmett Conyers, Sandra Conradi, David T. Rowlands, and Ralph C. Scott (Cincinnati General Hospital, Cardiac Laboratory; Cincinnati, University, Medical Center, Dept. of Internal Medicine and Dept. of Pathology, Cincinnati, Ohio).
Circulation, vol. 40, Aug. 1969, p. 185-195. 35 refs.
Research supported by the Heart Association of Southwestern Ohio; PHS Grants No. HE-08578; No. HE-6307; No. HE-5445; No. HE-5776.

Evaluation of 33 different electrocardiographic criteria for left ventricular hypertrophy in 360 autopsied hearts, using a chamber dissection technique. Five electrocardiographic criteria had a sensitivity of 56 per cent, but 10.5 per cent to 14.5 per cent false positives. A point-score system employing a combination of criteria had a sensitivity of 54 per cent, but lowered the false positives to 3 per cent. Overall, the precordial lead criteria were considerably more sensitive but less specific than the limb lead criteria. M.M.

A70-12891
USE OF THE ULTRASONIC DOPPLER METHOD FOR TIMING OF VALVULAR MOVEMENT.
John B. Kostis, Dietrich Fleischmann, and Samuel Bellet (Philadelphia General Hospital, Div. of Cardiology; Pennsylvania, University, Graduate School of Medicine, Philadelphia, Pa.).
Circulation, vol. 40, Aug. 1969, p. 197-207. 14 refs.

The ultrasonic Doppler method was employed to time the rapid movements (opening and closure) of the mitral and aortic valves. To exclude signals due to slowly moving structures (heart walls), the Doppler tracing was processed by a filter that eliminated low frequencies. Clear tracings containing two deflections, one due to the opening and the other to the closure of each valve, were obtained. The valvular origin of the deflections was verified by recordings

simultaneous with intracardiac pressures in five dogs. The ultrasonic Doppler tracing was found to be a satisfactory aid in the differentiation of various extra heart sounds in 24 patients. Thus, the second heart sound precedes, the third heart sound follows, and the opening snap is simultaneous with the signal due to the mitral opening. The fourth heart sound is simultaneous with the atrial component of the unfiltered Doppler signal. Ejection clicks and systolic clicks are simultaneous with or follow the signal due to aortic opening. Because of its simplicity and safety, this method used in conjunction with the phonocardiogram should prove helpful in distinguishing the opening snap, third and fourth heart sounds, and certain additional auscultatory phenomena. (Author)

A70-12892
VISUAL ASSESSMENT OF REGIONAL MYOCARDIAL PERFUSION UTILIZING RADIOACTIVE XENON AND SCINTILLATION PHOTOGRAPHY.
P. J. Cannon, J. I. Haft, and P. M. Johnson (College of Physicians and Surgeons, Dept. of Medicine, New York, N.Y.).
Circulation, vol. 40, Sept. 1969, p. 277-288. 50 refs.
Research supported by the J. Hartford Foundation; PHS Grants No. 5 RO1-HE-10182-03; No. HE-05741.

Description of a method devised to visualize the areas of left ventricle supplied by various coronary arterial branches, utilizing scintillation photography and an inert radioactive gas which distributes instantaneously between coronary blood and perfused myocardial cells. From 1 to 5 millicuries of Xe 133 dissolved in saline solution were injected through a catheter into the anterior descending or posterior circumflex branch of the left coronary artery of 15 dogs. Scintillation images produced during arrival and washout of Xe 133 in the various regions of the heart were recorded by an image-intensifier scintillation camera and a high-speed television monitor and were reproduced on Polaroid film during replay of the videotape on an oscilloscope. The resulting scintiphotographs defined the region of the left ventricle supplied by the coronary arterial branch. In nine of the dogs acute myocardial infarctions were produced by occluding one or the other branch of the left coronary artery. When Xe 133 was injected again into the coronary artery proximal to the occlusion, that area of the left ventricle which was deprived of nutrient blood flow was no longer visualized on the gamma-ray scintiphotograph. The results indicate that regional myocardial perfusion may be dynamically visualized in the intact animal. (Author)

A70-12893
ELECTROCARDIOGRAPHIC FINDINGS IN CARDIAC TRANSPLANTATION.
James Scheuer, James A. Shaver, Barry C. Harris, James J. Leonard, and Henry T. Bahnson (Pittsburgh, University, School of Medicine, Pittsburgh, Pa.).
Circulation, vol. 40, Sept. 1969, p. 289-296. 11 refs.

Outline of the electrocardiographic course of a 46-year old recipient of a cardiac transplant in whom direct myocardial leads were implanted. There was one episode of decreased QRS voltage with an intraventricular conduction delay, suggestive of an acute immunologic rejection. On one occasion bradycardia occurred, and this was treated by ventricular pacing. There was also an episode of supraventricular tachycardia. Vagotonic maneuvers or agents would not have been appropriate treatment for this arrhythmia. In the presence of both donor and recipient P waves, the interpretation of some of the arrhythmias was difficult. Since the QRS voltage is important in diagnosing early rejection, great care was taken in accurately standardizing the electrocardiogram and in reproducibly placing electrocardiographic leads. The myocardial leads were found to reflect voltage changes more clearly than surface leads. The presence of myocardial wires also proved convenient for pacing. The use of a right atrial recording electrode is recommended for the diagnosis of complex arrhythmias. This will permit more accurate identification of donor and recipient P waves. (Author)

A70-12975
FIBER ORIENTATION AND EJECTION FRACTION IN THE HUMAN LEFT VENTRICLE.
Edward A. Sallin (Alabama, University, Medical Center, Dept. of Biomathematics, Birmingham, Ala.).
Biophysical Journal, vol. 9, July 1969, p. 954-964. 8 refs.
PHS Grants No. HE-11310-01; No. FR-00145-06.

Fiber orientation and ventricular geometry are incorporated in a mathematical model for ejection fraction of the human left ventricle. The inadequacy of circularly oriented or "constrictor" fibers to explain high ejection fractions of cylindrical, spherical, or ellipsoidal reference ventricles is demonstrated. A class of "helical" fibers is then introduced from which ejection fractions, predicted by physiologic amounts of fiber shortening on cylindrical and ellipsoidal reference ventricles, are shown to be consistent with those calculated from biplane angiocardiographic films. (Author)

A70-12987 *
ON THE USE OF SYNTHESIS INHIBITORS TO ESTIMATE BRAIN NOREPINEPHRINE SYNTHESIS IN GONADECTOMIZED RATS.
R. J. Wurtman, F. Anton-Tay, and S. Anton (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).
Life Sciences, Part I—Physiology and Pharmacology, vol. 8, Sept. 1, 1969, p. 1015-1022. 12 refs.
PHS Grant No. AM-11237; Grant No. NGR-22-009-272.

Attempt to confirm that, if a physiological process tended to accelerate norepinephrine synthesis, it would also accelerate the decline in brain norepinephrine levels in alpha-methyl paratyrosine (alpha-MPT) treated animals. In measuring the rate of brain norepinephrine synthesis in gonadectomized and control rats treated with alpha-MPT, it was found that this synthesis decreased less rapidly in the castrated rats than in the control rats. The altered sensitivity to alpha-MPT among castrated rats may be unrelated to the mechanism which causes the steady-state synthesis of brain norepinephrine to be accelerated in these animals. F.R.L.

A70-12996
PLANETARY QUARANTINE AND SPACECRAFT STERILIZATION.
Washington, Exotech, Inc., 1969. 323 p.

CONTENTS:
RATIONALE AND EVOLUTION OF PLANETARY QUARANTINE CONSTRAINTS. 10 p.
SUMMARY OF PERTINENT MICROBIOLOGICAL CONCEPTS. 37 p.
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EFFECTS OF QUARANTINE REQUIREMENTS ON PLANETARY LANDING VEHICLES. 27 p.

A70-13008
PLATELET VOLUME—EFFECT OF TEMPERATURE AND AGENTS AFFECTING PLATELET AGGREGATION.
Edwin W. Salzman, Thomas P. Ashford, Donald A. Chambers, Lena L. Neri, and Arthur P. Dempster (Harvard University, Harvard

Medical School, Dept. of Surgery; Beth Israel Hospital, Boston; Harvard University, Dept. of Statistics, Cambridge, Mass.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1330-1338. 50 refs.
Research supported by the Massachusetts Heart Association; NIH Grants No. HE-11127; No. HE-05422.

Measurement of the volume of human blood platelets in the Coulter counter, followed by computer analysis. Platelet volume increased when the temperature was lowered but returned to basal values after rewarming for 5 to 15 hr, even after 5 hr at 0 deg C. Changes in platelet volume followed a different time course and were not dependent on microtubular architecture. M.M.

A70-13009
LEFT VENTRICULAR MECHANICS AND OXYGEN CONSUMPTION DURING ARTERIAL COUNTERPULSATION.
Henry M. Spotnitz, James W. Covell, John Ross, Jr., and Eugene Braunwald (U.S. Public Health Service, National Institutes of Health, National Heart Institute, Bethesda, Md.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1352-1358. 29 refs.

Examination of the effects of counterpulsation on the mechanics of left ventricular contraction and myocardial oxygen consumption in the normal dog and in animals with pharmacologically induced depressed myocardial function. Counterpulsation produced reductions of 19 to 25 per cent in peak left ventricular wall stress, integrated stress, contractile element work, and fiber shortening work, while the extent of fiber shortening increased. Myocardial oxygen consumption decreased during counterpulsation by 10 per cent. M.M.

A70-13010
PATTERN OF DISCHARGE OF RESPIRATORY NEURONS DURING SYSTEMIC VASOMOTOR WAVES.
Neil S. Cherniack (Michael Reese Hospital Medical Center, and Cardiovascular Institute, Chicago, Ill.), Norman H. Edelman (Illinois, University, Dept. of Medicine, Chicago, Ill.), and Alfred P. Fishman (Chicago, University, Dept. of Medicine, Chicago, Ill.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1375-1383. 28 refs.
NIH Grants No. HE-10979; No. HE-06375.

Investigation in which systemic blood pressure oscillations, produced in paralyzed dogs by arresting ventilation or by hemorrhage during mechanical ventilation, were related to the phasic phrenic nerve electrical activity. Traube-Hering waves occurred in hemorrhaged animals and during arrested ventilation. Mayer waves occurred only after hemorrhage. Neither wave pattern was abolished by carotid chemo- and baroreceptor denervation. Traube-Hering waves seem to be caused by a direct influence of the phasic activity of respiratory neurons on vasomotor activity. M.M.

A70-13011
STOCHASTIC PROPERTIES OF INDIVIDUAL MOTOR UNIT INTERSPIKE INTERVALS.
W. S. Masland, D. Sheldon, and C. D. Hershey (Pennsylvania, University, School of Medicine, Dept. of Neurology and Dept. of Physiology, Philadelphia, Pa.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1384-1388. 6 refs.
PHS Grant No. NB-06569-02.

Examination of recordings of individual somatic motor unit spikes from human biceps brachialis muscle during posture holding, to the point of fatigue, and with mild weight loading. By dividing the interspike-interval histogram into two or three regions, it is possible to define two patterns of behavior. The first is that of a simple Markov chain, while the second is that of a random variable. This behavior is not influenced by fatigue or mild loading. M.M.

A70-13012
TRANSMITTER RELEASE AND RESPONSES OF ARTERIES AND VEINS DURING NERVE STIMULATION.
T. F. Rolewicz, L. Whitmore, and B. G. Zimmerman (Minnesota, University, Dept. of Pharmacology, Minneapolis, Minn.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1459-1463. 21 refs.
PHS Grant No. HE-08570.

Study of the release of norepinephrine (NE) and the pattern of the vasoconstrictor response obtained during selective activation of the arterial and venous sympathetic nerves in the perfused hindpaw of the dog. Arterial nerve activation (ANA) produced a greater release of NE into the venous effluent than did venous nerve activation (VNA). Following the administration of phenoxybenzamine, both ANA and VNA produced a greater release of NE into the venous effluent than before the drug, and the potentiation appeared to be proportionately larger during VNA. M.M.

A70-13013 *
LIGHT SYNCHRONIZATION OF DEEP-BODY TEMPERATURE RHYTHMS IN MACACA NEMESTRINA.
Rudolf A. Hoffman, George P. George, and William F. Barrows (NASA, Ames Research Center, Moffett Field, Calif.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1487-1489. 7 refs.

Investigation of the efficiency of low levels of illumination as biorhythm synchronizers in *Macaca nemestrina*. It was demonstrated that a day illumination level of approximately 6 ft-c alternating with approximately 0.06 ft-c night illumination served as an effective rhythm synchronizer. M.M.

A70-13014
IONIC DEPENDENCE OF SLOW WAVES AND SPIKES IN INTESTINAL MUSCLE.
Jane Liu, C. L. Prosser, and Donald D. Job (Illinois, University, Dept. of Physiology and Biophysics, Urbana, Ill.).
American Journal of Physiology, vol. 217, Nov. 1969, p. 1542-1547. 19 refs.
NSF Grant No. GB-4005.

Investigation of the nature of slow waves and spikes in intestinal muscle. Longitudinal muscle fibers of cat jejunum show slow waves, prepotentials, and spikes. Slow waves are reduced to zero amplitude when sodium is replaced by Tris or lithium or when ouabain is added at concentrations less than required for depolarization. Intracellular iontophoresis of sodium, but not of potassium, enhances slow-wave amplitude. Longitudinal muscle spikes are reduced to zero in a Ca-free medium, are insensitive to sodium, and are eliminated by low concentrations of manganese or cobalt. M.M.

A70-13068 #
FEATURES OF ACTIVITY OF THE NEUROMOTOR UNITS OF RESPIRATORY MUSCLES (OSOBLIVOSTI DIIAL'NOSTI NEIROMOTORNIKH ODINITS' DIKHAL'NIKH M'IAZIV).
D. O. Kocherga (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Viddil Fiziologii Dikhannia, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 15, Sept.-Oct. 1969, p. 591-600. 31 refs. In Ukrainian.

Study of the features of electric discharges from individual neuromotor units of the respiratory muscles in chronic experiments on dogs and in acute experiments on cats. The activity of the neuromotor units is quantitatively analyzed as a function of (1) the relationship of the beginning and end of the volley to the respiratory cycle, (2) the duration of the volley, (3) frequency of discharges in the volley, and (4) distribution of intervals between discharges in the course of the volley. T.M.

A70-13069 #
NATURE OF THE AUTOMATISM AND OF THE FUNCTIONAL ORGANIZATION OF THE RESPIRATORY CENTER (DO PRIRODI AVTOMATIZMU I FUNKTSIONAL'NOI ORGANIZATSII DIKHAL'NOGO TSENTRA).
V. P. Doroshchuk (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 15, Sept.-Oct. 1969, p. 601-613. 20 refs.

In Ukrainian.

Description of the fundamental structure of the functional organization of the respiratory center and explanation of the nature of its automatism using data obtained in experiments involving artificial respiration and hypocapnic apnea in dogs and cats. The presence of six interconnected negative feedback systems is established in the respiratory center. The initial information for these systems is supplied by the chemoreceptors in the form of excitory pulses alternately transmitted to the bulbar efferent inspiratory and expiratory neurons. T.M.

A70-13070 #
EVOKED POTENTIALS OF THE ENTORHINAL CORTEX (VIKLIKANI POTENTSIALI ENTORINAL'NOI KORI).
M. Ia. Voloshin (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Viddil Elektrofiziologii Tsentral'noi Nervovoi Sistemi, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 15, Sept.-Oct. 1969, p. 636-640. 15 refs. In Ukrainian.

Investigation of the evoked potentials arising in the entorhinal area of the intermediate cortex of rabbits in response to afferent stimulation of differing modality (irritation of the somatic nerves, light, and sound). Responses to light and sound were less stable than the evoked potentials caused by stimulation of the sciatic and brachial nerves. Responses to light and sound are more pronounced in the medial regions of the entorhinal cortex. T.M.

A70-13071 #
TOPOGRAPHIC ARRANGEMENT OF THE TEMPORAL CORTEX NEURON PROJECTIONS IN THE HIPPOCAMPUS OF THE RABBIT (TOPOGRAFICHNE ROZTASHUVANNIA PROEKTSII NEIRONIV KORI SKRONEVOI DILIANKI V GIPOKAMPI KROLIKA).
V. S. Bilokrinits'kii (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Viddil Elektrofiziologii and Laboratoriia Morfologii Nervovoi Sistemi, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 15, Sept.-Oct. 1969, p. 641-650. 19 refs. In Ukrainian.

Experimental demonstration of the existence of direct links between the temporal cortex neurons and the neurons in each division of the hippocampus, and description of regularities in the organization of these links. It is shown that the quantity of temporal-cortex neuron axons penetrating into the different regions of the hippocampus is unequal, probably due to their functions. T.M.

A70-13072 #
PENETRATION OF DNA INTO YEAST CELLS IRRADIATED BY FAST NEUTRONS (PRO PRONIKNENNIA DNK U DRIZHDZHOVI KLITINI, OPROMINENI SHVIDKIMI NEITRONAMI).
E. Iu. Chebotar'ov, E. Z. Riabova, V. M. Indik, and B. P. Matseliukh (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii and Institut Mikrobiologii i Virusologii, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 15, Sept.-Oct. 1969, p. 695-698. 16 refs. In Ukrainian.

Experimental study of the features of DNA penetration into normal and irradiated (by fast neutrons at 10,000 rad) yeast cells using the method of immunofluorescent microscopy. DNA penetrates into nonirradiated cells in two stages: (1) adsorption on the cell wall and (2) penetration into the protoplasm. Within the cell, DNA is distributed on the basis of the functional state of the cell. In irradiated cells, the adsorption stage is only weakly evident. Within the cell, DNA is arranged in a large conglomeration. T.M.

A70-13073 #
SYNCHRONIZING AND DESYNCHRONIZING SYSTEMS OF THE CEREBRUM (SINKHRONIZUIUCHI I DESINKHRONIZUIUCHI SISTEMI GOLOVNOGO MOZKU).
P. M. Serkov (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR) and R. F. Makul'kin (Odes'kii Medichnii Institut, Odessa, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 15, Sept.-Oct. 1969, p. 699-707. 70 refs. In Ukrainian.

Survey of available experimental data confirming the presence of separate systems which synchronize and desynchronize electrical activity in the cerebrum. The most important systems consist of the corticothalamic synchronizing system and the reticular desynchronization system. The activity of these systems is closely associated with the archipaleocortex and plays a role in the mechanisms of sleep and wakefulness. T.M.

A70-13215 #
CERTAIN PHYSICOCHEMICAL PROPERTIES OF TWO CORONARY DILATATION MEDIA SECRETED BY THE HYPOTHALAMUS OF DIFFERENT ANIMALS (NEKOTORYE FIZIKOKHIMICHESKIE SVOISTVA DVUKH KORONARORASSHIRIAIUSHCHIKH VESHCHESTV, VYDELENNYKH IZ GIPOTALAMUSA RAZLICHNYKH ZHIVOTNYKH).
A. A. Galoian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR).
Akademiia Nauk Armianskoi SSR, Doklady, vol. 48, no. 5, 1969, p. 284-287. 5 refs. In Russian.

Experimental study of the physicochemical properties of different fractions of hypothalamic secretions responsible for coronary dilatation in rats, cattle, and pigs. Studies involved ion-exchange chromatography, gel filtration, electrophoresis, absorption spectral analysis, and emission microspectral analysis. Tabulated data are presented regarding solubility, thermal stability, dialysis capability, mobility in an electrophoretic field, amount of amino acids, and stability in different media. T.M.

A70-13216 #
REPRESENTATION OF SKIN SENSITIVITY IN THE CEREBELLAR CORTEX OF THE CAT IN A CHRONIC EXPERIMENT (O PREDSTAVITEL'STVE KOZHNOI CHUVSTVITEL'NOSTI V KORE MOZZHECHKA KOSHKI V KHRONICHESKOM EKSPERIMENTE).
L. L. Kazarian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR).
Akademiia Nauk Armianskoi SSR, Doklady, vol. 48, no. 5, 1969, p. 301-306. 10 refs. In Russian.

Assessment of experimental data regarding the evoked potentials of the cerebellar cortex of cats under electrocutaneous stimulation in a chronic experiment involving a normal living organism. Studies were conducted on ten cats with chronically implanted spherical silver electrodes, epidurally positioned in different regions of the cerebellar anterior section, posterior vermis, and hemispheres. The results differ significantly from those previously obtained in acute experiments and provide additional information about the afferent system carrying cutaneous sensations to the cerebellum. T.M.

A70-13217 #
INVESTIGATION OF THE BACKGROUND ELECTRICAL RHYTHMICITY OF THE CEREBRAL CORTEX AND OF CERTAIN SUBCORTICAL STRUCTURES DURING THE DEVELOPMENT OF CONDITIONED REFLEXES IN CATS (ISSLEDOVANIE FONOVOI ELEKTRICHESKOI RITMIKI KORY MOZGA I NEKOTORYKH PODKORKOVYKH STRUKTUR PRI VYRABOTKE USLOVNYKH REFLEKSOV U KOSHEK).
S. A. Arutiunian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR).
Akademiia Nauk Armianskoi SSR, Doklady, vol. 48, no. 5, 1969, p. 307-312. 14 refs. In Russian.

Measurement of the background electrical activity of different sections of the cat brain during the development of both positive and inhibitory conditioned reflexes. Tests were conducted on twelve adult cats with chronically implanted electrodes in the visual, auditory, associative, and motor regions of the cortex, in the corpus geniculatum laterale, and in the formatio reticularis of the midbrain. The most evident electrophysiological effect of the stimulant processes on the background rhythms consists of a shift toward higher frequencies. Inhibitory reactions are reflected by the prevalence of rarer rhythms in the EEG. T.M.

A70-13260
THE SAS SYSTEM OF SELECTION OF PILOTS. I.
Arne Trankell (Stockholm, Universitet, Stockholm, Sweden).
Flight Safety, vol. 3, Sept. 1969, p. 10, 11.

History of the Scandinavian Airlines' system of pilot selection, initiated in 1948. A theoretical account of the work of airline pilots was used to describe the demands that must be made on prospective pilots. Personality traits and behavior characteristics were listed, and a battery of measuring instruments was constructed. Guidelines were formulated for a clinical examination of each applicant, and instructions were established to guide the psychologists in their analyses and interpretations of data, their final collation of the results, and their hypothetical ratings of personality and future performance. F.R.L.

A70-13261
THE BIPHASIC NATURE OF PILOT ERROR IN GLIDING ACCIDENTS.
D. B. James.
Flight Safety, vol. 3, Nov. 1969, p. 3, 4. 5 refs.

Discussion of theoretical considerations based on the curve of the Yerkes-Dodson Law, which suggests that accidents have a biphasic nature. A hypothesis based on these considerations is supported by a study of accident reports due to pilot error in the sport of gliding. Suggestions are made as to means of reducing aircraft accidents based on these findings. M.M.

A70-13262
THE SAS SYSTEM OF SELECTION OF PILOTS. II.
Arne Trankell (Pedagogiska Institutionen, Stockholm, Sweden).
Flight Safety, vol. 3, Nov. 1969, p. 5-10.

Description of the methods used by SAS in selecting pilots trained by the Danish, Norwegian, or Swedish Air Force. The applicant's earlier life, development, and professional career are examined by two independent psychologists. The applicant is then subjected to a specially structured situation in which his ability to stand the stress arising when his simultaneous capacity is strained beyond his ability can be studied in a micromodel of reality. This is followed by a check on and interpretation of the ways in which the testee has solved the problems of the various capacity tests. The last task in the individual examination consists of the writing of a report and the summarizing ratings of the assessment and conclusive suitability variables. In addition to the psychological tests, each selection session includes a compulsory medical examination and conventional interviews with representatives of the personnel managements in the regions. M.M.

A70-13301
PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA).
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969. 142 p. In Russian.

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MECHANISM OF THE PROTECTIVE ACTION OF PYRIDINE DERIVATIVES (O MEKHANIZME ZASHCHITNOGO DEISTVIIA PROIZVODNYKH PIRIDINA). E. V. Burlakova, K. S. Burdin, I. M. Parkhomenko, and V. I. Afonin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 12-20. 11 refs. (See A70-13303 03-04)

ULTRAWEAK LUMINESCENCE OF THE CELLULAR ORGANELLAE OF IRRADIATED ANIMALS (SVERKHSLABOE SVECHENIE KLETOCHNYKH ORGANELL OBLUCHENNYKH ZHIVOTNYKH). V. S. Danilov and Iu. P. Kozlov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 21-29. 14 refs. (See A70-13304 03-04)

FREE-RADICAL PROCESSES IN IRRADIATED BIOLOGICAL SYSTEMS (SVOBODNORADIKAL'NYE PROTSESSY V OBLUCHENNYKH BIOLOGICHESKIKH SISTEMAKH). Iu. P. Kozlov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 30-46. 19 refs. (See A70-13305 03-04)

PHOTODYNAMIC DAMAGE IN CELLS AND THEIR PROTECTION (FOTODINAMICHESKOE POVREZHDENIE I ZASHCHITA KLETOK). I. P. Parkhomenko, L. A. Sverdlova, L. A. Zakirov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), and Iu. A. Kriger, p. 47-59. 21 refs. (See A70-13306 03-04)

USE OF BIOLOGICAL OBJECTS AND OF A RADIOMIMETIC MODEL IN STUDYING THE PROPERTIES AND THE PROTECTIVE ACTION OF RADIOPROPHYLACTIC MATERIALS (ISPOL'ZOVANIE BIOLOGICHESKIKH OB'EKTOV I RADIOMIMETICHESKOI MODELI DLIA IZUCHENIIA SVOISTV I ZASHCHITNOGO DEISTVIIA RADIOPROFILAKTICHESKIKH VESHCHESTV). Iu. B. Kudriashov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 60-98. 37 refs. (See A70-13307 03-04)

EFFECT OF SEPARATE IRRADIATION OF THE ENZYME AND THE SUBSTRATE ON THE DYNAMICS OF PROTEOLYSIS (VLIIANIE RAZDEL'NOGO OBLUCHENIIA FERMENTA I SUBSTRATA NA DINAMIKU PROTEOLIZA). B. A. Lomsadze (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR; Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR), p. 99-109. 29 refs. (See A70-13308 03-04)

ANTIOXIDATIVE ACTIVITY OF LIPIDS IN RADIATION LESIONS (ANTIOKSIDATIVNAIA AKTIVNOST' LIPIDOV PRI LUCHEVOM PORAZHENII). B. N. Tarusov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and N. N. Lukin, p. 110-114. 8 refs. (See A70-13309 03-04)

MEDIATING ACTION OF RADIOPROTECTORS UNDER CONDITIONS ENCOUNTERED IN LIVING SYSTEMS (OB OPOSREDOVANNOM DEISTVII RADIOPROTEKTOROV V USLOVIIAKH ZHIVYKH SISTEM). G. V. Sumarukov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 115-123. 24 refs. (See A70-13310 03-04)

PROTECTION OF MAMMALS FROM IONIZING RADIATION WITH THE AID OF DITHIOLS (ZASHCHITA MLEKOPITAIUSHCHIKH OT IONIZIRUIUSHCHEGO IZLUCHENIIA S POMOSHCH'IU DITIOLOV). A. G. Tarasenko and V. M. Fedoseev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), p. 124-140. 24 refs. (See A70-13311 03-04)

A70-13302 #
INVESTIGATION OF FREE-RADICAL PROCESSES IN CELLULAR ORGANELLAE OF THE LIVER BY THE METHOD OF GRAFT COPOLYMERIZATION (ISSLEDOVANIE SVOBODNORADIKAL'NYKH PROTSESSOV V KLETOCHNYKH ORGANELLAKH PECHENI METODOM PRIVITOI SOPOLIMERIZATSII).
A. S. Arkhipov, E. V. Burlakova, and Iu. P. Kozlov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 3-11. 14 refs, In Russian.

Study of the postradiation free-radical processes in cellular fractions of the liver of white male rats exposed to 200, 650, and 1500 r doses of total gamma irradiation. A method of AA C-14 graft copolymerization developed by Kozlov and Tarusov (1966) is used in detecting free radicals in the samples. The various fundamental changes observed in the free radical processes in the liver organellae of irradiated rats are discussed. V.Z.

A70-13303 #
MECHANISM OF THE PROTECTIVE ACTION OF PYRIDINE

DERIVATIVES (O MEKHANIZME ZASHCHITNOGO DEISTVIIA PROIZVODNYKH PIRIDINA).
E. V. Burlakova, K. S. Burdin, I. M. Parkhomenko, and V. I. Afonin (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 12-20. 11 refs. In Russian.

Study of the radioprotective action of AET, pyridine, vinyl pyridine, copper and cobalt thiopicoline anidine chelates, thiopicoline anisidine, cobalt thiopicoline anisidine chelate, copper alpha-methylthiopicolinetolidine chelate, mannitol, and vinyl pyrrolidone in cells from the heart of a monkey and in embryonic cells of the human epithelium exposed to 320, 480, 640, and 800 r doses of gamma radiation. The antioxidation action of these compounds is evaluated by using the dioxyphenyl alpha-alanine oxidation reaction. Hypothetical mechanisms of the radioprotective action of these agents are discussed. V.Z.

A70-13304 #
ULTRAWEAK LUMINESCENCE OF THE CELLULAR ORGANELLAE OF IRRADIATED ANIMALS (SVERKHSLABOE SVECHENIE KLETOCHNYKH ORGANELL OBLUCHENNYKH ZHIVOTNYKH).
V. S. Danilov and Iu. P. Kozlov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 21-29. 14 refs. In Russian.

Investigation of the kinetics of radiation damage and spectral properties of the cellular organellae of the liver of white male rats exposed to 200, 600, and 1500 r doses of gamma radiation. The time variable changes in the intensity of the luminescence of irradiated cell suspensions are discussed, noting that the damaging effects of stronger radiation doses are more severe. V.Z.

A70-13305 #
FREE-RADICAL PROCESSES IN IRRADIATED BIOLOGICAL SYSTEMS (SVOBODNORADIKAL'NYE PROTSESSY V OBLUCHENNYKH BIOLOGICHESKIKH SISTEMAKH).
Iu. P. Kozlov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 30-46. 19 refs. In Russian.

Application of the graft copolymerization and chemiluminescence methods to a study of the free-radical processes in various animal and plant tissue homogenates exposed to 600 to 1500 r doses of gamma radiation. The substantial role of free-radical states, notably lipids and their complexes, in the mechanism of the radiation damage sustained by irradiated biological materials is discussed. V.Z.

A70-13306 #
PHOTODYNAMIC DAMAGE IN CELLS AND THEIR PROTECTION (FOTODINAMICHESKOE POVREZHDENIE I ZASHCHITA KLETOK).
I. P. Parkhomenko, L. A. Sverdlova, L. A. Zakirov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR), and Iu. A. Kriger.
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 47-59. 21 refs. In Russian.

Review of published studies concerning the nature of damage caused by light in biological cells, discussing possible approaches to damage prevention. Special attention is given to free-radical processes as damage originators. The protective action of thiourea against photodynamic hemolysis is considered, along with that of mono- and polyvinylpyrrolidon, cysteine, and a group of antibiotics. An inhibitive effect on photodynamic damage is established in neomycin, oleandomycin, eritromycin, and polymyxin. V.Z.

A70-13307 #
USE OF BIOLOGICAL OBJECTS AND OF A RADIOMIMETIC MODEL IN STUDYING THE PROPERTIES AND THE PROTECTIVE ACTION OF RADIOPROPHYLACTIC MATERIALS (ISPOL'ZOVANIE BIOLOGICHESKIKH OB'EKTOV I RADIOMIMETICHESKOI MODELI DLIA IZUCHENIIA SVOISTV I ZASHCHITNOGO DEISTVIIA RADIOPROFILAKTICHESKIKH VESHCHESTV).
Iu. B. Kudriashov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 60-98. 37 refs. In Russian.

Tentative evaluation of the radioprotective action of a large group of aminoalkylthiols, aminoalkyl disulfides, aminoalkyl isothiurons, aminoalkylthiosulfuric acids, thiazolidine, and inhibitors of free radical reactions in mouse tissues, erythrocytes, and yeast cells. The objects were exposed to various X-ray doses or to the action of various radiomimetic agents, such as oxidized oleic acid which simulates most completely the action of "lipid radio toxins." It is expected that a radiomimetic model using yeast cells will contribute to further studies of the effectiveness of new radioprotective agents. V.Z.

A70-13308 #
EFFECT OF SEPARATE IRRADIATION OF THE ENZYME AND THE SUBSTRATE ON THE DYNAMICS OF PROTEOLYSIS (VLIIANIE RAZDEL'NOGO OBLUCHENIIA FERMENTA I SUBSTRATA NA DINAMIKU PROTEOLIZA).
B. A. Lomsadze (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR; Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 99-109. 29 refs. In Russian.

Study of postirradiation changes in the proteolytic activity of cathepsin C (prepared according to Dela Haba et al. (1955), trypsin, and cysteine in four series of experiments on hemoglobin-albumin-globulin substrates, with the enzyme and substrate components unexposed or separately exposed to gamma radiation doses from 150 to 200 kr. It is found that the protheolysis of serum albumin by trypsin was stimulated markedly after irradiation of both the trypsin and the albumin. The stimulating effect is linked to radiation-induced changes in proteins. V.Z.

A70-13309 #
ANTIOXIDATIVE ACTIVITY OF LIPIDS IN RADIATION LESIONS (ANTIOKSIDATIVNAIA AKTIVNOST' LIPIDOV PRI LUCHEVOM PORAZHENII).
B. N. Tarusov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR) and N. N. Lukin.
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 110-114. 8 refs. In Russian.

Study of free-radical oxidation reactions in the lipid elements of cells from the blood, liver, spleen, brain, and intestines of rats exposed (from 4 to 240 hr) to 650 and 1500 r doses of ionizing radiation. The intensity of the extinction of the anodic chemiluminescence of a carbon tetrachloride-methanol-ethanol mixture by samples of irradiated tissues is used as a criterion of lipid antioxidative activity. A depression of the antioxidative activity is observed in irradiated cells from the liver, spleen, and intestines. V.Z.

A70-13310 #
MEDIATING ACTION OF RADIOPROTECTORS UNDER CONDITIONS ENCOUNTERED IN LIVING SYSTEMS (OB OPOSREDOVANNOM DEISTVII RADIOPROTEKTOROV V USLOVIIAKH ZHIVYKH SISTEM).
G. V. Sumarukov (Moskovskii Gosudarstvennyi Universitet, Biologo-Pochvennyi Fakul'tet, Kafedra Biofiziki, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 115-123. 24 refs. In Russian.

Review of Soviet and foreign studies concerning the mechanism of the radioprotective action of various chemical agents on the organism. Experiments of Kudriashev et al. (1966) on mice with cystamin, cysteamin, and aminoethyl are considered. Equal decreases in the redox potential were observed, suggesting only a mediating action of these radioprotective agents. V.Z.

A70-13311 #
PROTECTION OF MAMMALS FROM IONIZING RADIATION WITH THE AID OF DITHIOLS (ZASHCHITA MLEKOPITAIUSHCHIKH OT IONIZIRUIUSHCHEGO IZLUCHENIIA S POMOSHCH'IU DITIOLOV).
A. G. Tarasenko and V. M. Fedoseev (Moskovskii Gosudarstvennyi Universitet, Khimicheskii Fakul'tet, and Mezhfakul'tetskaia Laboratoriia Biologicheskoi Khimii, Moscow, USSR).
IN: PHYSICOCHEMISTRY OF RADIATION DAMAGE (FIZIKO-KHIMIIA LUCHEVOGO PORAZHENIIA). (A70-13302 03-04)
Edited by Iu. P. Kozlov.
Moscow, Izdatel'stvo Moskovskogo Universiteta, 1969, p. 124-140. 24 refs. In Russian.

Evaluation of the protective effect of a large group of dithiols against ionizing radiation in mammals in the light of published Soviet and foreign studies. Experiments with 2,3-dimercaptopropylamine and its derivatives on white mice are described in detail. Theories concerning the mechanism of their radioprotective action are discussed. Contrary to an existing view, it is believed that the oxygen pressure drop produced by these compounds in tissues is not immediately involved in the mechanism of protective action but only accompanies it and may prolong the protective effect. V.Z.

A70-13403 #
CHANGES IN VASCULAR REFLEXES DUE TO MYOGENIC ACTIVITY (IZMENENIE SOSUDISTYKH REFLEKSOV POD VOZDEISTVIEM MYSHECHNOI DEIATEL'NOSTI).
M. M. Iusupova.
Akademiia Nauk Kazakhskoi SSR, Vestnik, vol. 25, Sept. 1969, p. 66-69. In Russian.

Plethysmographic investigation of the influence of myogenic loads on the state of the central nervous system of sportsmen. It is found that the plethysmograms truly depict the central and peripheral mechanism in response to various vascular loads. The results obtained for sportsmen made to run short and long distances are tabulated. V.P.

A70-13425 #
INFLUENCE OF THE REMOVAL OF THE NEOCORTEX ON THE MOTIVATIONAL EMOTIONAL REFLEXES (VLIIANIE UDALENIIA NOVOI KORY NA MOTIVATSIONNO-EMOTSIONAL'NYE REFLEKSY).
Ia. K. Badridze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR).
Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol. 55, July 1969, p. 177-180. 11 refs. In Russian.

Discussion of experiments performed with cats showing that a conditional emotional reaction of fear can be produced by electric stimulation of the anterior hypothalamus. After neodecortication, this reaction vanishes and can be restored only by a large number of combinations (70 to 90) of a conditional signal with an unconditional stimulus. The reaction of fear in neodecorticated animals is of a diffusive nature. These findings are interpreted by the presence of a constant regulating influence of the neocortex on the subcortical formations of the brain. V.P.

A70-13430 #
INFLUENCE OF THE REMOVAL OF THE SOMATOSENSORY CORTEX ON THE INTERACTION BETWEEN ASSOCIATIVE RESPONSES TO VARIOUS PERIPHERAL STIMULI (VLIIANIE UDALENIIA SOMATOSENSORNOI KORY NA VZAIMODEISTVIE ASSOTSIATIVNYKH OTVETOV, VOZNIKAIUSHCHIKH NA RAZNYE PERIFERICHESKIE RAZDRAZHENIIA).
S. P. Narikashvili, D. V. Kadzhaia, and A. S. Timchenko (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR).
Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol. 55, Sept. 1969, p. 689-692. 7 refs. In Russian.

Determination, in chloralosed cats, of the time lapse between the application of stimuli pairs (contralateral forepaw stimulation and light flash) and the partial and entire blocking of the test associative responses (recorded in the central suprasylvian gyrus) before and after bilateral aspiration of the somatosensory cortex. It was found that after removal of the cortex, the test associative response to skin stimulation was blocked by a light flash more effectively than before the operation. At the same time, the blocking action of skin stimulation on the test associative response to a light flash was appreciably weaker than before the operation. V.P.

A70-13476 #
BIOLOGICAL EFFECT OF PULSED NOISE (BIOLOGICHESKOE DEISTVIE IMPUL'SNYKH SHUMOV).
V. N. Morozov, I. M. Iakimets, and V. M. Istlent'ev.
Voenno-Meditsinskii Zhurnal, Aug. 1969, p. 53-58. 11 refs. In Russian.

Discussion of the biological effects of isolated and periodic noise lasting from fractions of a second to several seconds on the human organism, on the basis of the results obtained by various investigators. The mechanism of the biological effect of pulsed noise of various origins is deduced from these literature data. Pulsed noise is shown to act not only through the auditory duct as an adequate stimulant of the specialized auditory analysor system, but also through nonspecialized baric and mechanical reception systems, causing a nonspecific reaction of the entire organism which manifests itself in the form of various functional shifts originating primarily in the nerve centers. V.P.

A70-13477 #
CHANGES IN THE FUNCTIONAL STATE OF THE ORGANISM AWAITING AND PERFORMING A PARACHUTE JUMP (IZMENENIE FUNKTSIONAL'NOGO SOSTOIANIIA ORGANIZMA PERIOD PODGOTOVKI I SOVERSHENIIA PRYZHKA S PARASHIUTOM).
L. A. Kustov and M. I. Brusakov.
Voenno-Meditsinskii Zhurnal, Aug. 1969, p. 64-68. In Russian.

Determination of changes in the functional state of the organism of a parachutist performing a parachute jump from an aircraft flying at heights between 800 to 1000 m at speeds on the order of 300 km/hr. The functional state was studied by a modification of the orthostatic test, a test involving retention of expiration and inspiration, and the Howard version of the step test. The observed appreciable changes in the functional state of parachutists are diagramed and discussed. V.P.

A70-13478 #
COMPLEX TEST FOR DIFFERENTIATING BETWEEN FUNCTIONAL AND ORGANIC SYSTOLIC MURMUR (KOMPLEKSNAIA PROBA DLIA DIFFERENTSIATSII FUNKTSIONAL'NYKH I ORGANICHESKIKH SISTOLICHESKIKH SHUMOV).
M. A. Krivonosov and I. L. Abram.
Voenno-Meditsinskii Zhurnal, Aug. 1969, p. 70-72. In Russian.

Description of a phonocardiography test which proved to be extremely effective in differentiating between functional and organic systolic murmurs. After recording the initial phonocardiogram in the state of rest, the point of maximum systolic noise intensity is determined, and a phonocardiogram is then obtained at this point after application of a physical load (15 situps). After 10 min of rest, the patient inhales amyl nitrate 10 times for 30 sec, and the phonocardiogram is again obtained at the same point. Fifteen minutes after inhaling, the patient is given a subcutaneous injection of 1 ml of a 0.1 per cent solution of atropine sulfate, and a phonocardiogram is again obtained 20 min after injection. The phonocardiograms thus obtained make it possible to determine the nature of the systolic murmur. V.P.

A70-13490 #
SIMULATION OF THE BLOOD CIRCULATION SYSTEM (O MODELIROVANII V SISTEME KROVOOBRASHCHENIIA).
Sh. Z. Usmanova (Akademiia Nauk Uzbekskoi SSR, Institut Kibernetiki and Vychislitel'nyi Tsentr, Tashkent, Uzbek SSR).
Akademiia Nauk Uzbekskoi SSR, Izvestiia, Seriia Tekhnicheskikh Nauk, vol. 13, no. 4, 1969, p. 63-66. In Russian.

Examination of problems involved in the simulation of blood circulation dynamics, and description of an electrical analog of the cardiovascular system. The determination of the blood flow rate and of the pressure in the load elements (the aorta and the peripheral vascular system) is reduced to the determination of currents and voltages in an equivalent electric circuit. Expressions are derived which provide electrical approximations of the functions of cardiovascular organs. T.M.

A70-13491 #
PROBLEMS OF BIOPHYSICS (PROBLEMY BIOFIZIKI).
S. E. Bresler (Akademiia Nauk SSSR, Institut Vysokomolekuliarnykh Soedinenii, Leningrad, USSR).
Uspekhi Fizicheskikh Nauk, vol. 98, Aug. 1969, p. 653-708. 15 refs. In Russian.

Survey of the current state of several fundamental problems is biophysics, and identification of the most important trends of research in this area. The structures and functions of the more important classes of biological molecules are reviewed, along with the synthesis processes for proteins, nucleic acids, and genetic codes. The control of protein synthesis is examined, beginning with the control process in bacteria and considering the presently unsolved problems of the development and differentiation in higher organisms. The mechanisms for the formation of complex supramolecular biological structures are discussed on the basis of experimental data obtained for a bacteriophage model. The functions of biological membranes are considered, and the electric signals and the coding process in the nervous system are outlined. T.M.

A70-13510 #
REACTIONS OF NEURONS OF THE CEREBELLAR NUCLEI OF CATS ON THE ADEQUATE RESPONSE OF THE VESTIBULAR APPARATUS (REAKTSII NEIRONOV IADER MOZZHECHKA KOSHEK NA ADEKVATNOE RAZDRAZHENIE VESTIBULIARNOGO APPARATA).
R. A. Grigor'ian and E. M. Kristi (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR).
Akademiia Nauk SSSR, Doklady, vol. 188, Sept. 1, 1969, p. 249-252. 19 refs. In Russian.

Investigation showing that the neurons of the tegmental nucleus of the cerebellum provide the best response to changes in acceleration. They also provide the most specific response to a natural stimulation of the vestibular apparatus by the cells of intracerebellar nuclei. V.P.

A70-13542
SICKNESS IN SPACE.
James Reason (Leicester, University, Dept. of Psychology, Leicester, England).
New Scientist, vol. 44, Oct. 2, 1969, p. 28-31.

Discussion of the causes and prevention of motion sickness during prolonged space flights. The role of the vestibular system in motion sickness in both weightless flight and rotating spacecraft is explained. The visual-inertial and canal-otolith incongruities characteristic of the situations that produce motion sickness are discussed. The methods used to prevent motion sickness are briefly described. Z.W.

A70-13551 *
PARAMAGNETIC UNIT IN SPINACH SUBCHLOROPLAST PARTICLES—ESTIMATION OF SIZE.
E. C. Weaver (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.) and H. E. Weaver (Varian Associates, Analytical Instrument Div., Palo Alto, Calif.).
Science, vol. 165, Aug. 29, 1969, p. 906, 907. 5 refs.

Use of a pulsed ruby laser (wavelength 694.3 nm) to measure the dependence on light intensity of light-induced electron paramagnetic resonance (EPR) signal I for short flashes of uniform duration (400 microsec). Approximately 10^{18} photons per sq cm per flash from the unattenuated beam were available to the sample of subchloroplast "system I" particles from spinach. It is considered that the paramagnetic state is a property of an aggregate of chlorophyll molecules of the same general size as the photosynthetic unit. F.R.L.

A70-13570
THE EFFECTS OF TIME-VARYING BLOOD FLOW ON DIFFUSIONAL RESISTANCE TO OXYGEN TRANSFER IN THE PULMONARY CAPILLARIES.
Henry J. Graeser, Young G. Kim, and Edward D. Crandall (Northwestern University, Dept. of Chemical Engineering, Evanston, Ill.; Notre Dame, University, Dept. of Chemical Engineering, Notre Dame, Ind.).
Biophysical Journal, vol. 9, Sept. 1969, p. 1100-1114. 21 refs.

Study of the effects of the persistence of pulsatile blood flow in the pulmonary capillaries on the overall diffusing capacity and alveolar-arterial oxygen tension gradient. A mathematical analysis was made of the oxygen transfer process using an undamped cardiac flow pulse in the capillaries and taking into account the finite rate of reaction of oxygen with hemoglobin. In five cases of both normal and low oxygen atmospheres, combined with varying degree of exercise, it was found that the alveolar-arterial oxygen tension gradients were not affected by the time-varying blood flow, while in cases of breathing air the overall diffusing capacity of the lung increased 10 to 15 per cent over the diffusing capacity obtained with constant blood flow rate in the pulmonary capillaries. (Author)

A70-13571
LEFT VENTRICULAR STRESSES IN THE INTACT HUMAN HEART.
I. Mirsky (Harvard University, Harvard Medical School, Dept. of Medicine; Peter Bent Brigham Hospital, Boston, Mass.).
Biophysical Journal, vol. 9, Feb. 1969, p. 189-208. 21 refs.
PHS Grants No. GM-14938-01-6458-2; No. 5-S01 FR-05489-069971-2.

Derivation of a set of stress differential equations of equilibrium for a thick prolate spheroid which is the assumed shape for the left ventricle. An analysis for the stresses in the ventricular wall indicates that maximum stresses occur at the inner layers and decrease to a minimum at the epicardial surface, a result that is partially validated by experiment. Simple expressions are available for the evaluation of maximum stresses which occur at the equator and are suitable for

small laboratory-oriented digital computers employed in the clinical evaluation of patient status. The surprising result is that Laplace's law yields practical values for mean stresses in thick-walled ventricles. (Author)

A70-13572
FORMULATION OF STATISTICAL EQUATION OF MOTION OF BLOOD.
H. S. Lew (California, University, La Jolla, Calif.).
Biophysical Journal, vol. 9, Feb. 1969, p. 235-245. 7 refs.
NSF Grant No. GK-1415; Grant No. AF AFOSR 1186-67.

Derivation of a general form of the statistical equation of motion of the blood by averaging the motion of individual elements of the blood over a small volume in space. This equation can be transformed into an explicit form to find the constitutive equations of the blood, provided that the detailed motion of the plasma in some neighborhood of a suspended particle is known. As a demonstration of such transformation, the general form of the statistical equation of motion is applied to the suspension of sphere with a very low concentration to find the effective viscosity.(Author)

A70-13625 *
CENTRAL INTEGRATION OF VISUAL HALF-FIELDS IN SPLIT-BRAIN MONKEYS.
R. Johnson Gavalas and R. W. Sperry (California Institute of Technology, Div. of Biology, Pasadena, Calif.).
Brain Research, vol. 15, Sept. 1969, p. 97-106. 10 refs.
PHS Grant No. MH-03372; Grant No. NGL-05-007-003.

Discussion of tests on split-brain monkeys, which suggest that visual information relayed to one eye, and presumably to one hemisphere, is not available to the second hemisphere. The study was designed to attempt to force the split-brain monkey to integrate visual pattern information across the two hemispheres. A circle and half-circle were presented to the monkey through a system of polarized lights and lenses so that each eye saw only two half-circles. In order for the animal to be consistently rewarded, he had to select the panel on which a projected full circle was formed. Four monkeys were trained as normals and operated on successively (optic chiasm and forebrain commissures). All of the animals eventually relearned the task. A small but persistent deficit in postcriterion performance was observed after the posterior third of the corpus callosum was cut, following earlier transection of the chiasm, anterior commissure, and anterior two-thirds of the corpus callosum. Possible mediating mechanisms for such central integration are mentioned. F.R.L.

A70-13678
HEART VOLUME BY COMPUTER AIDED ANALYSIS OF PHOTOGRAPHIC IMAGES--A PROGRESS REPORT.
Allan H. Gott, Frederick H. Voss (Aerospace Corp., El Segundo, Calif.), Allen F. Bowyer (Loma Linda University, Loma Linda, Calif.), and Bessie L. Lendrum (Illinois, University, Urbana, Ill.).
IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS, ANNUAL TECHNICAL SYMPOSIUM, 13TH, WASHINGTON, D.C., AUGUST 19-23, 1968, PROCEEDINGS. VOLUME 1. (A70-13651 03-14)
Symposium supported by the U.S. Air Force, the U.S. Army, the U.S. Navy, and NASA.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation Engineers, 1969, p. 375-386. 5 refs.
Research supported by the Aerospace Corp., the University of Illinois, and NIH.

Description of the results of a computer-aided evaluation of the photographic imagery of the heart volume obtained by means of cineangiography. The study to date has clearly established the following: (1) ellipsoidal computation of the left ventricle (LV) volume has resulted in a significant reduction in data reduction time, and provided the physician with rapid access to important diagnostic information; (2) any LV chamber edge determination involves the interaction of multiple factors not all of which are commonly controlled; and (3) LV chamber volume computation by densitometric measurements are probably feasible when appropriate optimization of radiologic/photographic/optoelectronic factors is accomplished. M.M.

A70-13679
BIOLOGICAL EFFECTS OF LASER RADIATION.
Marvin N. Stein (U.S. Armed Forces Institute of Pathology, Laser Laboratory, Washington, D.C.; Eye Research Foundation, Biophysics Div., Bethesda, Md.).
IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS, ANNUAL TECHNICAL SYMPOSIUM, 13TH, WASHINGTON, D.C., AUGUST 19-23, 1968, PROCEEDINGS. VOLUME 1. (A70-13651 03-14)
Symposium supported by the U.S. Air Force, the U.S. Army, the U.S. Navy, and NASA.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation Engineers, 1969, p. 419, 420.

Discussion of the biological hazards arising from the use of laser technology. It is pointed out that the eye is undoubtedly the most vulnerable organ to exposure because it is often a part of the system or apparatus being employed. Although a single accidental, mild lesion on the retina will produce only a small blind spot in the visual field of the injured person, it is undesirable. An additional hazard may arise from transscleral exposure to a relatively intense laser beam. Although the surface effects may be a simple burn, which can be treated and will heal with relatively little permanent damage, it has been discovered in experiments with rabbits that occasionally a severe and unusual form of cataract is produced. It is noted that perhaps one of the most urgent requirements in the biomedical field is for a source of basic data on the physical properties of biological tissue, cells, and cell components. M.M.

A70-13680
A SHORT ANNOTATED BIBLIOGRAPHY ON LASER EYE PROTECTION.
C. Hermas Swope (American Optical Corp., Research Group, Framingham, Mass.).
IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS, ANNUAL TECHNICAL SYMPOSIUM, 13TH, WASHINGTON, D.C., AUGUST 19-23, 1968, PROCEEDINGS. VOLUME 1. (A70-13651 03-14)
Symposium supported by the U.S. Air Force, the U.S. Army, the U.S. Navy, and NASA.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation Engineers, 1969, p. 421-425. 17 refs.

Bibliography offering a cross section of the published literature on laser eye hazards. The information provided should make it possible to evaluate the potential eye hazard of a particular laser installation sufficiently well to take reasonable and adequate precautions. The references have been grouped, and under each heading the references have been ordered in the unorthodox manner of their publication date. Most references are followed by comments intended to aid the reader in placing each article in context. M.M.

A70-13681
LASER HAZARDS CONTROL IN THE LABORATORY AND IN THE FIELD.
David H. Sliney (U.S. Army, Environmental Hygiene Agency, Laser Hazards Branch, Edgewood Arsenal, Md.).
IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS, ANNUAL TECHNICAL SYMPOSIUM, 13TH, WASHINGTON, D.C., AUGUST 19-23, 1968, PROCEEDINGS. VOLUME 1. (A70-13651 03-14)
Symposium supported by the U.S. Air Force, the U.S. Army, the U.S. Navy, and NASA.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation Engineers, 1969, p. 427-430. 9 refs.

Brief description of the highlights of recent developments in the field of laser hazards and controls. Specific and commonly reoccurring problem areas which have been identified as a result of hazard evaluation of more than 500 laser operations performed by a

single organization are discussed. It is pointed out that lasers operated in an outdoor environment should be used in such a manner that the beam is terminated at the end of the useful beam path. It is also recommended that the parameters of laser protective eyewear, such as optical densities at appropriate laser wavelengths, be marked on the eyewear. M.M.

A70-13687 #
SLOW EEG POTENTIALS IN THE RHYTHM OF MOVEMENT AS ONE OF THE FORMS OF THE CORTICAL ACTIVITY OF THE CEREBRAL HEMISPHERES (MEDLENNYE POTENTSIALY EEG V TEMPE DVIZHENIIA KAK ODNA IZ FORM RABOCHEI AKTIVNOSTI KORY BOL'SHIKH POLUSHARII).
E. B. Sologub (Institut Fizicheskoi Kul'tury, Kafedra Fiziologii, Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1049-1058. 22 refs. In Russian.

Investigation of slow EEG potentials with amplitudes ranging from 50 to 100 microvolts and frequencies corresponding to the rhythm of movement. An autocorrelation and cross-correlation analysis of the EEG was conducted. It was found that during the initial period of intensive rhythmical work (running and rowing) and during the fatigue period the slow potentials occurring in the rhythm of movement emerge in isolated cortical functional structures. During the steady state these potentials concentrate in the area of one functional structure. Differences in the occurrence of the potentials were found for persons with sports or professional training and for persons without such training. Simple EEG indices of the personal work ability based on the slow potentials during a work test are recommended. G.R.

A70-13688 #
ORIGIN OF THE EARLY RESPONSE COMPONENT OF THE ASSOCIATIVE CORTICAL AREA IN THE CEREBRAL HEMISPHERES OF A CAT (K PROISKHOZHDENIIU RANNEGO KOMPONENTA OTVETA ASSOTSIATIVNOI OBLASTI KORY BOL'SHIKH POLUSHAVII GOLOVNOGO MOZGA KOSHKI).
V. S. Arutiunov (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR) and A. G. Poliakova (Akademiia Meditsinskikh Nauk SSSR, Institut Normal'noi i Patologicheskoi Fiziologii, Moscow, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1059-1069. 22 refs. In Russian.

Investigation of the origin of the response components of the associative cortical area in the cerebrum on the basis of tests with unanesthetized cats and with cats anesthetized with chloralose and Nembutal. It was found that the formation of the late component of the associative response is connected with a functional state which is conducive to the formation of polysensory neuron activity. The early component is generated under conditions of monosensory neuron activity. G.R.

A70-13689 #
ORIGIN OF ASSOCIATIVE EVOKED POTENTIALS IN THE ORBITAL CORTEX (K VOPROSU O PROISKHOZHDENII ASSOTSIATIVNYKH VYZVANNYKH POTENTSIALOV ORBITAL'NOI KORY).
V. N. Kazakov (Meditsinskii Institut, Kafedra Normal'noi Fiziologii, Vinnitsa, Ukrainian SSR).
Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1070-1078. 31 refs. In Russian.

Study of the origin and functional designation of components of evoked potentials (EP) in the orbital cortex in anesthetized cats. EP are obtained by stimulating peripheral nerves in the orbital cortex. Each phase of the EP is a separate component of the reaction in the associative cortex, having its own genesis and particular functional designation. The initial negative phase is found to be a result of the physical potential spreading from the specific cortex. The positive EP phase reflects the activity of neuron structures which receive the afferent signals. The negative EP phase is probably the result of excitation of the associative area. G.R.

A70-13690 #
INFLUENCE OF INCREASED OXYGEN PRESSURE ON CEREBRAL BIOELECTRIC ACTIVITY (VLIIANIE POVYSHENNOGO DAVLENIIA KISLORODA NA BIOELEKTRICHESKUIU AKTIVNOST' GOLOVNOGO MOZGA).
I. P. Berezin, V. A. Pigarev, and E. N. Lerner (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Khirurgicheskoi Apparatury i Instrumentov; Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1085-1091. 16 refs. In Russian.

Investigation of the effects of oxygen administered under increased oxygen partial pressure on the basis of EEG recordings. It was found that EEG recordings in unanesthetized animals may be employed for subclinical identification of the toxic effects of oxygen. Inhaling pure oxygen under atmospheric pressure for 3 hr causes no pathological changes in the cerebral bioelectric activity in animals. Convulsive activity in unanesthetized dogs in controlled inhalation of oxygen under 3-atm pressure becomes manifest after a period of 43.0 plus or minus 10.0 min. According to EEG data, this period of oxygen inhalation can be increased twofold when sodium thiopental anesthesia is employed. G.R.

A70-13691 #
ANALYSIS OF VASCULAR ELECTRICAL ACTIVITY (K ANALIZU ELEKTRICHESKOI AKTIVNOSTI KROVENOSNYKH SOSUDOV).
M. I. Vinogradova and I. A. Voronenkova (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Otdel Obshchei Fiziologii, Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1092-1099. 14 refs. In Russian.

Study of vascular electrical activity in cats and white rats by introducing a glass microelectrode into a blood vessel. The electrode makes it possible to record electrical activity differing in origin and nature from the pulsations inherent in vascular smooth muscles. This activity manifests itself in the form of continuous oscillations with an amplitude reaching 50 mV and a frequency of 400 per sec. The activity is conditioned by the blood flow in the vessel under study. Alterations in the frequency and duration of the oscillations are associated with the linear blood flow rate, the frequency being in direct and the duration in inverse relation to it. G.R.

A70-13692 #
INFLUENCE OF VESTIBULAR ANALYSOR STIMULATION UPON CEREBRAL BLOOD CIRCULATION IN MAN (VLIIANIE RAZDRAZHENIIA VESTIBULIARNOGO ANALIZATORA NA MOZGOVOE KROVOOBRASHCHENIE CHELOVEKA).
G. M. Nummaev (I Meditsinskii Institut, Tsentral'naia Nauchno-Issledovatel'skaia Laboratoriia, and Kafedra LOR-Boleznei, Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1100-1104. 7 refs. In Russian.

Study of vestibular analysor effects by investigating the alterations of cerebral blood circulation under conditions of angular accelerations in healthy humans, using a rheoencephalographic technique. Vestibular analysor stimulation is found to evoke various reactions in cerebral vessels. A vasospastic reaction was observed in 12 subjects in the internal carotid artery system. Temporary vasodilation was followed by vasoconstriction in eight subjects. The reaction of the vertebral artery system in the majority of subjects consisted of blood vessel dilation, while in a few subjects a vasospasm was found. G.R.

A70-13693 #
SINOCAROTID PRESSOR REFLEXES AND CORONARY CIRCULATION (PRESSORNYE SINOKAROTIDNYE REFLEKSY I KORONARNOE KROVOOBRASHCHENIE).
A. I. Khomaziuk, A. P. Neshcheret, and L. A. Iavorskii (Nauchno-Issledovatel'skii Institut Klinicheskoi Meditsiny, Otdel Patofiziologii, Kiev, Ukrainian SSR).

Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1105-1110. 10 refs. In Russian.

Discussion of experiments conducted in 40 dogs with intact thorax under morphine-chloralose anesthesia in order to study sinocarotid pressor reflexes and coronary circulation. It was found that the sinocarotid pressor reflexes were followed by increases in blood pressure, peripheral resistance, and pressure in cardiac cavities. Coronary artery resistance was either slightly increased or decreased. The active dilation of the coronary vessels was a regional reaction to alterations in cardiac activity. G.R.

A70-13694 #

EFFECT OF VAGOTOMY ON LUNG VENTILATION IN QUIET AND FORCED RESPIRATION (VLIIANIE VAGOTOMII NA VENTILIATSIIU LEGKIKH PRI SPOKOINOM I USILENNOM DYKHANII).

V. D. Glebovskii and V. A. Zhdanov (Pediatricheskii Meditsinskii Institut, Kafedra Normal'noi Fiziologii, Leningrad, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1118-1124. 19 refs. In Russian.

Study of the dependence of respiration rate, pleural pressure fluctuations, tidal volume, and lung ventilation on the increased carbon dioxide concentration in the inspired air previous to and following vagotomy. Reversed respiration from a spirograph filled with oxygen and lacking a carbon dioxide absorber was performed in intercollicularly decerebrated cats. It was found that carbon dioxide stimulates only the respiratory center structures determining the respiratory depth. Maximum pulmonary ventilation following vagotomy is decreased by more than half. The pulmonary afferent system plays an important part in ensuring high levels of pulmonary ventilation. The chemoreceptive mechanisms of pontobulbar cerebral structures are capable of ensuring adequate pulmonary ventilation at rest. G.R.

A70-13695 #

A SIMPLE FREQUENCY AMPLITUDE-THRESHOLD AUTOMATIC EEG ANALYZER (PROSTOI CHASTOTNYI AMPLITUDNO-POROGOVYI AVTOMATICHESKII ANALIZATOR EEG).

Iu. G. Kratin, A. I. Zavorotnyi, Iu. N. Petrov, and A. N. Solov'ev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 55, Sept. 1969, p. 1163-1166. 8 refs. In Russian.

Description of a frequency amplitude-threshold EEG analyzer in which the signals from each frequency filter are automatically distributed according to the amplitude of each frequency over one of several levels. The number and the values of these levels are previously established in accordance with the problem under investigation. This approach ensures objectivity of the evaluation of the EEG for each moment of the recording and for any period. G.R.

A70-13701 #

CERTAIN RESULTS OF A STUDY OF THE NATURE OF ORGANISM RESISTIVITY AND THE MECHANISMS OF CHANGES IN IT (NEKOTORYE ITOGI IZUCHENIIA PRIRODY REZISTENTNOSTI ORGANIZMA I MEKHANIZMOV EE IZMENENIIA).

Z. I. Barbashova.

Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 6-12. 38 refs. In Russian.

Review of Soviet and foreign published studies concerning the nature of the resistance of living organisms to biological environmental factors. Among the topics mentioned are the author's pressure chamber experiments on animals, tissue resistance studies, the biochemical properties of various tissues, cellular protein stability, and resistance alterations under various conditions. A relation is established between the resistance of the entire organism, the stability of its tissues, and the biochemical processes occurring in them under hypoxic conditions. V.Z.

A70-13702 #

RESPIRATION AND MINERAL DIET OF HYPOTHETICAL MARTIAN ORGANISMS AND OTHER PROBLEMS OF MARTIAN BIOLOGY (DYKHANIE I MINERAL'NOE PITANIE GIPOTETICHESKIKH MARSIANSKIKH ORGANIZMOV I DRUGIE VOPROSY BIOLOGII MARSA).

K. A. Liubarskii.

Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 12-17. 15 refs. In Russian.

Assessment of a biological model of hypothetical Martian organisms. The investigated model is based on the assumption that such organisms (1) perform photosynthesis with a pigment other than chlorophyll, having the principal absorption line in the blue spectral region, (2) contain a large amount of other hydrochrome pigments in their epithelium, (3) have a scale insect morphology with a single continuous assimilating surface, (4) have low-hydrated biocolloids and a highly concentrated intracellular liquid, (5) absorb moisture from the atmosphere or from surface hoarfrost, and (6) have low biomass growth rates. The following additions are made to the model: (1) iron oxide dust is used as a respiratory substrate, and (2) the pH of the intracellular liquid is low. V.Z.

A70-13703 #

EFFECT OF DEHYDRATED FOOD DIET ON THE FUNCTIONAL STATE OF THE HUMAN ORGANISM (VLIIANIE PITANIIA OBEZVOZHENNYMI PRODUKTAMI NA FUNKTSIONAL'NOE SOSTOIANIE ORGANIZMA CHELOVEKA).

V. P. Bychkov.

Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 17-23. 38 refs. In Russian.

Review of Soviet and foreign published studies concerning the effect of dehydrated food on the human organism. Among the topics covered are experiments on men and women confined in sealed chambers and open rooms on diets of dehydrated food of various caloric values, chemical composition, and methods of preparation. Natural food obtained a higher rating with respect to nutritional value and ease of digestion than dehydrated food in most experiments. V.Z.

A70-13705 #

CALCULATION OF A JUSTIFIED RISK DOSE FOR PROLONGED SPACE FLIGHTS (K RASCHETU DOZY OPRAVDANNOGO RISKA PRI DLITEL'NYKH KOSMICHESKIKH POLETAKH).

E. E. Kovalev, V. I. Popov, and V. A. Sakovich.

Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 29-32. 7 refs. In Russian.

Description of a procedure for calculating allowable doses of radiation as safety criteria during continuous exposures to radiation in prolonged space flights. The Blair effective radiation dose model is used to describe the radiation damage recuperation process in living organisms and the dependence of the justified-risk radiation dose on the exposure time. V.Z.

A70-13706 #

HEMOPOIETIC CHANGES IN DOGS DURING PROLONGED FRACTIONAL IRRADIATION (OB IZMENENIIAKH KROVETVORENIIA U SOBAK PRI DROBNOM PROLONGIROVANNOM OBLUCHENII).

M. F. Sbitneva, M. N. Trushina, N. I. Gvozdeva, and E. M. Samoilova.

Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 33-36. 13 refs. In Russian.

Study of hemopoietic changes in a group of ten dogs during and after a succession of four 24-hr exposures to 50-r doses of gamma radiation with six-day intermissions. The morphological composition of peripheral blood, the neutrophil myeloid hemopoiesis, the phagocytic activity, and the blood serotonin level are determined in the dogs. A temporary decrease in the leucocyte, thrombocyte, and myelokaryocyte populations, and a depression of the neutrophil phagocytic activity are established in the dogs after irradiation. V.Z.

A70-13707 #
SIGNIFICANCE OF IMMUNOBIOLOGICAL CHARACTERISTICS IN RADIATION DAMAGE DETECTION (ZNACHENIE IMMUNOBIOLOGICHESKIKH POKAZATELEI DLIA VYIAVLENIIA LUCHEVYKH POVREZHDENII).
G. M. L'vitsyna and S. A. Davydova.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 37-40. 7 refs. In Russian.

Study of changes in the natural immunity characteristics of a group of 15 dogs after single exposures to proton doses of 55, 89 and 160 rad. The integumentary bactericidal activity and microflora, the microflora in the oral mucus membrane, and the phagocytic activity of the blood neutrophils are determined in the dogs. A temporary depression of integumentary bactericidal activity was observed even after exposure to the lowest (55-rad) doses, while a stronger and persistent depression was apparent after stronger doses. V.Z.

A70-13708 #
NATURE OF THE BIOLOGICAL ACTION OF 50-MEV PROTONS ON THE INTESTINAL EPITHELIAL CELLS OF MICE (O KHARAKTERE BIOLOGICHESKOGO DEISTVIIA PROTONOV S ENERGIEI 50 MEV NA KLETKI KISHECHNOGO EPITELIIA MYSHI).
V. M. Mastriukova and A. D. Strzhizhovskii.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 41-45. 11 refs. In Russian.

Study of biological and morphological changes in the cells of the intestinal epithelium of a total of 195 mice one, three, five, seven, and nine days after single exposures to 50-MeV proton doses of 250 500, or 750 rad. A temporary depression of the mitotic activity with a decrease in the number of aberrant mitoses is observed in the experimental mice. V.Z.

A70-13709 #
MEDICAL TESTS PERFORMED DURING THE FLIGHTS OF THE SOYUZ 3, SOYUZ 4, AND SOYUZ 5 SPACE VEHICLES (MEDITSINSKIE ISSLEDOVANIIA VYPOLNENNYE VO VREMIA POLETOV KOSMICHESKIKH KORABLEI "SOIUZ-3," SOIUZ-4" I "SOIUZ-5").
E. I. Vorob'ev, Iu. G. Nefedov, L. I. Kakurin, B. B. Egorov, A. D. Egorov, A. G. Zerenin, and G. I. Kozyrevskaia.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 46-54. In Russian.

Preliminary results of medical observations performed on astronauts Beregovoi, Shatalov, Volynov, Khrunov, and Eliseev during Soyuz 3, 4, and 5 orbital flights. The observations covered the respiratory and cardiac activities, the body weight variations, and the blood and urine electrolytic composition. The temporary changes observed in these characteristics are found to be normal under space-flight conditions and suggest no pathological disorders. V.Z.

A70-13710 #
METHODOLOGICAL APPROACHES TO A STUDY OF THE EFFECTIVENESS OF LOCAL PROTECTION OF ASTRONAUTS (METODICHESKIE PODKHODY K IZUCHENIIU EFFEKTIVNOSTI LOKAL'NOI ZASHCHITY KOSMONAVTA).
G. M. Abramova, E. V. Ginsburg, R. A. Kuzin, G. F. Nevskaia, V. I. Popov, M. A. Sychkov, A. V. Shafirkin, and V. V. Iurgov.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 54-59. 17 refs. In Russian.

Discussion of experiments carried out on separated portions of frozen dog bodies in an attempt to determine the effectiveness of localized shielding in protecting specific areas of the body from radiation. Also described are similar experiments on a heterogeneous phantom dog consisting of a canine skeleton and a paraffin-soot mixture substituting for internal organs and muscles. Recommendations are made as to how such studies should be performed. V.Z.

A70-13711 #
EXPERIMENTAL STUDY OF DAILY PERIODS IN THE PHYSIOLOGICAL FUNCTIONS AND THE PERFORMANCE OF MAN WITH A SHIFTED SLEEP-WAKEFULNESS SCHEDULE (EKSPERIMENTAL'NOE IZUCHENIE SUTOCHNOI PERIODIKI FIZIOLOGICHESKIKH FUNKTSII I RABOTOSPOSOBNOSTI CHELOVEKA PRI SDVINUTOM RASPORIADKE SNA I BODRSTVOVANIIA).
A. N. Litsov.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 59-66. 29 refs. In Russian.

Study of the physiological functions and performance of a group of six healthy men subjected to solitary confinement for periods from 9 to 11 days with sleep from 1400 to 2300 hr and wakefulness from 2300 to 1400 hr. The adaptation of the organism to this activity schedule is discussed on the basis of the data obtained. V.Z.

A70-13712 #
CHANGES IN THE STABILITY OF THE OSSEOUS APPARATUS TO ACCELERATIONS AFTER PROLONGED EXPOSURE OF HUMANS TO WEIGHTLESSNESS (OB IZMENENII USTOICHIVOSTI KOSTNOGO APPARATA K PEREGRUZKAM POSLE DLITEL'NOGO PREBYVANIIA CHELOVEKA V USLOVIIAKH NEVESOMOSTI).
S. A. Gozulov and N. I. Frolov.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 67-71. 22 refs. In Russian.

Evaluation of the postweightlessness tolerance of the human skeleton to accelerations on the basis of available data. It is indicated that the acceleration tolerance of the spine after weightlessness can decrease 15 per cent when the proportion of mineral components in it is low. The possibility of decalcination of osseous tissues in prolonged space flights is also noted. V.Z.

A70-13713 #
EXCRETION AND BALANCE OF CERTAIN ELEMENTS DURING PROLONGED USE OF DEHYDRATED FOOD RATIONS (VYDELENIE I BALANS NEKOTORYKH ELEMENTOV PRI DLITEL'NOM ISPOL'ZOVANII RATSIONA IZ OBEZVOZHENNYKH PRODUKTOV).
E. I. Pokrovskaia, A. P. Tereshchenko, and V. P. Bychkov.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 71-75. 7 refs. In Russian.

Study of the excretion and balance of K, Ca, Mg, P, S, and N in a group of six subjects kept for a period of 120 days on dehydrated food diets. It is found that these characteristics remained without significant changes throughout the period. Only slight changes in the sulfur and calcium behavior could be established toward the end of the period. V.Z.

A70-13714 #
CONTACTLESS METHOD OF RECORDING THE CHARACTERISTICS OF THE CARDIOVASCULAR SYSTEM AND RESPIRATION (BESKONTAKTNAIA METODIKA REGISTRATSII POKAZATELEI SERDECHNO-SOSUDISTOI SISTEMY I DYKHANIIA).
R. M. Baevskii and I. I. Funtova.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 76-78. 6 refs. In Russian.

Description of a dielectrocardiograph designed for studying the cardiovascular and respiratory activities by recording hyperemia-evoked permittivity variations in localized areas of the body. The device uses electrodes attached to the clothing of the subject at various parts of his body. Typical recordings of seismocardiograms and dielectrocardiograms obtained with the device are given. V.Z.

A70-13715 #
RESULTS OF THE APPLICATION OF METHODS OF MATHEMATICAL PLANNING OF EXPERIMENTS TO A STUDY OF THE PROCESS OF BIOLOGICAL MINERALIZATION (OPYT PRIMENENIIA METODOV MATEMATICHESKOGO PLANIROVANIIA EKSPERIMENTA PRI ISSLEDOVANII PROTSESSA

BIOLOGICHESKOI MINERALIZATSII).
I. M. Chirkov, S. I. Tsitovich, I. L. Chernovich, and V. F. Varlamov. *Kosmicheskaia Biologiia i Meditsina,* vol. 3, July-Aug. 1969, p. 78-81. 6 refs. In Russian.

Preliminary results of experiments in the optimization of the process of biological mineralization of human wastes in a system with continuous microorganism cultivation. A formula is proposed for controlling the air admission rates and the waste material concentration during the cultivation process. V.Z.

A70-13716 #
A PHYTOTRON AT STOCKHOLM (O FITOTRONE V STOKGOL'ME).
V. P. Dadykin and M. V. Vil'iams.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 82, 83. In Russian.

Brief description of the design and operation of a closed, air-conditioned, plant-growing system developed by the Royal College of Forestry at Stockholm and put into operation in 1965. The system includes two greenhouse pavilions, six light-controlled rooms, three darkrooms, two constant temperature rooms, and two cooled rooms. V.Z.

A70-13717 #
REFLEX RESPONSES AND CONDITION OF CERTAIN VEGETATIVE FUNCTIONS OF WHITE RATS UNDER HYPOTHERMIA (REFLEKTORNYE REAKTSII I SOSTOIANIE NEKOTORYKH VEGETATIVNYKH FUNKTSII BELYKH KRYS PRI GIPOTERMII).
G. V. Altukhov, L. N. Khruleva, R. I. Gritsiuk, and P. A. Tkachenko. *Kosmicheskaia Biologiia i Meditsina,* vol. 3, July-Aug. 1969, p. 84, 85. In Russian.

Discussion of changes in conditioned reflexes and in respiration and heart beat rates observed in a group of ten white rats whose body temperature was kept at 30 deg C for periods of 2, 6, 10, and 24 hr. Observations of experimental rats over a period of six to eight months following the experiments indicate the absence of persistent reflex, respiration, and cardiac disorders due to the cooling. V.Z.

A70-13718 #
ENHANCEMENT OF THE RESISTANCE OF THE ORGANISM TO HYPOXIA WITH THE AID OF ACIDS (POVYSHENIE REZISTENTNOSTI ORGANIZMA K GIPOKSII S POMOSHCH'IU KISLOT).
A. Kh. Kogan, I. I. Pulin, and N. I. Losev.
Kosmicheskaia Biologiia i Meditsina, vol. 3, July-Aug. 1969, p. 86. In Russian.

Observation of increased hypoxia tolerance in white mice after intra-abdominal administration of small doses of dilute hydrochloric and lactic acids. The mice were exposed to low pressures reduced stepwise to 90 mm Hg. The time of survival was longer in the experimental mice than in control mice, especially after lactic acid administration. V.Z.

A70-13764
INTERACTIVE EFFECTS OF PREPARATORY INTERVALS, STIMULUS INTENSITY, AND EXPERIMENTAL DESIGN ON REACTION TIME.
George Kellas, Alfred A. Baumeister, and Stephen J. Wilcox (Alabama, University, Huntsville, Ala.).
Journal of Experimental Psychology, vol. 80, May 1969, p. 311-316. 12 refs.

Use of a simple reaction time (RT) task to examine the relationship between preparatory intervals (PIs) and stimulus intensity for three types of experimental designs—namely, within-subjects blocked presentation, within-subjects random presentation, and between-subjects. An interaction was found between PI and intensity, which was confirmed for both within- and between-subjects designs. In addition, the functions describing these interactive effects were different for the three designs employed. Even though the source of variance extracted was identical for the two within-subjects designs, some marked differences were found indicating that contextual variables are particularly critical. The results also suggested that variability in RTs attributable to temporal uncertainty is dependent, to some extent, on the ability of subject to discriminate the PIs and form a response strategy based on their successive probabilities of occurrence. (Author)

A70-13765 *
EFFECT OF DURATION OF STIMULUS PRESENTATION ON THE ANGULAR ACCELERATION THRESHOLD.
Richard L. Doty (San Jose State College, San Jose, Calif.).
Journal of Experimental Psychology, vol. 80, May 1969, p. 317-321. 18 refs.
Grant No. NGR-05-046-002.

Determination of oculogyral illusion thresholds for ten men on the Ames Man-Carrying Rotation Device, in order to establish the relationship between the angular acceleration threshold and the duration of the stimulus presentation. Thresholds were determined for stimulus durations of .50, 1.00, 1.50, 3.00, and 6.00 sec by a random, double-staircase psychophysical procedure. Mean oculogyral illusion thresholds ranged from .10 to .62 deg/sec^2 and varied inversely with the duration of stimulus. The product of acceleration times duration of stimulus presentation (at) was found to be a significant increasing linear function of the duration of the stimulation, and not constant as earlier data tended to suggest. Differences between the ordinal presentation of the duration conditions were found to be nonsignificant. The relation of the obtained threshold values and the at values to previous findings is discussed. (Author)

A70-13766
WITHIN-SESSION CRITERION CHANGES COMPARED TO AN IDEAL OBSERVER CRITERION IN A VISUAL MONITORING TASK.
Robert C. Williges (Ohio State University, Columbus, Ohio).
Journal of Experimental Psychology, vol. 81, July 1969, p. 61-66. 10 refs.

Sixty-four subjects were required to detect long-duration brightness changes during a 60-min monitoring session. Relevant/irrelevant signal ratio (1/5 vs 5/1), instructional set (accurate vs inaccurate instructions), and distraction (digit processing vs no digit processing) were combined factorially in a between-subject design. Signal detection theory analyses showed that within-session changes occurred in the subjects' willingness to respond rather than the effective sensitivity. It is concluded that the decrement in detection probability frequently obtained in vigilance tasks actually represents more optimal decision behavior. (Author)

A70-13767 *
RECALL AND RECOGNITION MEMORY IN CONCEPT IDENTIFICATION.
Robert C. Calfee (Wisconsin, University, Madison, Wis.).
Journal of Experimental Psychology, vol. 81, Sept. 1969, p. 436-440.
NASA-supported research; NSF Grant No. M-3165.

Study in which subjects saw six instances defining a one-dimensional solution for a six-dimensional concept problem, then gave a solution and were tested for recall or recognition of the instances. Different groups studied each instance for 5, 8, or 15 sec of presentation time (PT). Proportion of solutions increased with PT. Recall of relevant and irrelevant dimensions was considerably more accurate on solved than unsolved problems, and there was a small but significant increase in recall with PT. Recognition memory also improved slightly with PT and was slightly higher on solved than unsolved problems. Recall as a function of serial position in the presentation sequence revealed a typical bowed curve. Serial position functions for recognition memory were flat, except for the first two instances presented, which were more likely to be recognized if the problem was solved. (Author)

A70-13768 *
RETROACTIVE AND PROACTIVE INHIBITION IN VERBAL DISCRIMINATION LEARNING.
A. John Eschenbrenner, Jr. (St. Louis University, St. Louis, Mo.).
Journal of Experimental Psychology, vol. 81, Sept. 1969, p. 576-583. 9 refs.
Grant No. NsG(T)-74.

Investigation of retroactive inhibition (RI) and proactive inhibition (PI) of verbal discrimination (VD) lists, using the paradigms characteristic of paired-associate retention studies. RI and PI effects for incidentally learned right items and wrong-right associations were measured by modified-modified free recall (MMFR) scores. RI and PI effects for intentional VD learning were measured independently. Incidental RI was found, and intentional RI covaried positively across retention intervals with the course of incidental RI. PI was not found for either incidental or intentional components. M.M.

A70-13769
PERSPECTIVE AND FORM RATIO AS DETERMINANTS OF RELATIVE SLANT JUDGMENTS.
Myron L. Braunstein and John W. Payne (California, University, Irvine, Calif.).
Journal of Experimental Psychology, vol. 81, Sept. 1969, p. 584-590. 9 refs.
NSF Grant No. GB-5545.

Assessment of judgments of relative slant elicited by a paired-comparison method from 24 subjects in each of three experiments. The stimuli were computer-generated slides representing regular dot patterns (Exp. I), regular line patterns (Exp. II), or random dot patterns (Exp. III) rotated about a horizontal axis. The ratio of horizontal to vertical separations (form ratio) and perspective were independently varied in Exp. I and II. Perspective clearly dominated slant judgments when in conflict with form ratio as an indicator of degree of slant. Perspective alone was varied in Exp. III and was found to be less effective in determining slant judgments for random dot patterns. The equivalence of perspective and optical theta as explanations of slant perception is discussed. (Author)

A70-13770
SELECTIVE ATTENTION IN MULTISOURCE MONITORING TASKS.
Peter Hamilton (St. Andrews University, St. Andrews, Scotland).
Journal of Experimental Psychology, vol. 82, Oct. 1969, p. 34-37. 5 refs.

Study of the monitoring of three information sources, using the method of observing responses. It appeared that the variable governing the change in observing was the probability of a fault on any observation, P(F/O), which is affected by both fault rate and pacing changes. A function relating P(F/O) to the change in observing for pacing changes was derived, and the corresponding data for fault rate changes were found to fit that function. M.M.

A70-13771
EFFECTS OF EVENT PROBABILITY AND COST ON PERFORMANCE IN A CONTINUOUS MOTOR TASK.
Alfred G. Klipple and King M. Roberts (U.S. Department of Transportation, Bureau of Public Roads, Traffic Systems Div., Washington, D.C.).
Journal of Experimental Psychology, vol. 82, Oct. 1969, p. 75-78.

Study of the effects of two levels of objective event probability and two levels of objective event cost on performance in a continuous motor task. The subjects' control of the length of a changing bar of light was affected by cost, probability, and trials. Control was not found to conform to a maximization-of-expected-value model. The subjects tended to be less conservative than optimal when very conservative control was indicated. Also, variations in event probability were found to produce greater effects than variations in event cost. (Author)

A70-13772
EFFECTS OF THE INTENSITY OF AUDITORY AND VISUAL READY SIGNALS ON SIMPLE REACTION TIME.
David L. Kohfeld (U.S. Army, Medical Research Laboratory, Fort Knox, Ky.).
Journal of Experimental Psychology, vol. 82, Oct. 1969, p. 88-95. 17 refs.

Investigation of the effects of auditory and visual ready signal intensity in a simple reaction time (RT) task. Mean RT to three auditory response signals was found to systematically increase with a corresponding increase in the intensity of either auditory or visual ready signals. The results were analyzed according to a decision model of stimulus intensity effects. It was concluded that ready signal intensity influenced the value of the detection criterion. Practice effects and individual differences were also significant determinants of the criterion level. M.M.

A70-13773
STUDIES IN HUMAN ATRIAL FLUTTER WITH THE USE OF PROXIMITY ELECTRODES.
Yehezkiel Kishon (Mayo Clinic and Mayo Foundation, Section of Medicine, Rochester, Minn.) and Ralph E. Smith (Minnesota, University, Mayo Graduate School of Medicine, Rochester, Minn.).
Circulation, vol. 40, Oct. 1969, p. 513-525. 43 refs.

Ten patients with the electrocardiographic diagnosis of atrial flutter were investigated by exploration with electrodes within the esophagus and the right atrium. The records obtained were studied in regard to the timing of the intrinsic deflection and the contour of the atrial waves, as recorded at various sites. In four patients, atrial activation progressed in sequence cephalad in the left atrial wall and caudad in the right atrium. This process continued through two thirds of the total atrial cycle, favoring "circus movement" as the underlying mechanism. In six other patients, activation was believed to originate low in the left atrium, with simultaneous spread of excitation of both atrial walls in a general cephalad direction and terminating within the first half (usually the first third) of the atrial cycle. This pattern is compatible with, but not conclusive of, an ectopic focal mechanism. Serial records in one patient are presented in which transformation of one type into a second type of atrial flutter is suggested. It is likely that at least two mechanisms are present in human atrial flutter. (Author)

A70-13774 *
HIS BUNDLE RHYTHM.
Anthony N. Damato and Sun H. Lau (U.S. Public Health Service, Hospital, Cardiopulmonary Laboratory, Staten Island, N.Y.).
Circulation, vol. 40, Oct. 1969, p. 527-534. 23 refs.
NIH Grant No. HE-12536; NASA Contract No. T-22416 (G).

Discussion of a study which shows that the pacemaker in so-called nodal rhythms is located in the region of the His bundle and not in the A-V node. An electrode catheter technique was used to record the electrical activity of the A-V node and His bundle in patients with nodal rhythms and A-V dissociation. From the results of the tests it is suggested that in so-called lower and middle nodal rhythms the pacemaker site is within the His bundle. It is further suggested that so-called upper nodal rhythms may represent a coronary sinus or inferior left atrial rhythm. G.R.

A70-13809 *
THE MAMMALIAN PINEAL AS A NEUROENDOCRINE TRANSDUCER.
Richard J. Wurtman (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.) and Fernando Anton-Tay (México, Universidad Nacional Autónoma, Instituto de Investigaciones Biomedicas, Mexico City, Mexico).
IN: RECENT PROGRESS IN HORMONE RESEARCH. VOLUME 25.
Edited by Gregory Pincus.
New York, Academic Press, Inc., 1969, p. 493-514; Discussion, p. 514-522. 81 refs.
NIH Grants No. AM-11709; No. AM-11237; Grant No. NGR-22-009-272.

Description of the biosynthesis of melatonin (which constitutes

the transduction step in the pineal), estimation of the effects of physiological inputs on this synthesis, and assessment of the evidence that signals emitted from the pineal are decoded and can modify the function of distant target organs. It is pointed out that the mammalian pineal, a phylogenetically new organ, is a neuroendocrine transducer—i.e., it responds to sympathetic nervous impulses generated by the retinal responses to light and darkness by synthesizing variable amounts of melatonin and other methoxyindoles. The pathway by which signals generated by the photic input reach the pineal includes the eyes, the optic nerves and chiasm, the inferior accessory optic tract, unknown nerve bundles coursing through the midbrain, pons, medulla, and spinal cord, the preganglionic fibers to the superior cervical ganglia, the ganglia, and their postganglionic terminals which impinge directly on pineal parenchymal cells. The neurons appear to stimulate melatonin synthesis by releasing their neurotransmitter, norepinephrine. M.M.

A70-13822
EXPERIENCES IN THE AIR TRANSPORT OF THE SEVERELY ILL AND SERIOUSLY INJURED (ERFAHRUNGEN IM LUFTTRANSPORT SCHWERKRANKER UND SCHWERVERLETZTER).
J. Eichler (Lübeck, Medizinische Akademie, Chirurgische Klinik, Zentrale Anaesthesie-Abteilung, Lübeck, West Germany).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 15, Sept. 1969, p. 160-163. In German.

Discussion of the use of helicopters for the transportation of injured or sick persons, on the basis of the experience gained in such cases in the Federal Republic of Germany. It is pointed out that patients in a helicopter are less subject to harmful shock and vibration than patients in an ambulance. The types of helicopters which are most suitable for the transportation of sick or injured persons are considered, and the requirements for a landing site at the hospital are examined. G.R.

A70-13823
NIGHT VISION, GLARE, AND READAPTATION—HELICOPTER FLIGHT AND BLINDING BY LIGHTNING (NACHTSEHEN, BLENDUNG UND READAPTION—HUBSCHRAUBERFLUG UND BLITZERBLINDUNG).
F. A. Schiechel.
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 15, Sept. 1969, p. 169-179. 22 refs. In German.

Study of readaptation times of eyes adapted to darkness on the basis of tests conducted with a night vision training device. The device used had eight filters representing various degrees of brightness for day, dusk, and night conditions. The readaptation times were obtained after blinding the eyes with light from various sources. The test results are related to the conditions of flight safety for helicopters. G.R.

A70-13825
AN ANALYSIS OF HIERARCHICAL PROCESSING IN VISUAL PERCEPTION.
A. O. Dick and S. O. Dick (Lake Forest College, Lake Forest, Ill.).
Canadian Journal of Psychology, vol. 23, 1969, p. 203-211. 8 refs.
NSF Grant No. GB-7848.

Perception is viewed as a process in which attributes of a stimulus are analyzed in step-wise fashion. Two experiments were carried out in which the attributes of spatial location and identity were examined for two types of materials. The results indicate that identification of letters requires more stimulus energy than identification of lines. In turn, there were no differences between identification of lines, localization of lines or localization of letters. In general, these results support a hierarchical processing hypothesis. (Author)

A70-13888
CHANGES IN THE MYOCARDIUM OF RABBITS AFTER CHRONIC WHOLE-BODY IRRADIATION (FROM CARYOMETRIC DATA).
E. I. Vorob'ev and R. P. Stepanov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 3-9.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 97-102. 35 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32929)

A70-13889
INFLUENCE OF THE ALCOHOL-SOLUBLE FRACTION OF THE BIOMASS OF PROTOCOCCAL ALGAE ON WHITE RATS.
A. V. Novikova, N. S. Kliushkina, and V. I. Fofanov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 9-12.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 103-105. 8 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32930)

A70-13890
THE PROTECTIVE EFFECT OF ANTIHYPOXIC SUBSTANCES IN GRAVITATIONAL OVERLOADS.
V. M. Vinogradov and L. V. Pastushenkov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 12-16.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 106-109. 7 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32931)

A70-13891
SOME INDICES OF METABOLISM IN ANIMALS DURING PROLONGED EXPOSURE TO A HYPEROXIC ATMOSPHERE WITH NITROGEN OR HELIUM DILUTION.
A. G. Zhironkin and G. V. Troshkhin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 16-20.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 110-113. 28 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32932)

A70-13892
GAS EXCHANGE IN VEGETABLES GROWN IN A HYPEROXIC ATMOSPHERE.
N. T. Nilovskaia.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 20-25.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 114-117. 11 refs. Translation.
(For abstract see issue 17, page 2912, Accession no. A69-32933)

A70-13893
PECULIARITIES OF VESTIBULAR REACTIONS OF RATS EXPOSED TO ARTIFICIAL HYPOTHERMIA.
I. I. Voinova and M. D. Emel'ianov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 25-30.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 118-121. 9 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32934)

A70-13894
DAILY PERIODICITY OF PHYSIOLOGICAL FUNCTIONS IN FLIGHT PERSONNEL.
A. V. Chapek.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 30-35.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 122-125. 13 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32935)

A70-13895
EFFECT ON HUMAN ORGANISM OF "FRACTIONAL" RHYTHM OF DAILY ACTIVITY IN CONDITIONS OF RELATIVE ISOLATION.

B. A. Dushkov, A. N. Zolotukhin, A. V. Korobkov, and F. P. Kosmolinskii.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 35-40.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 126-130. 11 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32936)

A70-13896
CHANGES OF MOTOR PRECISION IN PERSONS WITH DIFFERENT PHYSICAL FITNESS EXPOSED TO HYPOKINESIA.
A. A. Korobova and T. I. Goriunova.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 41-45.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 131-134. 27 refs. Translation.
(For abstract see issue 17, page 2906, Accession no. A69-32937)

A70-13897
COORDINATION OF MOVEMENTS OF A MAN EXPOSED TO ALTERNATE ACCELERATION AND WEIGHTLESSNESS.
M. A. Cherepakhin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 45-49.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 135-137. 8 refs. Translation.
(For abstract see issue 17, page 2907, Accession no. A69-32938)

A70-13898
EFFECT OF PROLONGED HYPOKINESIA ON HUMAN RESISTANCE TO PHYSICAL EXERTION.
B. S. Katkovskii, O. A. Piliavskii, and G. I. Smirnova.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 49-55.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 138-142. 15 refs. Translation.
(For abstract see issue 17, page 2907, Accession no. A69-32939)

A70-13899
USE OF A TWO-GAS ARTIFICIAL ATMOSPHERE IN MANNED SPACECRAFT.
E. V. Bondarev, A. M. Genin, G. I. Gurvich, M. D. Draguzia, V. A Egorov, Iu. N. Eleshin, M. P. Elinskii, O. K. Erykalova, Z. N Parfenova, and V. V. Rassvetaev.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p 55-59.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 143-147 Translation.
(For abstract see issue 17, page 2912, Accession no. A69-32940)

A70-13900
MEASUREMENT OF PHYSIOLOGICAL PARAMETERS WITH THE AID OF A COMPUTER.
A. P. Kalinovskii.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 60-65.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 148-152. Translation.
(For abstract see issue 17, page 2912, Accession no. A69-32941)

A70-13901
PHAGOCYTIC ACTIVITY AND CARBOHYDRATE METABOLISM OF NEUTROPHILS IN HUMANS EXPOSED TO ATMOSPHERES WITH INCREASED OXYGEN CONTENT.
A. S. Kaplanskii, G. N. Durnova, I. R. Kalinichenko, V. V. Portugalov, and N. A. Agadzhanian.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 65-68.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 153-156. 23 refs. Translation.
(For abstract see issue 17, page 2907, Accession no. A69-32942)

A70-13902
HYDROPONIC CONVEYOR METHOD OF CARROT CULTIVATION.
E. V. Lebedeva, L. V. Dmitrieva, M. V. Vil'iams, and V. M. Simonov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 69, 70.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 157, 158. Translation.
(For abstract see issue 17, page 2912, Accession no. A69-32943)

A70-13903
STRUCTURAL CHANGES IN CHROMOSOMES IN THE CORNEAL EPITHELIUM OF MICE AFTER PROLONGED WHOLE-BODY γ-IRRADIATION.
T. M. Zukhbaia, B. A. Markelov, and N. A. Popova.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Mar.-Apr. 1969, p. 71, 72.)
Environmental Space Sciences, vol. 3, Mar.-Apr. 1969, p. 159, 160. Translation.
(For abstract see issue 17, page 2907, Accession no. A69-32944)

A70-13937 #
THE CHEMOTHERAPY OF HYPERCHOLESTEROLAEMIA.
A. Heffernan, R. Mulcahy, O. Fitzgerald (St. Vincent's Hospital, Cardiac Dept.; Dublin, University College, Dept. of Medicine and Therapeutics, Dublin, Ireland), and N. Hickey.
Acta Cardiologica, vol. 24, no. 1, 1969, p. 47-55. 11 refs.

Results of experiments with five hypocholesterolemic agents (nicotinic acid, triparanol, aluminum nicotinate, Atromid, and a nonfeminizing estrogen agent, WIN 25.920 (Bayer)). Atromid is at present the drug of choice, because of its efficacy and its freedom from side effects. In certain cases, there may be a place for nicotinic acid and possibly for aluminum nicotinate. Triparanol has been withdrawn, because of serious side effects, and WIN 25.920 was found to be relatively ineffective. Patients vary in their response to different hypocholesterolemic agents. F.R.L.

A70-13938 #
ATTEMPT TO ESTIMATE THE AGE OF A RECENT CORONARY THROMBOSIS (ESSAI D'APPRECIATION DE L'AGE D'UN THROMBUS CORONARIEN RECENT).
A. Ghys (Ixelles, Hôpital, Service de Médecine, Département de Cardiologie, Ixelles, Belgium).
Acta Cardiologica, vol. 24, no. 1, 1969, p. 56-63. 14 refs. In French.

Results of an attempt to estimate the age of coronary thromboses with a satisfactory degree of accuracy. The comparison of blood cells, fibrin, collagenous tissue, and neocapillaries, with reference to their respective quantitative changes, makes this possible. If the red corpuscles are numerous, the thrombosis is very recent (less than three days). If they are few, the thrombosis is more than three days old. The appearance of collagenous tissue and the neocapillaries makes it possible to state fairly exactly that the thrombosis is over 15 days old. The disappearance of figured elements of the blood associated with the presence of collagenous tissue, neocapillaries, and fibroblasts and fibrocytes suggests with a high degree of probability that the thrombosis is more than one month old. F.R.L.

A70-13939 #
THE ROLE OF ARTERIAL HYPERTENSION IN CORONARY PATHOLOGY (LE ROLE DE L'HYPERTENSION ARTERIELLE DANS LA PATHOLOGIE CORONARIENNE).
G. Rasson and P. van der Straeten (Ixelles, Hôpital, Département de Cardiologie, Ixelles, Belgium).
Acta Cardiologica, vol. 24, no. 1, 1969, p. 83-97. 10 refs. In French.

Results of an investigation of the occurrence of distal stenosis in coronary arteries following hypertension in a series of 320 post-mortem coronary angiographies. Evidence is presented which indicates that hypertension may induce or precipitate distal stenosing lesions in coronary arteries. In some cases, distal coronary atherosclerosis may induce myocardial infarction in hearts with proximal coronary trunks which are practically free of stenosing lesions. F.R.L.

A70-13940 #
WORK AND ENERGY EXPENDITURE OF THE HEART.
H. S. Badeer (Creighton University, School of Medicine, Omaha, Neb.).
Acta Cardiologica, vol. 24, no. 3, 1969, p. 227-241. 49 refs.

Results of a study showing that the traditional view that energy expenditure of the heart under all conditions depends on "external work" done on blood (cardiac output times mean ejection pressure) should be dropped, because it holds true only under special circumstances. When various parameters of cardiac function change at random, correlation between the two is poor. On the other hand, total work done by the contractile elements in developing tension (internal work) and in shortening against an external load (external work) correlates much better with myocardial energy expenditure. Tension development in terms of rate of rise, peak value, or duration seems to make a greater contribution to oxygen consumption than shortening of fibers, and is influenced by the geometry of the heart in accordance with the Laplace relationship as a first approximation. Cardiac nerves, particularly the sympathetics, and some hormones may affect myocardial energy expenditure in other ways than by altering the mechanical work of the contractile elements. The various components that add up to give the total oxygen consumption of the heart per unit time are briefly discussed. F.R.L.

A70-13941 #
PATHOLOGICAL Q WAVES IN THE ABSENCE OF MYOCARDIAL INFARCTION—CLASSIFICATION AND ELECTROPHYSIOLOGICAL CONSIDERATIONS (ONDES Q PATHOLOGIQUES EN L'ABSENCE D'INFARCTUS DU MYOCARDE—CLASSIFICATION ET CONSIDERATIONS ELECTROPHYSIOLOGIQUES).
L. Pec and J. Enderle (Bruxelles, Université Libre, Hôpital Universitaire Brugmann, Département de Cardiologie, Brussels, Belgium).
Acta Cardiologica, vol. 24, no. 3, 1969, p. 242-274. 112 refs. In French.

Results of six observations of pathological Q waves occurring in various diseases in the absence of myocardial infarction. All the conditions in which Q waves or QS patterns may be present are reviewed, and their electrophysiological mechanism is discussed. A classification of Q waves according to both clinical and electrophysical criteria is proposed. Five groups have been differentiated: (1) transient Q waves, (2) Q waves or QS patterns due to variations in the position of the heart and/or the electrodes, or due to variations in the direction of the initial vector, (3) Q waves due to superposition, (4) Q waves due to vectorial subtraction (muscular damage), and (5) Q waves due to diverse hypothetical mechanisms. Each of these groups is illustrated by one or two clinical observations most characteristic of the group. F.R.L.

A70-13942 #
RELATIONSHIP BETWEEN PATHOLOGIC FINDINGS OF LEFT VENTRICULAR PAPILLARY MUSCLE AND THE ELECTROCARDIOGRAM.
G. E. Burch, S. C. Sun, K. C. Chu, H. L. Colcolough, and R. S. Sohal (Tulane University, School of Medicine, Dept. of Medicine; Louisiana, Charity Hospital, New Orleans, La.).
Acta Cardiologica, vol. 24, no. 3, 1969, p. 285-295. 12 refs.
Research supported by the Rudolph Matas Memorial Fund and the Rowell A. Billups Fund; PHS Grants No. HE-06769; No. HE-5278.

Extension of gross studies of papillary muscle described in previous communications (DePasquale and Burch, 1966). The histopathology of the left ventricular papillary muscles from 150 unselected adult hearts obtained at routine autopsy was studied. The findings revealed frequent scarring of the papillary muscles and occasional fresh infarction. The extent of replacement of myocardial fibers by scar tissue was used to grade the severity of the lesions. The microscopic findings were correlated with the ECG patterns in 49 patients in whom electrocardiograms were recorded no more than three months prior to death. In approximately 50 per cent of the cases it was possible to predict that significant scarring of the papillary muscles had occurred from the electrocardiogram alone. These findings are discussed in terms of the overall concept of the papillary muscle dysfunction syndrome. F.R.L.

A70-13943 #
CONCERNING THE ORIGIN OF ABNORMAL Q WAVES IN OBSTRUCTIVE CARDIOMYOPATHY (A PROPOS DE L'ORIGINE DES ONDES Q ANORMALES DANS LES CARDIOMYOPATHIES OBSTRUCTIVES).
G. Meurice and R. Leleux (Louvain, Université Catholique, Clinique Universitaire St.-Pierre, Laboratoire d'Exploration Fonctionnelle Pulmonaire et d'Hémodynamique, Louvain, Belgium).
Acta Cardiologica, vol. 24, no. 5, 1969, p. 439-455. 24 refs. In French.

Attempt to define the origin of the production mechanism of abnormal Q waves. The concept of left ventricular hypertrophy is usually connected with a concentric and diffuse hyperplasia of the entire left ventricular muscle. In certain cases, however, this hypertrophy is asymmetrical, being located and centered on the interventricular septum. These hypertrophies of the septum are considered as a particular evolving modality, being just a stage in the formation of a classical left ventricular hypertrophy. However, in certain cases at least, they cause electrocardiographic readings in the form of abnormal Q waves. Certain obstructive cardiomyopathies were considered from an electrocardiographic and vectorcardiographic point of view in order to find the origin of these Q waves. No definitive argument can be advanced to explain these electrical anomalies. If the theory of septal hypertrophy seems to be the most likely, the hypothesis of a conduction defect cannot, at the same time, be refuted. F.R.L.

A70-13944 #
LATE SYSTOLIC MURMURS AND SYSTOLIC NON-EJECTION CLICKS.
J. Willems, J. Roelandt, H. De Geest, H. Kesteloot, and J. V. Joossens (Louvain, Catholic University, University Clinic St.-Raphaël, Dept. of Internal Medicine, Louvain, Belgium).
Acta Cardiologica, vol. 24, no. 5, 1969, p. 456-481. 46 refs.

Study of the phonocardiographic and mechanocardiographic features of 74 patients with nonejection clicks and mid- or late-systolic murmurs. An analysis was made of the value of simple nontraumatic means in assessing the intracardiac or extracardiac origin of these auscultatory findings. In most cases abnormalities of the apex cardiogram have been demonstrated. The carotid artery tracing showed a peculiar aspect in half of the patients, due to an early systolic downstroke. These abnormalities are thought to be a reflection of the altered hemodynamics as a consequence of the bulging of the mitral valve. Increased incidence of left axis deviation was noted in the electrocardiogram. Two cases with marked shortening of the left ventricular ejection time are discussed. F.R.L.

A70-13947
FOVEAL INCREMENT THRESHOLDS IN NORMAL AND DEUTAN OBSERVERS.
R. D. Watkins (Melbourne, University, Victorian College of Optometry, Melbourne, Australia).
Vision Research, vol. 9, Oct. 1969, p. 1185-1196. 26 refs.

Study of the spectral sensitivities of the color vision mechanisms, as measured by the increment threshold technique, for groups of ten normals, ten deuteronormals, and five deuteranopes. It is found that only in a few cases did the abnormal curves lie outside the normal range, but statistical analysis makes it possible to place a high level of significance on the differences between the mean values for each group. Z.W.

A70-13948
NONLINEARITIES OF THE HUMAN OCULOMOTOR SYSTEM—GAIN.
G. J. St-Cyr and D. H. Fender (California Institute of Technology, Pasadena, Calif.).
Vision Research, vol. 9, Oct. 1969, p. 1235-1246. 8 refs.

NIH Grants No. NB-03627; No. GM-01335.

Measurements of the eye movements of two subjects while performing various two-dimensional tracking tasks. It is shown that the transfer characteristics of the oculomotor system are a function of the spectral content of the target motion. Z.W.

A70-13949

FURTHER PROPERTIES OF THE HUMAN SACCADIC SYSTEM—EYE MOVEMENTS AND CORRECTION SACCADES WITH AND WITHOUT VISUAL FIXATION POINTS.

W. Becker (Freiburg, Universität, Abteilung für klinische Neurophysiologie, Freiburg im Breisgau, West Germany) and A. F. Fuchs (Washington, University, Regional Primate Research Center, Seattle, Wash.).

Vision Research, vol. 9, Oct. 1969, p. 1247-1258. 23 refs.

Investigation of the paradox of the second corrective saccade in the absence of visual position error signal. Experimental evidence suggests that for large angles, the eye movements response is preprogrammed as two movements and that the second saccade in the package is determined by a position error sample of 70 msec. Z.W.

A70-13950

EFFECT OF REDUCED RETINAL ILLUMINANCE ON THE PUPILLARY NEAR REFLEX.

Niles Roth (California, University, Jules Stein Eye Institute, Dept. of Ophthalmology, Los Angeles, Calif.).

Vision Research, vol. 9, Oct. 1969, p. 1259-1266. 11 refs.

PHS Grant No. NB-2709.

Measurements of the changes in pupil diameter associated with a constant change in accommodative stimulus, as retinal illuminance is varied over a range of two log units. In 10 of 11 subjects, the magnitude of pupil construction associated with one diopter of accommodative response is found to decrease significantly as retinal illuminance decreases. This indicates that the near reflex pupillary response is directly related in magnitude to the existing level of illuminance and functions in accord with other adaptive mechanisms that alter the overall sensitivity of the eye. Z.W.

A70-13951

INTEROCULAR HUE SHIFTS AND PRESSURE BLINDNESS.

Phyllis J. Gestrin and Davida Y. Teller (Washington, University, Dept. of Psychology, Seattle, Wash.).

Vision Research, vol. 9, Oct. 1969, p. 1267-1271. 8 refs.

Research supported by the Boeing Employees Medical Research Fund.

Study of the effect of pressure blinding of a bleached eye while the wavelength settings are made, on the appearance of the interocular hue shift. It is found that if the pressure is applied to the bleached eye at the termination of the bleaching light, in such a way that pressure blindness occurs, no displacement of wavelength settings is produced. The results show that the interocular hue effect depends on a continuing signal from the bleached retina. Z.W.

A70-13955

PRESENCE OF DEGENERATE RETINAL FIBERS IN THE SUPRAOPTICAL HYPOTHALAMIC REGION OF THE DUCK AFTER SECTION OF THE OPTIC NERVE (PRESENCE DE FIBRES RETINIENNES DEGENEREES DANS LA REGION HYPOTHALAMIQUE SUPRA-OPTIQUE DU CANARD APRES SECTION D'UN NERF OPTIQUE).

Noëlle Bons and Ivan Assenmacher (Montpellier, Université, Département de Physiologie Animale, Laboratoire de Neuro-Endocrinologie, Montpellier, France).

Académie des Sciences (Paris), Comptes Rendus, Série D—Sciences Naturelles, vol. 269, no. 16, Oct. 20, 1969, p. 1535-1538. 14 refs. In French.

Study of the nervous path connecting the retinal photoreceptors of the duck to the hypothalamic areas of hypophysial control. The adaptation of methods for detecting degenerate nervous fibers to slices in paraffin made it possible to detect the presence of very fine fibers, of retinal origin, in the supraoptical contralateral region of the hypothalamus eight days after section of an optic nerve. F.R.L.

A70-14011

THERMODYNAMICS AND THE PRIMARY PROCESSES OF PHOTOSYNTHESIS.

Robert S. Knox (Rochester, University, Dept. of Physics and Astronomy, Rochester, N.Y.).

Biophysical Journal, vol. 9, Nov. 1969, p. 1351-1362. 19 refs.

Grant No. AF AFOSR 611-67.

Numerous discussions of the relationship of the thermodynamics of radiation to photosynthesis have been published, but the results are often in disagreement or at best difficult to compare with one another. The recent treatment of maximal photosynthetic efficiencies by Ross and Calvin (1967) is shown to be directly related to the thermodynamic method of Duysens. A smooth connection between the light and dark conditions is derived, the case of polarized light is considered briefly, and a critique of some other thermodynamic treatments is presented. (Author)

A70-14021 #

CLOSING THE INFORMATION GAP IN THE COCKPIT.

William C. Schultz (Cornell Aeronautical Laboratory, Inc., Avionics Dept., Buffalo, N.Y.).

Astronautics and Aeronautics, vol. 7, Nov. 1969, p. 60-68. 41 refs.

Description of a new approach to the problem of cockpit information transfer between the pilot and flight-control information displays. Warning devices are scattered all over the cockpit and appear (in light of the tabulated and discussed aircraft-accident data) to be of quite questionable effectiveness in preventing confusion-entailed accidents. Current flight-safety research avoids the core of this information transfer problem. Promise of a major improvement in cockpit information transfer is seen to be held forth only by an appropriate application of an onboard data-processing system. Accordingly, current development work is aimed at a large central display on an electroluminescent panel; the most important information of the moment appears on this panel. In emergencies, messages in red would interrupt normal and caution data sequences and would convey corrective action advice. The pilot should then be able to limit his scan to the central area, confident of being informed about all that is important. M.V.E.

A70-14055 *

HISTORY AND DEVELOPMENT OF NONFLAMMABLE MATERIAL FOR APOLLO SPACECRAFT.

M. I. Radnofsky (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.).

Aerospace Medicine, vol. 40, Nov. 1969, p. 1181-1185.

Discussion of the NASA program to develop nonflammable materials for Apollo spacecraft. Selection of materials is restricted by the requirements that are imposed by high oxygen environments, by the necessity for no toxic offgassing, and by the wide temperature range under which the materials must function. The various types of testing required for flight qualification are described. In specific applications in which a flammable material must be used, the material is either covered by or coated with a nonflammable material, or is otherwise isolated to prevent flame propagation. Among the materials discussed are Beta glass fibrous materials, polybenzimidazole, metal fibers, and asbestos. The utilization of fluoropolymers such as carboxynitroso rubber and Fluorel in a variety of end-items, and the development effort to provide a nonflammable paper are also discussed. (Author)

A70-14056

FIRE AND EXPLOSION SUPPRESSION TECHNIQUES.

B. P. Botteri and J. Manheim (USAF, Aero Propulsion Laboratory, Fuel Lubrication and Hazards Div., Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 40, Nov. 1969, p. 1186-1193. 7 refs.

Review of the fire and explosion suppression technology for aircraft and hypobaric and hyperbaric oxygen-rich atmosphere applications. Specific aspects discussed include the effects of environmental conditions on the fire threat and personnel survival, the basic physicochemical actions involved in achieving effective fire suppression action, and the fire and explosion suppression techniques presently available. Past experience with fires and explosions under

these various environmental conditions has clearly indicated that the time available for effective fire suppression action is relatively short, ranging from a few milliseconds to several seconds. Suppression techniques have been developed for fires and explosions occurring in air. Certain of these suppression measures where combined with rapid fire detection appear promising for oxygen-rich atmosphere fire protection. (Author)

A70-14057
COMBUSTION SAFETY IN THE AIRCRAFT ENVIRONMENT.
George P. Bates, Jr. (Federal Aviation Administration, Aircraft Development Service, Washington, D.C.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1193-1196. 5 refs.

Outline of studies and tests conducted to improve cabin interior materials from the standpoint of greater fire resistance, lower smoke and toxic gas by-products, and lesser possibility of an intense short-duration flash fire from unburned gases which might collect in the upper part of the cabin. Cabin fire extinguishing systems are evaluated, along with safety fuels which minimize the amount of fuel dispersed and reduce the mist of highly combustible vapors when a fuel tank ruptures. (Author)

A70-14058 *
COMBUSTION SAFETY IN THE SPACECRAFT ENVIRONMENT.
Richard S. Johnston (NASA, Manned Spacecraft Center, Houston, Tex.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1197-1202.

Review of the design considerations of the Apollo command module atmosphere, and outline of criteria used in selection of materials. The spacecraft fire-extinguisher system is discussed, and specific changes in equipment design and fabrication are reviewed. Results are indicative that fire hazard within the Apollo spacecraft has been eliminated. (Author)

A70-14059
EXPERIMENTAL LABYRINTHINE TESTS ON ISOLATED INDIVIDUAL SEMICIRCULAR CANALS AS A FITNESS TEST FOR ASTRONAUTS.
H. Decher (Bonn, University, Ear, Nose and Throat Clinic, Bonn, West Germany).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1203-1208. 27 refs.

The threshold tests of the horizontal and vertical semicircular canals with recording of the postrotatory nystagmus permit the experimental testing of isolated single canals for all six of the semicircular canals. The minimum rotatory acceleration and deceleration giving rise to nystagmus represents the threshold, which is determined for all six semicircular canals. The method of testing the vertical semicircular canals consists of turning the recumbent subject with the head fixed in such a way that a corresponding pair of semicircular canals are stimulated by being brought into the plane of rotation. Electronystagmography, photoelectronystagmography, or, preferably, both methods simultaneously are used to record the reactions. A detailed program of experimental investigations has been produced allowing the excitability characteristics to be separately determined for all six semicircular canals. This is a suitable fitness test for astronauts where the presence of an intact vestibular system is of paramount importance. (Author)

A70-14060
ENGINEERING APPROACH TO SST CERTIFICATION.
Richard S. Sliff and Herbert H. Slaughter (Federal Aviation Administration, Flight Standards Service, Washington, D.C.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1209-1214.

Description of the FAA engineering approach to the type certification of the supersonic transport. The program for the development of applicable airworthiness standards is discussed including the methods of assessment of problem areas as well as needed new technology. Some of these areas are identified and discussed. The important needs of proper coordination in this process are emphasized. The engineering evaluation of compliance procedures that complement the development of airworthiness standards in the type certification process is explained. The FAA accomplishment and status to date regarding airworthiness standards development and compliance are stated for the Concorde and the Boeing 2707. (Author)

A70-14061
FORWARD FACING VERSUS REARWARD FACING PASSENGER SEATS DURING EMERGENCY DESCENT OF MULTI MACH/HIGH ALTITUDE TRANSPORT AIRCRAFT.
Harald J. von Beckh (USAF, Aeromedical Research Laboratory, Holloman AFB, N. Mex.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1215-1218. 46 refs.

During the postdecompression emergency descent of high-speed, high-altitude aircraft, the occupants will be subjected to deceleration induced inertial loads in the direction of the flight path which will temporarily reach or exceed values of 0.5 G. Forward-facing passengers who have not been able to don the oxygen mask may lose consciousness for various periods of time and will assume positions which are unfavorable for the recovery from hypoxic stress. Aft-facing passengers—even if unconscious—would not lose contact with their seat and seatback and would assume a semisupine position by the combined effect of the aircraft's negative attitude angle and the decelerative load. Recent research suggests that the semisupine position is favorable for recovery from severe hypoxic exposures. A reassessment of the value of aft-facing vs forward-facing passenger seats for the subject aircraft is suggested. (Author)

A70-14062
EFFECTS OF A SPACE-CABIN ATMOSPHERE ON THE IMMUNE RESPONSE. I—DEPRESSION IN SPLEEN WEIGHTS AND ANTIBODY TITERS.
Robert V. Coyne and G. Adolph Ackerman (Ohio State University, Dept. of Anatomy, Columbus, Ohio).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1219-1223. 30 refs.
NIH Grant No. AM-HE-12084-11.

Primary and secondary immunological responses in mice were studied relative to changes in spleen weight and antibody titer following antigenic stimulation. Room control animals (normal room atmosphere) responded to antigenic stimulation with consistent increases in average spleen weight reaching maximum values 7 to 9 days after primary stimulation and approximately 4 days after secondary stimulation. Peak antibody titers occurred during these same time intervals. Dome control animals (environmental dome under normal atmospheric conditions) and antigenically stimulated animals exposed to 100 per cent oxygen at 5 or 7.5 psia showed a statistically significant depression in the maximum average spleen weight compared with room controls. Spleen weights after secondary injections were similar among the groups studied, although the increase in spleen weight appeared to be delayed in animals exposed to 100 per cent oxygen at 5 psia. Animals exposed for two weeks to a space cabin environment, then injected and maintained in a normal room atmosphere, showed increases in the spleen weights similar to those from room control animals during the primary response. Antibody titers from room control animals were consistently higher than the titers obtained from any of the experimental groups. (Author)

A70-14063
EFFECTS OF A SPACE-CABIN ATMOSPHERE ON THE IMMUNE RESPONSE. II—HISTOCHEMICAL AND BIOCHEMICAL ALTERATIONS IN OXIDATIVE ENZYME ACTIVITY.
Robert V. Coyne and G. Adolph Ackerman (Ohio State University, Dept. of Anatomy, Columbus, Ohio).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1224-1231. 44 refs.
NIH Grant No. AM-HE-12084-11.

Primary and secondary immunological responses in mice were studied relative to histochemical and biochemical alterations in oxidative enzyme and acid phosphatase activities in the spleen following antigenic stimulation. In antigenically stimulated room control animals (normal room atmosphere), the biochemical activities of succinic and lactic dehydrogenases increased. Glucose-6-

phosphate dehydrogenase activity showed a biphasic response, peaks occurring at 2 to 3 days and at 14 days after the primary stimulation. No further increases in oxidative enzyme activities were observed following secondary antigenic stimulation. The biochemical profiles obtained from animals exposed to 100 per cent oxygen at 5 or 7.5 psia either before or after injection of antigen were identical to those from the room controls. Histochemically, succinic, lactic, and glucose-6-phosphate dehydrogenase and acid phosphatase activities were increased in spleens from room control animals following antigenic stimulation. The intensities of the histochemical reactions for the oxidative enzymes correlated with the quantitative biochemical data. Animals exposed to 100 per cent oxygen at 5 or 7.5 psia either before or after injection of antigen revealed no differences in the localization or intensity of enzyme activities when compared to room controls. The decrease in total spleen weights in antigenically stimulated animals exposed to 100 per cent oxygen at 5 or 7.5 psia would correspond to a total decrease in splenic activity of the oxidative enzymes. (Author)

A70-14064
METHOD AND RATING SYSTEM FOR EVALUATION OF THERMAL PROTECTION.
Alice M. Stoll and Maria A. Chianta (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1232-1238. 14 refs.

Discussion of thermal protection rating systems for fabrics, based on pain and blister effects in human skin. Attention is given to (1) precise evaluations applicable to any known temperature-time pattern, and (2) simple laboratory procedures to provide a universally useful standard rating system. The first system is more comprehensive, but is difficult and requires computer operations routinely; the second, described in detail, offers a rating system which is simple, directly related to pain and blister parameters, and may be understood by the uninitiated as well as those knowledgeable in the field. (Author)

A70-14065
CARDIAC OUTPUT AND CORONARY BLOOD FLOW DURING PROGRESSIVE RECUMBENT EXERCISE.
Lawrence E. Lamb, Wilbur L. Smith, Roy J. Kelly, Adrian D. LeBlanc, and Philip C. Johnson (Baylor University, College of Medicine, Dept. of Medicine, Houston, Tex.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1238-1243. 12 refs.
Research supported by the Jewish Institute for Medical Research; PHS Grant No. HE-05435.

The changes in cardiac output, CO (I-131), and coronary blood flow, CBF (Rb-84), were studied in ten patients at rest and during peak exertion. The change in expression of cardiac work (CO times systolic pressure) compared to change in CBF Rb-84 yielded a .987 correlation coefficient. Knowing the change in CO and systolic pressure, it is possible to estimate the change in CBF Rb-84 value. The factors related to this correlation are discussed. The change in systolic pressure correlated with the change in Rb-84 uptake values (correlation coefficient .758), independent of the change in CO value common to both CBF and the cardiac work expression. The results also indicate that high levels of exercise increase the CBF Rb-84 above the levels encountered in steady state hypoxia breathing 12 per cent oxygen. External work correlated well with oxygen consumption but neither of these values had a consistent correlation with cardiac work. The study demonstrated that exercise of a sufficient level to cause a major increase in cardiac work provides a test of the reserve capacity for coronary blood flow. (Author)

A70-14066
RESULTS OF A BIOLOGICAL EXPERIMENT CONDUCTED ABOARD THE AUTOMATIC STATION "ZOND-5".
O. G. Gazenko, V. V. Antipov, G. P. Parfenov, and P. P. Saksonov (Akademiia Nauk SSSR, Moscow, USSR).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1244-1247. 14 refs.

Description of the biological experiment conducted aboard the Zond-5 automatic station in an earth-moon-earth trajectory. The biological specimens aboard the space station included turtles, Drosophila, fly larvae, seeds of the higher plants (wheat, barley, pine), various strains of Chlorella, and lysogenic bacteria. For an evaluation of the possible deviations that might occur during the mission, physiological, morphological, cytological, genetic, and other research techniques were employed. The total absorbed dose of cosmic radiation as recorded with the aid of various types of dosimeters situated adjacent to the biocontainers amounted to approximately 3.5 rads. The biological results are described. (Author)

A70-14067
RESISTANCE TO INFECTION OF MICE AND HAMSTERS FOLLOWING SHORT TERM ACCELERATION STRESS.
Kathryn B. Horwitz, Robert J. Ball, and Jerome P. Schmidt (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1248-1251. 22 refs.

Acceleration to sublethal loads for 15 min significantly protected mice from a subsequent infection with Cl. tetani or S. typhimurium. Under the same regimen, hamsters showed no alteration of susceptibility when compared to controls. No stress-induced hypersecretion of hydrocortisone was demonstrable in mice. Injection with a single dose of hydrocortisone did not reverse the protection from infection. Thus the low hydrocortisone level found in stressed mice was ruled out as the protective agent. An attempt to demonstrate the rise in adrenocortical steroid levels seen in other laboratory animals during stress was unsuccessful in hamsters. They, like mice, were refractory to injected low doses of hydrocortisone, and showed no rise in mortality. It is suggested that the previously documented effect of stress and hydrocortisone in lowering resistance to infection does not occur when the stress is of short duration or the injected hormone is within physiological limits. (Author)

A70-14068
DETECTION OF RESPIRATORY IMPAIRMENT IN PILOTS.
G. F. Catlett and G. J. Kidera (United Air Lines, Inc., Medical Dept., Chicago, Ill.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1252-1257. 14 refs.

The number of commercial pilots reaching the age of increased susceptibility to emphysema is growing rapidly and the threat of impaired gas exchange in the hypobaric environment to which these workers are exposed is of critical concern. In anticipation of this problem, the medical department of United Air Lines has initiated studies of the ventilatory function during the periodic medical examination of its flight personnel in the appropriate age range and has accomplished similar baseline studies among a large number of flight officer candidates during their preemployment evaluation. Initial screening of all subjects was directed toward evidence of expiratory obstruction and was based upon the one-second forced expiratory volume expressed on a percentage of the forced vital capacity. Subjects who demonstrated evidence of airway obstruction by this test, or who otherwise presented clinical evidence suggestive of pulmonary insufficiency, were subsequently evaluated with additional tests of mechanical function. The latter studies included estimates of maximal breathing capacity, functional residual capacity, anatomic dead space, and uniformity of alveolar ventilation. Where indicated, the effect of bronchodilator drugs on the appropriate functional values was studied. Evidence of diminished function was widespread among the senior pilots, and significant ventilatory impairment, both of the restrictive and obstructive varieties, was demonstrated in several subjects in whom the dysfunction had not been suspected clinically. Representative cases are presented and the implications for potential flying disability are discussed. (Author)

A70-14069
USE OF SIMULTANEOUS MULTILEAD TELECARDIOGRAPHY FOR MONITORING CARDIOVASCULAR REHABILITANTS DURING EXERCISE.
Michael T. Lategola, John Naughton, Charles M. Brake, and Peggy

Lyne (Federal Aviation Administration, Civil Aeromedical Institute, Physiology Laboratory and Aeromedical Services Branch; Oklahoma, University, Medical Center, Dept. of Medicine and Dept. of Physiology, Oklahoma City, Okla.).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1258-1264. 33 refs.
FAA-supported research; PHS Grants No. HE-06286-07; No. 1-K3-HE-31, 272-02; No. CD-00170-03.

During a longitudinal study of civil aviation personnel undergoing cardiovascular rehabilitation, single-lead electrocardiographic telemetry (telecardiography) was used for monitoring and assessing cardiovascular status during supervised exercise. Blackburn et al. (1967) have reported that hard wire recording of a single chest lead fails to detect subendocardial ischemia during exercise in about 15 per cent of patients with known ischemia, whereas multiple leads (individually recorded) provide 100 per cent detection. Because of the detection capability of multiple leads and the freedom of movement provided by telecardiography, the usefulness of simultaneous multilead telecardiography was explored for monitoring the exercise of rehabilitants with documented histories of coronary artery disease. Several multilead combinations were used in specific exercise protocols, each preceded and followed by standard 12-lead ECG recordings. Simultaneous multilead telecardiography provides: dynamic monitoring of a variety of unrestricted-movement types of exercise; apparent corroboration of otherwise potentially equivocal ECG alterations observed in single-lead recording and an instantaneous visual display of such ECG changes during the actual monitoring procedure. (Author)

A70-14070
CARDIOVASCULAR DISEASE IN AIRLINE STEWARDS.
Roger L. Green (British European Airways Corp. and British Overseas Airways Corp., Air Corporations Joint Medical Service, London, England).
Aerospace Medicine, vol. 40, Nov. 1969, p. 1264-1266. 6 refs.

Study of cardiovascular and especially ischaemic heart disease in the stewards of BEA and BOAC between 1959 and 1967. All cases of cardiovascular disease were investigated, particularly proven cases of myocardial infarction. Overall attack rates were calculated, and with ischaemic disease the rates for different age groups in the two airlines were established. Comparisons were made to the general population and civilian pilots. The results indicated no evidence of predisposition among the stewards to heart disease. The rates recorded are lower than those of pilots, although mandatory ECG checks in the latter group may affect diagnosis rate. The series was too small to allow valid statistical analysis. Differences between the two airlines were examined, and related to the age structure of the two groups. An interesting phenomenon observed was the high attack rate of acute ischaemia while stewards were overseas. The impression obtained was that the airline steward is not unduly prone to cardiovascular disease, and his physical activities may even be protective. Suggestions are made regarding a further, prospective study of the subject. (Author)

A70-14081
ANALOGUE COMPUTER MODEL OF THE HUMAN CARDIOVASCULAR CONTROL SYSTEM.
W. D. Pickering, P. N. Nikiforuk, and J. E. Merriman (Saskatchewan, University, Saskatoon, Saskatchewan, Canada).
Medical and Biological Engineering, vol. 7, July 1969, p. 401-410. 24 refs.

Development of a simplified analog computer model of the human cardiovascular control system. This model can be adjusted to reproduce the response of a subject to a submaximal workload. The validity of the model is evaluated, and suggestions for its further development are presented. The long-range goal of the study is the derivation of a comprehensive cardiovascular-respiratory system model which could be used as an aid to confirm diagnoses of cardiopulmonary disease. The validity of the model was established by comparing its response to the behavior of subjects during exercise tests. F.R.L.

A70-14084
VISUAL PREDICTION OF THE POINT OF COINCIDENCE OF TWO MOVING TARGETS.
H. C. Foot (Dundee, University, Dept. of Psychology, Dundee, Scotland).
Ergonomics, vol. 12, Sept. 1969, p. 723-733. 16 refs.
Research supported by the Social Science Research Council.

Investigation of the accuracy of prediction in a task which requires the estimation of the point of coincidence of two pointers rotating at different rates, the trailing one closing on the leading one with a speed ratio of 3:2. Thirty undergraduates made predictions after watching filmed displays which varied both the viewing-span (VS) (the opportunity for viewing the pointers), and the prediction-span (PS) (the length of the prediction period). It was found that error in estimation increased linearly with increasing PS. For spans of 30, 60, 90, and 120 deg the mean error remained constant at about 18 per cent underestimation. Variable error was also found to be a linear function of the PS. Increasing VS had only a slight effect upon mean error, the longest VS alone producing significantly less error than the shorter spans. When the rate is held constant, predictions may be based upon the relative positions of the pointers at the end of the VS rather than upon rate perception alone. Generalization from the results is difficult. Comparison of these findings with those of other prediction studies indicates that the task itself is an important variable affecting prediction accuracy. (Author)

A70-14097
PHYSIOLOGICAL STRESS ON MAN CAUSED BY MECHANICAL VIBRATIONS (ZUR PHYSIOLOGISCHEN BEANSPRUCHUNG DES MENSCHEN DURCH MECHANISCHE SCHWINGUNGEN).
Heinrich Dupuis (Max-Planck-Institut für Landarbeit und Landtechnik, Bad Kreuznach, West Germany).
VDI-Z Fortschritt-Berichte, Reihe 11—Schwingungstechnik, no. 7, Mar. 1969. 168 p. 163 refs. In German.

Investigation of the effect of mechanical vibrations on man, taking into account vibrations produced in motor vehicles. Various possible effects of mechanical vibrations on man are analyzed. Experimental tests are described which show that passengers in a motor vehicle are subjected to considerable dynamic vibrations. Translational sinusoidal vibrations affecting a sitting person in a vertical direction are examined. G.R.

A70-14133 #
DISCHARGE OF AN ELECTROSTATICALLY CHARGED HUMAN.
John T. Petrick (U.S. Naval Material Command, Naval Weapons Laboratory, Dahlgren, Va.).
IN: FRANKLIN INSTITUTE RESEARCH LABORATORIES, SYMPOSIUM ON ELECTROEXPLOSIVE DEVICES, 6TH, SAN FRANCISCO, CALIF., JULY 8-10, 1969, PROCEEDINGS. (A70-14101 03-27)
Philadelphia, Franklin Institute Research Laboratories, 1969, p. 3-5.1 to 3-5.11.

Study of the generation and discharge of static electricity in human beings. Contact of various layers of clothing is the most common cause of personnel charging, and occurs whenever two dissimilar layers of clothing touch. The charging characteristics of various fabric combinations were measured. Discharge of electricity from a human occurs when the potential difference in the gap between body and object causes the air in the gap region to ionize. The importance of the values of body capacitance, resistance, and inductance lies in providing a suitable test to evaluate ordnance and fuels for electrostatic safety. A test is described which uses a nitrogen-filled pressurized spark gap and a 120,000-V power supply. Higher-speed oscilloscopes were used to record the discharge current of charged individuals. F.R.L.

A70-14155
EFFECT OF EXPIRATORY FLOW RATE ON EMPTYING OF LUNG REGIONS.
B. Millette, P. C. Robertson, W. R. D. Ross, and N. R. Anthonisen

(Royal Victoria Hospital, Respiratory Div.; McGill University, University Clinic, Montreal, Canada).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 587-591. 10 refs.
Research supported by the Medical Research Council of Canada and the John A. Hartford Foundation.

Seven erect subjects inhaled Xe-133 boli at residual volume (RV), resulting after inspiration to total lung capacity (TLC), in large apex to base differences in Xe-133 concentration. During the subsequent expiration, flow rate was varied, and Xe-133 concentration was measured at the mouth. By immediately performing a second inspiration of Xe-133-free gas to TLC, regional and end-expiratory volumes (Vre) could be assessed. During slow expiration from TLC, lower lung regions emptied more rapidly until low lung volumes were reached, when upper lung regions emptied preferentially. As inferred from alveolar plateaus, increasing expiratory flow rate progressively decreased late emptying of upper regions. At all lung volumes except RV, Vre showed less apex to base differences after maximally rapid expirations than after slow ones. It was concluded that above 30 per cent vital capacity it is likely that in most subjects regional volumes are substantially the same during forced expiration. (Author)

A70-14156
EFFECT OF TEMPERATURE AND HEMOGLOBIN CONCENTRATION ON SOLUBILITY OF O_2 IN BLOOD.
C. Christoforides (Beth Israel Hospital, Dept. of Anaesthesia, Boston, Mass.) and J. Hedley-Whyte (Harvard University, Harvard Medical School, Boston, Mass.).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 592-596. 14 refs.
PHS Grant No. GM-15904-02.

The Bunsen solubility coefficients for oxygen in human blood have been determined at 18, 28, and 37 deg C for bloods with hemoglobin concentration of 2.5, 7.8, 13.3, 17.1, 20.5, and 27.8 g/100 ml. Blood was shown directly to have a relative solubility different for each hemoglobin concentration but constant for any given hemoglobin concentration at the temperatures studied. Consequently, it was possible to construct a table for the Bunsen solubility coefficients for oxygen in blood from 15 to 40 deg C at different hemoglobin concentrations. Sodium nitrite depresses the solubility of oxygen in blood less than previously suggested. (Author)

A70-14157
EFFECT OF INCREASED AIRWAY RESISTANCE ON VENTILATION AND GAS EXCHANGE DURING EXERCISE.
Paolo Cerretelli, Rajinder S. Sikand, and Leon E. Farhi (New York, State University, School of Medicine, Dept. of Physiology, Buffalo, N.Y.).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 597-600. 11 refs.
USAF-supported research.

The effects of breathing through graded resistances during muscular exercise were studied in two trained subjects. At any exertion level, the minute volume decreased as the resistance was raised. The maximum oxygen uptake and exercise tolerance were decreased by addition of resistances, but the relationship between oxygen consumption and work load remained unchanged. Thus, there is no indication that limitations placed on the ventilatory apparatus cause a shift to anaerobic metabolism. The ventilatory response to exercise when the airway resistance is increased is neither a "minute volume" response nor a "work of breathing" response, but falls between the two. (Author)

A70-14158 #
THERMAL COMFORT IN DISPARATE THERMAL ENVIRONMENTS.
J. F. Hall, Jr. and F. K. Klemm (USAF, Aerospace Medical Research Laboratories, Biothermal Branch, Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 601-606. 10 refs.

Investigation of five disparate environments to define the comfort state in human subjects whose anterior-posterior skin surfaces were exposed to different radiative wall temperatures. Exposures at 65 deg C upper and -11 deg lower wall temperature produced levels of mean skin temperature and body water loss, as well as overall subjective sensations, most generally characteristic of a true comfort state. Greater disparate environments resulted in deviation from true comfort as evidenced by increased body water losses and higher skin and rectal temperatures. Lower disparities produced lower mean skin and rectal temperatures with slight shivering. M.M.

A70-14159
DIFFUSION OF ARGON, KRYPTON, AND XENON IN OLIVE OIL.
James O. Osburn, John A. Stitzell, and R. E. Peterson (U.S. Veterans Administration, Hospital, Radioisotope Service Laboratory, Iowa City, Iowa).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 624-629. 29 refs.
Research supported by the U.S. Veterans Administration.

Measurement of the diffusivities of argon, krypton, and xenon in olive oil at 1 atm at 25, 30, and 37 deg C. The volume of gas absorbed by a stagnant oil sample was measured to determine the absorption rate curve for each case. Diffusivity was determined by appropriate curve-fitting analysis of the sorption curves. The diffusivities obtained showed agreement to within 2.7 per cent experimental error. A modification of the Wilke diffusion factor incorporating the absorption coefficient gave an improved correlation of diffusion coefficients in the inert gas-olive oil system. (Author)

A70-14160 *
NATURE OF PLEURAL SPACE OF DOGS.
John H. Reed, Jr., William M. McConahey, III, Lucille Cronin (Mayo Clinic and Mayo Foundation, Section of Physiology, Rochester, Minn.), Earl H. Wood (American Heart Association, New York, N.Y.), and Charles C. Wunder.
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 637-643. 21 refs.
NIH Grant No. HE-3532; Grant No. NsG-327.

In an attempt to evaluate the different concepts concerning the nature of the pleural space, spheres of varying density and diameter were injected into the pleural space through narrow percutaneously inserted catheters in ten anesthetized dogs without thoracotomy. The sedimentation velocities were observed by detection of the gamma-emission of Yb-169 or by roentgenograms. Velocities of sedimentation for spheres of diameters as great as 550 microns at or below midlung level in dogs in the prone position were comparable to those measured in water. Sedimentation of 800-micron spheres at midlung in the prone dogs occurred at a much slower velocity than in open channels of water. For sphere diameters in excess of 800 microns, which preliminary optical measurements suggest may be the limiting width of the space at midlung, there was no sedimentation. These data suggest that, at midlung level and dependent thereto, the visceral and parietal pleura are separated by a fluid hydraulically similar to water and that a "real," as distinct from a "potential," pleural space exists. (Author)

A70-14161
INCREASED ALVEOLAR-ARTERIAL OXYGEN DIFFERENCE DURING SIMULATED HIGH-ALTITUDE EXPOSURE.
John T. Reeves, John Halpin, Fuheid Daoud (Kentucky, University, Medical Center, Dept. of Medicine, Lexington, Ky.), and Jerome E. Cohn.
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 658-661. 13 refs.
NIH Grants No. HE-06780; No. HE-08932.

Fifteen experiments in seven healthy volunteers at simulated high altitude were conducted to study possible changes in the alveolar-arterial oxygen difference during the first hours of severe

hypoxia. In nine experiments during supine rest, the arterial carbon dioxide tension steadily fell and the arterial oxygen pressure failed to rise during 3 hr. One subject developed a persistent dry cough. Arterial hypoxia was exaggerated when the subjects slept and was improved when they were seated. The apneic periods which attended sleep caused profound hypoxia (24 mm Hg) in one subject. Severe hypoxia at rest may relate to impaired pulmonary oxygen transport soon after arrival at high altitude. In general, the exercise studies were well tolerated and there was no clinical or laboratory evidence that pulmonary edema developed in exercising subjects. (Author)

A70-14162
CARDIOVASCULAR RESPONSES TO SUSTAINED HIGH SKIN TEMPERATURE IN RESTING MAN.
Loring B. Rowell, George L. Brengelmann, and John A. Murray (Washington, University, School of Medicine, Seattle, Wash.).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 673-680. 33 refs.
Research supported by the Washington State Heart Association; NIH Grants No. HE-09773; No. FR-37.

Four subjects at supine rest and wearing water-perfused suits had skin temperatures controlled at (1) 34-36 deg C for 30 min, (2) the highest level possible without pain for 40-53 min, and (3) cooler temperatures selected to return body temperatures to normal. During heating, cardiac output increased 7-10 1/min primarily by increased heart rate (stroke volume rose slightly). Blood temperature (right atrium) reached 38.7-39.2 deg C. Right atrial pressure (RAP) fell. Aortic pressure fell transiently and returned to control levels. At the point of intolerable discomfort, subjects complained of dizziness and impaired vision. Upon cooling, heart rate, cardiac output, and aortic pressure fell, while stroke volume, central blood volume, and RAP increased. Heating did not exhaust cardiovascular reserve. Increments in cardiac output exceeded previous estimates of maximum skin blood flow by twofold. Combined effects of direct heating and possibly hypocapnia probably caused extracutaneous vasodilatation. (Author)

A70-14163
RESPONSES TO COLD DURING A YEAR IN ANTARCTICA.
C. H. Wyndham (Chamber of Mines of South Africa, Human Sciences Laboratory, Johannesburg, Republic of South Africa) and H. Loots (Council for Scientific and Industrial Research, National Institute for Nutritional Research, Pretoria, Republic of South Africa).
Journal of Applied Physiology, vol. 27, Nov. 1969, p. 696-700. 6 refs.

Metabolic rates, skin temperatures, and rectal temperatures of two thin men, two fat men, and one "average" man were measured after 1.5 hr of exposure to temperatures of 20 and 13 deg C before they left South Africa for a year's stay in Antarctica and again at 27, 20, 15, 10, and 5 deg C during February, July, and December of the year there. Initially, the fat men were different from the thin men in that they had very much less increase in metabolism in cold conditions; skin temperatures were lower, and rectal temperatures were higher—indicating a smaller heat conductance. In the Antarctic, the fat and thin men behaved quite differently. The fat men did not put on weight and their metabolic and temperature responses did not change; the thin men increased in weight and skinfold thickness, and with this their metabolic and body temperature responses changed in the direction of the fat men. Maximum oxygen intakes per kilogram per minute did not change over the period; therefore, change in physical condition did not account for alteration in reactions. (Author)

A70-14198 *
β-HYDROXYBUTYRATE DEHYDROGENASE—LACK IN RUMINANT LIVER MITOCHONDRIA.
Niels C. Nielsen and Sidney Fleischer (Vanderbilt University, Dept. of Molecular Biology, Nashville, Tenn.).
Science, vol. 166, Nov. 21, 1969, p. 1017-1019. 17 refs.
NIH Grant No. GM-12831; Grant No. NsG-85.

Determination of the very low concentration of the enzyme D(-)-beta-hydroxybutyrate dehydrogenase in mitochondria from bovine and sheep liver. The amount of the enzyme in mitochondria from other ruminant tissues such as kidney and heart are comparable with those from mammalian sources. The very low activity of beta-hydroxybutyrate dehydrogenase is not referable to the inability of substrates to penetrate mitochondria or to decreased electron transfer activity but rather to a lack of the enzyme in ruminant liver mitochondria. M.M.

A70-14244
PULSATILE FLOWS IN ARTERIES.
S. C. Ling, H. B. Atabek, and J. J. Carmody (Catholic University of America, Washington, D.C.).
IN: APPLIED MECHANICS; INTERNATIONAL UNION OF THEORETICAL AND APPLIED MECHANICS, INTERNATIONAL CONGRESS, 12TH, STANFORD UNIVERSITY, STANFORD, CALIF., AUGUST 26-31, 1968, PROCEEDINGS. (A70-14226 03-32)
Congress co-sponsored by the U.S. Navy, the U.S. Air Force, the National Science Foundation, and the U.S. National Committee on Theoretical and Applied Mechanics.
Edited by Miklós Hetényi and W. G. Vincenti.
Berlin and New York, Springer-Verlag, 1969, p. 277-291. 8 refs.
NIH Grant No. HE-12083-01.

Experimental investigation of pulsatile flows in both living animals and models. The following results were found: (1) pulsatile flows through arteries are decidedly different from steady or steady oscillatory flows in rigid tubes; theories based on the linearized long-wave approximation fail to provide correct flow profiles and wall shears; (2) flow profiles were found to be developed locally and transiently during the passage of pressure-gradient waves; both entrance effect and locally developed flow instability are confined to a short distance in the arteries; (3) wall-shear stresses of the order of the yielding stress levels of endothelial cells were found to exist on the lips of arterial bifurcations; and (4) quantitative flow data can be obtained from realistic model systems to supplement data which would be difficult to obtain in living systems; these data are useful for guiding the development of more advanced theories. M.M.

A70-14267
MONITORING AND RECORDING OF PHYSIOLOGICAL PARAMETERS.
M. Ingerfield (Devices Instruments, Ltd.).
Electronic Engineering, vol. 41, Nov. 1969, p. 48-51.

Description of some of the techniques employed to measure the more common medical parameters such as heart, muscle, and brain potentials together with blood pressure and respiration. A typical ECG waveform obtained by connecting a differential imput amplifier between the patients right arm and left leg is shown, and the picture of a blood pressure transducer using a stainless steel diaphragm and an unbonded wire bridge element is presented. An analysis of a recording system designed for medical applications is conducted. G.R.

A70-14275
AN INTERACTING CONTROL SYSTEMS ANALYSIS OF THE HUMAN LENS ACCOMMODATIVE CONTROLLER.
W. D. O'Neill (Illinois, University, Systems Engineering Dept., Chicago, Ill.).
Automatica, vol. 5, Sept. 1969, p. 645-654. 14 refs.
NIH Grants No. NB-06197; No. NB-07898-01.

Derivation of a mathematical control systems model of the human lens accommodative controller. The model accounts for the interaction of the pupil with accommodation and thereby becomes a two-loop interacting control system. The lens and pupil dynamical equations are derived from classical muscle mechanics and experiments as well as from experiments performed on cats, primates, and humans. The animal experiments represent open-loop identification procedures designed to identify the dynamics of accommodation without neurological control. The human experiments are closed-loop procedures used to verify the overall system responses with the system under neurological control. The resultant systems model is computer-simulated assuming a relay-type neurological control for both pupil and lens systems. (Author)

A70-14276
NUTRITION AND ATHEROSCLEROSIS; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, CONTINUATION COURSE AND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, LECTURES (ERNÄHRUNG UND ATHEROSKLEROSE; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, FORTBILDUNGSKURS UND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, VORTRÄGE). (A70-14276 03-04)
Edited by J. C. Somogyi.
Basel, Switzerland, S. Karger AG (*Bibliotheca Nutritio et Dieta,* No. 12), 1969. 144 p. In German.
$11.40.

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FOREWORD (VORWORT). J. C. Somogyi, p. 4, 5.

NUTRITION AND ATHEROSCLEROSIS (INTRODUCTORY REPORT) (ERNÄHRUNG UND ATHEROSKLEROSE /EINLEITENDES REFERAT/). J. C. Somogyi (Institut für Ernährungsforschung Stiftung im Gruene, Zurich, Switzerland), p. 11-22. 27 refs. (See A70-14277 03-04)

BIOCHEMICAL PROBLEMS CONCERNING THE ORIGIN OF ARTERIOSCLEROSIS (BIOCHEMISCHE PROBLEME DER ARTERIOSKLEROSE-ENTSTEHUNG). K. F. Gey (F. Hoffmann-La Roche and Co. AG, Basel; Bern, Universität, Berne, Switzerland), p. 37-59. 234 refs. (See A70-14278 03-04)

POSSIBILITIES OF LABORATORY DIAGNOSIS IN ATHEROSCLEROSIS (MÖGLICHKEITEN DER LABORATORIUMSDIAGNOSE BEI ATHEROSKLEROSE). G. Hartmann (Basel, Universität, Basel, Switzerland), p. 94-108. 13 refs. (See A70-14279 03-04)

NUTRITION, BLOOD COAGULATION, AND ATHEROSCLEROSIS (ERNÄHRUNG, BLUTGERINNUNG UND ATHEROSKLEROSE). G. Müller and F. Koller (Basel, Universität, Basel, Switzerland), p. 134-144. 21 refs. (See A70-14280 03-04)

A70-14277
NUTRITION AND ATHEROSCLEROSIS (INTRODUCTORY REPORT) (ERNÄHRUNG UND ATHEROSKLEROSE /EINLEITENDES REFERAT/).
J. C. Somogyi (Institut für Ernährungsforschung stiftung im Gruene, Zurich, Switzerland).
IN: NUTRITION AND ATHEROSCLEROSIS; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, CONTINUATION COURSE AND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, LECTURES (ERNÄHRUNG UND ATHEROSKLEROSE; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, FORTBILDUNGSKURS UND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, VORTRÄGE). (A70-14276 03-04)
Edited by J. C. Somogyi.
Basel, Switzerland, S. Karger AG (*Bibliotheca Nutritio et Dieta,* No. 12), 1969, p. 11-22. 27 refs. In German.

Discussion of the interaction between nutrition and the atherosclerotic vessel changes. Based on statistical data, it is demonstrated that atherosclerotic diseases are primarily affected by two groups of substances contained in food—i.e., cholesterin and saturated fatty acids. A review is given of the cholesterol content in some nutriments, the fat consumption in different countries, the changes in the serum cholesterol content in men and women with aging, the effect of saturated fats on the serum cholesterol content, mortality due to myocardial infarction, etc. In conclusion, several recommendations are presented concerning an adequate diet. O.H.

A70-14278
BIOCHEMICAL PROBLEMS CONCERNING THE ORIGIN OF ARTERIOSCLEROSIS (BIOCHEMISCHE PROBLEME DER ARTERIOSKLEROSE-ENTSTEHUNG).
K. F. Gey (F. Hoffmann-La Roche and Co. AG, Abteilung für experimentelle Medizin, Basel; Bern, Universität, Medizinisch-Chemisches Institut, Berne, Switzerland).
IN: NUTRITION AND ATHEROSCLEROSIS; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, CONTINUATION COURSE AND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, LECTURES (ERNÄHRUNG UND ATHEROSKLEROSE; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, FORTBILDUNGSKURS UND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, VORTRÄGE). (A70-14276 03-04)
Edited by J. C. Somogyi.
Basel, Switzerland, S. Karger AG (*Bibliotheca Nutritio et Dieta,* No. 12), 1969, p. 37-59. 234 refs. In German.

Discussion of the pathogenetic mechanism most probably responsible for the origin of arteriosclerosis. A comprehensive review is presented of existing relevant knowledge in biochemistry, electron microscopy, and experimental medicine, citing the most important risk factors to round out the picture presented of arteriosclerosis. It is shown that arteriosclerotic changes are primarily characterized by the following abnormalities: lipid accumulation, mucopolysaccharide changes, calcium deposits, and a loss of elastin and an increase in collagen. O.H.

A70-14279
POSSIBILITIES OF LABORATORY DIAGNOSIS IN ATHEROSCLEROSIS (MÖGLICHKEITEN DER LABORATORIUMSDIAGNOSE BEI ATHEROSKLEROSE).
G. Hartmann (Basel, Universität, Medizinische Klinik, Basel, Switzerland).
IN: NUTRITION AND ATHEROSCLEROSIS; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, CONTINUATION COURSE AND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, LECTURES (ERNÄHRUNG UND ATHEROSKLEROSE; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, FORTBILDUNGSKURS UND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, VORTRÄGE). (A70-14276 03-04)
Edited by J. C. Somogyi.
Basel, Switzerland, S. Karger AG (*Bibliotheca Nutritio et Dieta,* No. 12), 1969, p. 94-108. 13 refs. In German.

Discussion of the possibilities of laboratory diagnosis of risk factors affecting atherosclerosis. It is shown that direct laboratory diagnosis of atherosclerosis is at present impossible, since atherosclerosis constitutes a complex multifactor pathological-anatomical process. On the other hand, it is possible to utilize laboratory diagnostic methods to determine and measure some risk factors and apply the test results to the prediction of the disease. The importance of several determinable risk factors is evaluated, and a simplified laboratory test program, yielding serviceable information in most cases, is proposed. O.H.

A70-14280
NUTRITION, BLOOD COAGULATION, AND ATHEROSCLEROSIS (ERNÄHRUNG, BLUTGERINNUNG UND ATHEROSKLEROSE).
G. Müller and F. Koller (Basel, Universität, Medizinische Klinik, Basel, Switzerland).
IN: NUTRITION AND ATHEROSCLEROSIS; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, CONTINUATION COURSE AND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, LECTURES (ERNÄHRUNG UND ATHEROSKLEROSE; INSTITUT FÜR ERNÄHRUNGSFORSCHUNG DER STIFTUNG IM GRUENE, FORTBILDUNGSKURS UND SYMPOSIUM, BAD RAGAZ, SWITZERLAND, OCTOBER 24-26, 1968, VORTRÄGE). (A70-14276 03-04)
Edited by J. C. Somogyi.
Basel, Switzerland, S. Karger AG (*Bibliotheca Nutritio et Dieta,* No.

12), 1969, p. 134-144. 21 refs. In German.

Discussion of some aspects of the interactions between nutrition, blood coagulation, and atherosclerosis in the light of Duguid's (1946) theory. A review is presented of the present state of knowledge of this subject, and the possible interactions are analyzed. Particular attention is given to fibrinolysis and thrombosis as the final blood coagulation products, and to alimentary lipids which are important from the blood coagulation and physiological standpoints. O.H.

A70-14291
OXYGEN CONSUMPTION AND BODY TEMPERATURES DURING ACUTE HYPOXIA OF LONG DURATION IN MAN (SAUERSTOFFAUFNAHME UND KÖRPERTEMPERATUREN IM LÄNGERDAUERNDEN AKUTEN SAUERSTOFFMANGELVERSUCH BEIM MENSCHEN).

K. Lüders and W. Höfler (Tübingen, Universität, Tropenmedizinisches Institut, Tübingen, West Germany).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 27, no. 4, 1969, p. 283-291. 13 refs. In German.

Study of oxygen consumption and body temperatures during acute hypoxia in man on the basis of four tests involving the breathing of a low-oxygen mixture for a period of four hours. It was found that with 12 per cent oxygen content of inspiratory air, oxygen consumption was lowered during the first 60 min, respiration volume was raised, and rectal temperature decreased by 0.3 deg C. Acral skin temperatures of the lower extremities increased by 1.5 deg C (toe) and 0.9 deg C (foot), and decreased later during hypoxia. G.R.

A70-14292
A COMPUTATIONAL CRITERION FOR DETERMINING THE ENDURANCE LIMIT (EIN RECHNERISCHES KRITERIUM ZUR BESTIMMUNG DER DAUERLEISTUNGSGRENZE).

Hans-V. Ulmer (Deutsche Sporthochschule, Physiologisches Institut, Cologne, West Germany).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 27, no. 4, 1969, p. 299-310. 25 refs. In German.

Quantitative determination of the augmentation of the heart rate occurring when a constant performance exceeds the endurance limit. The correlation coefficient between heart rate and time was calculated from the beginning of the sixth to the end of the fifteenth minute of a constant test performance on a bicycle ergometer. A value of more than 0.8 shows that the performance exceeds the endurance limit. In this way the individual heart rate can be measured up to the point where no muscle fatigue occurs. This value is denoted as the endurance heart rate. G.R.

A70-14293
ON MUSCLE STRENGTH AND THE THRESHOLD OF ANAEROBIC WORK.

C. Kay and R. J. Shephard (Toronto, University, School of Hygiene, Dept. of Physiological Hygiene, Toronto, Canada).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 27, no. 4, 1969, p. 311-328. 41 refs.
Research supported by the Department of National Health and Welfare.

Study of lactate accumulation and the threshold of anaerobic work in subjects exercised on a bicycle ergometer. When subjects are exercised at 80 per cent of aerobic power there is a progressive increase in "arterial" lactate for a period from 5 to 15 min. In subjects of poor cardiorespiratory fitness the terminal level may approach the level found in maximal exercise. After 2.5 min of submaximal exercise at 70 or 80 per cent of aerobic power, a substantial accumulation of "arterial" lactate is noted. Evidence is presented that lactate accumulation represents an effect of muscle contraction on oxygen supply rather than an overloading of intracellular biochemical mechanisms. G.R.

A70-14294
DIURNAL VARIATIONS OF THE PHASE COUPLING BETWEEN HEART BEAT AND RESPIRATION UNDER RESTING CONDITIONS AND ITS MODIFICATION BY QUANTITATIVELY REGULATED PHYSICAL EFFORT (DER TAGESGANG DER PHASENKOPPELUNG ZWISCHEN HERZSCHLAG UND ATMUNG IN RUHE UND SEINE BEEINFLUSSUNG DURCH DOSIERTE ARBEITSBELASTUNG).

P. Engel, G. Hildebrandt, and E.-D. Voigt (Marburg, Universität, Institut für Arbeitsphysiologie und Rehabilitationsforschung, Marburg an der Lahn, West Germany).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 27, no. 4, 1969, p. 339-355. 32 refs. In German.

Study of the phase coupling between heart beat (R-peak of the ECG) and respiration (starting point of inspiration) in 33 healthy subjects, aged 18 to 32. In the resting group the mean daily variation of the coupling rate showed a 24-hr rhythm, reaching the maximum at night at about 0100 hr. In the group performing physical work every 4 hr, the amplitude of the mean daily variation of the coupling rate was significantly smaller, exhibiting two maxima at 12-hr intervals. G.R.

A70-14295
INVESTIGATIONS REGARDING THE EFFECT OF VARIOUS WORK AND EXERCISE CONDITIONS IN EARLY STAGES OF LEARNING ON THE LEARNING OF A SIMPLE SENSORIMOTOR PERFORMANCE (UNTERSUCHUNGEN ÜBER DEN EINFLUSS VERSCHIEDENER ARBEITS- UND ÜBUNGSBEDINGUNGEN IN FRÜHEN LERNSTADIEN AUF DAS ERLERNEN EINER EINFACHEN SENSUMOTORISCHEN LEISTUNG).

J. Rutenfranz and A. Iskander (Max-Planck-Institut für Arbeitsphysiologie, Psychologische Abteilung, Dortmund, West Germany).

Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 27, no. 4, 1969, p. 356-369. 9 refs. In German.

Study of the significance of the conditions of the first minutes of training in learning a sensorimotor skill. Five homogeneous groups of subjects worked in the first training minutes under different learning conditions and in different body positions. The best possible training conditions resulted in an increase of performance in all groups, but this increase was determined by the training conditions within the first minutes of the training time. G.R.

A70-14296 *
STIMULUS GENERALIZATION IN SLOW ROTATION.

Norman W. Weissman and Nancy D. Gottlieb (NASA, Ames Research Center, Moffett Field, Calif.).

Journal of Comparative and Physiological Psychology, vol. 69, no. 1, 1969, p. 150-156. 10 refs.

Investigation of the ability of rats to discriminate slow speeds of rotation, using a rotating chamber in which responses on a nose key produced food reinforcement. By use of conventional stimulus generalization and discrimination training procedures, generalization gradients were obtained which are similar to those obtained along more traditional stimulus dimensions. This indicates that the rat is capable of discriminating slow speeds of rotation. Sensitivity of the otolith organs to linear acceleration and of the proprioceptors to changes in muscle tension required to maintain posture during rotation are proposed as possible mechanisms involved in the discrimination. (Author)

A70-14316
MANAGEMENT FACTORS IN REDUCING ATCS STRESS.

John T. Dailey (Federal Aviation Administration, Office of Aviation Medicine, Washington, D.C.).

(International Symposium on Air Traffic Control, Stockholm, Sweden, Mar. 1969.)
Journal of Air Traffic Control, vol. 11, Nov. 1969, p. 26-30.

Discussion of the human factors affecting the rated capacity of an air traffic control system. Levels of safe productivity of air traffic control teams could be raised and the optimal productive career

duration of air traffic controllers lengthened by changes in personnel management practices conducive to minimization and equalization of the stresses imposed on controllers. Short- and long-range recommendations regarding such changes in management practices are presented. M.V.E.

A70-14345
EYE TRACKING OF SELF-MOVED TARGETS—THE ROLE OF EFFERENCE.
Martin J. Steinbach (York University, Dept. of Psychology, Toronto, Canada).
Journal of Experimental Psychology, vol. 82, Nov. 1969, p. 366-376. 15 refs.

Simultaneous monitoring of eye and hand positions shows that a subject can visually track a target more accurately if moved by him rather than if moved independently of his control. This indicates that the oculomotor system has access to the efference (outflow) that produces the target movements. In tracking, most of the useful information in the efferent signal appears to be dynamic and thus concerned with the self-moved target's absolute velocity and acceleration changes. The subject was able to track smoothly an intermittently appearing target (which of itself gave no information about its motion) when the target movement was related to the subject's passively moved arm, indicating a proprioceptive input from the arm to the pursuit eye movement system. (Author)

A70-14347 *
SLEEP OF UNRESTRAINED CHIMPANZEE—CORTICAL AND SUBCORTICAL RECORDINGS.
Frank R. Freemon, James J. McNew (Florida, University, Div. of Neurology, Gainesville, Fla.), and W. Ross Adey (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).
Experimental Neurology, vol. 25, Sept. 1969, p. 129-137. 12 refs.
PHS Grant No. NB-02501; Contract No. NSR-05-007-158.

Summary of telemetered EOG, EMG, and cortical and subcortical EEG records of the brain and amygdala activity and of visual observations of five unrestrained juvenile chimpanzees during REM and non-REM sleep periods. The telemetry records obtained have confirmed the basic conclusions from sleep studies of the restrained animals. New observations made include: (1) sawtooth waves, described in man, are also present in the chimpanzee where they occur not only in the cortex but also in the MBRF (midbrain reticular formation); (2) bursts of 21 to 24 cycles/sec high amplitude waves occur in the amygdala, most frequently during either wakefulness, when they are associated with excitement, or during REM sleep, when their appearance often heralds an imminent awakening; and (3) arousals from REM sleep are often associated with electrical change in the cortex preceding change in the hippocampus, while in arousals from non-REM, especially Stage 4 sleep, hippocampal change usually precedes cortical. M.V.E.

A70-14387
CHIMPANZEE PERFORMANCE—COMPUTER ANALYSIS OF ELECTROENCEPHALOGRAMS.
J. Hanley, D. O. Walter, J. M. Rhodes, and W. R. Adey (California, University, Brain Research Institute; Space Biology Laboratory, Los Angeles, Calif.).
Nature, vol. 220, Nov. 30, 1968, p. 879-881. 13 refs.

Investigation of the performance of chimpanzees in playing a game. Electroencephalograms were recorded from chimpanzees trained to play tic-tac-toe. Parameters selected by computer analysis served to discriminate between two phases of the game and between correct and incorrect decisions. M.V.E.

A70-14425 *
CENTRAL NEURON INITIATION OF PERIODIC GILL MOVEMENTS.
Bertram Peretz (California Institute of Technology, Div. of Biology, Pasadena, Calif.).
Science, vol. 166, Nov. 28, 1969, p. 1167-1172. 19 refs.
PHS Grant No. NB-07071; Grant No. NGR-05-002-031.

In *Aplysia* periodic spontaneous gill movements are controlled by activity endogenous to the abdominal ganglion. These movements were still observed when only the ctenidio-genital nerve was left intact between the ganglion and the gill. One kind of spontaneous gill movement (one per 5 min at 15 deg C) was correlated with the expression of activity of interneuron II; others were not. With reference to this kind of spontaneous gill movement, four types of central neurons in the ganglion send processes to the gill via the nerve. Two cell types are inhibited, and the other two are excited. Two types elicited gill movement; one type activating large gill areas elicited spontaneous gill movements, and the other activating specific gill regions did not participate in the spontaneous gill movements. The value of this preparation in studying the role of central neurons eliciting specific patterned movements and the temporal organization of their activity is shown. (Author)

A70-14448
EFFECTS OF LOWERED BODY TEMPERATURE ON HYPEROXIC SEIZURES.
F. S. Rucci, M. La Rocca (Sassari, Università, Istituto di Fisiologia Umana and Istituto di Clinica Chirurgica, Sassari, Sardinia, Italy), and M. L. Giretti.
Electroencephalography and Clinical Neurophysiology, vol. 27, Dec. 1969, p. 581-586. 20 refs.

Investigation of the influence of hypothermia on the mechanism of hyperoxic seizures in unrestrained, unanesthetized rats. The effect of simple hypothermia on cerebral electrical activity was analyzed in a first group of animals. A pre-epileptic activity, consisting of isolated spikes and sharp waves, occurred at a rectal temperature of 24 deg C, and spontaneous convulsive activity was recorded in 61 per cent of the animals when the body temperature was below 21 deg C. Hyperbaric oxygen stopped the hypothermic seizures. The starting and development of hyperbaric seizures were investigated in a second group of hypothermic rats in comparison with euthermic animals subjected to simple hyperoxia. Hypothermia caused a decrease in the incidence of seizures and an increase in their latency. A probable explanation of this could be that, by lowering the body temperature, a decrease in the metabolic activity of the whole organism and of the nervous system was induced. M.M.

A70-14449
A TEST OF AN "EFFERENT MODEL" OF THE FUNCTION OF INFEROTEMPORAL CORTEX IN VISUAL DISCRIMINATION.
Philip A. Schwartzkroin, Alan Cowey, and Charles G. Gross (Harvard University, Dept. of Psychology, Cambridge, Mass.).
Electroencephalography and Clinical Neurophysiology, vol. 27, Dec. 1969, p. 594-600. 18 refs.
Research supported by the United Cerebral Palsy Research and Educational Foundation; NIH Grant No. MH-14471; NSF Grant No. GB-6999.

Direct test of the prediction that, following inferotemporal cortex lesions, the disinhibition of the visual system will be reflected in an enhanced striate-evoked response to the second of two light flashes. Paired flashes of light were presented to monkeys under a variety of testing conditions. The amplitude of the evoked response at striate cortex to the second flash was expressed as a percentage of the response to the first flash and plotted against interflash interval to yield a recovery function. Bilateral removal of the inferotemporal cortex failed to change the recovery function. This result fails to confirm the hypothesis that inferotemporal cortex exerts an inhibitory influence on the visual system. M.M.

A70-14460 #
INFLUENCE OF RADIATION ON THE PERMEABILITY OF THYMOCYTE NUCLEI MEMBRANES (VLIIANIE RADIATSII NA PRONITSAEMOST' MEMBRANY IADER TIMOTSITOV).
M. A. Tarshis, A. M. Kuzin, and G. I. Burd (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR).

Akademiia Nauk SSSR, Doklady, vol. 188, Sept. 21, 1969, p. 700-703. 17 refs. In Russian.

Investigation of the permeability of membranes of isolated nuclei from the thymus of white rats in a sucrose-calcium buffer. The rats were slaughtered 1, 2, and 4 hrs after exposure to gamma-radiation of 500 rad per min in a dose of 1000 rad. The permeability of the membrane was measured by the penetration rate of a specially prepared glucose into the test and control nuclei. It is found that radiation has the effect of increasing the permeability of the membrane. V.P.

A70-14553 #
CERTAIN HOMOGENEOUS NEURON NETS (O NEKOTORYKH ODNORODNYKH NEIRONNYKH SETIAKH).
I. I. Piatetskii-Shapiro, O. N. Stavskaia, and A. L. Toom.
Avtomatika i Telemekhanika, Sept. 1969, p. 123-128. In Russian.

Discussion of a mathematical model designed as an aid in computer simulation studies of the behavior of a class of homogeneous neuron nets controlling recurrent inhibition. It is assumed that the neurons are situated on two parallel straight lines and that they are in activated or inactivated states whose durations are discrete functions of time. Several situations are discussed to assess the effectiveness of this model when applied to neuron nets with various combinations of activated and inactivated neuron states. V.Z.

A70-14556
IMAGERY IN MEDICINE; INSTRUMENT SOCIETY OF AMERICA, ANNUAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, 7TH, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH., MAY 19-22, 1969, PROCEEDINGS.
Edited by F. D. Thomas and E. E. Sellers (Michigan, University, Ann Arbor, Mich.).
Pittsburgh, Instrument Society of America (Biomedical Sciences Instrumentation. Volume 6), 1969. 291 p.
Members, $11.00; nonmembers, $14.

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A70-14557 #
THE ROLE OF THREE-DIMENSIONAL DISPLAYS IN ELECTROCARDIOGRAPHY.
I. R. Neilsen and C. R. Collier (Loma Linda University, School of Medicine, Loma Linda, Calif.).
IN: IMAGERY IN MEDICINE; INSTRUMENT SOCIETY OF AMERICA, ANNUAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, 7TH, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH., MAY 19-22, 1969, PROCEEDINGS. (A70-14556 04-05)
Edited by F. D. Thomas and E. E. Sellers.
Pittsburgh, Instrument Society of America (Biomedical Sciences Instrumentation. Volume 6), 1969, p. 44-47. 5 refs.
NIH Grants No. FR-3; No. FR-00276.

Description of work in progress in developing methods for the presentation of the extensive information available on the body surface as an efficient aid for diagnosis of cardiac abnormalities. Because strictly numerical solution of the inverse problem is proving inordinately difficult, adequate visualization of the potential distributions on the body surface may prove of value in improving formulation of the problem, leading to better methods of solution. The results described were obtained by exercising a mathematical model of cardiac activity. The same approach and graphical representations can be used with experimental data obtained from measurements on actual patients. Continuing investigation will utilize both patient data and output from the model. F.R.L.

A70-14559 #
APPLICATION OF OPTICAL IMAGE PROCESSING FOR THE EDGE ENHANCEMENT IN ANGIOCARDIOGRAPHS.
T. M. Holladay, P. E. Engler, and R. E. Kinzly (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).
IN: IMAGERY IN MEDICINE; INSTRUMENT SOCIETY OF AMERICA, ANNUAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, 7TH, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH., MAY 19-22, 1969, PROCEEDINGS. (A70-14556 04-05)
Edited by F. D. Thomas and E. E. Sellers.
Pittsburgh, Instrument Society of America (Biomedical Sciences Instrumentation. Volume 6), 1969, p. 172-176. 5 refs.
Research sponsored by the Cornell Aeronautical Laboratory.

Description of the theoretical and practical aspects of an automatic optical scheme for rapidly obtaining a time-course history of the left-ventricular volume. The scheme determines the projected area of the left ventricle from cineangiocardiograms. The original film is preprocessed in the optical laboratory to eliminate or minimize unwanted structure and to enhance the edges of the left ventricle. Examples of preprocessed images with a clearer outline of the left ventricle are presented. These images are more amenable to subsequent processing by automatic computer techniques. F.R.L.

A70-14560 * #
FULL-COLOR AND THREE-DIMENSIONAL RADIOGRAPH DISPLAYS.
Wilfred Roth (Vermont, University, Electrical Engineering Dept., Burlington, Vt.) and Ronald Tolmei.
IN: IMAGERY IN MEDICINE; INSTRUMENT SOCIETY OF AMERICA, ANNUAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, 7TH, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICH., MAY 19-22, 1969, PROCEEDINGS. (A70-14556 04-05)
Edited by F. D. Thomas and E. E. Sellers.
Pittsburgh, Instrument Society of America (Biomedical Sciences Instrumentation. Volume 6), 1969, p. 183-187. 5 refs.
Grant No. NGR-46-001-008.

Description of methods whereby black and white roentgenograms can be converted to full-color and three-dimensional cathode ray tube displays in order to convey more information than can readily be interpreted by even a skilled observer. Electronic data processing circuitry is incorporated to enhance the spatial gradient in order to improve the displayed image. Also, contour lines (isodensity contours) are generated to provide loci which join all points having a

preselected density. The contour levels can be manually or automatically selected. F.R.L.

A70-14564
PROBLEMS OF SCIENTIFIC DEVELOPMENT OF MOTOR ACTIVITY AS AN IMPORTANT PRINCIPLE OF THE PSYCHOLOGICAL AND PHYSIOLOGICAL TRAINING OF COSMONAUTS.
A. V. Korobkov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 3-9.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 1-5. Translation.
(For abstract see issue 13, page 2215, Accession no. A69-28611)

A70-14565
YEAR-LONG BIOENGINEERING EXPERIMENT IN A GROUND COMPLEX OF LIFE-SUPPORT SYSTEMS.
A. I. Burnazian, V. V. Parin, Iu. G. Nefedov, B. A. Adamovich, S. B. Maksimov, B. L. Gol'dshvend, N. M. Samsonov, and G. N. Kirikov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 9-19.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 6-14. 6 refs. Translation.
(For abstract see issue 13, page 2216, Accession no. A69-28612)

A70-14566
PROBLEMS IN SPACE PHARMACOLOGY.
V. V. Paris, V. M. Vinogradov, and A. N. Razumeev.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 20-32.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 15-25. 25 refs. Translation.
(For abstract see issue 13, page 2211, Accession no. A69-28613)

A70-14567
CIRCADIAN RHYTHMS AND THEIR IMPORTANCE IN SPACE BIOLOGY AND MEDICINE.
G. K. Mikushkin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 32-39.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 26-32. 44 refs. Translation.
(For abstract see issue 13, page 2211, Accession no. A69-28614)

A70-14568
HYPOTHALAMIC NEUROSECRETION AND STATE OF ADRENAL GLANDS IN RATS IN HIGH-ALTITUDE CONDITIONS.
E. S. Gul'iants and V. I. Gonikman.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 40-45.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 33-36. 16 refs. Translation.
(For abstract see issue 13, page 2211, Accession no. A69-28615)

A70-14569
CHANGES IN CROSS-STRIATED MUSCLE FIBERS ASSOCIATED WITH RESTRICTION OF MUSCLE'S MOTOR ACTIVITY.
V. V. Portugalov and K. D. Rokhlenko.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 45-52.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 37-42. 25 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28616)

A70-14570
EFFECT OF PROLONGED FIXATION ON SOME FUNCTIONS OF THE ANIMAL ORGANISM.
A. B. Kogan.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 52-54.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 43-45. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28617)

A70-14571
CHANGE IN THE CALCIUM METABOLISM IN RATS UNDER CONDITIONS OF HYPOKINESIA.
B. B. Egorov, V. I. Lobachik, and L. N. Kleimenova.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 55-58.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 46-49. 7 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28618)

A70-14572
THE POSSIBILITY OF USING SWEET POTATOES AS THE BASIC SOURCE OF CARBOHYDRATES IN HUMAN NUTRITION DURING SPACE FLIGHT.
V. P. Dadykin and T. I. Nikishanova.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 59-63.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 50-53. 10 refs. Translation.
(For abstract see issue 13, page 2216, Accession no. A69-28619)

A70-14573
THE PRODUCTION AND NUTRITIVE VALUE OF CHLORELLA BIOMASS WITH AN INCREASED CYSTEINE CONTENT.
N. N. Verzilin, V. V. Pinevich, E. V. Kozlova, I. E. Kamchatova, K. V. Kvitko, I. A. Abakumova, and Iu. I. Kondrat'ev.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 63-67.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 54-57. 7 refs. Translation.
(For abstract see issue 13, page 2216, Accession no. A69-28620)

A70-14574
BACTERICIDAL ACTION OF SILVER-COATED ACTIVATED CHARCOALS AND ION-EXCHANGE RESINS.
S. V. Chizhov, V. V. Shaidorova, Iu. G. Gel'tsev, and V. V. Krasnoshchekov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 68-71.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 58-61. 13 refs. Translation.
(For abstract see issue 13, page 2216, Accession no. A69-28621)

A70-14575
PROBLEMS OF DECOMPRESSION IN SPACE MEDICINE.
I. M. Khazen.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 72-79.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 62-68. 62 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28622)

A70-14576
EFFECT OF HIGH-ALTITUDE ACCLIMATIZATION ON RESISTANCE TO ENVIRONMENTAL FACTORS.
P. I. Egorov, N. A. Agadzhanian, M. M. Korotaev, V. P. Baranova, T. V. Benevolenskaia, O. I. Boikova, V. K. Vasil'ev, A. F. Zavadovskii, M. P. Kuz'min, M. B. Reutova, N. I. Tsyganova, and I. Ia. Iakovleva.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 80-84.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 69-72. 6 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28623)

A70-14577
METABOLIC CHARACTERISTICS OF HUMANS MAINTAINED ON A DIET OF DEHYDRATED FOODS FOR 120 DAYS.
V. P. Bychkov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 84-89.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 73-76. 14 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28624)

A70-14578
INFLUENCE OF HYPOKINESIA, ACCELERATION, AND REDUCED DIET ON THE HUMAN BLOOD-CLOTTING SYSTEM.
O. D. Anashkin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 89-94.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 77-81. 22 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28625)

A70-14579
CIRCULATION IN THE CEREBRAL AND SUPERFICIAL VESSELS OF THE HUMAN HEAD UNDER THE ACTION OF ACCELERATION.
A. S. Barer and V. B. Zubavin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 95-98.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 82-84. 15 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28626)

A70-14581
THE EFFECT OF THE SIMULTANEOUS ACTION OF HYPOXIC HYPOXIA AND HIGH TEMPERATURE OF THE ENVIRONMENT ON HUMAN HEAT METABOLISM.
A. N. Azhaev.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, Jan.-Feb. 1969, p. 104-106.)
Environmental Space Sciences, vol. 3, Jan.-Feb. 1969, p. 89, 90. 5 refs. Translation.
(For abstract see issue 13, page 2212, Accession no. A69-28628)

A70-14610
BIOLOGICAL RHYTHMS IN THE COURSE OF SPACE FLIGHTS (LES RYTHMES BIOLOGIQUES AU COURS DES VOLS COSMONAUTIQUES).
Ph. Chemin (Bordeaux, Université, Faculté de Médecine, Bordeaux, France).
La Recherche Spatiale, vol. 8, Aug.; Sept. 1969, p. 16-22. 15 refs. In French.

Study of the influence of biological rhythm perturbations on astronauts, especially perturbation of the waking-sleeping rhythm during space flights. Biological rhythms are discussed in general terms; they are endogenous and autonomous. The ways by which circadian rhythms convert physiological aspects into adaptation to the environment are outlined. Certain experiences of Soviet and American astronauts are described. The use of synchronizers is important under the exceptional conditions of outer space. While the nychthemeral rhythm need not be respected in its entirety by astronauts on short-duration flights, it is necessary, in the case of long flights, to conform scrupulously to the habitual terrestrial way of life. F.R.L.

A70-14630 *
THE TRANSMISSION CHARACTERISTICS OF LARGE AND SMALL PRESSURE WAVES IN THE ABDOMINAL VENA CAVA.
Max Anliker (Stanford University, Dept. of Aeronautics and Astronautics, Stanford, Calif.), Michael K. Wells (Litton Industries, Inc., Applied Science Div., Minneapolis, Minn.), and Eric Ogden (NASA, Ames Research Center, Experimental Biology Div., Moffett Field, Calif.).
IEEE Transactions on Bio-Medical Engineering, vol. BME-16, Oct. 1969, p. 262-273. 22 refs.
Grant No. NGR-05-020-223.

The mechanical behavior of the abdominal venae cavae of anesthetized dogs has been studied by measuring the speed, attenuation, and changes in waveform of various kinds of artificially induced pressure signals. The propagation of large-amplitude pressure waves is shown to be affected by reflection interference and pronounced nonlinear phenomena. For pressure signals exceeding a few millimeters mercury, the speed increases with amplitude and the wavefront steepens during propagation as in the early phases of the formation of a shock wave. By inducing distension waves in the form of finite trains of sine waves with amplitudes less than 20 mm water, the dispersion and attenuation were determined without requiring Fourier transform computations. At transmural pressures between 50 and 300 mm water and frequencies between 20 and 100 Hz, the vena cava was found to be only mildly dispersive and the logarithmic decrement appears to be independent of frequency. Irrespective of the amplitude and shape of the pressure signals, their speeds varied along the vena cava, and also with respiration. In addition, the speeds generally increased under the influence of the chemical and electrical stimuli applied, and with rising transmural pressure. (Author)

A70-14631
FLOW THROUGH COLLAPSIBLE TUBES AND THROUGH IN SITU VEINS.
J. P. Holt (Louisville, University, School of Medicine, Dept. of Medicine, Louisville, Ky.).
IEEE Transactions on Bio-Medical Engineering, vol. BME-16, Oct. 1969, p. 274-283. 53 refs.
Research supported by the Kentucky County Heart Association, the Louisville County Heart Association, the Jefferson County Heart Association, and NIH.

Summary of the results of investigations of the principles of flow through veins and similar collapsible tubes. Studies in models employing thin-walled rubber tubes and in the intact animal have shown that the flow of liquid through such a collapsible tube, in which the pressure immediately downstream from the collapsed segment is less than the pressure surrounding the collapsed segment, is unaffected by changes in the downstream pressure. With changes in the downstream pressure, the collapsed tube automatically adjusts its resistance so that flow remains constant. In the mammalian organism the flow of blood in veins above heart level, and at the points where veins enter the low-pressure are of the thorax, is governed by the principles of flow through collapsible tubes. The importance of the collapse phenomena in the flow of blood through the lung and other organs is discussed. M.M.

A70-14632 *
COMPUTER SIMULATION STUDIES OF THE VENOUS CIRCULATION.
M. F. Snyder and V. C. Rideout (Wisconsin, University, Madison, Wis.).
IEEE Transactions on Bio-Medical Engineering, vol. BME-16, Oct. 1969, p. 325-334. 24 refs.
Grant No. NGR-50-002-083.

An analog computer model of the human cardiovascular system has been set up in which detailed attention is given to the representation of pressure and flow events in the veins, including effects of gravity, collapse, breathing, and the action of venous valves. This model, which includes a control loop for heart rate, was checked against human venous pressure waveforms and against response of the human to tilt-table experiments. These comparisons indicate that the model is valid for the study of postulated venous tone control characteristics; it should also be useful in the study of the mechanisms of venous return and circulatory system response during unusual acceleration conditions. (Author)

A70-14633
A LIGHT SOURCE FOR PUPIL STIMULATION.

Y. Kurioka (Ministry of International Trade and Industries, Electrotechnical Laboratory, Osaka Branch, Amagasaki, Japan) and H. O'Beirne (Toronto, University, Institute of Bio-Medical Electronics, Toronto, Canada).
IEEE Transactions on Bio-Medical Engineering, vol. BME-16, Oct. 1969, p. 338-340. 5 refs.
Defence Research Board Grant No. DRB 9310-112.

Description of a system designed for satisfactory controllable light stimulus to be used for experiments on the human pupillary servomechanism. The system consists of a potassium dihydrogen phosphate (KDP) electrooptic light modulator and an amplifier capable of giving a suitable high-voltage signal. M.M.

A70-14679
ALVEOLAR HYPOXIA, DIFFERENTIAL EFFECTS ON PULMONARY ARTERIES OF VARIED SIZE.

Richard L. Naeye (Pennsylvania State University, College of Medicine, Dept. of Pathology, Hershey, Pa.).
Society for Experimental Biology and Medicine, Proceedings, vol. 132, Nov. 1969, p. 558-560. 9 refs.
PHS Grant No. HE-11688-01.

Experimental investigation of the relationship between increased vascular resistance, vascular constriction, and muscle mass in the pulmonary arteries of mice subjected to alveolar hypoxia. Quantitative histologic analysis demonstrated that hypoxia but not polycythemia led to a marked medial hyperplasia in small pulmonary arteries, a small hyperplasia in intermediate-sized arteries, and no change in the largest muscular pulmonary arteries. M.M.

A70-14680
DIFFERENTIAL EFFECT OF HYPOBARIC HYPOXIA ON POTENCY OF CNS DEPRESSANTS IN RATS AND MICE.

Irwin Baumel, John J. DeFeo, and Harbans Lal (Rhode Island, University, Dept. of Pharmacology and Institute of Environmental Biology, Kingston, R.I.).
Society for Experimental Biology and Medicine, Proceedings, vol. 132, Nov. 1969, p. 629-631. 21 refs.

Experimental investigation of acute exposure of mice and rats to hypobaric hypoxia. The exposure enhanced the depressant effects of sodium barbital, sodium pentobarbital, and chloral hydrate. Mice were far more sensitive than rats, barbital hypnosis being affected to the greatest extent. In addition, hypothermia observed under the hypobaric environment was greater in mice than in rats. M.M.

A70-14681
EFFECTS OF HYPERBARIC OXYGENATION ON METABOLISM. V—COMPARISON OF PROTECTIVE AGENTS AT 5 ATMOSPHERES 100% OXYGEN.

William D. Currie, Robert M. Gelein, Jr., and Aaron P. Sanders (Duke University, Medical Center, Dept. of Radiology, Durham, N.C.).
Society for Experimental Biology and Medicine, Proceedings, vol. 132, Nov. 1969, p. 660-662. 12 refs.
PHS Grant No. GM-14226-03; Contract No. N 00014-67-A-0251-0002.

Comparison of several protective agents used in rats exposed to 5 absolute oxygen pressures. GSH was the best single compound for protecting against oxygen toxicity. This appears to be a combined SH protection and metabolite protection. SH group protection, as evidenced by cysteine experiments, was not as effective as metabolites. The acid-base buffer Tris was less effective than SH group protectors, or GABA, glutamate, or succinate. M.M.

A70-14682 *
INACTIVATION AND DEGRADATION OF GLUCAGON BY DIPEPTIDYL AMINOPEPTIDASE I (CATHEPSIN C) OF RAT LIVER.

J. Ken McDonald, Paul X. Callahan, Benjamin B. Zeitman, and Stanley Ellis (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
Journal of Biological Chemistry, vol. 244, Nov. 25, 1969, p. 6199-6208. 41 refs.

Extensive investigation of the degradation of glucagon and secretion by purified rat liver dipeptidyl aminopeptidase I. Chloride and sulfhydryl activators were found to be essential for the degradation. Evidence derived from this study is used to support a common identity for dipeptidyl aminopeptidase I and the glucagon-degrading enzyme of liver. M.M.

A70-14826 #
USE OF LINES OF NONEXTENSION TO PROVIDE MOBILITY IN FULL-PRESSURE SUITS.

A. S. Iberall (General Technical Services, Inc., Upper Darby, Pa.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/Aut-22. 17 p.
Members, $1.00; nonmembers, $2.00.
Navy-USAF-supported research.

Determination of the efficacy of utilizing the lines of nonextension, characteristic to human skin, to provide natural mobility and minimal ballooning in full-pressure suits. The investigation program involved (1) mapping of the lines of nonextension; (2) testing whether string elements of high elastic modulus, a connected network, could be laid along the lines of nonextension without any constraint to mobility; (3) obtaining a highly mobile pressure-retaining layer to be constrained by the net; and (4) constructing an entire pressure-retaining garment system that makes use of all necessary layers and string elements in a completely connected netted covering for the body with minimal constraint to mobility up to 5 psi. Z.W.

A70-14850 #
FORCE INPUT AND THORACO-ABDOMINAL STRAIN RESULTING FROM SINUSOIDAL MOTION IMPOSED ON THE HUMAN BODY.

K. O. Lange and R. G. Edwards (Kentucky, University, Wenner-Gren Aeronautical Research Laboratory, Lexington, Ky.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-3. 8 p. 16 refs.
Members, $1.00; nonmembers, $2.00.
Contract No. AF 33(616)-7766.

Measurement of the (1) reciprocating force at the interface of the shake-table and a subject and (2) repetitive circumferential deformations of the torso of two human subjects exposed to sinusoidal inputs of an electrohydraulic shake-table over the frequency range of 2 to 14 Hz at four distinct intensities. Supine, the subjects were either completely relaxed or, by contracting all voluntary muscles, fully tensed. A principal resonance of the supine body occurs between 5 and 7.5 Hz, shifting downward systematically with increasing shake-table amplitude. Maximum strain of chest and abdomen occurs at, or somewhat above, the resonant frequency and shifts with the resonance. The amplitude of the deformation also increases systematically with increasing input. At and about the resonant frequency, the force input increases by some 50 per cent when the muscles are tightened, but the torso deformation decreases by as much as 75 per cent. On the other hand, at frequencies above 12 Hz, the force input to the tense subject becomes as much as 35 per cent smaller than that which is imposed on the relaxed subject, while little or no difference of strain in the thoracoabdominal region is noted. (Author)

A70-14851 #
QUANTITATIVE MODELS OF HUMAN MOTION BY RESPONSE SURFACE METHODOLOGY.

Appu Kuttan (Puerto Rico, University, Industrial Engineering Dept., Mayaguez, P.R.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-5. 13 p. 16 refs.
Members, $1.00; nonmembers, $2.00.
Research sponsored by the Wisconsin Alumni Research Foundation and the University of Wisconsin.

Study of three temporal human motor responses (reaction time, movement time, and manipulation time) by response surface methodology, statistical experimental design, and a model building technique. This comparatively new technique makes it possible to develop, for the first time, reliable quantitative models for motor responses with the least amount of data. The validity of such models can also be verified. Three independent variables investigated were stimulus information, movement information, and manipulation information. Simple first-order models are developed for the three responses studied. (Author)

A70-14852 #
VARIABLE ANAMORPHIC MOTION PICTURE.
William C. Ebeling (Singer Co., Link Div., Binghamton, N.Y.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-8. 9 p.
Members, $1.00; nonmembers, $2.00.

Description of a variable anamorphic motion picture system that produces a visual display for use with a simulator. The properties of this photooptical system are such that the projected picture can be so distorted as to produce, for the occupant in the simulator, the illusion that the system he is operating is physically moving in response to his control inputs, as well as to other perturbations that may be introduced. (Author)

A70-14853 #
MOTION AND AURAL SIMULATION--REQUIREMENTS, CURRENT STATUS, AND NEEDED RESEARCH.
Edwin Cohen (Singer Co., Link Div., Binghamton, N.Y.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-9. 4 p.
Members, $1.00; nonmembers, $2.00.

Discussion of the importance of visual, motion, and aural stimuli in aircraft simulators. The absence of these stimuli noticeably decreases the realism of a simulation by changing the context of the cues that are provided. Special attention is given to the parameters of the motion system and to unwanted motion. Problems connected with aural simulation are briefly described. Z.W.

A70-14854 #
IMPROVING THE PILOT'S ROLE IN AIRCRAFT SYSTEMS.
Arthur McNealus (Grumman Aerospace Corp., Bethpage, N.Y.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-12. 7 p. 9 refs.
Members, $1.00; nonmembers, $2.00.

Review of onboard aircraft pilot aids specifically related to information transfer from the cockpit instrumentation panel to the pilot. Current cockpit display problems are examined, along with the new state-of-the-art devices apt to solve those problems, and a recommended approach to a cockpit display system is presented. Its aim is to reduce the pilot's work load and to aid him in making quicker and more accurate judgments, particularly during critical phases of operation. M.V.E.

A70-14855 #
RATE CONTROL IN MAN-MACHINE SYSTEMS.
Joseph Hirsch (U.S. Naval Material Command, Undersea Research and Development Center, Pasadena Laboratory, Pasadena, Calif.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-14. 9 p. 15 refs.
Members, $1.00; nonmembers, $2.00.

Description of a tactile control system using feed-forward loops to provide rate information to the operator. The tactile link simplifies operation through a display that indicates means of error correction rather than the nature of the error itself. Applications in unmanned-aircraft and machine-tool control are described, and design techniques are presented. Tests indicating an overall improvement of 30 per cent in closed-loop control-system gain, as applied to a simulated drone-control situation, are described. The concept can be applied to a wide variety of semiautomatic control operations. (Author)

A70-14856 #
IMPEDANCE MATCHING--A HUMAN FACTORS PROBLEM.
R. E. Wienke (Central State University, Wilberforce, Ohio) and W. C. Steedman (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/GT-15. 6 p. 11 refs.
Members, $1.00; nonmembers, $2.00.

Discussion of the importance of impedance matching--i.e., matching the machine response to human sensory capacities, in the design of any man-machine system. The design example of a visual approach landing system is used for illustrating the definition and solution of the man-machine interface problem at every step of the design. This example shows that a successful system can be obtained only when the machine design ensures maximum man-machine information transfer. M.V.E.

A70-14858 #
CREW DESIGN REQUIREMENTS FOR AN ON-ORBIT BIOMEDICAL AND BEHAVIORAL MEASUREMENTS PROGRAM.
H. T. Fisher and J. H. Duddy (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Biotechnology Organization, Sunnyvale, Calif.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/BHF-17. 4 p.
Members, $1.00; nonmembers, $2.00.

Description of previous and current activities relating to the development of crew systems-design and operations requirements for a biomedical and behavioral experiment and measurement system for orbital operations. The development of these crew requirements has been based on detailed systems and function analyses and translation of the analytical data into general system design and operations criteria. A full-scale mockup of a candidate space station laboratory module was fabricated. After simulation equipment, mockups, and operating models of the biomedical/behavioral hardware were installed, requirements were reviewed, design verifications were conducted, operational factors were examined, crew/equipment interfaces were evaluated, and equipment design tradeoffs were validated. These results were translated into refined crew requirements and system-design and operations criteria. The process has been iterative, complemented by equipment testing in aircraft zero-g parabolic flights and underwater "weightlessness" simulations. (Author)

A70-14903 #
HUMAN BOTTLENECK IN AIR TRAFFIC CONTROL.
Harry P. Schmidt and Samuel P. Saint (R. Dixon Speas Associates, Inc., Manhasset, N.Y.).
American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/Av-1. 6 p.
Members, $1.00; nonmembers, $2.00.

The most critical, and, at the same time, the most neglected problem in air traffic control today is the human decision maker in the control loop. Control cannot move into the modern age until a computer is put "on line" with the controller in directing and organizing traffic flow. Modern technology has failed to reduce the pressure on human controllers, as evidenced at the busiest terminal areas, which impose too much stress on controllers. Since the controller sorely needs relief, the machine must take over routine functions. Some new approaches to control are needed. The technology to evoke the solution certainly exists, but solution will not come easily, for the needed first step toward solution is proper understanding of the problem--what the design objective must be. Because economic well-being of the civil users and improved transportation offered the traveling public depend on increased aircraft movements, it is important that maximum volume of movements be the principal criteria for system design. System capacity must be maximized by restructuring the manpower side of

the equation to retain the overriding judgment and flexibility of the human while using computer capability effectively. The system must not merely automate what the controller does today. (Author)

A70-14942 #
SIMULATED WEIGHTLESSNESS CONDITIONS IN ANIMAL DEVELOPMENT.
W. Briegleb, A. Schatz, and G. Teuchert (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).
International Astronautical Federation, Congress, 20th, Mar del Plata, Argentina, Oct. 5-10, 1969, Paper. 12 p. 12 refs.
Ministerium für Wissenschaftliche Forschung Contract No. WRK 35.

Results of ground-based biological experiments performed under conditions of weightlessness. The beneficial effect of space-flight weightlessness and radiation on mitosis and the adverse effect on meiosis are pointed out, and current methods of duplication of zero-gravity conditions for biological experiments in ground-based laboratories are evaluated. The reported experiments were performed on the bug *Tribolium*, the nematod *Ascaris*, and on frog eggs. The subjects investigated include organism orientation, functional development of the vestibular apparatus in the frog germ, polarization in frog eggs, and cell mitosis and meiosis. M.V.E.

A70-14976 #
EXPERIMENTAL STUDY ON FUNCTIONAL CHANGES OF CONTROLLING C-8 TRAINER.
Hiroko Hagihara, Sadahito Aramaki, Teruomi Sakurai, and Yuko Nagasawa (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Dec. 1968, p. 1-8. 15 refs. In Japanese, with abstract in English.

Measurement of functional changes in five experts at controlling a C-8 trainer by flicker value, pulse rate, reaction time, instrument error, and control error. It is found that the flicker value after flight was higher than that before flight, but the pulse rate did not change during flight. Reaction time to pure tone did not change during flight, but reaction time to signal and noise decreased in speed and increased in deviation after the first 30 min. Instrument error and control error increased in the first 30 min and after 90 min of flight. M.M.

A70-14977 #
THE EFFECTS OF NOISE ON TRACKING PERFORMANCE, EEG AND GSR.
Yuko Nagasawa, Kiyohisa Niwa, Hiroko Hagihara, and Sadahito Aramaki.
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Dec. 1968, p. 9-16. 10 refs. In Japanese, with abstract in English.

Investigation of the effects of noise on tracking performance, EEG, and GSR in six subjects. Judging from tracking error, there was a decrease in the performance level. Under 80 dB, within 10 min from the start of exposure, the performance level was temporarily increased, but gradually decreased afterward. Under 90 dB, the performance level continuously decreased as the task proceeded. Under all conditions of noise exposure, there were no remarkable changes in EEG and GSR, except in the period within 10 min from the start. M.M.

A70-14978 #
AN EXAMINATION OF THE SPEED ANTICIPATION TEST, ESPECIALLY WITH REFERENCE TO THE MANIFEST ANXIETY SCALE UNDER NORMAL CONDITIONS.
Sakurako Takigawa and Hayao Hori (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Dec. 1968, p. 17-23. 8 refs. In Japanese, with abstract in English.

Investigation of interindividual reaction time by target speed anticipation test, and determination of the relation between reaction time and manifest anxiety scale in three anxiety groups. It is found that reactions tended to lag with an increase in the masking distance or in the speed of the target. The high-anxiety group reacted too late, regardless of speed and masking distance. The middle and high anxiety groups responded more promptly at each speed compared with the low-anxiety group. M.M.

A70-14979 #
AN INVESTIGATION OF THE EMPIRICAL VERTIGO IN AIRCRAFT PILOTS DURING FLIGHT.
Noriko Kato, Masaaki Iwane, Shigeyuki Yagura, Hiroshi Wada, Ichiro Saito, and Ryohei Yurugi (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Dec. 1968, p. 24-34. 9 refs. In Japanese, with abstract in English.

Investigation of the so-called pilots' vertigo in 120 pilots, using a questionnaire and interviews. It is found that 38 per cent of the pilots examined experienced some vertigo, especially bank directional disorientation, and that even normal and proficient pilots were apt to experience vertigo under disadvantageous flight conditions. The importance of establishing an efficient method other than instrument flight training, such as training of the equilibrium-reflex system, to prevent and alleviate vertigo is stressed. M.M.

A70-14980 #
PRACTICAL METHOD OF SOMATOMETRY—RECORDS OF LECTURE BY PROFESSOR KIMURA.
Naokazu Hirashima and Hiroko Hagihara (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Dec. 1968, p. 35-39. In Japanese, with abstract in English.

Discussion of the development, basic concepts, and practice of somatometry. The appropriate posture during somatometry, a method of searching for landmarks, and a method of using anthropometric instruments are considered. M.M.

A70-14981 #
THE INFLUENCE OF VIBRATION ON MOTOR PERFORMANCE. I—THE EFFECT OF HORIZONTAL TRANSVERSE VIBRATION ON TRACKING TASK.
Yuko Nagasawa, Hiroko Hagihara, Sadahito Aramaki, and Tomohiko Ito.
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Mar. 1969, p. 1-7. 8 refs. In Japanese, with abstract in English.

Experimental investigation of the effects of horizontal transverse vibration on the ability of five healthy young subjects to carry out a tracking task. The greatest increase in tracking errors was observed at a frequency of 3 cps with a peak acceleration of 0.09 g. Obvious resonant effects were observed at frequencies of 3 and 5 cps, and tracking errors increased at 3 cps. The resonance was deemed to cause roughness in the tracking performance feedback function. M.M.

A70-14982 #
THE SURVEY ON HEARING OF PILOTS IN JASDF.
Noriko Kato, Ichiro Saito, and Shigeyuki Yagura (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Mar. 1969, p. 8-13. In Japanese, with abstract in English.

Survey of the pure-tone threshold audiograms of 100 pilots above 50 years of age. Hearing levels of pilots were tabulated at each frequency for each ear. These hearing levels were compared with those of personnel not exposed to job noise. The results showed that pilots had better hearing levels than the general population at the lower audiometric frequencies, while at the higher frequencies, particularly at 4000 Hz, they tended to lose hearing more rapidly, probably owing not only to job-noise exposure, but also to pathological changes in the eardrum. M.M.

A70-14983 #
CHANGES IN THE LEVEL OF PLASMA FREE FATTY ACID ON EXPOSURE TO COLD.
Teruko Akiyama, Michihiko Iizuka, and Ryohei Yurugi (Japan Air Self-Defence Force, Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Mar. 1969, p. 14-21. 14 refs. In Japanese, with abstract in English.

Experimental investigation of acute and chronic exposure to 5 deg C cold in rabbits, rats, and humans. The results obtained showed that the levels of plasma FFA (free fatty acid) in rabbits increased markedly immediately after exposure and reached the maximum value in 60 to 120 minutes of exposure, then declined quickly. The levels of plasma FFA in rats decreased to below the control level after one week of exposure when cold acclimatization might have been achieved. After one hour of cold exposure of male humans, a decrease in mean skin temperature, an increase in heat production, and a marked increase in plasma FFA level were noticed. M.M.

A70-14984 #
STUDIES ON THE EVALUATION OF PHYSIOLOGICAL LOAD OF WORK AT ALTITUDE BY MEANS OF HEART RATE.

Haruo Ikegami, Yoshihisa Yamazaki, Chieko Sakakibara, Nobuo Yuza, and Ryohei Yurugi (Japan Air Self-Defence Force Aeromedical Laboratory, Tachikawa, Japan).

Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Mar. 1969, p. 22-31. 11 refs. In Japanese, with abstract in English.

Evaluation of the physiological load of exercise at altitude in six healthy subjects. The results obtained showed that heart rate during exercise at altitude was higher than that observed at the same work intensity at ground level. The effect of altitude on heart rate during work was remarkable in moderate exercise, unremarkable in light exercise. In heavy exercise, heart rate reached nearly the highest value regardless of altitude. The recovery rate was estimated by the half-decay time of the heart rate. In light exercise the recovery rate did not show significant difference at ground level and was heightened by altitude. M.M.

A70-14985 #
RELATIONSHIPS BETWEEN FLYING SAFETY AND HUMAN FACTORS FROM JOB-SATISFACTION IN JASDF.

Isao Kuroda, Yukiko Kakimoto, and Yoshinori Kurihara.

Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 9, Mar. 1969, p. 32-37. In Japanese, with abstract in English.

Investigation of human communication in pilots, and in maintenance and administrative personnel, using a questionnaire. The results obtained show that advice is sought from family as well as from superior officers in each group. Enlisted personnel ask advice of a friend rather than their superior officer. This tendency is especially noticeable in pilot trainees. As the years of service increase, especially after five years, communication with superior officers improves. The pilot group has a more intimate relationship with friends than with other career groups. Only a few people get advice from medical doctors. M.M.

A70-15082
THE ROLE OF MIDDLE EAR MUSCLE CONTRACTIONS IN CONTRALATERAL REMOTE MASKING.

H. McRobert, M. E. Bryan, and W. Tempest (Salford, University, Dept. of Electrical Engineering, Audiology Research Unit, Salford, Lancs., England).

Journal of Sound and Vibration, vol. 10, Sept. 1969, p. 305-316. 16 refs.

Medical Research Council Grant No. G.964/154/B.

Middle ear muscle contractions are shown to produce a small but significant increase in the contralateral remote masking of a low-frequency tone burst when its threshold shift is determined as a function of its time delay with respect to a high-frequency masking stimulus (either octave band noise or tone). For low levels of masking stimulus (below 85 dB) there is a smooth fall in masking with increasing delay. However, when the masking noise exceeds 85 dB or the masking tone exceeds 95 dB, there is an increase in masking amounting to an average (over seven subjects) of 3.2 and 1.4 dB, respectively, for masking stimuli of up to 115 dB. These increases occur at delay times of between 200 and 100 msec, depending upon subject and upon masking stimulus level. The behavior of these masking increases, with stimulus level, agrees with the behavior of the impedance changes produced in the acoustic reflex bridge when the middle ear muscle reflexes are elicited. The assumption is therefore made that the attenuation of a low-frequency tone in contralateral remote masking is not only due to central masking but a small yet significant contribution is provided by middle ear muscle contractions. (Author)

A70-15086 * #
EFFECTS OF BREATHING NOBLE GASES UPON FREE AMINO ACID POOLS IN RAT BRAINS.

Herbert B. Chermside and Arthur Furst (San Francisco, University, Institute of Chemical Biology, San Francisco, Calif.).

Western Pharmacology Society, Proceedings, vol. 12, 1969, p. 21-25. 10 refs.

Grant No. NGR-05-029-001.

Rats breathed mixtures of oxygen with the noble gases helium, argon, and neon as diluents for 72 hr at 1 atm pressure. The free amino acid pools of their brains were measured. Helium and argon both increased the levels of over half of the 39 compounds measured. The single increase due to neon may be spurious. No mechanisms are proposed; further investigation is encouraged. (Author)

A70-15204 #
EFFECT OF POLYMETHYLENE-BIS-LEPIDINE DIBROMIDES ON BLOOD PRESSURE AND PERIPHERAL VESSEL TONUS.

A. Krustev and S. Varbanova (Veterinary Medical Institute, Sofia, Bulgaria).

Bolgarskaia Akademiia Nauk, Doklady, vol. 22, no. 8, 1969, p. 963-966.

Detailed study of the peripheral action of a series of dibromides containing two quaternized nitrogen atoms. The effect of these dibromides on blood pressure and peripheral vessel tonus in dogs was tested. The experimental results show that the tested substances produce a depressor reaction, the strength and duration of which depends on the dose as well as on the length of the binding polymethylene chain. The same substances, tested against a background of the mechanism maintaining the peripheral vessel tonus, produce a depressor reaction which is similar in character. What is characteristic in this case is that the strength and duration of the reaction is solely determined by the length of the polymethylene chain. F.R.L.

A70-15219 #
STUDY OF THE IMAGE MEMORY IN LOWER PRIMATES (K IZUCHENIIU OBRAZNOI PAMIATI U NIZSHIKH OBEZ'IAN).

I. S. Beritashvili, A. I. Kats (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR), and A. N. Bakuradze.

Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol. 56, Oct. 1969, p. 201-204. 9 refs. In Russian.

Investigation of brief and persistent image memories in a group of seven monkeys of the *Papio hamadryas* family reacting to visual food stimuli in a special experimental chamber. Well-developed food memories are established in the monkeys, who were trained to determine the location of food in response to various combinations of visual and flavor stimuli. V.Z.

A70-15220 #
EFFECT OF LESIONS OF THE THALAMIC RELAY NUCLEI ON ASSOCIATIVE RESPONSES.

E. S. Moniava and A. S. Timchenko.

Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol. 56, Oct. 1969, p. 205-208. 7 refs. In Georgian, with abstract in English.

Study of associative responses in anesthetized cats with electrocoagulated lateral and medial geniculate bodies and nucleus ventralis postero-lateralis. A temporary suppression of cortical associative responses was observed in the cats, but only when the stimuli had certain specific modalities. It is believed that this group of nuclei is active in forming associative responses. V.Z.

A70-15221 #
IDENTIFICATION OF THE ACTIVITY OF NEURON ELEMENTS OF THE DORSAL HIPPOCAMPUS OF CATS (K IDENTIFIKATSII AKTIVNOSTI NEIRONNYKH ELEMENTOV DORSAL'NOGO GIPPOKAMPA KOSHKI).
V. S. Arutiunov, P. P. Mol'nar (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR), and S. P. Narikashvili.
Akademiia Nauk Gruzinskoi SSR, Soobshcheniia, vol. 56, Oct. 1969, p. 209-212. 7 refs. In Russian.

Comparative study of the neuron activity in the dorsal hippocampus of a group of ten anesthetized cats and a group of three immobilized cats. The study was designed to determine the nature of small-amplitude discharges in the dorsal hippocampus recorded simultaneously with the extracellularly recorded activity of pyramid cells in previous studies. It is concluded that these small-amplitude discharges are associated with the activity of the basket cells. V.Z.

A70-15276 #
DEVICES FOR THE TRANSMISSION OF PHYSIOLOGICAL INFORMATION, POWERED BY THE ENERGY OF THE INVESTIGATED OBJECT (USTROISTVA DLIA PEREDACHI FIZIOLOGICHESKOI INFORMATSII, PITAEMYE ENERGIEI ISSLEDUEMOGO OB'EKTA).
I. N. Syromiatnikova, A. P. Sadikov, A. G. Shcherbina, and Iu. N. Vysotskii (Leningradskii Institut Aviatsionnogo Priborostroeniia, Leningrad, USSR).
Priborostroenie, vol. 12, no. 9, 1969, p. 31-33. In Russian.

Description of radio transmitters for physiological telemetry, using electric power obtained by conversion of the thermal and mechanical energy of man's respiratory activity. Both the transmitters and the energy converters are illustrated by diagrams. The practical advantages of such heat converters for powering devices using tunnel diodes are demonstrated. M.V.E.

A70-15295
BLOOD-FLOW SENSOR IMPEDANCE EXPERIMENTS.
M. Davis.
Medical Research Engineering, vol. 8, Oct.-Nov. 1969, p. 20-30. 20 refs.

Description of investigations which may lead to a new class of blood-flow sensors depending upon variations in electrical conductivity with flow rate. The apparatus consists of a sensing electrode which can be applied externally over a vessel of small size or mounted on the tip of a cardiac catheter. A companion electrode is arranged so that it remains relatively passive in action and also provides the high interelectrode impedance which is the basic essential of this system. Monitoring and recording instruments complete the apparatus. The individual velocity of the erythrocytes alone seems responsible for the amplitude modulation of the carrier-current employed. The degree of modulation depends upon various unrelated parameters. The velocity is always proportional to the modulation amplitude cubed, while the degree of modulation is directly proportional to the average carrier-current or interelectrode conductivity. Applications may include detection of impaired circulation and use as a surgical aid. In addition, data obtained concerning velocity-related parameters may permit detection of pathological conditions which result in abnormal rheology. (Author)

A70-15307
OBSERVATIONS CONCERNING THE VALIDITY OF THE VENTRICULAR GRADIENT CONCEPT.
C. Thomas Fruehan, Burt Crain, Mary Jo Burgess, Kay Millar, and J. A. Abildskov (New York, State University, Upstate Medical Center, Dept. of Medicine, Syracuse, N.Y.; Utah, University, College of Medicine, Salt Lake City, Utah).
American Heart Journal, vol. 78, Dec. 1969, p. 796-801. 9 refs.
PHS Grants No. HE-11-1011; No. HE-122551.

Measurement of the QRS, ST-T, and combined QRS-T areas in multiple bipolar chest leads during normal and abnormal activation in a patient with intermittent left bundle branch block. QRS and ST-T areas were plotted as functions of angular lead axis and were compared with sine waves which would be the expected form of such plots with a single central dipole in a circular homogeneous conducting medium. It is found that the total QRS-T areas during normal and abnormal activation were most nearly alike in leads in which QRS and ST-T areas during both activation states corresponded to sine waves. These results suggest that the gradient concept of QRS-T area independent of activation order is applicable to electrocardiographic leads only when these are equally sensitive to activation and recovery patterns, and that it is applicable to single leads. Z.W.

A70-15308
GALLOP RHYTHM.
Pravin M. Shah (Rochester, University, School of Medicine and Dentistry, Rochester, N.Y.) and Paul N. Yu (Strong Memorial Hospital, Medical Service, Rochester, N.Y.).
American Heart Journal, vol. 78, Dec. 1969, p. 823-828. 18 refs.
Research supported by the Genesee Valley Heart Association; NIH Grants No. HE-3966-10; No. HE-5500-06; No. HE-5054-16.

Study of the hemodynamic determinants of gallop sounds in a group of patients with aortic valve disease. Detailed clinical, hemodynamic, and angiographic observations are correlated with the gallop sounds in 28 patients with myocardial disease and in ten with aortic valve disease. It is shown that the cardiac index in patients with atrial gallop is maintained close to the normal values, although it is reduced in patients with ventricular gallop. The former group has normal left atrial pressure, while the latter group has a significantly elevated pressure. The combination of high left atrial pressure and low cardiac index in these patients may be accepted as hemodynamic evidence for ventricular decompensation. In explaining the basis for these findings in the two groups, the characteristics of diastolic filling of the left ventricle are examined. Z.W.

A70-15356
MEDICAL SYSTEM ENGINEERING.
I. P. Smirnov and M. A. Shneps-Shneppe (All-Union Scientific Research Institute of Medical Instrument-Making, Moscow, USSR).
IEEE, Proceedings, vol. 57, Nov. 1969, p. 1869-1879. 29 refs.

Study of particular problems of public health services, such as determining the optimal number of beds in a hospital and the optimal number of ambulances, and determining periodicities in conducting prophylactic examinations. The study of the systems of several medical institutions and their influence on the flow of patients leads to the use of the method of statistical simulation. A simulation using the Markov process, changing the random waiting times of individual cases to their mean values, thereby decreasing the variance of the statistical estimates, is considered. A numerical example is given, illustrating one heuristic approach to estimating the accuracy of the results of this type of simulation. M.M.

A70-15357 *
NEW MEXICO'S PROPOSED PHYSICIAN-MONITORED REMOTE AREAS HEALTH PROGRAM.
Robert B. Munson (NASA, Manned Spacecraft Center, White Sands, N. Mex.).
IEEE, Proceedings, vol. 57, Nov. 1969, p. 1887-1893.

Discussion of the State of New Mexico's proposal to combine existing technology in biomedical instrumentation, telemetry, data handling, and communications, developed for aerospace applications, with new techniques in public health screening, prevention, and emergency medical treatment, to establish an integrated system of health care for people living in remote areas. The system proposed consists of a physician-monitored central control facility communicating with remote site facilities staffed by paramedical personnel of limited training. Instrumentation at the remote sites, together with simplified laboratory test materials, provides information on patient condition which is transmitted to central data processing equipment and displayed for the center duty physician. M.M.

A70-15358
PRACTICAL PROBLEMS IN THE USE OF COMPUTERS IN MEDICAL DIAGNOSIS.

Robert S. Ledley (National Biomedical Research Foundation, Silver Spring, Md.).
IEEE, Proceedings, vol. 57, Nov. 1969, p. 1900-1918. 25 refs.
Research supported by the John A. Hartford Foundation.

Examination of practical problems experienced in using computers for medical diagnosis and treatment processes. It is noted that in cases where complete symptom information is unavailable, the computer can apply Bayes' formula, which correlates the conditional probability of having a disease complex, given a certain sympton profile, with that of having the given symptom profile, given the disease complex, and the total probability of the patient's having the disease complex. A simple illustrative example is given of the application of Bayes' formula. An uncertainty principle exists in the collection of statistics for determining the total probability, due to the time lag in processing data. A method is given for handling data from patients presenting incomplete symptom profiles. M.M.

A70-15359
SOME MEDICAL AND MATHEMATICAL ASPECTS OF COMPUTER DIAGNOSIS.
N. I. Moiseeva and V. V. Usov (Academy of Medical Science, Institute for Experimental Medicine, Leningrad, USSR).
IEEE, Proceedings, vol. 57, Nov. 1969, p. 1919-1925. 78 refs.

Brief review of the background of computer-aided medical diagnosis, and description of the various automated diagnostic methods and their mathematical bases. The efficacies of several diagnostic procedures are compared. The important matter of the quality of the medical input data is discussed. It is pointed out that, to achieve the goal of widespread computer-aided diagnosis, it is necessary not only to strengthen medical computing capabilities, but also to educate physicians to the advantages of computer diagnosis. M.M.

A70-15360
EVALUATION OF PULMONARY FUNCTION DATA USING COMPUTER TIME-SHARING.
Stuart F. Sullivan, Richard W. Patterson, and Emanuel M. Papper (Columbia University, College of Physicians and Surgeons, Dept. of Anesthesiology; Columbia Presbyterian Hospital, New York, N.Y.).
IEEE, Proceedings, vol. 57, Nov. 1969, p. 1996-1999. 16 refs.
NIH Grants No. GM-14419; No. GM-09069; No. K 3-HE-11,900.

Description of a computer program which evaluates the measured values of lung function by comparing them with accepted norms. The computer program is written in the BASIC programming language, and minimal involvement by laboratory personnel is required. Matrices containing the regression coefficients used for the computation of the predicted values for each of the pulmonary function tests based upon the patient's sex, height, age, and weight are stored in the computer program. M.M.

A70-15361
INSTRUMENTATION FOR AUTOMATED EXAMINATIONS OF CELLULAR SPECIMENS.
Louis A. Kamentsky (Bio/Physics Systems, Inc., Katonah, N.Y.) and Myron R. Melamed (Memorial Hospital for Cancer and Allied Diseases, New York, N.Y.).
IEEE, Proceedings, vol. 57, Nov. 1969, p. 2007-2016. 17 refs.

Discussion of the requirements, physical limitations, advantages, and disadvantages of various instrumentation techniques for measuring multiple optical properties of individual cells at very rapid rates in order to differentially classify some biological cells. An instrument devised to measure multiple spectrophotometric properties of cells flowing in liquid suspension at rapid rates is described, and examples are shown of how the data obtained may be analyzed and displayed by an on-line computer. M.M.

A70-15402 * #
DEVELOPMENT OF METEOROID PROTECTION FOR EXTRAVEHICULAR-ACTIVITY SPACE SUITS.
William E. McAllum (NASA, Manned Spacecraft Center, Space Physics Div., Houston, Tex.).
(American Institute of Aeronautics and Astronautics, Hypervelocity Impact Conference, Cincinnati, Ohio, Apr. 30-May 2, 1969, Paper 69-366.)
Journal of Spacecraft and Rockets, vol. 6, Nov. 1969, p. 1225-1228. 7 refs.
(For abstract see issue 13, page 2213, Accession no. A69-28298)

A70-15439
MEASUREMENT OF INSTANTANEOUS BLOOD FLOW VELOCITY AND PRESSURE IN CONSCIOUS MAN WITH A CATHETER-TIP VELOCITY PROBE.
Ivor T. Gabe, James H. Gault, John Ross, Jr., Dean T. Mason, Christopher J. Mills, John P. Schillingford, and Eugene Braunwald (U.S. Public Health Service, National Institutes of Health, National Heart Institute, Bethesda, Md.; Hammersmith Hospital, MRC Cardiovascular Unit, London, England).
Circulation, vol. 40, Nov. 1969, p. 603-614. 21 refs.

Twenty-three patients were investigated during diagnostic right and left cardiac catheterization with an electromagnetic catheter-tip velocity probe. The catheter contained a pressure lumen for simultaneous measurements of intravascular pressure. Average peak and mean blood velocities were 66 and 11 cm/sec in the ascending aorta, 57 and 10 cm/sec in the pulmonary artery, 28 and 12 cm/sec in the superior vena cava, and 26 and 13 cm/sec in the inferior vena cava. The velocity pattern in the ascending aorta was similar to that obtained by other methods. Positioning of the catheter in the ascending aorta required care; in one patient with aortic stenosis, the recorded blood velocity pattern was unsatisfactory. In the pulmonary artery, flicking of the catheter often produced artifacts in the records. The effect of deep respiration on blood velocity in the ascending aorta and pulmonary artery was studied. In the ascending aorta, the highest velocities and stroke volumes were achieved during late expiration, while in the pulmonary artery blood velocity and stroke volume were greatest in inspiration. (Author)

A70-15440
THE EJECTION CLICK OF VALVULAR PULMONIC STENOSIS.
Herbert N. Hultgren, Richard Reeve, Keith Cohn, and Rima McLeod (Stanford University, School of Medicine, Div. of Cardiology, Stanford; Pacific University, Medical Center; Close Clinic, San Francisco, Calif.).
Circulation, vol. 40, Nov. 1969, p. 631-640. 26 refs.
Research supported by the Santa Clara Heart Association and the San Mateo Heart Association.

Ten patients with valvular pulmonic stenosis were studied by simultaneous external phonocardiograms and intracardiac pressure recordings during successive respiratory cycles to examine the mechanism of the respiratory variation in the ejection click. Selective cineangiograms were performed in four. During inspiration, right ventricular end-diastolic pressure (RVEDP) exceeded the pressure in the pulmonary artery (plus 2.7 mm) and no ejection click was recorded. During expiration, RVEDP was lower than the pressure in the pulmonary artery (minus 3.6 mm) and a click was recorded. The click was present throughout the respiratory cycle when pulmonary artery diastolic pressure consistently exceeded RVEDP. Clicks were associated with sudden "doming" of the valve demonstrated by cineangiography. These data support the valvular origin of the ejection click in pulmonic stenosis and provide an explanation for the respiratory variation. (Author)

A70-15441 *
ENZYMES OF INTERMEDIARY CARBOHYDRATE METABOLISM IN THE OBLIGATE AUTOTROPHS THIOBACILLUS THIOPARUS AND THIOBACILLUS NEAPOLITANUS.
Emmett J. Johnson and S. Abraham (Northern California, Children's Hospital Medical Center, Bruce Lyon Memorial Research Laboratory, Oakland, Calif.).
Journal of Bacteriology, vol. 100, Nov. 1969, p. 962-968. 39 refs.
PHS Grant No. FR-5467; Contract No. NAS 2-3901.

Comparison of the levels of enzymes operating in the Embden-Meyerhof-Parnas (glycolytic) pathway, the pentose phosphate cycle,

the citric acid cycle, and certain other phases of intermediary carbohydrate metabolism in *Thiobacillus thioparus* and *T. neapolitanus*. All enzymes of the glycolytic pathway except phosphofructokinase were demonstrated in both organisms. There were some striking quantitative differences between the two organisms with respect to the activities of individual enzymes of the glycolytic pathway and the citric acid cycle. Qualitative differences were also found. All enzymes which function in the carbon reduction cycle were present at very high levels. In contrast, enzymes which operate exclusively in cycles other than the carbon reduction cycle were present at low levels. The qualitative and quantitative aspects of the data are discussed in relation to possible biochemical explanations of obligate autotrophy. F.R.L.

A70-15442 *
THERMAL DEATH OF BACILLUS SUBTILIS VAR. NIGER SPORES ON SELECTED LANDER CAPSULE SURFACES.
W. W. Paik, E. J. Sherry, and J. A. Stern (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
Applied Microbiology, vol. 18, Nov. 1969, p. 901-905. 5 refs.

Determination of the dry-heat resistance of *Bacillus subtilis* var. *niger* spores on various lander capsule materials at 125 deg C. Eight surface materials were evaluated, including a reference material, stainless steel. Survivor curves were computed, and decimal reduction times (D values) were obtained by a linear regression analysis. In four tests on stainless steel, the average value of D at 125 deg C was 17.07 min. The D values for the other seven materials tested ranged from 18.64 min on magnesium surfaces to 20.83 min on conversion-coated magnesium. Of the materials evaluated, the results indicate that there is only a significant difference in the thermal resistance of *B. subtilis niger* spores on conversion-coated magnesium and conversion-coated aluminum from that on the reference material, stainless steel. The differences in D values for all the test surfaces may be the result of variations in test procedures rather than the effect of the surfaces on the thermal resistivity of the spores. (Author)

A70-15443
LOW OXYGEN TENSION AND DISCRIMINATION REVERSAL.
Ralph Gunter, Edwin T. Wright, W. Jann Brown, and Eleanor R. Gunter (California, University, Dept. of Pathology /Neuropathology/, Los Angeles; Hacker Psychiatric Clinic, Beverly Hills, Calif.).
Perceptual and Motor Skills, vol. 29, Oct. 1969, p. 415-424. 17 refs.

Study of an experimental group of nine cats, trained to a visual form discrimination; the valences of the stimuli were then reversed and the cats were subjected to various levels of oxygen deprivation after which they were tested for retention and reversal performance. A normal control group (N = 9) were trained identically to the experimental group but were not subjected to hypoxia. Ten naive cats constituted the posthypoxia new-learning group. It was found that 70 minutes of oxygen deprivation had a significant effect on retention and reversal performance; one exposure had no observable effect on either function. No differential effects were found on retention or new learning as measured by either retention new-learning or reversal-reversal comparisons. (Author)

A70-15444
NOTE ON HEADACHE, PERSONALITY TRAITS AND VISUAL PERFORMANCE AT ALTITUDE.
Bernard J. Fine and John L. Kobrick (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.).
Perceptual and Motor Skills, vol. 29, Oct. 1969, p. 521, 522.
ARPA-supported research.

Description of the relationships between personality traits and altitude-induced alterations in physical performance and symptomatology, using Kobrick's (1968) vision measures and measures used by Fine (1968). Increases in visual acuity and brightness sensitivity from sea level to altitude are found to be inversely related to severity of headache at altitude. Specific personality traits also appear to be related to the vision variables. Z.W.

A70-15445
VISUAL ORIENTATION AS A FUNCTION OF HEAD TILT.
N. J. Wade (Monash University, Clayton, Victoria, Australia).
Perceptual and Motor Skills, vol. 29, Oct. 1969, p. 573, 574. 8 refs.

Measurement of the visual vertical in two experiments for head tilts from 40 deg left to 40 deg right in 10-deg intervals. For all tilts, the visual vertical is found to be located on the opposite side of the gravitational vertical to tilt (E-effect), with maximum values at 30 deg left and 40 deg right tilt. Z.W.

A70-15453
SEMI-CONTINUOUS CULTURE AND MONITORING SYSTEM FOR TEMPERATURE-SYNCHRONIZED EUGLENA.
O. Terry and L. N. Edmunds, Jr. (New York, State University, Dept. of Biological Sciences, Stony Brook, N.Y.).
Biotechnology and Bioengineering, vol. 11, Sept. 1969, p. 745-756. 16 refs.
NSF Grants No. GB-4140; No. GB-6892.

Description of a temperature-synchronized, semi-continuous culture and monitoring system, with results from use of the system for autotrophically growing *Euglena*. Outflow from the culture vessel consists of measured samples taken automatically at 2-hr intervals and fixed for later counting. Inflow is by siphon feed, which restores the culture level after each sampling. The interpretation of growth curves obtained from such cultures is discussed from the viewpoint of division synchrony and cell cycle studies, and some general comparisons are made between batch and continuous cultures for such studies. (Author)

A70-15454
EFFECT OF TOTAL ILLUMINATION UPON CONTINUOUS CHLORELLA PRODUCTION IN A HIGH INTENSITY LIGHT SYSTEM.
Robert O. Matthern, John A. Kostick, and Isao Okada (U.S. Army, Natick Laboratories, Food Laboratory, Natick, Mass.).
Biotechnology and Bioengineering, vol. 11, Sept. 1969, p. 863-874. 6 refs.

Description of a high intensity light system (HILIS) designed and constructed to define the environmental parameters affecting production of algae. HILIS incorporates the basic concepts of an aerobic fermenter for heterotrophic cells with high-intensity illumination for photosynthetic studies. Of nine parameters considered, temperature and light intensity studies using Chlorella 71105 have been completed. Total illumination was varied from 25,000 to 300,000 lumens in 7.7 to 1 culture. Growth (measured as total daily yield, dry weight concentration, and packed cell volume) was determined, and is reported as a function of total illumination.F.R.L.

A70-15455
RESEARCH ON ACUTE MYOCARDIAL INFARCTION; AMERICAN HEART ASSOCIATION AND NATIONAL HEART INSTITUTE, SYMPOSIUM, PHOENIX, ARIZ., MARCH 26-28, 1969, PROCEEDINGS.
Symposium supported by the U.S. Department of Health, Education, and Welfare, Contract No. PH-43-68-1015.
Circulation, vol. 40, Nov. 1969, Supplement no. 4. 351 p.

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SOME PROBLEMS CONCERNING CORONARY ARTERY OCCLUSION AND ACUTE MYOCARDIAL INFARCTION. D. B. Hackel, E. H. Estes, A. Walston, S. Koff, and E. Day (Duke University, Durham, N.C.), p. IV-31 to IV-37. 18 refs. (See A70-15459 04-04)

CERTAIN CHEMORHEOLOGIC CONSIDERATIONS REGARDING THE BLOOD VASCULAR INTERFACE WITH PARTICULAR REFERENCE TO CORONARY ARTERY DISEASE. D. L. Fry (U.S. Public Health Service, Bethesda, Md.), p. IV-38 to IV-59. 33 refs. (See A70-15460 04-04)

EFFECTS OF ACIDOSIS ON THE PERFORMANCE AND METABOLISM OF THE ANOXIC HEART. T. R. Gelet, R. A. Altschuld, and A. M. Weissler (Ohio State University, Columbus, Ohio), p. IV-60 to IV-73. 38 refs. (See A70-15461 04-04)

PSYCHOSOCIAL FORCES IN MYOCARDIAL INFARCTION AND SUDDEN DEATH. S. Wolf (Oklahoma, University; Oklahoma Medical Research Foundation, Oklahoma City, Okla.), p. IV-74 to IV-83. 36 refs. (See A70-15462 04-04)

CRITICAL APPRAISAL OF WHAT HAS BEEN LEARNED ABOUT MYOCARDIAL INFARCTION FROM STUDIES ON PREVENTION AND CORRELATIONS.

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THE ROLE OF LIPIDS IN ACUTE MYOCARDIAL INFARCTION. D. S. Fredrickson (U.S. Public Health Service, Bethesda, Md.), p. IV-99 to IV-111. 60 refs. (See A70-15464 04-04)

SOME LESSONS LEARNED FROM PAST STUDIES ON THE USE OF ANTICOAGULANTS IN ACUTE MYOCARDIAL INFARCTION. E. Rapaport (California, University; San Francisco General Hospital, San Francisco, Calif.), p. IV-112 to IV-118, IV-123. 41 refs. (See A70-15465 04-04)

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HEREDITARY ASPECTS OF MYOCARDIAL INFARCTION. C. M. Bloor (California, University, La Jolla, Calif.), p. IV-130 to IV-135, IV-140 to IV-143. 20 refs. (See A70-15467 04-04)

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POTENTIAL IMPROVEMENTS IN MEANS OF EVALUATION OF ACUTE MYOCARDIAL INFARCTION.

STUDIES ON EFFECTIVE CAPILLARY BLOOD FLOW OF THE HUMAN AND CANINE HEART AFTER ACUTE MYOCARDIAL INFARCTION. N. Goldschlager, K. Ravens, G. Leb, C. Cowan, and R. J. Bing (Southern California, University; Huntington Memorial Hospital, Pasadena, Calif.; Wayne State University, Detroit, Mich.), p. IV-145 to IV-154, IV-163 to IV-167. 46 refs. (See A70-15468 04-04)

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SUDDEN DEATH AND MYOCARDIAL INFARCTION. M. Fulton, D. G. Julian, and M. F. Oliver (Edinburgh, University; Edinburgh, Royal Infirmary, Edinburgh, Scotland), p. IV-182 to IV-193. 35 refs. (See A70-15472 04-04)

RESEARCH ON THE TREATMENT OF ACUTE MYOCARDIAL INFARCTION.

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THE POTENTIAL OF THROMBOLYSIS IN THE TREATMENT OF THROMBOTIC CORONARY OCCLUSION. J. R. Hampton (Harvard University; Peter Bent Brigham Hospital, Boston, Mass.), p. IV-231 to IV-239.

FACTORS INFLUENCING CORONARY RESISTANCE IN THE ISCHEMIC HEART. R. M. Berne and R. Rubio (Virginia, University, Charlottesville, Va.), p. IV-240 to IV-251. 32 refs. (See A70-15473 04-04)

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PATHOGENESIS, PREVENTION, AND TREATMENT OF ARRHYTHMIAS IN MYOCARDIAL INFARCTION. B. Lown, B. D. Kosowsky, and M. D. Klein (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.), p. IV-261 to IV-270.

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THE POTENTIAL OF ANTICOAGULANT TREATMENT IN ACUTE MYOCARDIAL INFARCTION. R. V. Ebert (Minnesota, University, Minneapolis, Minn.), p. IV-271 to IV-276.

CURRENT STATUS OF TREATMENT OF POWER FAILURE OF THE HEART IN ACUTE MYOCARDIAL INFARCTION WITH DRUGS AND BLOOD VOLUME REPLACEMENT. H. J. C. Swan, R. Danzig, Y. Sukumalchantra, and H. Allen (Cedars-Sinai Medical Center; California, University, Los Angeles, Calif.), p. IV-277 to IV-291.

TREATMENT OF POWER FAILURE BY MEANS OF MECHANICAL ASSISTANCE. H. S. Soroff, W. C. Birtwell, F. Giron, U. Ruiz, A. Nishimura, M. Many, M. El-Zawahry, and R. A. Deterling, Jr. (Tufts-New England Medical Center Hospitals; Tufts University, Boston, Mass.), p. IV-292 to IV-314.

SURGICAL MANAGEMENT OF MYOCARDIAL INFARCTION—SOME PROMISING CONCEPTS UTILIZING REVASCULARIZATION, MECHANICAL CIRCULATORY ASSISTANCE, OPERATIVE TREATMENT OF SEVERE COMPLICATIONS, AND CARDIAC REPLACEMENT. C. W. Lillehei, A. J. Lande, W. R. Rassman, S. Tanaka, and J. H. Bloch (New York-Cornell Medical Center, New York, N.Y.), p. IV-315 to IV-339.

A70-15456
WHAT IS MYOCARDIAL INFARCTION?

Jesse E. Edwards (Charles T. Miller Hospital, Dept. of Pathology, St. Paul; Minnesota, University, Dept. of Pathology, Minneapolis, Minn.).

(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)

Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-5 to IV-11; Discussion, p. IV-11 to IV-12. 9 refs.
PHS Grant No. 5 RO1 HE-05694.

Discussion of pathological manifestations of acute myocardial ischemia such as angina pectoris, acute cardiovascular collapse in the absence of acute myocardial necrosis, and classic acute myocardial infarction. It is pointed out that, from the pathological viewpoint, myocardial infarction is but one major consequence of coronary atherosclerosis. Among subjects with chronic occlusive coronary atherosclerosis, more common than death from acute myocardial infarction is death occurring acutely in the absence of infarction or acute coronary occlusion. M.M.

A70-15457
THE ROLE OF SMALL VESSEL DISEASE IN MYOCARDIAL INFARCTION.
Thomas N. James (Alabama, University, Medical Center, Dept. of Medicine and Dept. of Pathology; U.S. Veterans Administration, Hospital, Birmingham, Ala.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-13 to IV-17; Discussion, p. IV-18 to IV-19. 21 refs.
Research supported by the Alabama Heart Association; PHS Grants No. PH-43-67-1441; No. HE-11310.

Definition of the primary and secondary pathological changes in the small coronary arteries and their role in the development of acute myocardial infarction. A description of the anatomical distribution of small coronary arteries is followed by a corollary consideration of the consequences of their occlusion and by an examination of the possible etiologies of such occlusions. M.M.

A70-15458
PLATELET FUNCTION AND MYOCARDIAL INFARCTION.
James Fraser Mustard (McMaster University, Dept. of Pathology, Hamilton, Ontario, Canada) and Marian Aitchison Packham (Toronto, University, Dept. of Biochemistry, Toronto, Canada).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-20 to IV-28; Discussion, A. P. Fletcher (Washington University, St. Louis, Mo.), Arnold Schwartz (Baylor University, Houston, Tex.), John Vester (Good Samaritan Hospital, Cincinnati, Ohio), and J. R. Hampton (Harvard University, Boston, Mass.), p. IV-28 to IV-30. 81 refs.

Examination of the part played by platelets in coronary artery disease, considering the relations between platelets and thrombosis, and between thrombosis and atherosclerosis. It is pointed out that platelet thromboemboli may be important not only in the development of some forms of atherosclerosis and occlusive thrombi, but also in initiating disturbances of the microcirculation. In addition, it is possible that mural thrombi and atherosclerotic lesions may fragment and shower the microcirculation with emboli. Such a mechanism appears to occur in the cerebrovascular and renal circulations, and it seems unlikely that the myocardial tissue would be spared the effects of such a mechanism. M.M.

A70-15459
SOME PROBLEMS CONCERNING CORONARY ARTERY OCCLUSION AND ACUTE MYOCARDIAL INFARCTION.
Donald B. Hackel, E. Harvey Estes, Abe Walston, Stephen Koff, and Eugene Day (Duke University, Medical Center, Durham, N.C.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-31 to IV-35; Discussion, p. IV-35 to IV-37. 18 refs.
AEC Contract No. AT (40-1)-3195; PHS Contract No. PH-43-67-1440.

Review of some experiences in studying coronary artery disease clinicopathologically. The following questions are treated: (1) how to explain the variable incidences of acute coronary occlusion that are reported in patients with acute myocardial infarction; (2) whether there exist possible clinical clues to the presence or absence of acute coronary occlusion in patients with acute myocardial infarction; and (3) whether coronary thrombosis precedes myocardial infarction or vice versa. It is noted that actively forming thrombi will incorporate labeled fibrinogen and can thus be identified as having been formed subsequent to the time of injection. M.M.

A70-15460
CERTAIN CHEMORHEOLOGIC CONSIDERATIONS REGARDING THE BLOOD VASCULAR INTERFACE WITH PARTICULAR REFERENCE TO CORONARY ARTERY DISEASE.
Donald L. Fry (U.S. Public Health Service, National Institutes of Health, National Heart Institute, Bethesda, Md.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-38 to IV-57; Discussion, Peter Harris (Institute of Cardiology, London, England), J. F. Mustard (McMaster University, Hamilton, Ontario, Canada), and Thomas Killip, III (New York Hospital, New York, N.Y.), p. IV-58 to IV-59. 33 refs.

Description of studies designed to quantify certain aspects of the histological and physicochemical response of the arterial intima to a variety of acutely imposed mechanical stresses. The locations of coronary atheroma in a hyperlipemic dog are shown to occur at points in the arterial tree where one would expect the most intense exposure to physical stress. The results indicate that the endothelial-cell population has an acute yield stress to shear of about 400 dynes/sq cm; that exposure to stress in excess of this is associated with cytological and chemical changes, suggesting that physical processes are occurring, such as yielding, melting, dissolving, imbibition, and permeation of the interfacial tissues. M.M.

A70-15461
EFFECTS OF ACIDOSIS ON THE PERFORMANCE AND METABOLISM OF THE ANOXIC HEART.
Theodore R. Gelet, Ruth A. Altschuld, and Arnold M. Weissler (Ohio State University, College of Medicine, Dept. of Medicine, Columbus, Ohio).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-60 to IV-69; Discussion, p. IV-70 to IV-73. 38 refs.
Research supported by the Central Ohio Heart Association; PHS Grant No. HE-09884.

Description of investigations of the independent influence of diminished pH on cardiac performance and anaerobic energy generation in the anoxic rat heart. The observational results are consistent with the thesis that increased hydrogen ion concentration dominantly affects the energy utilization phase of cardiac metabolism. M.M.

A70-15462
PSYCHOSOCIAL FORCES IN MYOCARDIAL INFARCTION AND SUDDEN DEATH.
Stewart Wolf (Oklahoma, University, Medical Center, Dept. of Medicine; Oklahoma Medical Research Foundation, Oklahoma City, Okla.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-74 to IV-81; Discussion, p. IV-82 to IV-83. 36 refs.

Review of evidence indicating a role for psychosocial factors in myocardial infarction and sudden death. This evidence supports the thesis that fatal cardiac arrhythmias, with or without associated

myocardial infarction, may often be attributable to undamped autonomic discharges in response to either afferent information from below, or to impulses resulting from integrative processes in the brain involved in adaptation to life experience, or both. Regulatory inhibition appears to be diminished in situations that are interpreted as overwhelming and without hope, such as total social exclusion and other circumstances characterized by hopeless dejection or sudden fear. M.M.

A70-15463
WHAT WE HAVE LEARNED ABOUT MYOCARDIAL INFARCTION FROM EPIDEMIOLOGIC AND DIETARY STUDIES.
Eugene A. Stead, Jr. (Duke University, Medical Center, Dept. of Medicine, Durham, N.C.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-85 to IV-87; Discussion, p. IV-87 to IV-90.

Critical evaluation of facts learned about myocardial infarction. It is pointed out that hypercholesteremia and hyperlipemia have too many causes spread out over too long a period of time and are too loosely coupled to the occurrence of clinical heart disease to be good starting points for useful field trials of therapeutic programs designed to prevent coronary disease. M.M.

A70-15464
THE ROLE OF LIPIDS IN ACUTE MYOCARDIAL INFARCTION.
Donald S. Fredrickson (U.S. Public Health Service, National Institutes of Health, National Heart Institute, Bethesda, Md.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-99 to IV-110; Discussion, M. F. Oliver (Royal Infirmary, Edinburgh, Scotland), G. F. Cahill, Jr. (Harvard University, Boston, Mass.), Peter Harris (Institute of Cardiology, London, England), and Eugene Braunwald (California, University, San Diego, Calif.), p. IV-110 to IV-111. 60 refs.

Description of changes in plasma lipids after acute myocardial infarction. It is pointed out that plasma lipids and lipoproteins usually undergo several phasic changes following myocardial infarction. Within a few hours the free fatty acid (FFA) concentration rises precipitously and may not become normal for two days or more. During the first one to three days, there begins a significant decline in cholesterol and beta lipoproteins. After a possible early decline, the concentrations of very-low-density lipoproteins and triglycerides begin to climb within the first week and characteristically are considerably above the measured initial levels for weeks thereafter. Beta lipoprotein concentrations return slowly to initial values. The late return of lipids to supranormal levels is probably often an expression of abnormality present before infarction. M.M.

A70-15465
SOME LESSONS LEARNED FROM PAST STUDIES ON THE USE OF ANTICOAGULANTS IN ACUTE MYOCARDIAL INFARCTION.
Elliot Rapaport (California, University, School of Medicine, Cardiovascular Research Institute and Dept. of Medicine; San Francisco General Hospital, Medical Service, San Francisco, Calif.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-112 to IV-118; Discussion, p. IV-123. 41 refs.
PHS Grant No. HE-06285.

Discussion of evidence regarding the role of anticoagulant therapy in acute myocardial infarction. It is pointed out that, in view of the evidence obtained, the justification for the use of heparin stems from its proven efficacy in other causes of venous thrombotic disease, as well as from the belief that definitive evidence on its role in acute myocardial infarction given as a continuous intravenous drip has yet to be evaluated. It is believed that the theoretical advantages of heparin over warfarin, the minimum complications that arise with its use under good laboratory control, and the ease of controlling any hemorrhagic complications that might arise justify its use in the absence of apparent contraindications. M.M.

A70-15466
RELATION OF EXERCISE TO ACUTE MYOCARDIAL INFARCTION--THERAPEUTIC, RESTORATIVE, PREVENTIVE, AND ETIOLOGICAL ASPECTS.
Herman K. Hellerstein (Cleveland, University Hospitals, Dept. of Medicine; Case-Western-Reserve University, School of Medicine, Cleveland, Ohio).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-124 to IV-129; Discussion, p. IV-140 to IV-143. 33 refs.
Research supported by the Republic Steel Corp.; PHS Grant No. HE-06304.

Review of the relation of exercise to acute myocardial infarction, coronary thrombosis, stenosis, and obstruction. The occurrence of acute myocardial infarction after submaximal or maximal exercise testing of apparently healthy subjects is virtually unknown, and in subjects with known heart disease extremely uncommon. Acute physical activity may produce significant coronary insufficiency that may lead to arrhythmias that subside spontaneously, or are acutely fatal, or lead to such critical ischemia and infarction as to produce acute pump failure, and nonfatal mechanism failure. The therapeutic and restorative role of exercise in the management of acute and convalescent myocardial infarction and the unmet needs for effort prescription and guidance are discussed. Attention is given to the preventive value of physical reconditioning in arteriosclerotic heart disease patients and in normal subjects. F.R.L.

A70-15467
HEREDITARY ASPECTS OF MYOCARDIAL INFARCTION.
Colin M. Bloor (California, University, School of Medicine, Dept. of Pathology, La Jolla, Calif.).
(American Heart Association and National Heart Institute, Sympsoium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-130 to IV-135; Discussion, p. IV-140 to IV-143. 20 refs.

Survey of the present state of evidence for familial aggregation for coronary artery disease, with discussion of familial similarities in coronary anatomy as a promising area of further genetic investigations, and outline of several major problems that have to be considered to make cogent genetic analysis of myocardial infarction possible. Although most evidence available suggests that polygenic determinism is involved in myocardial infarction, it is considered to be too soon to abandon hope that at least some cases of coronary artery disease may be traced to a mutant gene at one locus. Some useful approaches are sketched. F.R.L.

A70-15468
STUDIES ON EFFECTIVE CAPILLARY BLOOD FLOW OF THE HUMAN AND CANINE HEART AFTER ACUTE MYOCARDIAL INFARCTION.
Nora Goldschlager, Kurt Ravens, Georg Leb, Charles Cowan, and Richard J. Bing (Southern California, University, Dept. of Medicine; Huntington Memorial Hospital, Dept. of Medicine, Pasadena, Calif.; Wayne State University, School of Medicine, Detroit, Mich.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-145 to IV-154; Discussion, p. IV-163 to IV-167. 46 refs.

Description of the measurement of myocardial blood flow in

patients with documented acute myocardial infarction. Effective capillary flow (ECF), that portion of the total myocardial blood flow involved in metabolic exchange with the tissues, was measured in human subjects by determining the myocardial uptake of rubidium 84 as a fraction of cardiac output with use of a double-coincidence counting system; the method is simple and safe and does not require intubation of the coronary sinus. The effect of acute myocardial infarction on dogs was also studied. Regional ECF, as measured by direct counting of myocardial uptake of rubidium 86, was determined in portions of the infarcted left ventricle and related to regional capacity of the terminal vascular bed as determined by I 131 albumin. F.R.L.

A70-15469
EVALUATION OF MYOCARDIAL METABOLISM IN ISCHEMIC HEART DISEASE.
Richard Gorlin (Peter Bent Brigham Hospital, Cardiovascular Div.; Harvard University, Harvard Medical School, Boston, Mass.; Howard Hughes Medical Institute).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-155 to IV-163; Discussion, p. IV-163 to IV-167. 12 refs.
Research supported by the Women's Aid for Heart Research; PHS Grants No. 5-RO1-HE-08591; No. 1-PO1-HE-11306.

Study of metabolism of the human heart during myocardial infarction by means of arterial and coronary sinus catheterization. The procedure involves little risk, but definite inconvenience. Ischemia has been readily detected through myocardial production or release of lactate, potassium, hydrogen, and certain enzymes. It is suggested that these findings may be of help in identifying the presence of acute myocardial injury or infarction and in evaluation of applied therapy. The patchy nature of coronary atherosclerosis and its partial compensation by collateral vessels renders coronary venous inflow nonuniform. This makes interpretation of the meaning of the concentration of substances contained within the coronary venous effluent extremely difficult. Multiple-site venous sampling is particularly helpful in overcoming this inherent defect in the method. F.R.L.

A70-15470
FUNCTION OF INFARCTING MYOCARDIUM.
Robert F. Rushmer (Washington, University, Div. of Bioengineering, Seattle, Wash.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-168 to IV-172; Discussion, E. H. Sonnenblick (Peter Bent Brigham Hospital, Boston, Mass.), H. T. Dodge (Alabama, University, Birmingham, Ala.), Eugene Braunwald (California, University, San Diego, Calif.), and S. M. Fox, III, p. IV-173 to IV-174. 8 refs.

Evaluation of ventricular performance, a subject of prime importance in the clinical management of patients suffering from acute coronary occlusion. Studies (Sonnenblick et al., 1964, 1966) have been conducted to make detailed, quantitative analyses of isolated myocardial samples contracting under various experimental conditions. They directed attention to a variety of contributing factors, including the contractile elements and series elastic elements, the preload, the initial myocardial fiber length and the tension development, the afterload and the velocity of shortening, and the changes in contractile force secondary to changes in heart rate. These studies provide insight into changes in ventricular performance observed by means of recording techniques which disclose dynamic characteristics of ventricular contraction in healthy-appearing animals, human subjects, and patients with various types of heart disease. F.R.L.

A70-15471
SOME PERTINENT PHYSICAL FINDINGS IN THE CLINICAL EVALUATION OF ACUTE MYOCARDIAL INFARCTION.
W. Proctor Harvey (Georgetown University, Hospital, Div. of Cardiology, Washington, D.C.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-175 to IV-181. 20 refs.
Research supported by the Benjamin May Memorial Fund, the Special Cardiac Research Fund, and PHS.

Study of some of the newer or poorly recognized clinical features of acute myocardial infarction that have recently assumed greater importance or are now deserving of special emphasis. Gallop rhythm (atrial and ventricular diastolic gallops), the prognosis of ventricular diastolic gallops, and aids in diagnosis of myocardial infarction are discussed. These may involve assessment of gallop rhythm, ventricular arrhythmias, ventricular tachycardia, bradycardia, pericardial friction rub, perforation of the ventricular septum, papillary muscle dysfunction, rupture of the papillary muscle, and ventricular aneurysm. F.R.L.

A70-15472
SUDDEN DEATH AND MYOCARDIAL INFARCTION.
Mary Fulton, Desmond G. Julian, and Michael F. Oliver (Edinburgh, University, Dept. of Social Medicine and Dept. of Medicine; Edinburgh, Royal Infirmary, Edinburgh, Scotland).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-182 to IV-191; Discussion, p. IV-191 to IV-193. 35 refs.

Attempt to appraise the importance of sudden death (within one hour of the onset of symptons) and early death (within the first 24 hr) in acute myocardial infarction and of the ways it might be predicted or prevented. Evidence is presented concerning the proportion of early deaths in acute myocardial infarction, the time relationship between death and the onset of symptons, the relationship between death and preceding health, and the probable contribution of myocardial ischemia to sudden death. The majority of deaths occur before patients with acute myocardial infarction reach the hospital. Most of these are sudden and unattended medically. In many, symptoms of ischemic heart disease have been present, but often they have passed unnoticed or at least undeclared. It is considered that reliable identification of those prone to sudden death, and the development of prophylactic measures, would do as much or more to combat the problem of acute coronary attacks as any other approach. F.R.L.

A70-15473
FACTORS INFLUENCING CORONARY RESISTANCE IN THE ISCHEMIC HEART.
Robert M. Berne and Rafael Rubio (Virginia, University, School of Medicine, Dept. of Physiology, Charlottesville, Va.).
(American Heart Association and National Heart Institute, Symposium on Research on Acute Myocardial Infarction, Phoenix, Ariz., Mar. 26-28, 1969.)
Circulation, vol. 40, Nov. 1969, Supplement no. 4, p. IV-240 to IV-250; Discussion, p. IV-251. 32 refs.

Reconsideration of the effects of acute coronary occlusion on the resistance in a neighboring unoccluded artery, with an attempt to elucidate the mechanisms responsible for the changes in resistance of the arterioles of the occluded vessel and those of an adjacent unoccluded vessel. It is shown that occlusion of one major branch of the left coronary artery in the dog results in an increase in coronary blood flow (CBF) in the other. Direct inflow and outflow measurements, intramyocardial pressure measurements, and determination of great cardiac vein and coronary sinus blood oxygen saturation suggest that the flow increase is due to greater contractile work of the nonischemic myocardium and to a reduction in myocardial tissue pressure. The large collateral flows to the ischemic area, as measured by clearance techniques, are difficult to explain, and may represent

an overlap of blood supply to larger border zones between the branches of the left coronary artery or movement of tissue fluid between the ischemic and nonischemic zones via lymphatic vessels. F.R.L.

A70-15475
A STUDY OF THE EFFECTS OF HYDROSTATIC PRESSURE ON MACROMOLECULAR SYNTHESIS IN ESCHERICHIA COLI.
A. A. Yayanos (California, University, Scripps Institution of Oceanography, Physiological Research Laboratory, La Jolla, Calif.) and E. C. Pollard (Pennsylvania State University, Biophysics Dept., University Park, Pa.).
Biophysical Journal, vol. 9, Dec. 1969, p. 1464-1482. 23 refs.
Grant No. NsG-324.

In cultures of *Escherichia coli* 15 which were incubated at high hydrostatic pressures, cell division occurred only at pressures below 430 atm but in a somewhat synchronous fashion at around 250 atm. The rate of leucine/C-14 incorporation into a macromolecular fraction of the cells diminished to a zero value at about 580 atm and that of uracil/C-14 incorporation to a zero value at about 770 atm. The rate of thymine/C-14 incorporation at pressures around 330 atm was that to be expected with a culture in which DNA synthesis is somewhat synchronous. At pressures above 500 atm, thymine/C-14 was incorporated only over the initial part of the pressure incubation and further incorporation under pressure was not observed no matter how long the duration of the incubation. Evidence is given along several lines that the thymine incorporation kinetics reflect an effect of pressure on a locus at the origin (or termination) of a replication of the bacterial chromosome. The recovery of cell division and of the incorporation rates upon release of pressure was found to depend on the magnitude of the pressure and the duration of the pressure incubation. (Author)

A70-15501
PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'NOSTI).
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969. 243 p. In Russian.

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PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'NOSTI). N. I. Putilin, p. 9-18. (See A70-15502 04-04)

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CHANGES IN COMPLEX CONDITIONED REFLEXES CAUSED BY THE EXTINCTION OF POSITIVE CONDITIONED REFLEXES TO AN ELEMENT OF A COMPLEX STIMULUS (IZMENENIE KOMPLEKSNYKH USLOVNYKH REFLEKSOV POD VLIIANIEM UGASHENIIA POLOZHITEL'NYKH USLOVNYKH REFLEKSOV NA ELEMENT KOMPLEKSA). M. M. Gorpinchenko, p. 62-66. (See A70-15504 04-04)

CHARACTERISTICS OF THE TEMPERATURE VARIATIONS IN HUMAN SKIN OVER MUSCLES UNDER VARIOUS ACTIVITY REGIMES (KHARAKTERISTIKA IZMENENII TEMPERATURY KOZHI NAD MYSHTSAMI U CHELOVEKA PRI RAZLICHNYKH REZHIMAKH DEIATEL'NOSTI). V. I. Zav'ialov, p. 75-80. (See A70-15505 04-04)

COMPARATIVE CHARACTERISTICS OF THE TEMPERATURE OF HUMAN SKIN AND MUSCLES UNDER VARIOUS ACTIVITY REGIMES (SRAVNITEL'NAIA KHARAKTERISTIKA TEMPERATURY KOZHI I MYSHTS U CHELOVEKA PRI RAZLICHNYKH REZHIMAKH DEIATEL'NOSTI). V. I. Zav'ialov, p. 80-85. (See A70-15506 04-04)

ENERGY CHARACTERISTICS OF VARIOUS TRAINING REGIMES WITH PHYSICAL EXERCISES (ENERGETICHESKAIA KHARAKTERISTIKA RAZLICHNYKH TRENIROVOCHNYKH REZHIMOV PRI SILOVYKH UPRAZHNENIIAKH). G. P. Zakhar'evich, p. 89-93. (See A70-15507 04-04)

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A NEW METHOD OF STUDYING MENTAL FATIGUE (O NOVOM METODE ISSLEDOVANIIA UMSTVENNOGO UTOMLENIIA). S. I. Moldavskaia and N. V. Kol'chenko, p. 123-127. (See A70-15509 04-04)

CERTAIN CHARACTERISTICS OF THE REHABILITATION PERIOD AFTER TRAINING STRAINS (O NEKOTORYKH OSOBENNOSTIAKH VOSSTANOVITEL'NOGO PERIODA POSLE TRENIROVOCHNYKH NAGRUZOK). V. V. Petrovskii, A. M. Zelentsov, and B. N. Iushko, p. 148-152. (See A70-15510 04-04)

ENERGY SHIFTS AND GAS METABOLISM IN THE THYROID GLAND DURING CHANGES IN ITS FUNCTIONAL STATE (ENERGETICHESKIE SDVIGI I GAZOOBMEN V SHCHITOVIDNOI ZHELEZE PRI IZMENENIIAKH EE FUNKTSIONAL'NOGO SOSTOIANIIA). N. I. Putilin, M. T. Pindich, and V. K. Puninskaia, p. 153-165. (See A70-15511 04-04)

SOME CAUSES OF THE VARIATIONS IN PHYSIOLOGICAL TESTS USED IN THE EVALUATION OF VARIOUS ACTIVITY REGIMES (NEKOTORYE PRICHINY KOLEBANII FIZIOLOGICHESKIKH TESTOV IZPOL'ZUEMYKH PRI OTSENKE RAZLICHNYKH REZHIMOV DEIATEL'NOSTI). A. K. Podshibiakin, O. N. Prokopovich, A. Ia. Potar', E. N. Nessen, and V. I. Isaenko, p. 166-168. (See A70-15512 04-04)

THERMOMETRY OF HUMAN SKIN AND REGIMES OF ALTERNATION OF PHYSICAL EXERCISE AND REST (TERMOMETRIIA KOZHI CHELOVEKA I REZHIMY CHEREDOVANIIA FIZICHESKIKH UPRAZHNENII S OTDYKHOM). V. A. Sirenko, p. 183-187. (See A70-15513 04-04)

THE DYNAMICS OF TEMPERATURE AND MORPHOLOGICAL CHANGES OF ADIPOSE TISSUE IN VARIOUS NUTRITION REGIMES (DINAMIKA TEMPERATURNYKH I MORFOLOGICHESKIKH IZMENENII ZHIROVOI TKANI PRI RAZLICHNYKH REZHIMAKH PITANIIA). I. V. Torskaia, p. 207-213. (See A70-15514 04-04)

A70-15502 #
PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'NOSTI).
N. I. Putilin.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 9-18. In Russian.

Review of studies concerning the temperature variations in different organs of man and animals performing various types of physical work. It is concluded that such variations can be used as criteria of the functional state of the organism and can provide information concerning the metabolic processes. It is suggested that such criteria be taken into account when developing timetables of daily physical activity on a sound physiological basis. V.Z.

A70-15503 #
DEPENDENCE OF EVOKED POTENTIALS ON THE FUNCTIONAL STATE OF THE CEREBRAL CORTEX (ZAVISIMOST' VYZVANNYKH POTENTSIALOV OT FUNKTSIONAL'NOGO SOSTOIANIIA KORY GOLOVNOGO MOZGA).
V. A. Gmyria-Novi.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 48-56. In Russian.

Study of evoked cortical potentials obtained in response to dc current pulses delivered into various cortical areas of a group of five

dogs after administration of nembutal to change the functional state of the cerebrum. Conditions are indicated under which well-pronounced cortical potentials can be evoked. The EEG patterns reflecting these potentials are discussed. V.Z.

A70-15504 #
CHANGES IN COMPLEX CONDITIONED REFLEXES CAUSED BY THE EXTINCTION OF POSITIVE CONDITIONED REFLEXES TO AN ELEMENT OF A COMPLEX STIMULUS (IZMENENIE KOMPLEKSNYKH USLOVNYKH REFLEKSOV POD VLIIANIEM UGASHENIIA POLOZHITEL'NYKH USLOVNYKH REFLEKSOV NA ELEMENT KOMPLEKSA).
M. M. Gorpinchenko.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 62-66. In Russian.

Application of the Pavlov (1928) secretory method and the Putilin (1954) theormoelectrical technique to a study of complex conditioned reflexes to a complex stimulus in three dogs confined in a sound-proof chamber. Changes in the reflexes in response to the exclusion of one component in the three-component visual-acoustic-tactile stimulus are investigated specifically. V.Z.

A70-15505 #
CHARACTERISTICS OF THE TEMPERATURE VARIATIONS IN HUMAN SKIN OVER MUSCLES UNDER VARIOUS ACTIVITY REGIMES (KHARAKTERISTIKA IZMENENII TEMPERATURY KOZHI NAD MYSHTSAMI U CHELOVEKA PRI RAZLICHNYKH REZHIMAKH DEIATEL'NOSTI).
V. I. Zav'ialov.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 75-80. In Russian.

Discussion of the results of a total of 180 measurements of the skin temperature in various supramuscular areas of a group of 12 subjects performing physical exercises with intermissions. The effects of the various factors causing the periodic variations in the skin temperature of the subjects during activity and rest are evaluated. V.Z.

A70-15506 #
COMPARATIVE CHARACTERISTICS OF THE TEMPERATURE OF HUMAN SKIN AND MUSCLES UNDER VARIOUS ACTIVITY REGIMES (SRAVNITEL'NAIA KHARAKTERISTIKA TEMPERATURY KOZHI I MYSHTS U CHELOVEKA PRI RAZLICHNYKH REZHIMAKH DEIATEL'NOSTI).
V. I. Zav'ialov.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 80-85. In Russian.

Measurement of skin and muscle temperatures of the musculus gastrocnemius and flexor carpi in a group of male volunteers performing various physical exercises with intermissions. Synchronous variations are established in the skin and flexor carpi temperatures during activity and rest; this synchronism is found to be absent in the musculus gastrocnemius. Theories are proposed to explain these results. V.Z.

A70-15507 #
ENERGY CHARACTERISTICS OF VARIOUS TRAINING REGIMES WITH PHYSICAL EXERCISES (ENERGETICHESKAIA KHARAKTERISTIKA RAZLICHNYKH TRENIROVOCHNYKH REZHIMOV PRI SILOVYKH UPRAZHNENIIAKH).
G. P. Zakhar'evich.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 89-93. In Russian.

Study of muscle temperature variations and of respiratory activity in a group of 11 athletes who performed a total of 52 exercises in weight lifting according to different programs with different periods of relaxation. Optimal training programs for weight lifting are outlined, using the supramuscular skin temperature as a criterion. V.Z.

A70-15508 #
RATIO OF SKIN AND MUSCLE TEMPERATURES DURING VARIOUS PERIODS OF ACTIVITY AND REST (SOOTNOSHENIE TEMPERATURY KOZHI I MYSHTS V RAZLICHNYE PERIODY DEIATEL'NOSTI I OTDYKHA).
Iu. Iu. Men'shikh.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 111-117. In Russian.

Study of variations in the ratio of skin and muscle temperatures of dogs performing prolonged exercises in a special stand with various periods of running and rest. It is concluded that the temperature variations in the supramuscular skin differ from those in the corresponding muscles during muscle activity and during shifts from rest to activity and vice versa. V.Z.

A70-15509 #
A NEW METHOD OF STUDYING MENTAL FATIGUE (O NOVOM METODE ISSLEDOVANIIA UMSTVENNOGO UTOMLENIIA).
S. I. Moldavskaia and N. V. Kol'chenko.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 123-127. In Russian.

Application of the Khil'chenko method of motion-picture signal perception to studying the performance and fatigue of cortical cells in a group of subjects engaged in mental work during the midday hours and the late evening hours. It is concluded that the Khil'chenko method provides adequate objective data when used in such studies. The simplicity and convenience of the method are noted. V.Z.

A70-15510 #
CERTAIN CHARACTERISTICS OF THE REHABILITATION PERIOD AFTER TRAINING STRAINS (O NEKOTORYKH OSOBENNOSTIAKH VOSSTANOVITEL'NOGO PERIODA POSLE TRENIROVOCHNYKH NAGRUZOK).
V. V. Petrovskii, A. M. Zelentsov, and B. N. Iushko.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 148-152. In Russian.

Investigation of the effects of the alternation of activity and rest on the fatigue and rehabilitation behavior of a group of trained athletes who performed successions of 60 meter runs with rest periods of various durations. The effect of these training programs on the muscle performance characteristics of the subjects are discussed. V.Z.

A70-15511 #
ENERGY SHIFTS AND GAS METABOLISM IN THE THYROID GLAND DURING CHANGES IN ITS FUNCTIONAL STATE (ENERGETICHESKIE SDVIGI I GAZOOBMEN V SHCHITOVIDNOI ZHELEZE PRI IZMENENIIAKH EE FUNKTSIONAL'NOGO SOSTOIANIIA).
N. I. Putilin, M. T. Pindich, and V. K. Puninskaia.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES

(FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 153-165. In Russian.

Investigation of the temperature variations of the thyroid gland and of the gas metabolism in the blood of intact and decorticated dogs and in anesthetized rabbits and rats. The efferent thyroid nerve was kept under pulsed current for 1 to 2 hr during the 8 to 10 hr periods of temperature measurements with the aid of copper-constantan thermocouples. Adrenalin was also used for thyroid stimulation. A manometric technique is used in determining the carbon dioxide and oxygen contents in the blood. It is concluded that there is a relation between the temperature variations and the functional state of a stimulated thyroid gland. V.Z.

A70-15512 #
SOME CAUSES OF THE VARIATIONS IN PHYSIOLOGICAL TESTS USED IN THE EVALUATION OF VARIOUS ACTIVITY REGIMES (NEKOTORYE PRICHINY KOLEBANII FIZIOLOGICHESKIKH TESTOV IZPOL'ZUEMYKH PRI OTSENKE RAZLICHNYKH REZHIMOV DEIATEL'NOSTI).
A. K. Podshibiakin, O. N. Prokopovich, A. Ia. Potar', E. N. Nessen, and V. I. Isaenko.
IN: PHYSIOLOGICAL FOUNDATION OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 166-168. In Russian.

Discussion of the effects of solar and geomagnetic factors on data obtained in physiological tests. The effect of environmental conditions on the physiological test results is examined. It is found that a correlation exists between the magnitude of the alimentary reflex of dogs and disturbances of the geomagnetic field. Other effects are connected with the solar activity cycle. It is concluded that the state of the sun and the geomagnetic field has to be considered when the causes of variations in physiological test results are investigated. G.R.

A70-15513 #
THERMOMETRY OF HUMAN SKIN AND REGIMES OF ALTERNATION OF PHYSICAL EXERCISE AND REST (TERMOMETRIIA KOZHI CHELOVEKA I REZHIMY CHEREDOVANIIA FIZICHESKIKH UPRAZHNENII S OTDYKHOM).
V. A. Sirenko.
IN: PHYSIOLOGICAL FOUNDATIONS OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 183-187. In Russian.

Study of the question of the establishment and evaluation of regimes of alternation of athletic activity and rest on the basis of a thermoelectric method. A total of 26 highly qualified athletes were used in the experiments. The thermoelectric method with photorecording was employed for continuous observation of the skin temperature above a working gastrocnemius muscle. G.R.

A70-15514 #
THE DYNAMICS OF TEMPERATURE AND MORPHOLOGICAL CHANGES OF ADIPOSE TISSUE IN VARIOUS NUTRITION REGIMES (DINAMIKA TEMPERATURNYKH I MORFOLOGICHESKIKH IZMENENII ZHIROVOI TKANI PRI RAZLICHNYKH REZHIMAKH PITANIIA).
I. V. Torskaia.
IN: PHYSIOLOGICAL FOUNDATIONS OF ACTIVITY REGIMES (FIZIOLOGICHESKOE OBOSNOVANIE REZHIMOV DEIATEL'-NOSTI). (A70-15501 04-04)
Edited by N. I. Putilin.
Kiev, Izdatel'stvo Zdorov'ia, 1969, p. 207-213. In Russian.

Study of changes in adipose tissue of animals under various nutrition conditions on the basis of recordings of temperature measured by thermocouples implanted in fat deposits or introduced at the time of the experiment. It is found that the temperature in desympathectomized lipomas is always lower than in innervated lipomas of the same animal. Under conditions of hunger, the temperature difference between desympathectomized and innervated lipomas increases sharply, because the rate of cleavage of triglycerides in desympathectomized lipomas is reduced in comparison to the original rate, while there is a progressive increase in the rate of cleavage in the case of innervated lipomas. G.R.

A70-15646
CLASSICAL REACTION TIME AND SIGNAL RATE IN A VIGILANCE SETTING.
Hans-Olof Lisper (Uppsala, Universitet, Uppsala, Sweden).
Psychonomic Science, vol. 17, Nov. 25, 1969, p. 217, 218. 14 refs.

Four subjects were employed in an experiment to determine if "classical" reaction time would increase over time in an ordinary vigilance setting. Two signal rates were used, one very high and the other low. The result was an increase in reaction time for the high rate and a constant reaction-time level for the low rate. This result was considered to support an inhibition theory of vigilance decrement, an explanation rejected on empirical evidence in vigilance research. The discrepancy between this and ordinary vigilance experiments is considered to be caused by differences in signal strength and is a consequence of the attention demanded. (Author)

A70-15647 *
DISTANCE DISCRIMINATION IN A REDUCED CUE SETTING.
Johnny K. Worley and Robert P. Markley (Texas Christian University, Fort Worth, Tex.).
Psychonomic Science, vol. 17, Nov. 25, 1969, p. 237, 238. 6 refs.
Grant No. NGR-44-009-018.

Experimental investigation of distance discrimination in five subjects in a reduced cue setting simulating outer space. The results obtained confirm previous findings that the Weber function for apparent distance is a power function with an exponent greater than 1. M.M.

A70-15665 * #
APOLLO LIFE-SUPPORT AND PROTECTIVE SYSTEMS.
Maxime A. Faget and Robert E. Smylie (NASA, Manned Spacecraft Center, Houston, Tex.).
International Astronautical Federation, Congress, 20th, Mar del Plata, Argentina, Oct. 5-10, 1969, Paper. 46 p.

Description of the Apollo extravehicular mobility unit (EMU) system designed to operate in the lunar environment and to support a contingency extravehicular transfer from the lunar module to the command module in case the transfer cannot be made through the tunnel. The system was developed from the former Gemini extravehicular activity (EVA) system by introducing significant improvements in the areas of thermal control and mobility, and by meeting design requirements imposed by other uses of the equipment. Following the general description, a detailed review of the EMU test program is presented, and its practical verification on the Apollo 11 mission is discussed. O.H.

A70-15754 *
DETERMINATION OF COENZYME A AND ACETYL CoA IN TISSUE EXTRACTS.
John B. Allred and David G. Guy (Ohio State University, Institute of Nutrition, Columbus, Ohio).
Analytical Biochemistry, vol. 29, May 1969, p. 293-299. 14 refs.
PHS Grant No. ROI-AM-06673; Grant No. NGR-37-001-001.

Description of a sensitive and specific method for the determination of coenzyme A and acetyl CoA in tissue extracts. CoA is recycled through a coupled enzyme system in which the rate of formation of NADH is proportional to CoA concentration when the necessary enzymes and substrates are present in excess. For measuring acetyl CoA, the same system can be used by first binding free CoA irreversibly with N-ethylmaleimide. The rate of NADH production can be followed either spectrophotometrically or, with greater sensitivity, fluorometrically. M.V.E.

A70-14164

A MATHEMATICAL STUDY OF THERMAL LOSSES BY SWEATING IN MAN.

Jean Timbal, Jean Colin, Jean-D. Guieu, and Charles Boutelier (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France).

Journal of Applied Physiology, vol. 27, Nov. 1969, p. 726-730. 11 refs.

Curves of weight loss as a function of time have been studied in the nude man suddenly exposed to a warm environment. The environment was such that sweat was totally evaporated and skin temperature was lower than that of the environment. A mathematical formula is proposed and verified; it accurately describes the experimental record from four graphically determined parameters: the evaporative weight loss before the onset of sweating; the total evaporative weight loss during the steady state; the time corresponding to the onset of sweating; and the time constant of sweating. Without making other measurements and using simple computations, it is possible to determine the flow of these water losses during the transient state. A general consideration of the first-order linear system is made which leads to the proposal of a simple graphical method to predict heat storage. (Author)

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* MARCH 1970

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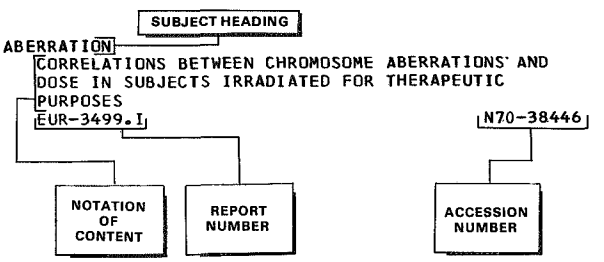

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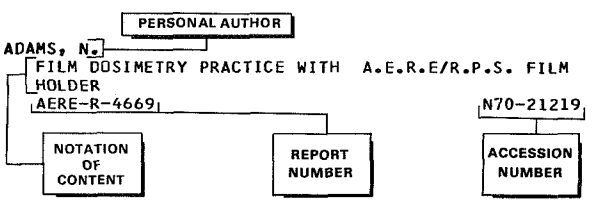

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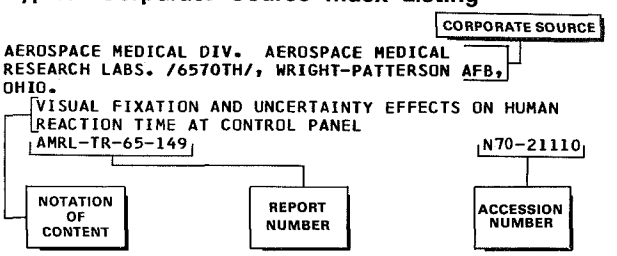

The Notation of Content (NOC), rather than the title of the document, is used to provide a more exact description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

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Decaborane effects on liver glycogen content of rats at ground level and at high altitude
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AIR FORCE SYSTEMS COMMAND, WRIGHT- PATTERSON AFB, OHIO.
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Algorithmization of image recognition process and proposed method for algorithm construction
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Effect of spaceflight environment on seeds of certain higher plants onboard Cosmos 110 satellite
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ARGONNE NATIONAL LAB., ILL.
Catalase inhibition of hydrogen transfer in hydrogen peroxide presence
[PB-186067T] N70-13960

ASTRO RESEARCH CORP., SANTA BARBARA, CALIF.
Analysis of large bending deformations of filamentary tubular shell typical for pressure constraint components of space suits
[NASA-CR-1507] N70-15131

ATOMIC ENERGY COMMISSION, NEW YORK.
Natural and post-weapons testing fission products distribution and transfer from environment to human body tissues in Soviet Union studies
[AEC-TR-7030] N70-14726
Migration peculiarities of total cesium 137 from sandy podzolic soils through food chain into human body
[A-AC-82/G/L-1187] N70-14727
Ion diffusion coefficient and characteristics of strontium 90 in Soviet Union soils
[A-AC-82/G/L-1242] N70-14728
Strontium 90 levels in bones of Soviet Union adults and children, 1957-1967
[A-AC-82/G/L-1244] N70-14729
Dietary intake of strontium 90 and cesium 137 from stratospheric fallout during 1966 and 1967
[A-AC-82/G/L-1245] N70-14730
Radioecological concentration processes by food chain organisms in seas and oceans
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Strontium 90 and cesium 137 surveyed in environmental, food, and human sites, 1958-1967
[A-AC-82/G/L-1248] N70-14732
Multicomponent models of cesium 137 exchange metabolism in rats and human beings
[A-AC-82/G/L-1251] N70-14735
Strontium 90 uptake from soil and air in dietary products following nuclear weapons tests
[A-AC-82/G/L-1252] N70-14736
Vertical distribution character of cesium 137 in four soil sites
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Cut human hair analyzed for cesium 137 content as body concentration indicator
[A-AC-82/G/L-1257] N70-14739
Vertical distribution and ionic mobility of fission products in Soviet Union soils
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Polonium 210 distribution in human body tissues and total environment
[A-AC-82/G/L-1260] N70-14742

ATOMIC ENERGY OF CANADA, LTD., CHALK RIVER /ONTARIO/.
Method for making fission fragment tracks visible, and research in biochemistry, environmental resources, and health physics
[AECL-3430] N70-12998

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Variation of human plasma during immersion in water bath
[NASA-TT-F-12422] N70-13620
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[NASA-TT-F-12705] N70-15407

B

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Instrumentation for radiation measurements in biology and medicine
[BNWL-1051-VOL-2-PT-3] N70-14054
Induced radionuclides in muscle tissues of astronauts by cosmic rays
[NASA-CR-107583] N70-15400

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N70-14902

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