NASA SP-7011 (116)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 116)

JUNE 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (116)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 116)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1973 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 336 reports, articles and other documents announced during May 1973 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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 of 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 is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1973 Supplements.

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IAA ENTRIES (A73-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche [1] are available at the rate of $1.00 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., A73-10625, when requesting publications.

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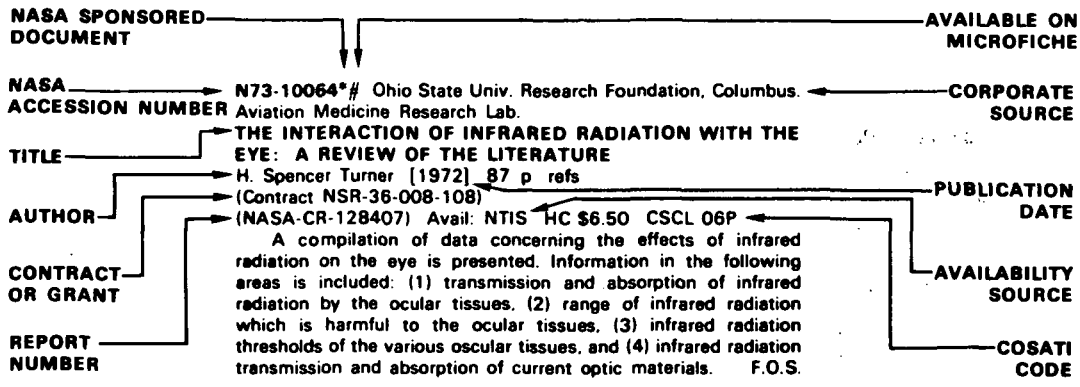

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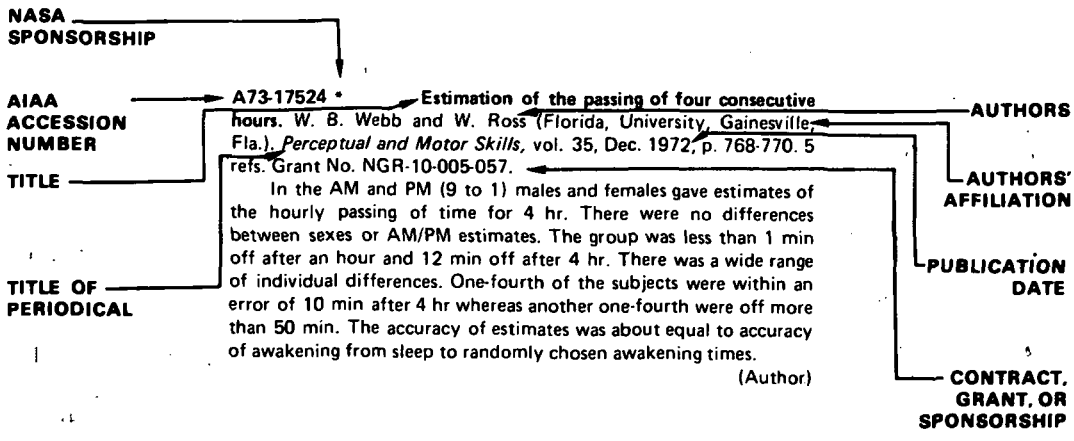

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 116) JUNE 1973

IAA ENTRIES

A73-21850 # **The pharmacology of practolol - A cardioselective beta adrenergic blocking drug.** J. D. Fitzgerald. *(Symposium Practolol, Brussels, Belgium, June 5, 1971.) Acta Cardiologica, Supplementum,* no. 16, 1972, p. 1-18. 33 refs.

A73-21871 # **Determination of oxidized and reduced pyridine nucleotides in human and rabbit blood with the aid of the polarographic cycling technique (Bestimmung der oxydierten und reduzierten Pyridinnukleotide in Menschen- und Kaninchenblut mit Hilfe der polarographischen Cycling-Technik).** I. Steinbrecht and W. Kunz (Magdeburg, Medizinische Akademie, Magdeburg, East Germany). *Acta Biologica et Medica Germanica,* vol. 29, no. 4-5, 1972, p. 495-507. 18 refs. In German.

A73-21872 # **Effects of experimental conditions on parameter estimated when using the Hill model (Der Einfluss experimenteller Bedingungen auf die Parameterschätzung beim Hill-Modell).** M. Glende and J. G. Reich (Deutsche Akademie der Wissenschaften, Zentralinstitut für Molekularbiologie, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 29, no. 4-5, 1972, p. 595-606. 7 refs. In German.

Review of statistical experiments using binding function curves obtained on the basis of a mathematical simulation process. These curves are shown to indicate the effect of accidental errors and number of measurements on the accuracy of Hill-model parameter estimates. The results obtained include the finding that 15 is the optimum number of measurements for a sigmoid curve. M.V.E.

A73-21873 # **UV-induced lipid peroxidation in human epidermis, dermis, and hypodermis in vitro (UV-provozierte Lipidperoxydation in Epidermis, Korium und Subkutis des Menschen in vitro).** H. Meffert, Ch. Dressler (Klinik und Poliklinik für Hautkrankheiten, Berlin, East Germany), and B. Meffert (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 29, no. 4-5, 1972, p. 667-675. 29 refs. In German.

Assessment of lipid peroxidation as a function of UV-irradiation dose through measurements performed upon surviving human skin mechanically separated into epidermis, dermis, and hypodermis, then, homogenized and exposed to various doses of UV radiation. The results obtained support the view that acute as well as chronic damage resulting from the action of sunlight may be caused by UV-induced lipid peroxidation. M.V.E.

A73-21893 **Distribution of ocular dominance and effect of image clarity.** P. A. Ondercin, N. W. Perry, Jr., and D. G. Childers (Florida, University, Gainesville, Fla.). *Perception and Psychophysics,* vol. 13, no. 1A, Feb. 1973, p. 5-8. 11 refs. Grants No. NIH-EY-00077; No. NIH-EY-00581.

The purposes of this study were to determine if ocular dominance could be measured and defined in a quantitative and continuous manner, rather than dichotomously, and whether such a measure could be related to image sharpness, or acuity. Ocular dominance was assessed on a dichoptic, but nonrivalry, task for 56 subjects, who were than assigned to groups according to their degree of dominance. Four positive spherical lenses (+0.75, +1.25, +1.75, +2.25) were used to induce differing amounts of refractive error in one eye. Primary results indicate that (1) dominance, as measured, is a continuous function which is normally distributed in the general population, (2) blurring the image in the dominant eye reduces the degree of dominance, and (3) blurring the image to a nonpreferred eye increases the amount of dominance in the other eye. (Author)

A73-21894 **Visibility of an afterimage alone and in the presence of one or two additional afterimages.** P. Taves and J. Atkinson (Johns Hopkins University, Baltimore, Md.). *Perception and Psychophysics,* vol. 13, no. 1A, Feb. 1973, p. 9-12. 8 refs. Navy-supported research.

Review of the results of two experiments whose aim was to determine the total unitary visibility of a single circular afterimage, both alone and in the presence of either one or two additional circular afterimages in specified spatial relationships to the first. The total time for which a circular afterimage is visible has been found to be increased by the presence of one or two additional afterimages. The increased visibility, called 'facilitation', is greater the nearer the afterimages are to one another. M.V.E.

A73-21895 * **Cortical potentials evoked by confirming and disconfirming feedback following an auditory discrimination.** K. C. Squires, S. A. Hillyard, and P. H. Lindsay (California, University, La Jolla, Calif.). *Perception and Psychophysics,* vol. 13, no. 1A, Feb. 1973, p. 25-31. 29 refs. Grants No. NGR-05-009-083; No. NIH-NS-07454.

Vertex potentials elicited by visual feedback signals following an auditory intensity discrimination have been studied with eight subjects. Feedback signals which confirmed the prior sensory decision elicited small P3s, while disconfirming feedback elicited P3s that were larger. On the average, the latency of P3 was also found to increase with increasing disparity between the judgment and the feedback information. These effects were part of an overall dichotomy in wave shape following confirming vs disconfirming feedback. These findings are incorporated in a general model of the role of P3 in perceptual decision making. (Author)

A73-21896 * **Simultaneous motor and verbal processing of visual information in a modified Stroop test.** H. Friedman and P. L. Derks (College of William and Mary, Williamsburg, Va.). *Perception and Psychophysics,* vol. 13, no. 1A, Feb. 1973, p. 113-115. 16 refs. Grants No. NGL-47-006-008; No. NGR-47-006-028.

A73-21897 **Visual discrimination of motion - Stimulus relationships at threshold and the question of luminance-time reciprocity.** D. C. Henderson (Columbia University, New York, N.Y.). *Perception and Psychophysics,* vol. 13, no. 1A, Feb. 1973, p. 121-130. 12 refs. Grants No. PHS-5-R01-EY-00391-03; No. PHS-

EY-00375-04; Contract No. N00014-67-A-0108-0009.

Quantitative descriptions, derived from an earlier empirical study, of threshold relationships among the principal stimulus variables for motion discrimination are presented, with emphasis on evaluating the influence of stimulus energy content. The present findings are compared with those of Brown (1955, 1957, 1958), who reported the applicability of luminance-time reciprocity to motion threshold for exposures shorter than 0.1 sec. It is demonstrated that such reciprocity is atypical of motion threshold, and that it represents limitations imposed by the requirements of target visibility rather than by motion discrimination itself. It is also shown that Brown's data are predictable from the present equations. (Author)

A73-22347 # **Mathematical modeling of biological systems (Matematicheskoe modelirovanie biologicheskikh sistem).** Iu. M. Svirezhev and E. Ia. Elizarov. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 20), 1972. 160 p. 94 refs. In Russian.

Available mathematical models of natural and artificial biological population-associations, biocenosis and biogeocenosis are discussed. A definition is given for the concept of optimal crop resulting from the optimal productivity of a society. Optimal productivities of a homogeneous population, of a chemostat-cultivated population, and of a predator-victim society are analyzed. Solutions are given to the respective optimal productivity problems. Also considered are the steady processes of harvesting, continuous harvesting operations, a maximum crop theorem, and a trophic control problem of a society. A mathematical basis for stable artificial biological associations is derived. Some novel criteria of stability are proposed for biological associations and for reliability of biological life support systems. V.Z.

A73-22364 # **Investigation of certain indices of higher nervous activity in man during prolonged stay in a water environment (Doslidzhennia deiakikh pokaznikiv vishchoi nervovoi diial'nosti liudini pri bagatogodinnomu perebuvanni u vodnomu seredovishchi).** S. O. Guliar, Iu. M. Kiklevich, S. O. Pevnii, and S. S. Sirota (Donets'kii Derzhavnii Universitet, Donetsk, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 744-750. 18 refs. In Ukrainian.

A73-22365 # **Changes in hemodynamics and efferent sympathetic pulsation during pressor cardiovascular reflexes under conditions of acute hypoxic hypoxia (Zmini gemodinamiki ta eferentnoi simpatichnoi impul'satsii pri deiakikh presornikh sertsevo-sudinnikh refleksakh v umovakh gostroi gipoksichnoi gipoksii).** S. A. Bershtein and O. V. Baziliuk (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 769-778. 33 refs. In Ukrainian.

Hemodynamics and efferent sympathetic activity were investigated in the postganglionic fiber of the renal nerve of anesthetized cats. A pressor sinocarotid reflex was evoked in the animals by clamping the carotid arteries. A nitrogen mixture containing 7.5% oxygen was used for respiration. Oscillograms of biopotentials were recorded during the stimulation of the A and C fibers of the tibial nerve. Evidence was found for the stimulating effect of acute hypoxia on the bulbar and spinal portions of the cardiovascular system of the test cats. Tables are given to show the changes caused by acute hypoxia in the hemodynamics and efferent sympathetic activity of the cats. V.Z.

A73-22366 # **Changes in the vascular tone of certain organs during experimental embolism of pulmonary circulation (Zmini sudinnogo tonusu deiakikh organiv pri eksperimental'nii embolii malogo kola krovoobigu).** L. I. Antonenko (Kiivs'kii Medichnii Institut, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 779-783. 11 refs. In Ukrainian.

A73-22367 # **Influence of a low-intensity ultrahigh-frequency electromagnetic field on the bioelectrical activity of the brain in rabbits (Vpliv malointensivnogo ul'travisokochastotnogo elektromagnitnogo polia na bioelektrichnu aktivnist' golovnogo mozku krolikiv).** A. M. Serdiuk and N. K. Ershova (Kiivs'kii Institut Zagal'noi i Komunal'noi Gigieni, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 802-807. 13 refs. In Ukrainian.

A73-22368 # **Influence of ultrasound and of a superhigh-frequency electromagnetic field in the three-centimeter band on the oxidative phosphorylation of liver and kidney mitochondria (Vpliv ul'trazvuku i nadvisokochastotnogo elektromagnitnogo polia trisantimetrovogo diapazonu na okisne fosforiliuvannia mitokhondrii pechinki i nirok).** V. R. Faitel'berg-Blank and G. O. Sivorinovs'kii (Odes'kii Sil's'kogospodars'kii Institut, Odessa, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 808-814. 11 refs. In Ukrainian.

A73-22369 # **Effect of copper ions on the functional state of the neuromuscular apparatus (Vpliv ioniv midi na funktsional'nii stan nervovo-m'iazovogo aparata).** K. I. Bekh (Ivano-Frankivs'kii Medichnii Institut, Ivano-Frankovsk, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 815-817. 19 refs. In Ukrainian.

Chronic experiments on rabbits which received 0.01 to 0.1 mg/kg doses of copper chloride indicated a reduction of responsiveness and a slowing down of accommodation rates of their neuromuscular apparatus in response to electric stimuli applied to their shins. Copper was found to exert an inhibitive effect on the response reflexes of their spinal cord. V.Z.

A73-22370 # **Modification of the electroencephalograph 4EEG-1 for polygraphy (Modifikuvannia elektroentsefalografa 4EEG-1 dlia poligrafii).** A. A. Novikov and F. F. Getman (Odes'kii Medichnii Institut, Odessa, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Nov.-Dec. 1972, p. 847, 848. In Ukrainian.

Discussion of a modified version of this standard electroencephalograph which was developed for rheographic recordings of hemodynamics of the brain and internal and peripheral blood vessels. The basic circuit of frequency filters of the modified version is described and is shown in a diagram. V.Z.

A73-22527 **Neuroendocrine, cardiorespiratory, and performance reactions of hypoxic men during a monitoring task.** J. F. O'Hanlon (California, University, Santa Barbara, Calif.) and S. M. Horvath (Human Factors Research, Inc., Goleta, Calif.). *Aerospace Medicine,* vol. 44, Feb. 1973, p. 129-134. 23 refs. Grant No. AF-AFOSR-69-1653.

A73-22528 **Drive and performance modification following multiple /light-light/ shifts in the photoperiod.** F. H. Rohles, Jr. and C. H. Ptacek (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). *Aerospace Medicine,* vol. 44, Feb. 1973, p. 135-139. 8 refs. Contract No. F44620-68-C-0020.

A73-22529 **Effects of some antimotion sickness drugs and secobarbital on postural equilibrium functions at sea level and at 12,000 feet /simulated/.** A. R. Fregly, M. J. Smith, C. D. Wood, and D. B. Cramer (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine,* vol. 44, Feb. 1973, p. 140-145. 24 refs.

A73-22530 **Theoretical trans-respiratory pressure during rapid decompression. I - Model experiment. II - Animal experiments.** J. Boyle, III (New Jersey College of Medicine, Newark, N.J.). *Aerospace Medicine,* vol. 44, Feb. 1973, p. 153-162. 39 refs.

A73-22531 * **Findings on American astronauts bearing on the issue of artificial gravity for future manned space vehicles.** C. A. Berry and G. L. Homick (NASA, Washington, D.C.). *Aerospace Medicine,* vol. 44, Feb. 1973, p. 163-168. 9 refs.

A73-22532 Fire retardance of mixtures of inert gases and oxygen. M. A. Chianta and A. M. Stoll (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 169-173.

The relative effectiveness of helium, nitrogen, and argon as fire retardants in oxygen mixtures was assessed at atmospheric and hypobaric pressures under carefully controlled flow and ignition conditions. It was found that: (1) combustion rate is directly and linearly related to the log of the mass flow (weight/time) of oxygen in each instance; (2) preignition time varies directly, and fabric destruction rate inversely, with the heat transport capacity of the medium; (3) when heat is supplied by the source in contact with the specimen, the destruction rate depends solely on the oxygen mass flow; (4) at any one concentration throughout the range of gas mixtures used, as pressure decreases, destruction rate decreases even though the mass flow of oxygen is maintained constant from level to level. It is concluded that in situations where heat is applied at a sufficiently low rate, the efficiency of the diluent gas is related directly to the heat transport capacity of the gaseous medium. Where the heating intensity is sufficient to overwhelm the retardant effect of the inert component only limitation of oxygen content controls combustion rate. (Author)

A73-22533 Assessment of temperature rise suppression by edge losses during irradiation. A. M. Stoll (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 174-178.

A method is described for determining: (1) the minimum aperture size required to yield temperature rise data free from edge loss effects in measurements made at the center of a site during thermal irradiation of a semi-infinite solid; (2) the magnitude of edge losses due to restriction of the irradiated area to less than the 'no loss' size, and its variation with respect to irradiance level and exposure time; and (3) where the thermal properties of the material are known, the energy absorption rate. The relationship of edge losses to area size is shown to be a hyperbolic function conforming to the equation $Y = A + (B/X)$ where A and B are constants dependent upon the exposure time and irradiance level. The edge loss effect is shown to be directly dependent upon area irradiated and independent of the shape of the irradiated area. From the experimental data presented, it is concluded that the method described is suitable for providing the information cited above with an accuracy limited only by that of the data collection technique. (Author)

A73-22534 Intravascular changes associated with hyperbaric decompression - Theoretical considerations using ultrasound. R. Y. Nishi and S. D. Livingstone (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 179-183. 16 refs.

Doppler blood flowmeters have been used to detect intravascular gas bubbles which are considered to be a major cause of decompression sickness. However, observations by various investigators have indicated that other factors such as red cell agglutination, platelet aggregates, and coalescence of lipids may be involved in decompression sickness. The possibility of using the Doppler flowmeters to detect such particles in the blood has been investigated theoretically. Experimental results from these devices implanted around the inferior venae cavae of rabbits are presented showing the waveform for bubbles as well as changes which appear in the blood flow waveform during decompression. The latter may indicate aggregation of erythrocytes and/or platelets. (Author)

A73-22535 Proposed new test for aptitude screening of air traffic controller applicants. B. B. Cobb and J. J. Mathews (FAA, Aviation Psychology Laboratory, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 184-189. 6 refs.

A73-22536 Stress and aerospace medicine /The Harry G. Armstrong Lecture/. H. Selye (Montréal, Université, Montreal, Canada). *(Aerospace Medical Association, Annual Meeting, 43rd, Bal Harbour, Fla., May 8-11, 1972.) Aerospace Medicine*, vol. 44, Feb. 1973, p. 190-193.

Discussion of recent advances in the understanding of adaptive hormone action, and review of the nonspecific adaptive functions of some steroid hormones. Several steroids can increase nonspecific resistance through very different mechanisms and are accordingly classified into two main groups which control essentially dissimilar processes: (1) the syntoxic steroids that act as tissue tranquilizers, and (2) the catatoxic steroids which actively attack the pathogen by accelerating its metabolic degradation. The physiologic and pharmacologic actions of these and other steroids are briefly described. M.V.E.

A73-22537 A study of Halon 1301 /CBrF3/ toxicity under simulated flight conditions. D. W. Call (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 202-204. 11 refs.

To test possible toxicity of Halon 1301 (CBrF3) under hypobaric conditions, such as would accompany its use in flight, eight male military personnel (ages 20 to 35 years) were exposed for 3 minutes to either 4 or 7% Halon 1301 in air in a hypobaric chamber maintained at 760 torr (sea level), 632 torr (5000 ft), or 380 torr (18,000 ft). Subjects' electrocardiograms obtained during and after exposures showed no changes from control tracings. Postexposure physical examination results and pulmonary function measurements were similar to pre-exposure values. Subjects' mean reaction times, as measured by a complex reaction time task administered before, during, and after all exposures, were significantly increased during inhalation of 4% or 7% CBrF3. However, no Halon 1301-related performance changes were noted on maze tracking tasks. Results of this study corroborate the findings of other tests conducted at one atmosphere and support the contention that Halon 1301 may be a safe fire extinguishing agent for use in occupied aircraft sections. (Author)

A73-22538 Frontal sinus hematomas in aerospace medicine. R. S. Green and B. Weissman (USAF, Otolaryngology Service, Lackland AFB, Tex.). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 205-209. 10 refs.

Aerosinusitis and frontal sinus hematomas in aviators continue to be a cause of lost flying time and should be of medical concern among flight surgeons and otolaryngology consultants to flying programs. The frontal sinuses are most frequently involved in aerosinusitis and hematoma formation due to their anatomical course and the many factors which can block their opening into the nasal cavity. The clinical picture of sudden acute frontal pain when descending from lesser to greater barometric pressure with a frontal sinus opacity on X ray is a hematoma until proven otherwise. Suggested regimen of therapy is antibiotics, decongestants, and mist for two to three weeks. No improvement in symptoms or X-ray evidence of increasing sinus disease is a situation which calls for surgical consideration. An altitude chamber flight should follow any therapeutic regimen before returning flier to flying status. The frontal sinus trephine procedure has little morbidity and in most cases is sufficient to remove the obstructing material and allow the nasofrontal ducts to again drain naturally the frontal sinuses. (Author)

A73-22539 # The WAVR file. W. E. McConnell (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 44, Feb. 1973, p. 210-213. 10 refs.

The USAF WAVR File, a recently established data repository on medically waivered pilots and navigators, is described. Utilizing the USAF School of Aerospace Medicine Computer at Brooks Air Force Base, Tx, a unique computer program enables the maintenance of a continually updated, very flexible, epidemiologic tool. Present stages of development, existing data on Air Force waivers and future directions of the WAVR File are discussed. (Author)

A73-22550 * Automatic surface inoculation of agar trays. J. R. Wilkins, S. M. Mills, and E. H. Boykin (NASA, Langley Research Center; Northrop Services, Inc., Hampton, Va.). *Applied Micro-*

biology, vol. 24, Nov. 1972, p. 778-785.

Description of a machine and technique for the automatic inoculation of a plastic tray containing agar media with a culture, using either a conventional inoculation loop or a cotton swab. The design of the machine is simple, it is easy to use, and it relieves the operator from the manual task of streaking cultures. The described technique makes possible the visualization of the overall qualitative and, to some extent, quantitative relationships of various bacterial types in a sample tested. M.V.E.

A73-22576 # **Synaptic activation of thoracic spinal cord interneurons through recticulo-spinal pathways (Sinapticheskaia aktivatsiia promezhutochnykh neironov grudnogo otdela spinnogo mozga retikulo-spinal'nymi putiami).** I. S. Bezhenaru, A. P. Gokin, A. G. Zadorozhnyi, and N. N. Preobrazhenskii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia*, vol. 4, Nov.-Dec. 1972, p. 566-578. 27 refs. In Russian.

A73-22577 # **Structural characteristics of connections between medial efferent systems and spinal cord neurons (Strukturnaia kharakteristika sviazei medial'nykh niskhodiashchikh sistem s neironami spinnogo mozga).** P. G. Kostiuk and G. G. Skibo (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia*, vol. 4, Nov.-Dec. 1972, p. 579-586. 21 refs. In Russian.

A Fink-Heimer technique was applied in a study of structural changes in the medial portion of various segments of the spinal cord of cats with a partially destroyed ventral funiculus. Degenerative alterations were observed in myelinated axons and in axo-dendrite, axo-somatic and axo-axonal terminations. A comparison of numbers of intact fiber terminations in test cats with those in control cats suggests that most connections of efferent fibers with spinal neurons are of an axo-dendrite type. V.Z.

A73-22578 # **Cortico-pyramidal and cortico-extrapyramidal synaptic effects on lumbar motor neurons in monkeys (Kortiko-piramidnye i kortiko-ekstrapiramidnye sinapticheskie vliianiia na poiasnichnye motoneirony obez'iany).** Z. A. Tamarova, A. I. Shapovalov, O. A. Karamian, and G. G. Kurchavyi (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Neirofiziologiia*, vol. 4, Nov.-Dec. 1972, p. 587-596. 20 refs. In Russian.

A73-22579 # **Investigation of evoked activity in the ventral horn of lumbar segments during the interaction of efferent extrapyramidal and cortical stimuli (Issledovanie vyzvannoi aktivnosti v ventral'nom roge liumbal'nykh segmentov pri vzaimodeistvii ekstrapiramidnykh i kortikal'nykh niskhodiashchikh vliianii).** E. T. Blagodatova and S. A. Evdokimov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Neirofiziologiia*, vol. 4, Nov.-Dec. 1972, p. 597-607. 18 refs. In Russian.

A73-22580 # **Electrophysiological investigation of noise rejection in an auditory system receiving sound from a localized source (Elektrofiziologicheskoe issledovanie pomekhoustoichivosti slukhovoi sistemy pri lokalizatsii istochnika zvuka).** Ia. A. Al'tman (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Neirofiziologiia*, vol. 4, Nov.-Dec. 1972, p. 621-628. 6 refs. In Russian.

Responses of inferior colliculus neurons to direct and echoed acoustic signals were studied in anesthetized cats in a sound-proof chamber. Acoustic signals from capacitor microphones were directly or after reflection delivered in the ear. The neuron activity was recorded through microelectrodes inserted in the inferior colliculus. The effects of interferences of direct and reflected signals on the perception of the sound source direction and distance by the auditory system of the test cats are analyzed. V.Z.

A73-22649 * **Ouabain-sensitive component of brown fat thermogenesis.** B. A. Horwitz (California, University, Davis, Calif.). *American Journal of Physiology*, vol. 224, Feb. 1973, p. 352-355. 15 refs. NSF Grant No. GB-30594; Grant No. NGR-05-004-035.

The study discussed was undertaken to quantify the amount of energy utilized by the ouabain-sensitive Na(+)-K(+) membrane pump during the norepinephrine-induced thermogenesis of brown adipose tissue. The data obtained indicate that the observed inhibition of the catecholamine-induced increase in brown fat thermogenesis by ouabain does not reflect an inhibition of cyclic AMP synthesis. G.R.

A73-22650 * **Effect of actinomycin D on aldosterone-mediated changes in electrolyte excretion.** M. D. Lifschitz, R. W. Schrier, and I. S. Edelman (California, University, San Francisco, Calif.). *American Journal of Physiology*, vol. 224, Feb. 1973, p. 376-380. 16 refs. Research supported by the Bay Area Heart Association; Grants No. NIH-HE-13319-01; No. NIH-AM-12753; No. NIH-HL-06285; No. NGR-05-025-007.

A73-22676 * **Role of mineralocorticoids in the natriuresis of water immersion in man.** M. Epstein, J. L. Katsikas, and D. C. Duncan (Miami, University; U.S. Veterans Administration Hospital, Miami, Fla.). *Circulation Research*, vol. 32, Feb. 1973, p. 228-236. 30 refs. Research supported by the Florida Heart Association; U.S. Veterans Administration Grant No. TR-139; Grants No. NIH-RR-261; No. NGR-10-007-097.

In an attempt to assess the quantitative contribution of aldosterone suppression to the natriuresis of water immersion, renal sodium handling in normal male subjects undergoing water immersion was examined before and after administration of exogenous mineralocorticoid. The study demonstrated that the administration of a potent mineralocorticoid in pharmacological doses failed to abolish the natriuresis of water immersion. F.R.L.

A73-22694 **Alpha-delta sleep.** P. Hauri (Dartmouth College, Hanover, N.H.) and D. R. Hawkins (Virginia, University, Charlottesville, Va.). *Electroencephalography and Clinical Neurophysiology*, vol. 34, Mar. 1973, p. 233-237. 5 refs. Grant No. PHS-MH-14421.

Alpha-delta sleep is a mixture of delta waves and alpha-like rhythms of relatively large amplitude. Alpha-delta sleep was first noticed during studies of sleep in various psychiatric patients. Alpha-delta sleep has also been observed in morphine addicts and in depressed patients. It appears that it replaces delta sleep in some patients with chronic, somatic malaise and fatigue. G.R.

A73-22695 **Responsiveness at the onset of spike-wave bursts.** R. J. Porter, J. K. Penry (National Institutes of Health, National Institute of Neurological Diseases and Stroke, Bethesda, Md.), and F. E. Dreifuss (Virginia, University, Charlottesville, Va.). *Electroencephalography and Clinical Neurophysiology*, vol. 34, Mar. 1973, p. 239-245. 18 refs. Grant No. NIH-RR-304.

Simple reaction time is a sensitive means of evaluating consciousness during an epileptic seizure. A paroxysm-triggered reaction-time method is described for the evaluation of responsiveness during paroxysmal abnormal discharges in patients with absence (petit mal) seizures and generalized spike-wave bursts. Evidence is presented for decreased responsiveness at the onset of the abnormal discharge. Fourteen patients, five males and nine females, ranging in age from 5 to 20 years were used in the experiments. G.R.

A73-22696 * **Polysensory responses and sensory interaction in pulvinar and related postero-lateral thalamic nuclei in cat.** C. C. Huang and D. B. Lindsley (California, University, Los Angeles, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 34, Mar. 1973, p. 265-280. 37 refs. Contract No. N00014-69-A-0200-4024; Grants No. NGL-05-007-049; No. PHS-NS-8552.

A73-22697 **Rapid eye movement analyzer.** R. J. McPartland, D. J. Kupfer, and F. G. Foster (Yale University, New Haven, Conn.). *Electroencephalography and Clinical Neurophysiology*, vol. 34, Mar. 1973, p. 317-320. 8 refs.

A block diagram of the REM analyzer is presented. Each

electrooculogram (EOG) is amplified and filtered by Grass polygraph amplifiers. Besides REMs an EOG signal may contain rolling eye movements. Other outputs provided by the analyzer include a count signal and an interval signal. A relay closure is activated by the interval signal. Electronic switches activated by both the count and interval signals drive display amplifiers which power display lamps. G.R.

A73-22849 # Determination of the optimal time of continuous work for operators in man-machine systems (Opredelenie optimal'noi prodolzhitel'nosti nepreryvnoi raboty operatorov v sistemakh 'chelovek-tekhnika'). V. N. Treier (Minskii Radiotekhnicheskii Institut, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady,* vol. 16, Dec. 1972, p. 1107-1109. 6 refs. In Russian.

Expressions are proposed for the estimation of the optimal work-rest time alternation schedule which provides the highest possible alertness levels in human operators of automatic control systems. The expressions are based on the laws of a theory of combined reliability and endurance estimations as defined by the author (1970). V.Z.

A73-22850 # Study of the influence of weak electromagnetic field gradients on man (K issledovaniiu vliianiia slabykh perepadov elektromagnitnykh polei /EMP/ na cheloveka). V. D. Mikhailova-Lukasheva, A. V. Skripal', V. P. Mel'nikov, V. P. Korotkii, and L. V. Naimitenko (Akademiia Nauk Belorusskoi SSR, Sektor Gerontologii, Belorussian SSR). *Akademiia Nauk BSSR, Doklady,* vol. 16, Dec. 1972, p. 1147-1149. In Russian.

Description of a technique for studying the effect of weak electromagnetic field gradients on the physiological functions of man and animals. Square pulses at frequencies matching the rhythms of particular physiological processes are applied to create weak electromagnetic field gradients in a capacitor chamber in which subjects and animals are confined during experiments. Electroencephalograms, EKGs, phonocardiograms, rheovasograms, plethysmograms, blood pressure and respiration are recorded during exposures. V.Z.

A73-22856 # Influence of certain brain structures on the sulfhydryl-group, diphosphopyridine-nucleotide, and serotonin contents of the blood (Vliianie nekotorykh obrazovanii golovnogo mozga na soderzhanie v krovi sul'gidril'nykh grupp, difosfopiridinnukleotidov i serotonina). A. I. Sikharulidze, L. G. Ramishvili, N. G. Lobzhanidze, M. G. Kikvidze, and K. P. Beridze. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Nov. 1972, p. 469-472. In Georgian, with abstract in English.

A73-22857 # Technique for the implantation of long-term diagnostic electrodes in the amygdaloid complex of the human brain (K metodike vvedeniia dolgosrochnykh diagnosticheskikh elektrodov v mindalevidnyi kompleks golovnogo mozga cheloveka). O. A. Sigua, S. A. Chkhenkeli, and V. G. Gogsadze (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Klinicheskoi i Eksperimental'noi Nevrologii, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Nov. 1972, p. 481-484. 8 refs. In Russian.

A modified method for the implantation of electrodes in the amygdaloid complex of the human brain is presented. The implantation is performed following preliminary pneumo-encephalography with the aid of an image converter tube for observation. Speed, simplicity, and safety are shown to characterize the described method. M.V.E.

A73-22862 # Dynamics of electrical activity in the neocortex and hippocampus when hunger and thrist are satisfied (Dinamika elektricheskoi aktivnosti novoi kory i gippokampa pri udovletvorenii potrebnosti). T. N. Oniani (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Dec. 1972, p. 681-684. 8 refs. In Russian.

The biopotentials of the neocortex and hippocampus were recorded in cats during and after a 48-hr period without food and water. Statistical analysis of the recordings showed that the 2 to 30-Hz neocortex potentials and the 2 to 4-Hz and 8 to 20-Hz hippocampus biopotentials were stimulated when the cats were given milk after deprivation. V.Z.

A73-22863 # Organization of spontaneous muscular activity in man (Ob organizatsii neproizvol'noi aktivnosti myshts cheloveka). A. M. El'ner (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) and G. V. Mamasakhlisov (Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Dec. 1972, p. 705-708. 5 refs. In Russian.

Achilles tendon reflexes were evoked by electromagnetic hammer impacts in a study of the functional state of the segmental apparatus of the spinal cord in subjects whose muscles reacted spontaneously to changes in their posture during the motion of the test-stand platform. Diagrams are given for changes in the amplitude of Achilles reflexes during the latent period of spontaneous motion and for the response of the Musculus soleus to extension during a posture disturbance or to a hammer impact on the Achilles tendon. V.Z.

A73-22864 # Effect of the administration of free amino acids and metabolic cofactors on the distribution of regional biogenic amine contents in the brain and blood of animals (Vliianie nagruzki zhivotnykh svobodnymi aminokislotami i kofaktorami ikh obmena na raspredelenie regional'nogo fonda biogennykh aminov v golovnom mozgu i v krovi). I. I. Ibragimov (Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Dec. 1972, p. 721-724. 19 refs. In Russian.

A73-22865 # Modification of a ballisto-oscillograph for extremities (K voprosu modifikatsii differentsial'nogo ballisto-ostsillografa konechnostei). A. M. Romanko, K. G. Berbichashvili, and Z. A. Okropiridze. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Dec. 1972, p. 769-772. 6 refs. In Georgian, with abstract in English.

Modified ballisto-oscillograph designs for taking ballisto-oscillograms of extremities are discussed. A design with a cranio-caudal sensor is described. Ballisto-cardiograms and differential ballisto-oscillograms of extremities can be recorded simultaneously when this modified ballisto-oscillograph is used. V.Z.

A73-22925 On the nature of the interhemispheric effects of fatigue. S. J. Dimond and J. G. Beaumont (University College, Cardiff, Wales). *Acta Psychologica,* vol. 36, Dec. 1972, p. 443-449. 8 refs. Medical Research Council Grant No. G-969/96/C.

The possibility that different levels of fatigue could be maintained independently at each hemisphere was examined by projecting a continuous task to one hemisphere by a divided visual field technique. Occasional test stimuli were flashed to both hemispheres. The extended response times observed at the task hemispheres were not observed at the opposite hemisphere. When both task and test stimuli are all flashed to the same hemisphere, fatigue spreads to test stimuli at different locations in the left hemisphere, but not in the right. The response times of left-handed subjects are longer than those of right-handed. The results suggest that there is no transfer of fatigue from one hemisphere to the other, that the hemispheres deal differently with the demands made upon them, and that the brain of the left-hander has a reduced capacity to sustain performance. (Author)

A73-22926 Thyroid responses to simulated altitude. T. A. Kotchen, E. H. Mougey, R. P. Hogan, A. E. Boyd, III, L. L. Pennington, and J. W. Mason (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.; U. S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology,* vol. 34, Feb. 1973, p. 165-168. 32 refs.

Results of studies of the pituitary-thyroid axis in man during a 72-hr exposure to high altitude in the controlled environment of an altitude chamber. Both an absence of measurable increases of thyroid

stimulating hormone (TSH) concentration and rapidly occurring alterations in the steady state of thyroxine are observed in subjects exposed to a simulated altitude of 12,000 ft, thus suggesting a shift from the extravascular to the intravascular compartment at altitude rather than enhanced pituitary-mediated thyroxine secretion. The elevated free thyroxine concentration at high altitude in the absence of measurably increased TSH-mediated thyroxine secretion is regarded as evidence that an alteration in the peripheral utilization of thyroxine may result in a decreased thyroid requirement to maintain tissue respiration and hence a lower prevalence of goiter. A.B.K.

A73-22927 Red cell flexibility and pressure-flow relations in isolated lungs. R. Greene (Massachusetts General Hospital, Boston, Mass.), J. M. B. Hughes, L. D. Iliff, and G. F. Pineo (London, Royal Postgraduate Medical School, London, England). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 169-175. 24 refs.

Resistance to blood flow in 10 isolated canine lungs was examined using perfusates with red cells whose physical properties were altered by heat treatment. At normal hematocrit levels perfusion with suspensions of heat-treated red cells of reduced flexibility significantly increased vascular resistance under a variety of conditions of flow, arterial, venous, and transpulmonary pressures. The effects on resistance were reversed when perfusion with flexible red cells was substituted. Results indicate that alterations in the physical properties of red cells which reduce their flexibility can substantially increase vascular resistance in the absence of any hematocrit change. (Author)

A73-22928 Influence of developmental adaptation on aerobic capacity at high altitude. A. R. Frisancho, C. Martinez, T. Velasquez, J. Sanchez, and H. Montoye (Michigan, University, Ann Arbor, Mich.). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 176-180. 26 refs. Grant No. NIH-HE-13805.

Sixty-three young male subjects were tested during maximal exercise on a bicycle ergometer at an altitude of 3,400 m above sea level. The maximal oxygen intake and maximal ventilation for 23 Peruvian lowland subjects who during the developmental period were acclimatized to chronic high-altitude hypoxia were equal to those attained by 20 high-altitude natives. In contrast, 10 Peruvian and 10 U.S. sea-level subjects who were acclimatized to chronic high-altitude hypoxia as adults attained significantly lower aerobic capacities and higher ventilations than the high-altitude natives. It is concluded that the attainment of aerobic capacity at high altitude is influenced by adaptations acquired during the developmental period. (Author)

A73-22929 'Closing volumes' and decreased maximum flow at low lung volumes in young subjects. T. Takishima and K. Takahashi (Tohoku University, Sendai, Japan). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 188-193. 26 refs.

We measured the 'closing volume' phenomenon with a nitrogen-bolus technique in 10 healthy subjects under 35 years of age. We were able to classify the subjects into two groups: group A (5 cases) had no apparent 'closing volume'; and group B (5 cases) had significant, easily measured 'closing volumes.' When compared to group A, group B subjects had higher Broca indices and smaller residual volumes, presumably because their abdominal muscles were able to elevate the diaphragms more efficiently. In addition, group B subjects showed markedly decreased flows near RV with a curvilinear tail of the flow-volume loop. (Author)

A73-22930 Distribution of systemic blood flow during cardiopulmonary bypass. L. W. Rudy, Jr., M. A. Heymann, and L. H. Edmunds, Jr. (California, University, San Francisco, Calif.). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 194-200. 30 refs. Grants No. NIH-HL-13105; No. NIH-HL-06285.

The distribution of systemic blood flow in rhesus monkeys, measured with microspheres labeled with different radionuclides at normal and reduced hematocrit, is reported. Effects of random, unknown, and known variables on organ blood flow during bypass were reduced by experimental design and by rigorous control of circulatory, hematologic, and chemical variables between experiments. The results obtained provide a reference for possible changes in organ blood flow that may occur with pulsatile pumping, hypothermia, hypothermia and circulatory arrest, or prolonged total or partial bypass. M.V.E.

A73-22931 Predicting heart rate response to work, environment, and clothing. B. Givoni and R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 201-204. 10 refs. Research supported by the National Council for Research and Development of Israel.

Formulas are presented for the prediction of the heart rate response to work, environment, and clothing. These formulas, derived from rectal temperature responses, predict the dynamic response pattern of heart rate with time of exposure, not only for a constant activity and environment but also with varying activity, environment, and clothing during an exposure. The accuracy of the prediction has been checked by comparison with experimental results from several studies at different laboratories and under a wide range of conditions. (Author)

A73-22932 A comparison of three methods of acclimatization to dry heat. E. Shvartz, E. Saar, N. Meyerstein, and D. Benor (Negev Institute for Arid Zone Research, Beersheba; Tel Aviv University, Tel Aviv, Israel). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 214-219. 21 refs.

A work-heat test (50 deg C DB, 28 deg C WB; 5.6 km/hr up a 5% grade) was given to three groups of subjects following three programs of acclimatization: by exposure to dry heat (6 subjects), wet heat of equal stress (6 subjects), and exercise performed at an air temperature of 23 deg C (5 subjects). A comparison between the three experimental groups and a control group on the work-heat test showed substantial acclimatization in the hot-dry group, mild acclimatization in the hot-wet group, and a lack of acclimatization in the exercise group. It was shown that acclimatization to dry heat resulted from a decrease in resting body temperature and an increase in the efficiency, rather than the quantity of sweating, and that these changes were accompanied by decreases in work metabolism and in heat conductance. (Author)

A73-22933 Intermittent exercise - Metabolites, oxygen pressure, and acid-base equilibrium in the blood. J. Keul and E. Doll (Freiburg, Universität, Freiburg, West Germany). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 220-225. 36 refs.

Heart rate, arterial and femoral venous blood glucose, lactate, pyruvate, hemoglobin, blood gas, pH, and standard bicarbonate were investigated in 10 young men during ergometer interval work. During and after work glucose is continually extracted by muscle; its share in the energy metabolism, however, is much lower than that of calculated muscle glycogen. At the beginning, arterial blood lactate levels of 5.5 (2 min) and 9.9 (4 min) micromole/ml were found; at the end of exercise they increased above 20 micromole/ml. Corresponding decreases of pH (to 7.09) and of standard bicarbonate (to 11 mEq/1) were found during exercise. Extremely low oxygen pressure (18.6 mm Hg) in venous blood from working muscle and a correspondingly high arterial-femoral venous difference express the high rate of oxidative metabolism. (Author)

A73-22934 A frequency response analysis of fusimotor-driven muscle spindles. M. J. Evanich (Tennessee, University, Memphis, Tenn.). *Journal of Applied Physiology*, vol. 34, Feb. 1973, p. 226-232. 20 refs. Research supported by the Easter Seal Research Foundation; Grant No. NIH-NS-08608.

A linear frequency response analysis was performed on the fusimotor-muscle spindle pathway as a first approximation in an attempt to quantify the dynamic behavior of this system. When stimulus pulse rates which were sinusoidally-modulated were applied over a cyclic frequency range of 0.039-15.6 Hz to single and multiple fusimotor fibers, the response of primary and intermediate sensory

endings was an approximately sinusoidal variation in firing rate. Under constant muscle length conditions, all receptor preparations studied had similar gain and phase curves. The gain curves rose gradually attaining a broad maximum between 0.5-5 Hz and falling above this range. The main new finding of this study is the presence of a phase lead at low cyclic frequencies, and implies an adaptation-like effect of the muscle spindle's response to fusimotor nerve input. (Author)

A73-22935 * # Myocardial metabolism during exposure to carbon monoxide in the conscious dog. J. D. Adams, H. H. Erickson, and H. L. Stone (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology,* vol. 34, Feb. 1973, p. 238-242. 13 refs. NASA-supported research. NASA Order A-94544.

Investigation of the relationship between coronary flow, heart rate, left ventricular function, and myocardial oxygen consumption at increasing levels of carboxyhemoglobin in conscious dogs. The results demonstrate a linear increase in coronary flow and heart rate as the carboxyhemoglobin increases up to 20%. Myocardial oxygen consumption declined during the same period. M.V.E.

A73-22936 Modification and updating of the bioelectric DS2C amplifier for a FET input. T. Richardson and A. R. Freeman (Indiana University, Indianapolis, Ind.). *Journal of Applied Physiology,* vol. 34, Feb. 1973, p. 257, 258.

A73-22937 Recording of second time derivative of displaced volume V in breathing. D. Bargeton, E. Florentin, R. Menier, and G. Vardon (Institut National de la Santé et de la Recherche Médicale, Paris, France). *Journal of Applied Physiology,* vol. 34, Feb. 1973, p. 259-262. 7 refs.

Experimental comparison of the results obtained with the aid of electrical and pneumatic (variometer) differentiating devices fed by a pneumotachograph during different patterns of spontaneous breathing. The best electrical differentiation is obtained from a circuit using three operational amplifiers. The variometer works with a slightly better signal-to-noise ratio. The variometer is simpler and cheaper but the electrical differentiator is more flexible. M.V.E.

A73-22964 Peripheral threshold of perceived contrast of the human eye. J. Stanek. *Optica Acta,* vol. 20, Feb. 1973, p. 137-146. 7 refs.

An apparatus is described for measuring minimum perceived brightness differences in the extrafoveal regions of the retina. Peripheral threshold-contrast functions are graphically presented for the vertical and horizontal meridians of the eye at two basic luminance levels, as obtained by averaging over an ensemble of 28 observers. Some implications for instrumental optics and road traffic are discussed. (Author)

A73-22971 # Analysis of the spectra in a 'man-machine' system (Analiz spektrov v sisteme 'chelovek-mashina'). Iu. R. Zakis, Iu. Ia. Kuz'min, L. M. Kuz'mina, A. V. Moskal'onov, and L. R. Putse. *Zhurnal Prikladnoi Spektroskopii,* vol. 17, Dec. 1972, p. 1098-1101. 6 refs. In Russian.

Description of a simple algorithm for decomposing spectra into 'elementary bands.' The decomposition process is performed during continuous interaction between the experimenter and the computer. Such an approach makes it possible to take into account the individual peculiarities of the experimenter without constant revision of the programs. An example is presented involving the decomposition of spectra the bands of which were described by Gaussian functions, while the background was approximated by a linear function. A.B.K.

A73-22999 Estimation of left ventricular size by echocardiography. D. G. Gibson (St. Bartholomew's Hospital, London, England). *British Heart Journal,* vol. 35, Feb. 1973, p. 128-134. 16 refs.

Review of the results of a study based on a comparison of echocardiography with angiocardiography in estimating left ventricular dimensions in 50 patients. The results obtained show that the left ventricular dimension measured by echocardiography was related to the angiographic mean minor axis and also to cavity shape. The method appears particularly suitable for multiple determinations in the same patient. M.V.E.

A73-23173 Left ventricular blood flow velocity in man studied with the Doppler ultrasonic flowmeter. A. Benchimol, K. B. Desser, and J. L. Gartlan, Jr. (Good Samaritan Hospital, Phoenix, Ariz.). *American Heart Journal,* vol. 85, Mar. 1973, p. 294-301. 16 refs. Research supported by the Nichols' Memorial Fund.

Experience with the Doppler catheter tip flowmeter as a method for the instantaneous estimation of phasic left ventricular flow velocity is described. Characteristic and reproducible flow velocity waveforms were obtained from various sites within the left ventricle. Left ventricular inflow tract, outflow tract, and midcavity records differed. The location of measurement determined the dominance of a systolic, diastolic, or presystolic flow velocity wave. F.R.L.

A73-23174 Clinical evidence of cardiac weakness and incoordination secured by simultaneous records of the force BCG and carotid pulse derivative and interpreted by an electrical analogue. I. Starr, P. D. Verdouw, and A. Noordergraaf (Pennsylvania, University, Philadelphia, Pa.). *American Heart Journal,* vol. 85, Mar. 1973, p. 341-348. 14 refs. Grants No. PHS-HE-625-CVB; No. PHS-HE-10330.

A73-23244 # Reflex bradycardia elicited from left ventricular receptors during acute severe hypoxia in cats. P. Thoren (Goteborg, University, Goteborg, Sweden). *Acta Physiologica Scandinavica,* vol. 87, Jan. 1973, p. 103-112. 27 refs. Research supported by the University of Goteborg; Swedish Medical Research Council Grant No. B72-14X-644-08A.

A73-23297 # Quantum theory of muscle contraction (Kvantova teoriia skorochennia m'iaziv). O. S. Davidov. *Akademiia Nauk Ukrains'koi RSR, Visnik,* vol. 36, Nov. 1972, p. 26-32. 10 refs. In Ukrainian.

Review of recent studies dealing with the application of the quantum theory to the mechanism of muscle contraction. The collective excitation of peptide groups in alpha-spiral protein molecules is interpreted in terms of the quantum theory. Expressions describing a collective excitation process in a two-wave approximation are discussed. The application of a 'skating model' to the excitation of myosin molecules is considered. V.Z.

A73-23298 # Approaches to the realization of complex biotechnological systems (Shliakhi realizatsii skladnikh biotekhnichnikh sistem). K. O. Ivanov-Muroms'kii and Iu. V. Paramonov. *Akademiia Nauk Ukrains'koi RSR, Visnik,* vol. 36, Nov. 1972, p. 33-40. 35 refs. In Ukrainian.

Discussion of the biological and technological aspects of organism-machine interactions in complex hybrid control systems intended for specific applications including intelligence assignments. Biotechnological systems of lower, intermediate and higher levels, in which a biological component is used, respectively, as an unconscious sensor, a homeostatically controlled unit, or a purposful executive, are considered. V.Z.

A73-23301 **Physiology of photoreceptor organs.** Edited by M. G. F. Fuortes (National Institutes of Health, Bethesda, Md.). Berlin, Springer-Verlag (Handbook of Sensory Physiology. Volume 7/2), 1972. 763 p. $77.40.

The topics discussed concern the structure of visual cells and the histological architecture of the retina; the laws governing photochemical reactions, the biochemistry of photopigments; the optical properties of invertebrate eyes and the electrophysiology and interactions of their photoreceptors; the properties of vertebrate eyes, including studies of optics, the electrical responses of rods and cones, and the functional organization of the retina; and an extensive review of retinal biochemistry and metabolism. All the studies discussed are directed toward the solution of two basic problems - namely, transduction in the photoreceptors and organization (or information processing) in the retina.

A.B.K.

A73-23302 **The structural organization of the compound eye in insects.** O. Trujillo-Cenóz (Instituto de Investigatión de Ciencias Biológicas, Montevideo, Uruguay). In: Physiology of photoreceptor organs. (A73-23301 09-04) Berlin, Springer-Verlag, 1972, p. 5-62. 134 refs. Grants No. NIH-NS-08669-01-02-03; No. AF-AFOSR-618-64; No. AF-AFOSR-618-66; No. AF-AFOSR-618-67.

Detailed review of the anatomical structure of the main components of the compound eye of insects. The general anatomy of the compound eye and associated nervous centers is briefly summarized, and some geometrical terms and reference axes required for understanding of the structural organization of the eye are defined. The retina is considered as the sum of elementary units or ommatidia each of which consists of an optical system showing different degrees of structural complexity and a group of photoreceptor cells exhibiting dissimilar morphology in the various groups of insects. The nervous and nonnervous components of the lamina ganglionaris are described, and some basic points are made concerning the anatomical structure of the intermediate chiasm or optic nerve in order to facilitate understanding of the projection of the lamina upon the medulla. The nervous and nonnervous components of the medulla are reviewed, and a brief description is given of the lobula or optic lobe. A.B.K.

A73-23303 **Rods and cones.** A. L. Cohen (Washington University, St. Louis, Mo.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 63-110. 292 refs. Grant No. NIH-NB-04816-06.

Detailed review of the development and structure of the photoreceptor cells of vertebrates - the rods and cones. Topics discussed include the light pathway through the photoreceptor, outer segments and their membranous disks, the ciliary connective and ciliary microtubules, inner segments and their organelles, the external limiting membrane, cell somas and axons, and the inter-receptor contacts and synaptic contacts serving as receptor terminals. A contemporary view of rods and cones is outlined, noting some difficulties due to the duplex retinal property implied by the presence of rods and cones. A.B.K.

A73-23304 **The morphological organization of the vertebrate retina.** W. K. Stell (California, University, Los Angeles, Calif.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 111-213. 418 refs.

Critical historical review of attempts to establish the spatial relationships between the structural, functional, and chemical units in the retina which correspond to networks of cells performing complex retinal functions. The structure of retinal cells and their relationships as revealed by optical microscopy are discussed, including the morphology of photoreceptors, intermediate neurons, efferent fibers, and ganglion cells. The ultrastructure of cell contacts and patterns of connections is considered, including direct connections between photoreceptor cells, interconnections between photoreceptor, bipolar, and horizontal cells, and interconnections between bipolar, ganglion, and amacrine cells. The possibility of morphological identification of functional units is investigated, and a study is made of the histochemical localization and pharmacology of substances possibly related to synaptic transmission. A.B.K.

A73-23306 **The structure and reactions of visual pigments.** A. Kropf (Amherst College, Amherst, Mass.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 239-278. 155 refs. Grant No. NIH-EY-00201.

Review of available knowledge concerning the structure of the visual pigments and their reactions in solution and in the visual receptors. The role of the retinylidene chromophore in absorbing visible and ultraviolet light is discussed. A study is made of the nature of the primary linkage joining the chromophore to the protein in rhodopsin and of the composition of pure rhodopsin. A number of proposed hypothetical noncovalent interactions between chromophore and protein are described. The effect of light on solutions of visual pigments such as pre-lumi pigments, lumirhodopsin, metarhodopsin, pararhodopsin, and N-retinylidene-opsin is examined. The physicochemical properties of rod outer segments are discussed to facilitate understanding of the chemistry of visual pigments in situ. A.B.K.

A73-23307 **Generator potentials in invertebrate photoreceptors.** M. G. F. Fuortes and P. M. O'Bryan (National Institutes of Health, Bethesda, Md.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 279-319. 103 refs.

Description of the responses evoked by light in photoreceptor cells of invertebrates, and discussion of various views on the mechanisms leading to the photic responses. Topics discussed include the organization of photoreceptor cells, microvilli, the lateral eye of Limulus, generator potentials in eccentric cells, the origin of nerve impulses in eccentric cells, the function of the small fibers in the optic nerve of Limulus, conductance changes following illumination, rectification and electrical coupling in ommatidial cells, the action of light on the ommatidial resistances, voltage-clamp studies on photoreceptors, the action of sodium ions on the generator potential, generator potentials in the eye of the scallop, generator potentials in other structures, the site of origin of visual responses, kinetics of visual responses, and the relation between sensitivity and speed of response. A.B.K.

A73-23308 **Responses to single photons.** M. G. F. Fuortes and P. M. O'Bryan (National Institutes of Health, Bethesda, Md.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 321-338. 36 refs.

Description of various experiments on the responses of photoreceptors to stimulation by a single photon. Investigations of the changes produced in photoreceptors by barely visible flashes of light are discussed, including statistical studies on the optic nerve of Limulus, electrophysiological studies of subliminal responses in visual cells of Limulus, studies of irregular discrete waves noted by Yeandle in dark-adapted visual cells of Limulus, studies showing the dual nature of responses to dim lights, studies of the latency distribution of discrete waves, and studies of the summation of discrete waves. A.B.K.

A73-23309 **Interpretation of generator potentials.** J. Z. Levinson (Maryland, University, College Park, Md.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag,

1972, p. 339-356. 43 refs.

Results of investigations of the light-evoked changes in the potential difference between the inside and outside of cells in Limulus ommatidia. A multistage model of the generator potential in which the latter is a continuous function of time is described, as well as a statistical model in which the potential is the result of discrete, quantal events. A study is made of generator potential 'bumps,' a new, n-compartment model of a 'bumpy' generator potential is described, and the results of experimental tests of the new model are cited. A.B.K.

A73-23310 **Optical properties of the compound eye.** C. G. Bernhard, G. Gemne (Kungl. Karolinska Institutet, Stockholm, Sweden), and G. Seitz (Erlangen-Nürnberg, Universität, Erlangen, West Germany). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 357-379. 140 refs.

Review of studies of the dioptric apparatus of the arthropod compound eye. The basic optical characteristics of the apposition eye are described with special reference to that of the fly. The structures which subserve the analysis of polarized light in flies, crayfish, and crabs are discussed. The theory of light transmission in the superposition eye of fireflies is outlined and is followed by a discussion of waveguide transmission and longitudinal pupil in the superposition eye of night moths. Finally, selective transmission due to the influence of various microcomponents is treated with reference to observations made on butterflies, moths, and horseflies. A.B.K.

A73-23311 **Inhibitory interaction in the retina of Limulus.** H. K. Hartline and F. Ratliff (Rockefeller University, New York, N.Y.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 381-447. 96 refs. NSF Grant No. GB-6540; Grants No. NIH-EY-188; No. NIH-GM-1789.

Review of the state of knowledge regarding inhibitory interaction in the retina of Limulus. The relevant anatomical and histological features of the compound eye and its retina are briefly summarized, and experimental methods used in physiological studies of the Limulus eye are described. Following a review of receptor properties, an outline is given of the basic properties of the lateral inhibition, and a detailed study is made of the quantitative experimental and theoretical features of the interaction under steady conditions of retinal illumination. The work that has been done on cellular mechanisms operating in the Limulus retina is then reviewed, with emphasis on inhibitory processes. The dynamic properties of the inhibitory interaction are discussed, as well as some of the consequences of mutual inhibitory interaction in visual systems. A.B.K.

A73-23312 **Optical properties of vertebrate eyes.** G. Westheimer (California, University, Berkeley, Calif.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 449-482. 46 refs. Grant No. PHS-EY-00220.

Attempt to describe and measure the effectiveness of the eye's performance in terms of standards of physical theory. The parameters relevant to the image-forming properties of the simple eye are discussed. Calculations regarding the dioptrics of the eye are presented, as well as object-image calculations with a reduced eye. The geometrical structure of the entrance and exit pupil system is described. Other topics discussed include diffraction, aberrations, image quality, the determination of the modulation transfer function of eyes, and the specification of the image light distribution on the receiving layer of the retina for a given target configuration. A.B.K.

A73-23313 **Light-induced potential and resistance changes in vertebrate photoreceptors.** T. Tomita (Keio University, Tokyo, Japan; Yale University, New Haven, Conn.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 483-511. 66 refs. Research supported by the Ministry of Education of Japan and U.S. Air Force; Grants No. PHS-NB-06421; No. PHS-EY-00017.

Review of the development of research regarding the response to light of vertebrate photoreceptors. A study of potential changes in single carp cones is described which illustrates the technique of intracellular recording from small cells such as the vertebrate photoreceptors, as well as the technique of cell identification. Experiments in which single photoreceptor responses and changes in the resistance of single photoreceptors were measured in the mudpuppy and the nocturnal gecko are also described. It is shown that the vertebrate photoreceptors are hyperpolarized by light and that the hyperpolarization is accompanied by an increase in the membrane resistance. Evidence obtained from extrinsic-current experiments regarding the reason for the observed resistance change is cited. The relation between the receptor potential and the cornea-negative component, PIII, is discussed, and a comparison is made of the receptor potentials in vertebrates and invertebrates. It is shown that sodium ions are of vital importance in the generation of the vertebrate photoreceptor potential. A.B.K.

A73-23314 **S-potentials.** P. Gouras (National Institutes of Health, Laboratory of Vision Research, Bethesda, Md.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 513-529. 64 refs.

Review of the literature concerning the properties of S-potentials. The extraordinarily large size of the receptive field of S-potentials is noted. The relation between S-potentials and light energy is discussed, as well as their relations to light wavelength, cone potentials, ganglion cells, and vision. Some findings regarding the S-potentials of rods are presented. A.B.K.

A73-23315 **Receptive fields of retinal ganglion cells.** W. R. Levick (Australian National University, Canberra, Australia). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 531-566. 135 refs.

Review of the literature regarding the sensitivity of retinal ganglion cells to photic stimuli. Modifications of the receptive field concept are considered, including the observation of silent inhibitory surrounds, antagonistic surrounds, silent and inhibitory receptive fields, and a periphery effect. A comparative study is made of the functional types and behavior of ganglion cells in the frog, the cat, the monkey, the rabbit, and other species. The results of quantitative analyses of retinal ganglion cell function are cited, as well as the results of spatial and temporal analyses of retinal ganglion cell performance. A number of problems still posing difficulties are noted, such as the problem of off-responses, the question of the existence and effects of possible centrifugal efferents to the retina, the angular size of receptor fields, and the relation between structure and function in the retina. A.B.K.

A73-23316 **Retinal mechanisms of colour vision.** I. Abramov (Rockefeller University, New York, N.Y.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 567-607. 139 refs. NSF Grant No. GB-6540X; Grant No. PHS-NB-00864.

Study of the role played by various retinal mechanisms in determining the messages which pass along the optic nerve and allow an organism to distinguish colors. The spectral characteristics of the light transducers or visual receptors which set the primary limitations on color discrimination are discussed. It is shown that the three primary processes of normal color vision are based on three separate photolabile pigments. These pigments, found in the cones of the retina, are of the same general class of photopigments as rhodopsin, the rod pigment. Thus the limitation of color information to three channels is imposed as the very first stage of the visual system. A number of electrophysiological experiments are described which concern cone potentials, spectrally opponent and nonopponent responses, receptor connections, receptive fields, and neural responses and illustrate the ways in which the responses of the receptors are treated, analyzed, and transmitted by the later neural elements. A.B.K.

A73-23317 **Light and dark adaptation.** P. Gouras (National Institutes of Health, Laboratory of Vision Research, Bethesda, Md.). In: *Physiology of photoreceptor organs.* Berlin, Springer-Verlag, 1972, p. 609-634. 134 refs.

Review of the mechanisms by which living photoreceptor systems modify their behavior in response to light stimulation or darkness. The duplex theory of vision, based on the existence of two classes of photoreceptor cells (rods and cones), is reviewed. The responses of dark-adapted rods and cones are compared. It is shown that light-adaptation not only desensitizes but under suitable conditions also sensitizes rod vision. A parallelism between the slow return of rod sensitivity in the dark and the regeneration of rhodopsin is noted, and a study is made of the relation between the bleaching of rhodopsin and changes in rod sensitivity. The possibility that the same mechanisms produce rod desensitization in both light and darkness is considered. It is found that the desensitization of both cones and rods by light is not usually due to exhaustion of their photopigment. Some contradictory evidence regarding the recovery of cone sensitivity in darkness is cited. A.B.K.

A73-23318 **The electroretinogram, as analyzed by microelectrode studies.** T. Tomita (Keio University, Tokyo, Japan; Yale University, New Haven, Conn.). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 635-665. 96 refs. Research supported by the Ministry of Education of Japan and U.S. Air Force; Grants No. PHS-NB-06421; No. PHS-EY-00017.

Review of the knowledge acquired concerning the ERG components in vertebrates since the introduction of the microelectrode technique. The principles of ERG analysis with microelectrodes are summarized, and observations on the excised eye of the frog with a micropipette electrode are evaluated, as well as the results of in situ ERG analyses with penetrating microelectrodes on cat and monkey retinas. Investigations revealing the presence of two subcomponents of PIII in cold-blooded retinas are described in which one of the subcomponents is found to originate more distally than the rest of the ERG involving a large fraction of PIII. The distal fraction of PIII is believed to arise from the receptors, while the remaining large fraction originates from cells in the inner nuclear layer. Studies of the cellular origin and physiological significance of the ERG components are critically reviewed. A.B.K.

A73-23319 **Retinal metabolism in dark and light.** W. Sickel (Köln, Universität, Cologne, West Germany). In: Physiology of photoreceptor organs. Berlin, Springer-Verlag, 1972, p. 667-727. 229 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Results of studies of metabolic activity in the frog eye in dark and light. A brief description is given of the various reactions occurring in the retina during metabolic processes. The use of the perfused-retina technique and nondestructive analysis in examining retinal metabolism in frogs is discussed. Findings regarding the effects of light on photoreceptors and the results of tests of gross electrical response are presented, as well as the results of studies of environmental influences. Three types of metabolic measurements of the activities of the functioning retina are described - namely, radiorespirometry, polarographic determination of oxygen uptake, and spectrophotometric assay of pyridine nucleotides, each combined with electrical testing of function. The effects of light on retinal metabolism are discussed, noting three separate effects - namely, a spurt of oxygen uptake caused by a stimulating light flash, depression of metabolism during steady light, and extra oxygen uptake from regeneration after bleaching. A.B.K.

A73-23380 * **Coronary flow and left ventricular function during environmental stress.** H. H. Erickson, J. D. Adams (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), H. L. Stone (USAF, School of Aerospace Medicine, Brooks AFB; Texas, University, Galveston, Tex.), and H. Sandler (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; NASA, Ames Research Center, Moffett Field, Calif.). In: International Telemetering Conference, Los Angeles, Calif., October 10-12, 1972, *Proceedings.* Woodland Hills, Calif., International Foundation for Telemetering, 1972, p. 206-213. 8 refs. NASA-supported research. NASA Order A-94544.

A canine model was used to study the effects of different environmental stresses on the heart and coronary circulation. The heart was surgically instrumented to measure coronary blood flow, left ventricular pressure, and other cardiovascular variables. Coronary flow was recorded by telemetry. Physiologic data were processed and analyzed by analog and digital computers. By these methods the physiologic response to altitude hypoxia, carbon monoxide, hypercapnia, acceleration, exercise, and the interaction of altitude hypoxia and carbon monoxide were described. The effects of some of these stresses on the heart and coronary circulation are discussed. (Author)

A73-23381 * **A narrowband, crystal controlled biomedical telemetry system.** R. M. Westbrook and T. B. Fryer (NASA, Ames Research Center, Moffett Field, Calif.). In: International Telemetering Conference, Los Angeles, Calif., October 10-12, 1972, Proceedings. Woodland Hills, Calif., International Foundation for Telemetering, 1972, p. 214-220. 7 refs.

A miniature, single-channel, crystal-controlled transmitter has been developed for biomedical applications. A narrow-band frequency modulation (plus or minus 7 kHz) of the RF is used to achieve maximum operating range with minimum transmitting power. The radiated power is limited to stay within the 50 microvolts/m at 15 m FCC requirement for low-power transmitters in the 88- to 108-MHz band. This technique offers a number of advantages. First only manufacturer's type approval is required for the device and the user does not need a license. Second maximum operating range can be achieved within the FCC power limitations by using a narrow-band that is consistent with the required medical information bandwidth. A third advantage in using the 88- to 108-MHz band is that the commercial FM stations are relatively widely spaced and carefully regulated so that by selecting the transmitter's frequency in the guard band between stations, minimum interference from other transmitter sources is encountered. (Author)

A73-23469 * **A possible step in the origin of the genetic code.** L. E. Orgel (Salk Institute for Biological Studies, San Diego, Calif.). *Israel Journal of Chemistry,* vol. 10, 1972, p. 287-292. 8 refs. Grant No. NGR-05-067-001.

It is suggested that the earliest coding polynucleotides contained a high proportion of alternating sequences of purines and pyrimidines, and that these sequences coded for polypeptides in which hydrophobic and hydrophylic amino acids alternated. Structural properties of such alternating polypeptides are discussed. (Author)

A73-23562 ***Habitable atmospheres which do not support* combustion.** C. Huggett (Atlantic Research Corp., Alexandria, Va.). *Combustion and Flame,* vol. 20, Feb. 1973, p. 140-142. 8 refs.

Discussion of the possibility of ensuring fire safety in inhabited spacecraft, submarine or other hermetic compartments through use of fire-suppressant atmospheres in which humans can live and perform their normal functions for extended periods of time. As diluents for air or oxygen-helium mixtures, completely fluorinated carbon compounds of low molecular weight, such as carbon tetrafluoride, are shown, in the light of some preliminary experimental research results, to offer considerable promise of making possible hermetic-chamber atmospheres that are fit for prolonged habitation and can quench combustion without impairment of human faculties or permanent harm. M.V.E.

A73-23572 **Thermoregulatory behavior of man during rest and exercise.** A. Bleichert, K. Behling, M. Scarperi, and S. Scarperi (Hamburg, Universität, Hamburg, West Germany). *Pflügers Archiv,* vol. 338, no. 4, 1973, p. 303-312. 17 refs.

The thermoregulatory behavior of two highly trained racing cyclists and of five untrained male subjects was investigated. The subjects were totally immersed in a water bath. They could regulate the water temperature according to their sensation of thermal comfort. At rest, in the state of thermal comfort, no thermoregulatory events - as sweating - could be observed. During exercise, esophageal temperature rises and consequently the subjects lower the water temperature. The resulting skin and deep-body temperatures caused an increase in sweat rate and heat conductance. Thus, during exercise, thermoregulatory responses increase as a function of oxygen uptake although the subjects are at thermal comfort. The different function of the two systems regulating sweat rate and thermoregulatory behavior respectively may arise from different weighting factors of skin and deep-body temperature as input variables to both systems. (Author)

A73-23648 **60-Hz interference in electrocardiography.** J. C. Huhta and J. G. Webster (Wisconsin, University, Madison, Wis.). *IEEE Transactions on Biomedical Engineering,* vol. BME-20, Mar. 1973, p. 91-101. 20 refs.

The many possible kinds of interference that can enter and affect EKG recordings are identified, defined, and quantitatively described, and means for eliminating such interferences are also presented. It is shown that interference in EKG recordings is not a necessary evil or recurring nuisance that must be tolerated. By employing an organized approach to the problem, it is possible effectively to eliminate the causes of interference without resort to any drastic remedies, such as changing recording sites or installing expensive shielding. M.V.E.

A73-23649 * **An IC piezoresistive pressure sensor for biomedical instrumentation.** Mr. Samaun (Bandung Institute of Technology, Bandung, Indonesia), K. D. Wise, and J. B. Angell (Stanford University, Stanford, Calif.). *IEEE Transactions on Biomedical Engineering,* vol. BME-20, Mar. 1973, p. 101-109. 13 refs. Grant No. NGR-05-020-401.

A73-23650 **Caloric vestibular stimulation via UHF-microwave irradiation.** R. M. Lebovitz (Texas, University, Dallas, Tex.). *IEEE Transactions on Biomedical Engineering,* vol. BME-20, Mar. 1973, p. 119-126. 27 refs.

Reports of behavioral and electrophysiological changes in response to low-level UHF-microwave irradiation are not easily reconciled with known biophysical mechanisms. Effects at incident power densities on the order of 10 mW/sq cm or less would imply either enhanced sensitivity of the nervous system to induced thermal loads or the existence of stronger nonthermal modes of interaction than hitherto proposed. In this paper, a hypothesis is developed that accounts for a class of such reportedly nonthermal effects. It is proposed that absorbed electromagnetic (EM) radiation yields thermal gradients within the semicircular canals of the labyrinth. The intravestibular convective torque induced thereby would mimic natural vestibular simulation. (Author)

A73-23676 # **Influence of histamine on cutaneous capillary circulation and on the oxygen tension of subcutaneous cellular tissue in various age periods (Vliianie gistamina na kozhnoe kapilliarnoe krovoobrashchenie i napriazhenie kisloroda v podkozhnoi kletchatke v razlichnye vozrastnye periody).** O. V. Korhushko, L. A. Ivanov, and K. G. Sarkisov (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Nov. 1972, p. 3-5. 12 refs. In Russian.

A73-23677 # **Features of supraspinal control of the reflex paths of the spinal cord during walking (Osobennosti supraspinal'nogo kontrolia reflektornykh putei spinnogo mozga vo vremia khod'by).** V. V. Lisin, M. B. Rekhtman, and S. I. Frankshtein (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Nov. 1972, p. 6-9. 10 refs. In Russian.

A73-23678 # **Correlation analysis of the bioelectrical activity of the brain during mental work (Korreliatsionnyi analiz bioelektricheskoi aktivnosti golovnogo mozga v protsesse umstvennoi deiatel'nosti).** S. S. Gofman (Institut Narodnogo Khoziaistva, Sverdlovsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Nov. 1972, p. 9-11. 11 refs. In Russian.

Analysis of biotelemetric EEG records obtained with healthy male and female subjects under conditions of normal intellectual pursuits (truck dispatchers, undergraduate students hearing lectures, and students undergoing examinations). Results indicate increased cross-correlation of biopotentials and intensified periodicity of processes in functionally participating regions of the cerebral hemispheres (particularly the speech motor center of the left hemisphere and the symmetrical area of the right hemisphere). It is concluded that speech mechanisms are involved in both hemispheres. T.M.

A73-23679 # **Organic and species-related differences in the action of certain hydrazine derivatives and of aminoperhydroacridine on the oxidative deamination of serotonin (Organnye i vidovye razlichiia v deistvii nekotorykh proizvodnykh gidrazina i aminopergidroakridina na okislitel'noe dezaminirovanie serotonina).** Z. P. Gureeva (Novokuznetskii Nauchno-Issledovatel'skii Khimiko-Farmatsevticheskii Institut, Novokuznetsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Nov. 1972, p. 36-39. 6 refs. In Russian.

A73-23680 # **Influence of rare-earth metal dust containing radioactive components on the development of reticulosarcoma of the lungs (Vliianie pylei redkozemel'nykh metallov, soderzhashchikh radioaktivnyi komponent, na vozniknovenie retikulosarkom legkikh).** Iu. P. Likhachev, P. P. Liarskii, and L. T. Elovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Nov. 1972, p. 78-81. 18 refs. In Russian.

A73-23681 # **Effect of light deprivation on the metabolic reaction development in retinal ganglion cells (Vliianie svetovoi deprivatsii na formirovanie metabolicheskoi reaktsii ganglioznykh kletok setchatki).** E. I. Sankova and A. M. Aref'eva (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Nov. 1972, p. 105-108. 19 refs. In Russian.

Investigation of the importance of sensory stimulation for the development and normal functioning of nerve tissues in ganglion neurons of the retina in BALB mice. The results obtained include the finding that a reduction in the dry cell weight and an alteration in the metabolic reaction of the retinal ganglion cells take place in mice kept in darkness from birth to the age of two months. M.V.E.

A73-23684 # **Problems of detecting and measuring psychic stress (Probleme der Erfassung und Messung der psychischen Beanspruchung).** M. Söll (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 8, no. 9, 1972, p. 435-442. In German.

Introduction to the problem of stress evaluation, and suggestion of possible methods of quantifying stress in actual practice. An attempt is made to obtain a definition of psychic stress which includes the various aspects of the stress phenomenon. A study is made of the consequences of psychic stress, such as psychic fatigue or so-called 'psychic saturation' resulting from the performance of monotonous tasks. The possibility of measuring psychic stress is considered, and five possible approaches to detecting and quantifying psychic stress are outlined, none of which is perfectly reliable or entirely applicable. A.B.K.

A73-23687 # **Problems of the interior design of passenger cabins (Probleme der Innengestaltung von Fluggastkabinen).** O.

Trunov (Staatliches wissenschaftliches Forschungsinstitut der zivilen Luftfahrt, USSR). *(Grazhdanskaia Aviatsiia,* no. 5, 1972, p. 28, 29.) *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 8, no. 9, 1972, p. 467-469. In German. (Translation).

Consideration of the factors contributing to the creation of a reassuring atmosphere for the occupants of commercial airliner passenger cabins. Among the factors cited are the seating accommodations, the choice of materials used in the cabin architecture and fittings, the color combinations employed, and the illumination provided. The need to reconcile desirable features with ease of maintenance is noted. A.B.K.

A73-23760 # **Determination of iodo amino acids in plasma by gel chromatography (Bestimmung der Jodaminosäuren im Plasma durch Gelchromatographie).** D. Gehring, G. Hoffmann, and H. Kempe (Medizinische Universitäts-Klinik, Freiburg im Breisgau, West Germany). *Radiobiologia - Radiotherapia,* vol. 14, no. 1, 1973, p. 53-59. 7 refs. In German.

Review of the theory and practice of gel-chromatographic separation of triiodothyronine and thyroxine, using Sephadex G-15. The separation results for different conditions of the thyroid function are discussed in terms of thyroid-hormone incretion kinetics. A method of gel-chromatographic determination of iodo amino acids using Sephadex LH-20 is also described. Both methods are simple to use and yield consistently reproducible results. M.V.E.

A73-23772 # **Examination of responses evoked in the sensory cortex by thalamic stimulation.** Y. Matsuda, K. Sasaki (Kyoto University, Kyoto, Japan), and N. Mizuno (Hiroshima University, Hiroshima, Japan). *Japanese Journal of Physiology,* vol. 22, Dec. 1972, p. 651-666. 20 refs.

The occurrence of augmenting and recruiting responses in the sensory cortices of anesthetized cats was examined according to the interpretation of the responses proposed by Sasaki et al. (1970). The absence of superficial thalamocortical (T-C) responses in the form of recruiting responses as well as a component of augmenting responses in the sensory cortices suggests that there is little or no thalamocortical projection system for the superficial T-C response ending in these cortices. F.R.L.

A73-23801 # **Oxygen consumption and its 'critical' tension for the cerebral cortex in situ (Potreblenie kisloroda i ego 'kriticheskoe' napriazhenie dlia kory golovnogo mozga in situ).** K. P. Ivanov and M. K. Kalinina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1469-1475. 15 refs. In Russian.

Investigation of oxygen consumption of the cerebral cortex in nonanesthetized rats breathing air and gas mixtures (containing 6.5 or 6-5.8% oxygen in nitrogen). The oxygen consumption of the cerebral cortex was found to be characterized by a significant independence of the oxygen tension in the blood. Volumetric increases in blood flow seem to be the main compensatory reaction to hypoxemia. M.V.E.

A73-23802 # **Statistical investigation of the impulse activity of neurons in various hypothalamic regions (Statisticheskoe issledovanie impul'snoi aktivnosti neironov razlichnykh otdelov gipotalamusa).** V. M. Klimenko and A. S. Kaplunovskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1484-1493. 30 refs. In Russian.

Quantitative study of the spontaneous impulse activity characteristics of 391 hypothalamic neurons in rabbits. There is shown to exist a considerable diversity in the neuronal activity of the various hypothalamic regions in terms of average neuron impulse frequencies. The organizational interrelation of this neuronal activity of the various hypothalamic regions is discussed. M.V.E.

A73-23803 # **Thermosensitive interoreceptors and their interaction with thermosensitive structures of the hypothalamus (O termochuvstvitel'nykh interoretseptorakh i ikh vzaimodeistvii s termochuvstvitel'nymi strukturami gipotalamusa).** N. A. Slepchuk and K. P. Ivanov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1494-1498. 23 refs. In Russian.

A73-23804 # **Role of the medial area of the medulla oblongata in the rhythmical activity of respiratory-center neurons (Rol' medial'noi zony prodolgovatogo mozga v ritmicheskoi deiatel'nosti neironov dykhatel'nogo tsentra).** R. Sh. Gabdrakhmanov (Akademiia Meditsinskikh Nauk SSSR, Kuibyshev, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1514-1519. 12 refs. In Russian.

A73-23805 # **Cerebral temperature oscillations and vascular responses in man (Kolebaniia temperatury mozga i sosudistye reaktsii u cheloveka).** A. I. Eremiagin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1520-1526. 15 refs. In Russian.

Cerebral temperature oscillations in man associated with wrist skin temperature variations are determined. The onset of vascular thermoregulation responses is observed at certain intercranial and skin temperature values. Within the thermoregulation system in man, the activation of the control signal appears to depend on a specific central-peripheral thermoreception correlation. M.V.E.

A73-23806 # **Heart activity characteristics in a human operator during a control process (Ob osobennostiakh serdechnoi deiatel'nosti cheloveka-operatora v protsesse upravleniia).** A. M. Zingerman (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1527-1534. 16 refs. In Russian.

Analysis of the EKG dynamics in a human operator during the sensomotor process of a moving-object tracking task. The analysis revealed two kinds of heart responses: intensive sympathetic-type reactions and weak parasympathetic-type ones. Both kinds of responses were representative of the stable heart activity characteristics of each individual under study and correlated meaningfully with the qualitative indices of the tracking task performance. M.V.E.

A73-23807 # **Study of the peripheral auditory adaptation in a psycho-acoustic experiment (Issledovanie perifericheskoi slukhovoi adaptatsii v psikhoakusticheskom eksperimente).** L. A. Chistovich, V. A. Kozhevnikov, and L. V. Lesogor (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1543-1547. 21 refs. In Russian.

Description of the techniques used in a psycho-acoustic experiment satisfying the requirements of peripheral auditory-adaptation measurement. The testing-stimulus detection threshold is investigated as a function of the masking sound duration. The results indicate that two distinct components characterize the adaptation effect: a fast component and a slow one. Their peculiarities and implications are discussed. M.V.E.

A73-23808 # **Functional model of the frequency channel of the peripheral auditory analysor (Funktsional'naia model' chastotnogo kanala perifericheskogo slukhovogo analizatora).** L. A. Chistovich, I. A. Chistovich, L. V. Lesogor, and M. P. Granstrem (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1548-1557. 21 refs. In Russian.

Description of a functional model of the frequency channel of the peripheral auditory system. The model includes a linear filter, an element with a nonlinear amplitude characteristic, a half-wave detector, and an automatic gain control unit. Using experimental data on residual masking, the structure of the gain control unit and the model parameters are determined. M.V.E.

A73-23809 # **Changes in gaseous metabolism and cardiac output per minute during local muscle work in man (Izmeneniia**

gazoobmena i minutnogo ob'ema serdtsa pri lokal'noi myshechnoi rabote u cheloveka). K. M. Smirnov, L. V. Shvaikova, and I. M. Popov (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR; Akademiia Nauk SSSR, Institut Fizicheskoi Kul'tury, Smolensk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1617-1621. 20 refs. In Russian.

Investigation of local muscle work effects in healthy young men. Quick hand tapping by the subjects was observed to result in cardiac output reduction and a rise in peripheral vascular resistance. The data obtained suggest that slow rhythmical light weight lifting by hand decreases the metabolic rate in inactive muscles and in other parts of the body when there has been a high gaseous metabolism level prior to work start. M.V.E.

A73-23810 # Possibility of modeling the relationship between the intracellular potential of individual muscle fibers and the overall electromyogram for tonic muscles (Vozmozhnost' modelirovaniia zavisimosti mezhdu vnutrikletochnym potentsialom otdel'nykh myshechnykh volokom i summarnoi elektromiogrammoi dlia tonicheskikh myshts). V. M. El'iasberg and A. A. Karlov. *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1629-1632. 7 refs. In Russian.

A73-23811 # Plotting of poststimulus histograms by means of the 'Neuron-1' analyzer (O postroenii poststimul'nykh gistogramm na analizatore 'Neiron-1'). K. N. Dudkin and L. V. Shperl (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1636-1638. In Russian.

Description of an improved technique for using the 'Neuron-1' analyzer in plotting poststimulus histograms that provide the possibility to determine neuron excitation probabilities as a function of time following stimulus onset. A specific example of an obtained histogram is presented for illustration. M.V.E.

A73-23812 # Device for analyzing the electrical activity of nerve fibers in intact nerves (Analizator elektricheskoi aktivnosti nervnykh volokon intaktnogo nerva). V. I. Skok, V. S. Savchuk, and I. N. Remizov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Oct. 1972, p. 1638-1641. 10 refs. In Russian.

Description of a recently developed instrument for analyzing the natural electric pulses delivered to nerve fibers. The merits of the instrument and analytical technique involved are evaluated in relation to previous procedures, and the practical use of the instrument is illustrated by a specific example. M.V.E.

A73-23819 # Poisoning by hydrazine derivatives (Otravleniia gidrazinoproizvodnymi). N. A. Bogdanov. *Voenno-Meditsinskii Zhurnal,* Nov. 1972, p. 46-49. 19 refs. In Russian.

Survey of literature on the symptoms and mechanisms of poisoning by hydrazine derivatives used in industrial processes and as drugs in clinical medicine. The causes of vitamin B6 deficiency in different forms of poisoning are discussed, and recommendations for treatment stress the complex nature of poisoning cases produced by different compounds. T.M.

A73-23820 # Changes in the cardiac rhythm during a hypoxic functional test (Ob izmeneniiakh ritma serdtsa pri gipoksicheskoi funktsional'noi probe). V. B. Malkin and V. I. Plakhatniuk. *Voenno-Meditsinskii Zhurnal,* Nov. 1972, p. 66-69. In Russian.

Observations of several thousand healthy subjects and subjects exhibiting deviations in the regulation of the cardiovascular system yielded information characterizing different forms of cardiac-rhythm disturbances under conditions of moderate hypoxia during exposure to chamber-simulated altitudes of 5000 m above sea level. Two specific groups considered include: (1) subjects ordinarily exhibiting cardiac-rhythm disturbances which completely or partially disappeared during hypoxia, and (2) apparently normal subjects in which hypoxia produced disturbances of the cardiac rhythm. T.M.

A73-23821 # The role of vestibulometry in medical evaluation of flight personnel (Znachenie vestibulometrii v praktike vrachebnoi ekspertizy letnogo sostava). S. R. Raskatova. *Voenno-Meditsinskii Zhurnal,* Nov. 1972, p. 69-71. In Russian.

Vestibulometric tests involving exposure to linear and Coriolis accelerations were conducted with a control group of healthy subjects and with subjects exhibiting an astheno-neurotic state, hypertensive neurocirculatory dystonia, and cardial asthenia. A discussion of the observed symptoms indicates that EKG recordings and hemodynamic measurements should be employed to detect latent forms of vestibular instability and to determine functional disturbances due to cardiovascular and vegetative nervous systems. T.M.

A73-23838 # Visual acuity as a function of exposure duration. W. S. Baron and G. Westheimer (California, University, Berkeley, Calif.). *Optical Society of America, Journal,* vol. 63, Feb. 1973, p. 212-219. 21 refs. Grant No. PHS-EY-00220.

Changes of visual acuity with exposure durations shorter than the critical duration for detection can be attributed to simple light summation; however, changes of visual acuity with longer exposure durations must be otherwise accounted for. This paper shows changes of photopic acuity with prolonged exposure durations, and considers several possible underlying mechanisms. The acuity threshold was found to decrease with exposure durations up to 400 ms and possibly longer. Thus, pupillary and accommodative fluctuations were investigated, as mechanisms concerned, but were found not to have an effect on the phenomenon. A task-specific summation period was sought; however, no evidence for such was found. Also, similar results were found whether the presentation consisted of a single uniform exposure or two discrete exposures with some interval between. (Author)

A73-23841 Immediate hemodynamic effects of cardiac angiography in man. K. E. Hammermeister (U.S. Public Health Service Hospital, Baltimore, Md.) and J. R. Warbasse (U.S. Veterans Administration Hospital, Denver, Colo.). *American Journal of Cardiology,* vol. 31, Mar. 1973, p. 307-314. 20 refs. Research supported by the U.S. Veterans Administration; Grants No. PHS-A-69-10-68; No. PHS-AY-70-17069.

Investigation of the changes in human circulatory physiology occurring after intracardiac injection of angiographic contrast material during the period of left ventricular opacification. The results of the study indicate that only minimal changes occur during left ventricular opacification. Major changes occur later, at approximately the time the contrast agent reaches the peripheral circulation. M.V.E.

A73-23842 Isometric effects on treadmill exercise response in healthy young men. D. H. Jackson, T. J. Reeves, L. T. Sheffield, and J. Burdeshaw (Alabama, University; U.S. Veterans Administration Hospital, Birmingham, Ala.). *American Journal of Cardiology,* vol. 31, Mar. 1973, p. 344-350. 9 refs. Research supported by the Alabama Heart Association; Grant No. PHS-HE-11310.

Evaluation of the hypothesis that the isometric stress of load carrying augments the dynamic exercise response seen on the treadmill, and estimation of the magnitude of this effect on heart rate and blood pressure for several methods of carrying the same load. The effects of isometric and dynamic exercise combined were greater than those of dynamic exercise alone. An effective technique of load distribution reduced the rate of increase in blood pressure, heart rate, and the peak attained during dynamic exercise, thereby suggesting a lower level of myocardial oxygen consumption for a given weight-carrying task. (Author)

A73-23843 Alternative mechanisms of apparent supernormal atrioventricular conduction. J. J. Gallagher, A. N. Damato, P. J. Varghese, A. R. Caracta, M. E. Josephson, and S. H. Lau (U.S. Public Health Service Hospital, Staten Island, N.Y.). *American*

Journal of Cardiology, vol. 31, Mar. 1973, p. 362-371. 50 refs. Grants No. NIH-HE-11829; No. NIH-HE-12536; No. PHS-PY-72-1.

The study discussed utilizes recordings of the specialized conducting tissues and programmed premature atrial stimulation in man. The investigation provides further electrophysiologic explanations for clinical examples of apparent supernormal conduction, based on the conduction characteristics of the atrioventricular nodal and His-Purkinje system. The results of the study are discussed, giving attention to supernormality mimicked by reentrant phenomena, the facilitation of conduction by ectopic beats, and the supernormality of intraventricular conduction. G.R.

A73-23849 # **An electrocardiograph amplifier which satisfies the stringent requirements of long-term monitoring of cardiac activity (Zesilovac pro kardiomonitor, splnujici vysoke pozadavky dlouhodobeho sledovani srdecni cinnosti).** Z. Hyza and J. Lexa (Institut Klinicke a Experimentalni Mediciny, Prague, Czechoslovakia). *Slaboproudy Obzor,* vol.34, Feb. 1973, p. 62-69. In Czech.

Consideration of a possible solution to the problem of designing a high-quality electrocardiograph amplifier. The basic technical parameters of the amplifier are determined on the basis of an analysis of the properties of the signal source with allowance for various possibilities of occurrence of noise signals. On the basis of generally valid relations applied to a signal source of given properties, the mean values of the individual parameters of the amplifier are determined which must be achieved if the amplifier is to satisfy all the stated requirements for long-term recording of the biopotentials of the heart muscle by an EKG monitor. A description is given of an amplifier constructed with the aid of monolithic operational amplifiers which attains various values established by prior analysis. A.B.K.

A73-23937 # **The influence of change in the functional state of the central nervous system on the course of asphyxia (Vpliv zminenogo funktsional'nogo stanu tsentral'noi nervovoi sistemi na perebig asfiksii).** T. M. Slobodianiuk (Vinnits'kii Medichnii Institut, Vinnitsa, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 26-32. 18 refs. In Ukrainian.

The effect of phenamine- and aminazine-induced change of the initial functional state of the central nervous system was studied in rabbits subjected to prolonged asphyxia caused by closed-space air breathing. Simultaneously recorded respiration, arterial-pressure, and cerebral electrical-activity data show that phenamine intensifies, whereas aminazine inhibits somewhat the progress of asphyxia. The ultimate functional breakdown is nearly the same in both control and experimental animals. M.V.E.

A73-23938 # **Effect of respiration stabilization on hemodynamic reactions during acute hypoxic hypoxia (Pro vpliv stabilizatsii dikhannia na gemodinamichni reaktsii pri gostrii gipoksichnii gipoksii).** S. A. Bershtein (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 33-38. 13 refs. In Ukrainian.

A73-23939 # **Age-related characteristics of pulmonary edema development during acute hypoxic hypoxia (Vikovi oseblivosti rozvitku nabriaku legen' v umovakh gostroi gipoksichnoi gipoksii).** M. M. Seredenko and M. G. Shuta (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 39-44. 49 refs. In Ukrainian.

A73-23940 # **Effect of electrostimulation on hemodynamic shifts during prolonged hypokinesia (Vpliv elektrostimuliatsii m'iaziv na gemodinamichni zrushennia pri trivalii gipokinezii).** M. I. Gurevich and E. O. Dukhin (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 45-51. 38 refs. In Ukrainian.

Using rheography and arterial-oscillography methods, hemodynamic shifts were investigated in subjects subjected to muscle electrostimulation during variously conditioned and prolonged states of hypokinesia. It is shown that the most typical hypokinesia-induced hemodynamic shifts are a reduction in the systolic blood volume and an increase in heartbeat rate. Muscle electrostimulation attenuates the unfavorable effect of prolonged hypokinesia on the cardiovascular system. M.V.E.

A73-23941 # **Modeling of water metabolism in the organism (Modeliuvannia obminu vodi v organizmi).** B. E. Esipenko (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR) and V. P. Soloviov (Akademiia Nauk Ukrains'koi RSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 58-62. 13 refs. In Ukrainian.

A mathematical model of the water-salt homeostasis of the organism is presented on the basis of experimental data. The simplified qualitative analysis made possible by the proposed model is shown to provide a meaningful mathematical interpretation for many experimental data and to lead to certain hypotheses on the water-salt metabolism of the organism during its adaptation to prolonged specific influences. M.V.E.

A73-23942 # **Origin of the external electric field detected near animals and men (Do pitannia pro pokhodzhennia zovnishn'ogo elektrichnogo polia, shcho reestruet'sia poblizu tvarin i liudini).** U. S. Valeev, O. S. Osennii, Iu. V. Tornuev, and D. F. Rakitians'kii (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 99-104. 6 refs. In Ukrainian.

Using a described technique for detecting the external electric fields of biological objects, it is found that the external electric fields vary in men and animals with heart and lung activity. The obtained results suggest that the external electric field is not directly related to the bioelectric processes of the organism. M.V.E.

A73-23943 # **Role of nerve structures in the action of low-frequency sinusoidally modulated currents on synovial membrane permeability in the knee joint (Rol' nervovikh struktur u proiavi dii niz'kochastotnikh sinusoidal'no-modul'ovanikh strumiv na proniknist' sinovial'noi obolonki kolinnogo sugloba).** V. R. Faitel'berg-Blank and Iu. O. Perevoshchikov (Odes'kii Sil's'kogospodars'kii Institut, Odessa, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 19, Jan.-Feb. 1973, p. 112-116. 12 refs. In Ukrainian.

A73-23945 **The physiology of the cerebral circulation.** M. J. Purves (Bristol, University, Bristol, England). Cambridge and New York, Cambridge University Press (Monographs of the Physiological Society, No. 28), 1972. 433 p. 1200 refs. $26.

The anatomy of cerebral blood vessels is considered, giving attention to collateral circulations, the fine structure of cerebral vessels, and structures imposed between cerebral vessels and neurones. Questions of capillary density and oxygen transport in the brain are discussed together with the innervation of cerebral blood vessels, haemodynamic considerations, the cerebral circulation, cerebral blood flow and arterial pressure, and aspects of the regulation of cerebral vessels by carbon dioxide. Other subjects investigated include the regulation of pH in the brain, the neural control of cerebral blood vessels, the regulation of cerebral vessels by oxygen, questions of cerebral blood flow and metabolism, and the pharmacology of the cerebral vascular smooth muscle. G.R.

A73-24326 # **Role of the hippocampus in the integrating activity of the brain (O roli gippokampa v integrativnoi deiatel'nosti mozga).** P. V. Simonov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1119-1124. 23 refs. In Russian.

Studies concerning the contribution of the hippocampus to conditioned reflexes, memory, voluntary motions, orientation, and emotional reactions are reviewed. Special attention is given to the

theta-rhythm which is a prominent characteristic of responses of the hippocampus to various stimuli. The important role of the hippocampus in the competitive conditioned-reflex activity is indicated. V.Z.

A73-24327 # Neurochemical aspects of the formation of electrographical and behavioral reactions (Neirokhimicheskie aspekty formirovaniia elektrograficheskikh i povedencheskikh reaktsii). R. Iu. Il'iuchenok and G. V. Abuladze (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1133-1141. 26 refs. In Russian.

Discussion of the participation of adrenoreactive, cholinoreactive and serotoninoreactive structures in the activities of the reticulocortical, hypothalamocortical and specific sensor systems. The distribution of various chemoreactive structures in specific and nonspecific cortical neuron systems is discussed on the basis of an analysis of evoked and spontaneous electrical activities of cerebral neurons. The contribution of cholinergic nerve fibers to the formation and reconstruction of memory traces is studied after single and multiple learning sessions with negative and positive emotional stimuli. The important role of serotonin in the mechanism of learning is noted. V.Z.

A73-24328 # Electromyographic alterations in articular muscles during emotional shifts (Elektromiograficheskie izmeneniia artikuliatsionnykh myshts pri emotsional'nykh sdvigakh). G. Iu. Volynkina, Sh. M. Zamakhover, and A. N. Timofeeva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1187-1196. 26 refs. In Russian.

Description of a specific electromyographic effect which incorporates aftereffects, relaxation, and summation of complex responses of articular muscles to functional stresses and is absent on electromyograms of other muscles. This effect appears on electromyograms of articular muscles recorded after emotional stresses and can be used in a study of the emotional state of man. An analysis of clinical and pharmacological test results shows that the effect can also indicate certain changes in the functional state of some structures of the prosencephalon and the limbic cortex. V.Z.

A73-24329 # Spatial analysis in monkeys of various ages after extirpation of the parietal areas of the cerebral cortex (Prostranstvennyi analiz u obez'ian raznogo vozrasta posle ekstirpatsii temennykh oblastei kory golovnogo mozga). E. N. Nuritdinov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR; Tadzhikskii Gosudarstvennyi Universitet, Dyushambe, Tadzhik SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1219-1225. 16 refs. In Russian.

A73-24330 # Functional characteristics of the hippocampus in lower monkeys (Funktsional'naia kharakteristika gippokampa nizshikh obez'ian). T. G. Urmancheeva (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1234-1241. 34 refs. In Russian.

The electrical activity of the hippocampus was studied in chronic experiments on waking rhesus and baboon monkeys which received sinusoidal stimuli of 200 Hz from an acoustic oscillator at numerous points in the hippocampus, neocortex, striopallidum nuclei, optic thalamus, and brain stem. Prominent in the responses to stimulation were the desynchronized biopotentials in the neocortex and subcortical stem structures, the behavioral reactions of orientation, and the convulsive activity. A comparison of these observations with available studies suggests that a number of functional characteristics of the hippocampus in monkeys are closer to those in man than in other animals. V.Z.

A73-24331 # Independence of the recognition of an object's orientation and position in the field of vision (O nezavisimosti opoznaniia orientatsii ob'ekta i ego mestopolozheniia v pole zreniia). L. I. Leushina and M. B. Pavlovskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1284-1288. 10 refs. In Russian.

A73-24332 # Transcommisural interaction of monocular systems (O transkomissural'nom vzaimodeistvii monokuliarnykh sistem). V. L. Bianki and L. A. Moiseeva (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1289-1297. 35 refs. In Russian.

Evoked biopotentials were measured in 148 anesthetized albino rats in a study of the binocular interactions in the symmetry centers of the cortex and corpus geniculatum laterale when the corpus callosum, and the commisurae of the anterior corpus bigeminum and median thalamus, were severed. A comparison with control rats indicated the active role of the corpus callosum in the mechanism of transcommisural interactions of monocular systems. V.Z.

A73-24333 # Binaural interaction during acoustic-stimulus after-perception (Binaural'noe vzaimodeistvie na sledakh zvukovogo razdrazhitelia). V. M. Kamenkovich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1298-1302. 9 refs. In Russian.

Noncoincident sequences of white noise pulses of different length were continuously delivered through a two-channel stimulator, an attenuator and independent headphones into the auditary systems of both ears of 10 subjects in 50 soundproof chamber experiments. The subjects were to determine whether they perceived the occurrence of sound in their heads or in one of their ears when acoustic stimulation events were simultaneous in both ears. Statistical analysis of the perception data showed the occurrence of binaural interactions when the stimuli received in one ear were coincident with periods of after-perception in the other ear. V.Z.

A73-24334 # Functional state of the cerebral cortex and of the mesencephalic reticular formation during prolonged action of impulsive and stable noise (Funktsional'noe sostoianie kory bol'shikh polusharii i mezentsefalicheskoi retikuliarnoi formatsii pri dlitel'nom vozdeistvii impul'snogo i stabil'nogo shuma). G. A. Suvorov (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Nov.-Dec. 1972, p. 1303-1310. 19 refs. In Russian.

A73-24419 # A method for studying the action of high-intensity electric fields on microorganisms (Un metodo per lo studio dell'azione dei campi elettrici di alta intensità sui microorganismi). U. Tiberio (Pisa, Università, Pisa, Italy). *Alta Frequenza,* vol. 41, Dec. 1972, p. 973-975. 8 refs. In Italian.

Description of a new method for obtaining purely electrical effects of inactivation of bacteriological suspensions through the use of a reflux cell. The proposed method makes it possible to subject a microorganism suspension to unidirectional fields or RF alternating fields with intensities up to 100 kV/cm or more without causing temperature rises capable of producing thermal effects. The results of the application of this method to suspensions of Saccharomyces cerevisiae are cited, showing inactivation at a field strength of 7 kV/cm under conditions of conductivity adaptation with a temperature rise of 14 C. A.B.K.

A73-24422 # An instrument with 240 probes for mapping the cardiac potential (Uno strumento a 240 sonde per la mappatura del potenziale cardiaco). C. Cottini, D. Dotti (Centro Informazioni Studi ed Esperienze, Milan, Italy), E. Gatti (Milano, Politecnico; Centro Informazioni Studi ed Esperienze, Milan, Italy), and B. Taccardi (Istituto di Tecnologia Sperimentale Simes, Milan, Italy). *Alta Frequenza,* vol. 41, Dec. 1972, p. 988-993. In Italian. Research supported by the Consiglio Nazionale delle Ricerche.

Description of an instrument for measuring and recording the

potential at 240 points of the thoracic surface for the purpose of mapping it at successive moments of time. In a time interval of 2-msec duration the signals provided by the 240 probes, suitably amplified, are selected in sequence by an electronic switch cascade, are compressed in a partially logarithmic scale, and are converted into digital form; these digital signals are then recorded on magnetic tape in such a way as to permit them to be processed by a computer. An oscillographic display makes it possible to achieve continuous monitoring of the measurement procedure. A.B.K.

A73-24458 # **Investigation of the infrastructural organization of interdisk spaces and photoreceptor membranes of the retina in vertebrates during aldehyde fixations, delipidization, and pronase treatment (Issledovanie ul'trastrukturnoi organizatsii mezhdiskovykh prostranstv i fotoretseptornykh membran setchatki pozvonochnykh, pri al'degidnykh fiksatsiiakh, delipidizatsii i obrabotke pronazoi).** V. L. Boroviagin, T. A. Ivanina, and D. A. Moshkov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 207, Dec. 11, 1972, p. 1223-1226. 16 refs. In Russian.

A73-24467 # **Formalization of an arterial pressure stabilization system (Formalizatsiia sistemy stabilizatsii arterial'nogo davleniia).** V. A. Lishchuk (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 207, Dec. 21, 1972, p. 1497-1500. 5 refs. In Russian.

Development of a model of the arterial pressure stabilization process in the general system of control of the blood supply of the organism. A model representing the general properties of the statics of the cardiovascular system is developed. This model describes the venous reservoir, the heart ventricle, the arterial reservoir, and the peripheral resistance in terms of lumped parameters. A.B.K.

A73-24500 **Rise time of the spike potential in fast and slowly contracting muscle of man.** F. Buchthal, K. Dahl, and P. Rosenfalck (Copenhagen, University; Rigshospital, Copenhagen, Denmark). *Acta Physiologica Scandinavica,* vol. 87, Feb. 1973, p. 261-269. 23 refs. Research supported by the Muscular Dystrophy Associations of America and Michaelsen Foundation.

A73-24513 # **Study of the possibilities of histone-RNA complex formation in experiments in vitro (Vivchennia mozhlivostei utvorennia kompleksiv mizh gistonami na RNK v doslidakh in vitro).** I. F. Paskevich, A. B. Fonar'ov, I. V. Stoliarov, and V. S. Likhodid (Kharkivs'kii Naukovo-Doshidnii Institut Medichnoi Radiologii, Kharkov, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 35, Jan. 1973, p. 73-75. In Ukrainian.

The combination of lysine and arginine histones isolated from albino rat livers with RNA(0-10) and RNA(55-65) fractions, and nuclear RNA into histone-RNA complexes was investigated. The results obtained include the finding that the formation of histone-RNA complexes proceeds most readily with nuclear RNA. M.V.E.

A73-24514 # **Some results of studies of the high-mountain physiology of man in Tian Shan and Pamir and prospects of further studies (Nekotorye itogi izucheniia vysokogornoi fiziologii cheloveka na Tian'-Shane i Pamire i perspektivy dal'neishikh issledovanii).** M. M. Mirrakhimov (Kirgizskii Meditsinskii Institut, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Dec. 1972, p. 1816-1826. 62 refs. In Russian.

Review of studies of the adaptation of the human organism to high altitudes, covering published papers on the subject since the 1890s. According to the review, adaptation leads to enhanced activity of oxygen uptake systems in individuals with brief adaptation periods and reduces the lung ventilation levels in native mountaineers. Hypertrophy of the right ventricle of the heart is frequent in the permanent inhabitants of mountains beginning at altitudes of 2 to 2.5 km above sea level. V.Z.

A73-24515 # **Electrophysiological study of the topographic organization of Deiters' lateral vestibular nucleus (Elektrofiziologicheskoe issledovanie topograficheskoi organizatsii lateral'nogo vestibuliarnogo iadra Deitersa).** V. V. Fanardzhian, D. S. Sarkisian, V. A. Sargsian, and K. Z. Pakhlevanian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Dec. 1972, p. 1827-1833. 26 refs. In Russian.

The focal distribution of potentials in Deiters' lateral vestibular nuclei was studied in anesthetized cats during stimulation of the lateral vestibulo-spinal tract and the vestibular nerve. A well-pronounced overlapping of zones representing the front and hind extremities in the nucleus is established. The existence of a broad projection of primary vestibular fibers onto the ventral half of Deiters' nucleus is also demonstrated. The findings are analyzed in the context of available morphological knowledge. V.Z.

A73-24516 # **Amplitude discriminator with variable discrimination levels (Amplitudnyi diskriminator s izmeniaemymi urovniami diskriminatsii).** A. M. Karpukhina, A. D. Riabinin, and V. A. Riabinin. *Fiziologicheskii Zhurnal SSSR,* vol. 58, Dec. 1972, p. 1878-1881. In Russian.

Description of an amplitude discriminator whose effective range can be varied as needed when the discriminator is used alone or with a digital computer in a neuron pulsed activity analysis. The discriminator consists of an upper and a lower discrimination channel, an adder, an amplifier, and a control block. The basic circuit of the discriminator and performance diagrams are included. V.Z.

A73-24517 # **Features of the spontaneous and evoked neuronal activity of deep brain structures in man during voluntary movements (Osobennosti spontannoi i vyzvannoi aktivnosti neironov glubokikh struktur mozga cheloveka pri proizvol'nykh dvizheniiakh).** S. N. Raeva (Akademiia Nauk SSSR, Institut Biofiziki, Pushchino-on-Oka, USSR) and A. L. Kadin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Feb. 1973, p. 198-205. 12 refs. In Russian.

A73-24518 # **Electroretinogram recovery cycle during light adaptation and after dark adaptation (Tsikl vosstanovleniia elektroretinogrammy v usloviiakh svetovoi i posle temnovoi adaptatsii).** L. P. Grigor'eva and V. A. Markevich (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Feb. 1973, p. 251-257. 19 refs. In Russian.

Electroretinograms were recorded in experiments on 31 rabbits after dark adaptation followed by retina exposures to diffused light from single, paired, or rhythmic flashes. An analysis of the recovery time of b-wave amplitudes in response to light signals following dark adaptation suggests that the restoration of electroretinograms during brief intervals between light stimuli is a result of inhibitor-stimulus interactions on the receptor-bipolar level. V.Z.

A73-24519 # **Voluntary activation of individual motor units in man (O proizvol'noi aktivatsii otdel'nykh dvigatel'nykh edimits cheloveka).** N. A. Rokotova and Iu. T. Shapkov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Feb. 1973, p. 269-275. 15 refs. In Russian.

A total of 72 tests were conducted on 16 trained male subjects in a study of the voluntary activation of individual motor units consisting of one spinal motor neuron and a group of 20 to 2000 muscle fibers controlled by the neuron. A three-channel electromyograph was used for the activation of muscle biopotentials; a loudspeaker and a monitor were included in the system to create artificial feedback loops. Positive results were obtained for voluntary activation of motor units in musculus abductor pollicis brevis and musculus palmaris longus. V.Z.

A73-24520 # **Investigation of the exchange between the blood and the intraocular fluid with the aid of radioactive phosphorus (Issledovanie obmena mezhdu krov'iu i vnutriglaznoi**

zhidkost'iu s pomosheh'iu radioaktivnogo fosfora). A. N. Shutko (I Leningradskii Meditsinskii Institut, Leningrad, USSR) and M. I. Razumovskii (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Feb. 1973, p. 288-291. 8 refs. In Russian.

A73-24521 # **Blood circulation during controlled tachycardia (Krovoobrashchenie pri upravliaemoi takhikardii).** V. L. Karpman, B. G. Liubina, and A. F. Siniakov (Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Feb. 1973, p. 292-298. 21 refs. In Russian.

Blood circulation tests were conducted on a group of 26 trained athletes who performed exercises on a bicycle stand to develop controlled tachycardia conditions. Analysis of interrelations between heart beat rates and blood circulation characteristics showed the ability of a trained human heart to perform adequately under widely varying conditions of tachycardia produced by physical stresses. V.Z.

A73-24522 # **Human forearm-muscle blood supply regimes after 'static' exercise with increasing stress (Rezhimy krovosnabzheniia myshts predplech'ia cheloveka posle 'staticheskoi' raboty s vozrastaiushchei nagruzkoi).** L. A. Baraz, E. S. Veselova, E. L. Meshcherskii, and V. M. Khaiutin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Feb. 1973, p. 307-314. 17 refs. In Russian.

A73-24523 # **Problems of gasdynamics theory in the organism (Voprosy teorii dinamiki gazov v organizme).** E. A. Kovalenko. *Fiziologicheskii Zhurnal SSSR*, vol. 59, Feb. 1973, p. 315-324. 18 refs. In Russian.

Current theories of oxygen and carbon dioxide uptake and discharge in the organism are considered. Particular attention is given to the O2 and CO2 partial pressure gradients which are permanently present in the tissues, blood, and lung and may act in opposite directions in the transport of O2 and CO2. It is theorized that the topography of O2 and CO2 partial pressures in the entire organism is subject to dynamic variations in different individual organs and tissues. The possible contributions of gas diffusion and convective transfer of O2 and CO2 molecules to these variations is discussed. Various oxygen gas diffusion field models applicable to biological tissues are analyzed, with the emphasis on convective oxygen transport mechanisms in the fluid extracellular and intracellular media of tissues. V.Z.

A73-24524 # **Effect of physical exercises on the lung rheogram (Vliianie zaniatii fizicheskimi uprazhneniiami na reogrammu legkikh).** V. I. Il'nitskii (Ternopol'skii Meditsinskii Institut, Ternopol, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Feb. 1973, p. 331-336. 24 refs. In Russian.

Lung rheograms were recorded in three groups of young trained athletes, 9 to 17 years old, who performed physical exercises of various types and grades. The curve amplitudes were greater and the slopes of the ascending and descending segments were more pronounced in the rheograms of all subjects than in control rheograms, while, in contrast, the presystolic, systolic and diastolic portions of the rheograms of subjects were smaller than those in control rheograms. These changes were less pronounced in athletes with longer periods of training. V.Z.

A73-24525 # **Reflex excitability of spinal motor neurons in man under high atmospheric pressure (Reflektornaia vozbudimost' spinal'nykh motoneironov u cheloveka v usloviiakh giperbarii vozdushnoi sredy).** A. V. Syrovegin, G. I. Kurenkov, and V. V. Kutepov (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Feb. 1973, p. 344-348. 13 refs. In Russian.

A73-24563 **Deficits in visual function associated with laser irradiation.** H. Zwick, R. B. Bedell, and K. Bloom (U.S. Army, Frankford Arsenal, Philadelphia, Pa.). In: EASCON '72; Electronics and Aerospace Systems Convention, Washington, D.C., October 16-18, 1972, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 187-189.

An investigation was conducted to study possible changes in spectral function associated with laser-induced retinal injury. Rhesus monkeys served as subjects in this experiment. The data suggest that laser injury can cause serious deficits in photopic function. Maximum acuity deficits obtained under spectral conditions are greater than those obtained under comparable white light conditions. G.R.

A73-24564 **Physiological responses of rats to intermittent high-altitude stress - Effects of age.** J. J. McGrath, J. Prochazka, V. Pelouch, and B. Ostadal (Rutgers University, New Brunswick, N.J.; Ceskoslovenska Akademie Ved, Prague, Czechoslovakia). *Journal of Applied Physiology*, vol. 34, Mar. 1973, p. 289-293. 27 refs.

White, male rats 30, 45, 60, and 360 days old were exposed to a simulated altitude of 7000 m (307 mm Hg) in a barometric chamber for 4 hr/day for 24 days. Body weight gain was depressed in all altitude-exposed rats compared to sea-level controls. The reduction in body weight gain was more pronounced and occurred earlier in the 60-day-old rats compared to the younger animals. The 360-day-old animals experienced high mortality as well as severe losses in body weight. Hemoglobin concentrations increased in the 30-, 45-, 60-, and 360-day animals to 18.2, 18.3, 19.5, and 20.6 g/100 ml, respectively. Cardiac anoxic resistance determined in vitro with isolated right ventricles was significantly higher in each group of altitude-exposed rats. Hydroxyproline content of the right ventricles was less in all altitude-exposed rats compared to sea level controls, but the differences were significant only in the 30- and 60-day-old age groups. Right ventricular hypertrophy occurred in all altitude-exposed rats but was statistically significant only in the three oldest groups. (Author)

A73-24565 **Independent effects of changes in H+ and CO2 concentrations on hypoxic pulmonary vasoconstriction.** A. B. Malik (Hospital for Sick Children, Toronto, Canada) and B. S. L. Kidd (Toronto, University, Toronto, Canada). *Journal of Applied Physiology*, vol. 34, Mar. 1973, p. 318-323. 30 refs. Research supported by the Medical Research Council of Canada.

Investigation of the independent effect of changes in carbon dioxide tension and hydrogen ion concentration on the hypoxia-induced rise in the pulmonary vascular resistance in the intact dog. The effects of changes in carbon dioxide tension and hydrogen ion concentration on the response were studied when the pulmonary hemodynamic parameters had reached a steady level. The results of the study suggest that hydrogen ions and hypoxia interact while hypercapnia and hypoxia act independently of each other. M.V.E.

A73-24566 * **Effect of passive 70-deg head-up tilt on peripheral visual response time.** R. F. Haines (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 34, Mar. 1973, p. 329-333. 32 refs.

Peripheral visual response time was measured continuously in seven young men during a 30-min, 70-deg head-up tilt before and after 14 days of bed rest. Small test lights were flashed on at unexpected times and locations along the subject's horizontal retinal meridian to determine what effect tilt would have on peripheral visual sensitivity and to better understand the physiological mechanisms that underlie peripheral visual sensitivity. Blood pressure was also measured every other minute throughout this period. The results indicated that response time lengthens significantly to stimuli imaged beyond about 70-deg arc from the line of sight for both the pre- and postbed-rest periods during tilt. (Author)

A73-24567 **A new portable temperature-sensing device.** P. Marcus and D. Field (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Journal of Applied Physiology*, vol.

34, Mar. 1973, p. 374-376.

A sturdy, light-weight, man-mounted thermometric device is described. The apparatus is intended for use in a practical heat acclimatization technique involving exercise in insulated vapor barrier clothing and allows a subject to control his own body temperature at various elevated levels. A red and green light system with a calibrated dial provides an accurate indication of temperature when operated by untrained personnel. Possible alternative uses are considered. (Author)

A73-24595 # Short-term latent reactions of the lateral geniculate body neurons in the rat to electrical stimulation of the optical tract (Korotkolatentnye otvety neironov naruzhnogo kolenchatogo tela krysy na elektricheskoe razdrazhenie opticheskogo trakta). V. I. Gusel'nikov, G. S. Voronkov, and G. M. Molodavkin (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Neirofiziologiia,* vol. 5, Jan.-Feb. 1973, p. 28-32. 16 refs. In Russian.

A73-24596 # Characteristics of the electrical activity of the superior olivary bodies of Vespertilionidae and Rhinolophidae bats in response to ultrasonic stimuli of different frequencies (Kharakteristika elektricheskoi aktivnosti verkhnikh oliv gladkonosykh i podkovnosykh letuchikh myshei na ul'trazvukovye stimuly s raznoi chastotoi zapolneniia). A. G. Vasil'ev and T. E. Timoshenko (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Neirofiziologiia,* vol. 5, Jan.-Feb. 1973, p. 33-39. 10 refs. In Russian.

A73-24597 # Acetylcholinesterase activity of hypothalamic and cortical structures under pharmacological effects (Atsetilkholinesteraznaia aktivnost' gipotalamicheskikh i korkovykh struktur pri farmakologicheskikh vozdeistviiakh). A. F. Makarchenko, B. A. Roitrub, R. S. Zlatin, E. D. Genis, and O. I. Kostiuk (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia,* vol. 5, Jan.-Feb. 1973, p. 47-53. 17 refs. In Russian.

A73-24598 # Reflex reaction of antagonist muscles during an evoked tendon reflex (Reflektornaia reaktsiia myshts-antagonistov pri vyzove sukhozhil'nogo refleksa). V. S. Gurfinkel' and E. I. Pal'tsev (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Neirofiziologiia,* vol. 5, Jan.-Feb. 1973, p. 70-76. 19 refs. In Russian.

Tendon reflex activity was examined electromyographically and mechanographically in the Triceps surae and Tibialis anterior muscles of healthy human subjects. It is shown that the evocation of a tendon reflex from one muscle is accompanied by a simultaneous contraction of its antagonist. It is proposed that monosynaptic connections between afferents of antagonist muscles play a decisive role in ensuring their coordinated activity which is characteristic of human locomotion and standing posture. T.M.

A73-24599 # Organization of the activity of a group of motor neurons in man during voluntary contraction of a muscle (Organizatsiia raboty gruppy motoneironov cheloveka pri proizvol'nom napriazhenii myshtsy). R. S. Person and L. P. Kudina (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Neirofiziologiia,* vol. 5, Jan.-Feb. 1973, p. 77-87. 25 refs. In Russian.

Motor unit action potentials of Rectus femoris muscles under isometric contraction (up to 50% of maximum level) were recorded by needle electrodes. It was possible to identify up to ten motor units acting simultaneously. The described behavior of the motor neurons is analyzed as the result of a diffuse nondeterministic distribution of the synaptic input in a group of neurons innervating a particular muscle. T.M.

A73-24625 * Self-imposed timeouts under increasing response requirements. J. F. Dardano (Johns Hopkins University, Baltimore, Md.). *Journal of the Experimental Analysis of Behavior,* vol. 19, Mar. 1973, p. 269-287. 23 refs. Grants No. NsG-189-61; No. NGR-21-001-069.

Three male White Carneaux pigeons were used in the investigation. None of the results obtained contradicts the interpretation of self-imposed timeouts as an escape response reinforced by the removal of unfavorable reinforcement conditions, although some details of the performances reflect either a weak control and/or operation of other controlling variables. Timeout key responding can be considered as one of several classes of behavior having a low probability of occurrence, all of which compete with the behavior maintained by positive reinforcement schedule. G.R.

A73-24657 * Binding of Melatonin to human and rat plasma proteins. D. P. Cardinali, H. J. Lynch, and R. J. Wurtman (MIT, Cambridge, Mass.). *Endocrinology,* vol. 91, Nov. 1972, p. 1213-1218. 22 refs. Grants No. PHS-AM-11709; No. NGR-22-009-627.

A73-24685 # IR-spectroscopic investigation of the thermal stability of albumin at different levels of its ionization (ICh-spektroskopichne doslidzhennia termostiikosti al'buminu pri riznikh stupeniakh iogo ionizatsii). M. O. Semenov and V. Ia. Maleev (Akademiia Nauk Ukrains'koi RSR, Institut Radiofiziki i Elektroniki, Kharkov, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 34, Dec. 1972, p. 1095-1097. 10 refs. In Ukrainian.

A73-24697 # Investigation of the sleep and wakefulness rhythms in the crewmembers of Soiuz-3 through Soiuz-9 spacecraft prior to, duiring, and after space flight (Issledovanie ritmov sna i bodrstvovaniia u ekipazhei kosmicheskikh korablei 'Soiuz 3-9' do, vo vremia i posle vypolneniia kosmicheskogo poleta). A. N. Litsov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1972, p. 836-845. 17 refs. In Russian.

A73-24717 # Pilot incapacitation. H. W. Orlady (United Air Lines, Inc., Chicago, Ill.). In: Human threats to air safety; Proceedings of the Twenty-fifth Annual International Air Safety Seminar, Washington, D.C., October 16-18, 1972. Arlington, Va., Flight Safety Foundation, Inc., 1972, p. 205-209.

Operational staff are concerned with pilot incapacitation because accidents and incidents have been officially attributed to this cause, and because there have been many unsatisfactorily explained air carrier accidents. An organized plan for handling the problems created, and a simple and straighforward method of recognizing so-called 'subtle' incapacitations early enough for the remaining crew to maintain control of the aircraft are discussed. F.R.L.

A73-24718 # Civil aviation medicine in the coming decade. C. R. Harper (Aviation Insurance Agency, Inc., Atlanta, Ga.). In: Human threats to air safety; Proceedings of the Twenty-fifth Annual International Air Safety Seminar, Washington, D.C., October 16-18, 1972. Arlington, Va., Flight Safety Foundation, Inc., 1972, p. 212-218.

It is considered that in the coming decade civil aviation medicine will become more standardized on a functional basis on both the national and international level. More emphasis will be placed on preventive medicine, which is not only in the best interest of those regulated, but economically sound for management. Health education and operational safety will become a more important function for civil aviation medicine specialists. The future medical organization's contribution to aviation safety will expand to become more directly involved in the daily working relationship with the flight operations and flight training departments. F.R.L.

A73-24770 Impact on a simple physical model of the head. V. H. Kenner (Wayne State University, Detroit, Mich.) and W. Goldsmith (California, University, Berkeley, Calif.). *Journal of Biomechanics,* vol. 6, Jan. 1973, p. 1-11. 18 refs.

An experimental study of the dynamic loading of a simple model of the human head is described. Water-filled spherical shells -

one aluminum and one acrylic plastic - were loaded by impact with 1/2, 1 and 2-in. dia. steel spheres. Strain measurements on the shells and pressure measurements in the fluid were obtained. Comparisons between the experimental data and the predictions of an elastic shell - compressible inviscid fluid analytical model were effected. Implications of the results for head injury are discussed. (Author)

A73-24771 **Regional myocardial dynamics from single-plane coronary cineangiograms.** G. T. Daughters, N. B. Ingels, Jr., C. J. Carrera (Palo Alto Medical Research Foundation, Palo Alto, Calif.), L. Wexler (Stanford University, Stanford, Calif.), and N. T. Smith (University Hospital, La Jolla, Calif.). *Journal of Biomechanics,* vol. 6, Jan. 1973, p. 25-30. Research supported by the Santa Clara County Heart Association and E. R. Squibb and Sons; Grant No. PHS-HE-14068.

A method is described for obtaining regional myocardial dynamics from single plane coronary cineangiograms that are currently used in clinical practice. The proposed method dispenses with the necessity of a calibrated biplane cineradiographic facility. Three sources of potential errors are defined and discussed. M.V.E.

A73-24772 **The nature of the optimum muscular performance achieved in the execution of fast eye rotations.** J. G. Thomas (University College, Cardiff, Wales). *Journal of Biomechanics,* vol. 6, Jan. 1973, p. 93-97. 9 refs.

A73-24855 **Recent measurements of flow using nuclear magnetic resonance techniques.** J. R. Singer and T. Grover (California, University, Berkeley, Calif.). In: Modern developments in flow measurement; Proceedings of the International Conference, Harwell, Berks., England, September 21-23, 1971.
London, Peter Peregrinus, Ltd., 1972, p. 38-47; Discussion, p. 47, 48. 14 refs. Research supported by the American Cancer Society and University of California; Grant No. NIH-FR-7006.

The use of nuclear magnetic resonance (NMR) techniques to measure flow rates is discussed. The velocity distribution function is introduced which gives the number of molecules per unit velocity integral, and it is shown that this concept has significant value in the flow measurement problem, especially in chemical, physiological and biological studies. The velocity distribution function for a human finger has been measured and compared to data obtained by counting the blood-carrying vessels in a dog. Data obtained from rats' tails is also presented and the associated velocity distribution function is compared to that for a human finger. (Author)

A73-24900 **Depolarization phase of the spatial velocity electrocardiogram in normal and ventricular overloading.** Y. Sakamoto, S. Kokusho, T. Hiroki, and T. Sano (Tokyo Medical and Dental University, Tokyo, Japan). *Journal of Electrocardiology,* vol. 6, no. 1, 1973, p. 19-26. 21 refs.

STAR ENTRIES

N73-18095*# BioTechnology, Inc., Falls Church, Va.
SHORT TERM HEARING LOSS IN GENERAL AVIATION OPERATIONS, PHASE 1, PART 1
James F. Parker, Jr. Sep. 1972 29 p refs
(Contract NASw-2265)
(NASA-CR-130987) Avail: NTIS HC $3.50 CSCL 06S

The effects of light aircraft noise on six subjects during flight operations were investigated. The noise environment in the Piper Apache light aircraft was found to be capable of producing hearing threshold shifts. The following are the principal findings and conclusions: (1) Through most of the frequency range for which measurements were taken (500 to 6000 Hz), there was a regular progression showing increased loss of auditory acuity as a function of increased exposure time. (2) Extensive variability was found in the results among subjects, and in the measured loss at discrete frequencies for each subject. (3) The principal loss of hearing occurred at the low frequencies, around 500 Hz. Author

N73-18096*# Delaware State Coll., Dover. Dept. of Biology.
THE EXAMINATION OF URINE SAMPLES FOR PATHOGENIC MICROBES BY THE LUCIFERASE ASSAY FOR ATP. 1: THE EFFECT OF THE PRESENCE OF FUNGI, FUNGAL LIKE BACTERIA AND KIDNEY CELLS IN URINE SAMPLES
Technical Report, 15 Jan. - 15 Nov. 1972
Valerie N. Bush Jan. 1973 16 p refs
(Grant NGR-08-002-003)
(NASA-CR-130797) Avail: NTIS HC $3.00 CSCL 06M

A method for accurately determining urinary tract infections in man is introduced. The method is based on adenosine triphosphate (ATP) concentration in urine samples after removing nonbacterial ATP. Adenosine triphosphate concentration is measured from the bioluminescent reaction of luciferase when mixed with ATP. An examination was also made of the effectiveness of rupturing agents on monkey kidney cells Candia albicans, a Rhodotorula species, and a Streptomyces species in determining whether these cells could contribute ATP to the bacterial ATP value of a urine sample. E.H.W.

N73-18097*# Southwest Research Inst., San Antonio, Tex.
SOUTHWEST RESEARCH INSTITUTE ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Monthly Report, 1 - 31 Jan. 1973
Jan. 1973 115 p
(Contract NASw-1867; SwRI Proj. 13-2538)
(NASA-CR-130984) Avail: NTIS HC $7.75 CSCL 06B

Applications of aerospace technology to biomedical science are described. Recent research and development of specific techniques, services, and equipment adopted by physicians to help combat disease and disability are reviewed. J.M.M.

N73-18098*# Scientific Translation Service, Santa Barbara, Calif.
PHYSICAL AND RADIOBIOLOGICAL INVESTIGATIONS ON ARTIFICIAL EARTH SATELLITES: ESTIMATING THE RADIATION HAZARD OF SPACE FLIGHTS
Yu. G. Grigoryev, ed. and Ye. Ye. Kovalev, ed. Washington NASA Jan. 1973 237 p refs Transl. into ENGLISH of the book "Fizicheskiye i Radiobiologicheskiye Issledovaniya na Iskusstvennykh Sputnikakh Zemli: Kotsenke Radiatsionnoy Opasnosti Kosmicheskikh Poletov" Moscow, Atom Press, 1971 p 1-198
(Contract NASw-2035)
(NASA-TT-F-724) Avail: NTIS HC $3.00 CSCL 06R

Experimental data obtained by artificial satellites are presented along with data from the literature reflecting the results of physical and medico-biological investigations of space radiation hazards to biological systems. For individual titles, see N73-18099 through N73-18103.

N73-18100* Scientific Translation Service, Santa Barbara, Calif.
DOSIMETRY OF SPACE RADIATIONS
V. V. Arkhangelskiy, V. V. Markelov, S. S. Skvortsov, L. N. Smirennyy, V. N. Turkin, and I. V. Chernykh *In its* Phys. and Radiobiol. Invest. on Artificial Earth Satellites Jan. 1973 p 24-56 refs
CSCL 06R

Harmful effects of space radiation are discussed. Radiation dosimetry methods are given. Dosimetry monitoring is investigated. Methods for measuring space radiation by ionization, thermoluminescence, and nuclear photographic emulsions are described. Author

N73-18102* Scientific Translation Service, Santa Barbara, Calif.
THE BIOLOGICAL EFFECT OF COSMIC RADIATION AND THE STANDARDIZATION OF A PERMISSIBLE DOSE LEVEL (ON CONDUCTING RADIOBIOLOGICAL EXPERIMENTS IN OUTER SPACE)
n its Phys. and Radiobiol. Invest. on Artificial Earth Satellites Jan. 1973 p 85-129

CSCL 06R

Radiobiological effects of cosmic radiation are investigated by animal experimentation. Prolonged radiation effects on humans are evaluated clinically. Methods for standardizing permissible radiation levels for spacecraft crews are discussed. Author

N73-18103* Scientific Translation Service, Santa Barbara, Calif.
THE COMBINED EFFECT OF IONIZING RADIATION AND OTHER SPACE FLIGHT FACTORS (RESULTS OF FLIGHT EXPERIMENTS)
In its Phys. and Radiobiol. Invest. on Artificial Earth Satellites Jan. 1973 p 130-229 refs

CSCL 06R

Problems and conditions of conducting radiobiological experiments in outer space are investigated. Effects of ionizing radiation and other prolonged space flight factors on animals are studied. Relationship of nonradiation space flight factors to radiation damage is evaluated. Author

N73-18104*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROCEEDINGS OF THE 1971 MANNED SPACECRAFT CENTER ENDOCRINE PROGRAM CONFERENCE
Carolyn S. Leach Nov. 1972 167 p refs Conf. held at Houston, Tex., Dec. 1971
(NASA-TM-X-58093; MSC-07232) Avail: NTIS HC $10.50 CSCL 06P

The effects of space flight stress on human hormonal and endocrine functions are studied in simulated weightlessness environments as well as postflight in spacecrews.

N73-18105* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ENDOCRINE LABORATORY RESULTS APOLLO MISSIONS 14 AND 15
Carolyn S. Leach *In its* Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 21 p refs

CSCL 06P

Endocrine/metabolic responses to space flight have been measured on the crewmen of Apollo missions 14 and 15. There were significant biochemical changes in the crewmen of both

missions immediately postflight. However, the Apollo 15 mission results differed from Apollo 14 and preflight shown by a normal to increased urine volume with slight increases in antidiuretic hormone. Although Apollo 15 was the first mission in which the exchangeable potassium measurement was made (a decrease), results from other missions were indicative of similar conclusions. Author

N73-18106* Baylor Univ., Houston, Tex. Coll. of Medicine.
THE MEDICAL ASPECTS OF SPACE FLIGHT SEEN FROM THE VIEWPOINT OF NUCLEAR MEDICINE
Philip C. Johnson and Theda B. Driscoll (Tex. Med. Center, Houston) *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 8 p
CSCL 06S

Radionuclide volume measurements performed on crews of selected Apollo missions indicate the following: (1) invariably, there is a small drop in red-cell mass of the returning crewmembers; (2) plasma-volume decreases similar to those experienced during bedrest are found in crewmen of short Gemini missions. After longer missions, the plasma-volume decrease is no longer present; (3) extracellular- and total-body water changes prove that spaceflight weight loss includes actual tissue losses; and (4) the loss of total-body exchangeable potassium after the Apollo 15 mission is evidence of increased aldosterone secretion. Author

N73-18107* State Univ. of New York, Syracuse. Upstate Medical Center.
URINARY EXCRETION OF ANTIDIURETIC HORMONE IN MAN
Myron Miller *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 15 p refs

CSCL 06P

It is shown that urinary excretion of ADH can be detected readily and quantitated accurately. The ADH excretion in normal subjects is inhibited following the administration of a water load and stimulated following water deprivation. It appears that measurement of ADH excretion in man provides a means of quantitating alterations in neurohypophyseal ADH secretion. By determining not only the basal excretion of ADH but also the response to such physiological influences as water loading and dehydration, it becomes possible to study the dynamics of ADH release. Thus, the ability to extract ADH efficiently from urine combined with a sensitive and specific technique for determination of ADH concentration allows the exploration of regulatory systems for ADH control in the normal state as well as the etiological role of altered ADH secretion in clinical disorders of water balance. Author

N73-18108* West Virginia Univ., Morgantown.
ESTIMATION OF VASOPRESSIN EXCRETION IN THE URINE AS A METHOD OF MONITORING VASOPRESSIN SECRETION DURING SPACE FLIGHT
Walter H. Moran *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 12 p refs

CSCL 06P

It is demonstrated that, under the circumstances of space flight, the measurement of plasma ADH levels might be misleading and that only the urinary ADH levels provide reliable information. The results of a partially completed survey of ADH levels in urine samples from human subjects in which simultaneous plasma ADH levels were available are included. Author

N73-18109* Baylor Univ., Houston, Tex. Coll. of Medicine.
ADRENOCORTICOTROPHIC HORMONE LEVELS IN GROUND BASED STUDIES
Bonnalie O. Campbell *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 9 p refs

CSCL 06P

Baseline values of immunoreactive ACTH were established in the normal healthy adult. Normal levels of ACTH secretion were determined for both the male and the female in circulating plasma and serum. The data obtained in these studies are particularly significant in that the sampling was carefully controlled; only healthy employed individuals of both sexes were tested in a routine work situation that would not be considered conducive to stress. It has been found that alterations in the classically described circadian rhythm of ACTH secretion can occur when activities (such as work/rest cycles) are imposed on the individual studied. These changes can be demonstrated even when there is no appreciable change noted in the rhythm of hydrocortisone secretion. Author

N73-18110* Miami Univ., Fla. School of Medicine.
STUDIES OF THE RENIN-ALDOSTERONE SYSTEM AND SODIUM HOMEOSTASIS DURING SIMULATED WEIGHTLESSNESS: APPLICATION OF THE WATER IMMERSION MODEL TO MAN
Murray Epstein *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 13 p refs

CSCL 06P

The ability of water immersion to reproducibly suppress renin and aldosterone and to produce a significant natriuresis in man during weightlessness simulation is proven. It is concluded that the water immersion model constitutes a useful tool for elucidating the mechanism of natriuresis occurring during manned space flight and the specific countermeasures for use in its management. Author

N73-18111* Harvard Univ., Cambridge, Mass. School of Medicine.
DEVELOPMENT OF SENSITIVE AND DIRECT METHODS FOR MEASURING PLASMA ALDOSTERONE AND CATECHOLAMINE CONCENTRATIONS
Edgar Haber *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 12 p refs
CSCL 06P

Radioimmunoassays for renin activity, angiotensin 1, and angiotensin 2 in the study of vasomotor regulation give new insight into the role of the renin system in maintaining postural homeostatsis. Similar laboratory procedures for specific assays of aldosterone and catecholamines achieve accurate determinations in small human blood samples. Author

N73-18112* Harvard Univ., Cambridge, Mass. School of Medicine.
PARATHYROID HORMONE, CALCITIONIN, AND VITAMIN D
John T. Potts *In* NASA. Lyndon B. Johnson Space Center Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 28 p refs

CSCL 06O

Analyses of secretion of parathyroid hormone during tests of stimulation and suppression of hormone-secretory activity using infusions of EDTA and calcium, respectively, have established that, in contrast to previous views, secretion of the hormone is not autonomous in many patients that have adenomatous hyperparathyroidism, but is responsive to changes in blood-calcium concentration. These findings have led to a new understanding of the pathophysiology of hormone production in hyperparathyroidism. A related application of the diagnostic use of the radioimmunoassay is the preoperative localization of parathyroid tumors and the distinction between adenomas and chief-cell hyperplasia. Work involving catheterization and radioimmunoassay of blood samples obtained from the subclavin and innominate veins and the venae cavae, led to localization in a high percentage

of patients. However, this procedure has been adopted recently to detect hormone concentration in the small veins directly draining the parathyroid glands. Author

N73-18113* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DISSOCIATION OF EFFECTS OF PROLONGED CONFINEMENT AND BEDREST IN NORMAL HUMAN SUBJECTS: HEART RATE AND BODY TEMPERATURE
Charles M. Winget, Joan Vernikos-Danellis, Carolyn S. Leach, and Paul C. Rambaut *In its* Proc of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 13 p refs

CSCL 06S

The effect of restricted muscular activity during bed rest in weightlessness simulation on certain physiological rhythms is investigated in human subjects. Results indicate that the primary influence of bed rest on body temperature and heart rate periodicity is to reduce the amplitude and change their phase relationships. The normally entrained rhythms are altered after approximately 20 days in the hypokinetic environment and are expressed in changes of amplitude and phases. Bed rest induces low grade hypothermia and minor tachycardia. This is characteristic of acute stress, regardless of the cause of stress. Author

N73-18114* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DISSOCIATION OF EFFECTS OF PROLONGED CONFINEMENT AND BED REST IN NORMAL HUMAN SUBJECTS; CORTISOL, INSULIN, THYROXINE, AND TRIIODOTHYRONINE
Joan Vernikos-Danellis, D. M. Winget, Carolyn S. Leach, and Paul C. Rambaut *In its* Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 8 p refs

CSCL 06S

Endocrine and metabolic information on the relative effects of confinement and prolonged bed rest in man was obtained by assaying blood samples for changes in cortisol, insulin, thyroxine, and triiodothyronine levels. Diurnal rhythms existed in all four hormone levels during prebed rest control period. Thyroid rhythms were most affected by bed rest and decreased markedly or showed considerable phase shifts: whereas the hydrocortisone rhythm was little affected. A marked decrease in the amplitude of the steroid rhythm developed by the end of the study.
Author G.G.

N73-18115* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
NUTRITION AND MUSCULOSKELETAL FUNCTION: SKYLAB EXPERIMENT SERIES NUMBER M070
Paul C. Raumbaut *In its* Proc. of the 1971 Manned Spacecraft Center Endocrine Program Conf. Nov. 1972 10 p refs

CSCL 06P

The M070 experiments are expected to give medical investigators precise information on a variety of biochemical changes occurring during exposure to space flight. Sufficient control data are being generated by baseline studies to differentiate those effects that are caused by weightless flight and those that are caused by other abnormal conditions that normally accompany spaceflight. Author

N73-18116*# Techtran Corp., Glen Burnie, Md.
MEDICINE AND SPACE
N. A. Agadzhanyan Washington NASA Feb. 1973 40 p refs Transl. into ENGLISH from Novye v Zhizne, Nauke Tekhn., Ser. Med. (Moscow), no. 4, 1971 p 1-32
(Contract NASw-2037)
(NASA-TT-F-735; F-735) Avail: NTIS HC $3.00 CSCL 06S

Medical data covering the effects of abnormal conditions on man are presented. Data cover high accelerations, weightlessness, and prolonged stay in space ship environments. E.H.W.

N73-18117# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
STUDIES ON THE INFLUENCE OF PERVITIN ON THE INCIDENCE OF GAS BUBBLES IN BLOOD AFTER DECOMPRESSION
V. Rheinwald 1972 49 p refs In GERMAN; ENGLISH summary (DLR-FB-72-66) Avail: NTIS HC $4.50; DFVLR Porz-Wahn: 14,20 DM

The influence of the pharmacon Pervitin on the incidence of gas bubbles in blood during quick decompression was proved in experiments with albino rats. The starting point of this study was the fact, that the blood-circulation determines the elimination of gas during decompression. Opposed results show the theoretical supposition that Pervitin improves elimination of N2 during decompression because of its effect on circulation, is not well founded. Preventive treatment of rats with Pervitin medication led to no significant reduction of mortality. Author

N73-18118# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
THE EFFECTS OF HYPOXIA AND ACCELERATION ON SOME ENZYME ACTIVITIES IN ERYTHOCYTES AND PLASMA
Ingo Carl 1972 44 p refs In GERMAN; ENGLISH summary (DLR-FB-72-71) Avail: NTIS HC $4.25; DFVLR Porz: 13,80 DM

Eleven male subjects were exposed to hypoxia corresponding to an altitude of 6900 meters and to acceleration of 2,5 + Gz. Prior to stress and at certain intervals during and after it the number of erythrocytes, hematocrit, and plasma protein concentration were determined. Erythrocytes, hematocrit, and plasma protein increased under both conditions. Under hypoxia the activities of MDH and GOT increased significantly, under acceleration only the activity of GOT. Except of the G-6-PDH activity which showed a considerable rise under hypoxia no significant changes could be observed in enzyme activities in erythrocytes under both stressors. Since there is no congruent reaction in the enzyme activities in erythrocytes and plasma, erythrocytes cannot be considered to be main enzyme source for the plasma level in the ubiquitary cell enzymes. The different responses of the measured blood parameters to both stressors indicate a specific reaction depending upon the kind of stress. Author

N73-18119# Leicester Univ. (England). Dept. of Psychology.
SIMULATOR SICKNESS IN PASSIVE OBSERVERS
J. T. Reason and E. Diaz London Flying Personnel Res. Comm. Jul. 1971 19 p refs Sponsored by Flying Personnel Res. Comm.
(FPRC/1310) Avail: NTIS HC $3.00

Fifteen women and sixteen men were given a 10-minute ride in a fixed-base car simulator with a moving visual display (Sim-L-Car). These exposures were standardized, and included a considerable amount of implied (but not actual) vestibular simulation. Approximately one half of the subjects wore blinkers which restricted their field of view to the dynamic visual display. The principal findings were: (1) Some measurable decline in well-being was reported by 28 of the 31 subjects: (2) Women were significantly more susceptible than men: (3) Both previous passenger and car driving experience correlated positively with the degree of disturbance produced by the simulator, but driving experience appeared to exert the greatest influence upon susceptibility: (4) Exclusion of the static features of the field of view appeared to have no effect upon susceptibility. These results were interpreted in the light of the sensory rearrangement theory of motion sickness. Author

N73-18120# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
A BRIEF GUIDE TO THE UNITS AND THE INTERPRETATION OF BLOOD ALCOHOL MEASUREMENTS
W. F. Lewis Jun. 1972 9 p refs
(DCIEM-TM-848) Avail: NTIS HC $3.00

A guide is presented for investigators to correlate blood

ethanol levels reported by laboratories with possible causes of aviation accidents. Methods of ethanol analysis, different concentration units, a tabulation of expected effects from given levels, and a number of precautionally interpretive considerations are presented. Author

N73-18121*# Scripta Technica, Inc., Washington, D.C.
HYPERTONIA AND ATHEROSCLEROSIS UNDER HIGH MOUNTAIN CONDITIONS
M. A. Aliyev and R. I. Kulakova NASA Feb. 1973 105 p refs Transl. into ENGLISH of the publ. "Gipertonia i ateroskleroz v usloviyakh vysokogorya" Frunze, USSR, Ilim, 1971 115 p
(Contract NASw-2036)
(NASA-TT-F-745) Avail: NTIS HC $3.00 CSCL 06S

Problems in the development and course of experimental atherosclerosis against a background of renovascular hypertonia and their interaction in long term acclimatization with consideration of the meteorological and heliogeophysical factors operating in the high mountains are illuminated. Incidental data on the variations of cholesterol, lecithin, and the lecithin-cholesterol coefficient under the conditions of low and high mountains are presented as they depend on season. Author

N73-18122*# Pittsburgh Univ., Pa. Philosophy of Science Center.
ON THE FUNDAMENTAL IMPORTANCE OF THE SOCIAL PSYCHOLOGY OF RESEARCH AS A BASIC PARADIGM FOR THE PHILOSOPHY OF SCIENCE: A PHILOSOPHICAL CASE STUDY OF THE PSYCHOLOGY OF THE APOLLO MOON SCIENTISTS
Ian I. Mitroff [1972] 44 p refs
(Grant NGL-39-011-080)
(NASA-CR-130832) Avail: NTIS HC $4.25 CSCL 05I

A combined philosophical and social psychological study of over 40 of the Apollo moon Scientists reveals that the Orthodox or Received View of Scientific Theories is found wanting in several respects: (1) observations are not theory-free; (2) scientific observations are not directly observable; and (3) observations are no less problematic than theories. The study also raises some severe criticisms of distinction between the context of discovery and the context of justification. Not only does this distinction fail to describe the actual practice of science but even more important it has the dangerous effect of excluding some of the strongest lines of evidence which could most effectively challenge the distinction. The distinction is harmful of efforts to found interdisciplinary theories and philosophies of science. Author

N73-18123*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PLANETARY QUARANTINE ANNUAL REVIEW, SPACE TECHNOLOGY AND RESEARCH, JULY 1971 - JULY 1972
Feb. 1973 205 p refs
(Contract NAS7-100)
(NASA-CR-130861; JPL-900-597) Avail: NTIS HC $12.25 CSCL 06M

The effects of planetary quarantine constraints are assessed for advanced missions and unmanned planetary sample return missions. Considered are natural space environment factors, post launch recontamination effects, spacecraft microbial burden estimation and prediction, and spacecraft cleaning and decontamination techniques. G.G.

N73-18124*# Columbia Univ., New York. Noise Research Unit.
A NEW FIELD-LABORATORY METHODOLOGY FOR ASSESSING HUMAN RESPONSE TO NOISE
Paul N. Borsky Washington NASA Mar. 1973 32 p refs
(Grant NGL-33-008-118)
(NASA-CR-2221) Avail: NTIS HC $3.00 CSCL 06S

Gross measures of community annoyance with intrusive noises have been made in a number of real environment surveys which indicate that aircraft noise may have to be reduced 30-40 EPNdb before it will generally be considered acceptable. Interview studies, however, cannot provide the precise information which is needed by noise abatement engineers of the variable human response to different types and degrees of noise exposure. A new methodological field-survey approach has been developed to provide such information. The integrated attitudes and experiences of a random sample of subjects in the real environment are obtained by a prior field survey. Then these subjects record their more precise responses to controlled noise exposures in a new realistic laboratory. The laboratory is a sound chamber furnished as a typical living room (18 ft x 14 ft) and subjects watch a color TV program while they judge simulated aircraft flyovers that occur at controlled levels and intervals. Methodological experiments indicate that subjects in the laboratory have the sensation that the airplanes are actually moving overhead across the ceiling of the chamber. It was also determined that annoyance judgments in the laboratory stabilize after three flyovers are heard prior to a judgment of annoyance. Author

N73-18125# Joint Publications Research Service, Arlington, Va.
FOURTH ALL-UNION CONFERENCE ON SPACE BIOLOGY AND MEDICINE
N. Gurovskiy and M. Kozar 28 Feb. 1973 8 p Transl. into ENGLISH from Med. Gaz. (Moscow), 19 Jan. 1973
(JPRS-58345) Avail: NTIS HC $3.00 CSCL 06C

A review of the materials presented at the Fourth All-Union conference on Space Biology and Medicine held in Kaluga is reported. A total of 254 reports were presented at three plenary and 24 section meetings. Author

N73-18126# Joint Publications Research Service, Arlington, Va.
RHYTHM OF SLEEP AND WAKEFULNESS IN CREWS OF THE SPACESHIPS SOYUZ 3-9 BEFORE, DURING AND AFTER EXPOSURE TO SPACEFLIGHT
A. N. Litsov 22 Mar. 1973 16 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 6, 1972 p 836-845
(JPRS-58173) Avail: NTIS HC $3.00

Data are presented on the work and rest regimes of crew members of Soyuz 3-9 spacecraft in the course of preparation for and implementation of space flight. Author

N73-18127*# Oak Ridge National Lab., Tenn. Neutron Physics Div.
RADIATION TRANSPORT CODES FOR POTENTIAL APPLICATIONS RELATED TO RADIOBIOLOGY AND RADIOTHERAPY USING PROTONS, NEUTRONS, AND NEGATIVELY CHARGED PIONS
T. W. Armstrong Aug. 1972 27 p refs Submitted for publication Sponsored in part by AEC
(NASA Order H-38280A)
(NASA-CR-130965; ORNL-TM-3816) Avail: NTIS HC $3.50 CSCL 06R

Several Monte Carlo radiation transport computer codes are used to predict quantities of interest in the fields of radiotherapy and radiobiology. The calculational methods are described and comparisions of calculated and experimental results are presented for dose distributions produced by protons, neutrons, and negatively charged pions. Comparisons of calculated and experimental cell survival probabilities are also presented. Author

N73-18128*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A STUDY OF LIVER MICROSOMAL CYTOCHROMES FOLLOWING CHRONIC EXPOSURE TO DICHLOROMETHANE
F. J. Bullock (Little (Arthur D.), Inc., Cambridge, Mass.), M. Callahan (Little (Arthur D.), Inc., Cambridge, Mass.), and E. S. Harris Dec. 1971 11 p refs Presented at 2d Ann. Conf. on Environ. Toxicol., Fairborn, Ohio, 31 Aug. 2 Sep. 1971; Sponsored by SysteMed Corp. Prepared in cooperation with AMRL
(AF Proj. 6302)
(NASA-TM-X-69101; AD-751433; AMRL-TR-71-120-Paper-11)

Avail: NTIS HC $3.00 CSCL 06T

It was noted that CCl3CH3 has been reported to result in an increase of cytochrome P-450 as well as NADPH-cytochrome c reductase in rat liver. The chlorocarbon was administered by inhalation at 2500-3000 ppm for 24 hours. GRA

N73-18129*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

CONTINUOUS ANIMAL EXPOSURE TO METHYLENE-CHLORIDE

Charles C. Haun (SysteMed Corp., Dayton, Ohio), Elliott S. Harris, and Kenneth I. Darmer, Jr. (SysteMed Corp., Dayton, Ohio) Dec. 1971 13 p refs Presented at 2d Ann. Conf. on Environ. Toxicol., Fairborn, Ohio, 31 Aug. - 2 Sep. 1971; Sponsored by SysteMed Corp. Prepared in cooperation with AMRL

(AF Proj. 6302)

(NASA-TM-X-69099; AD-751432; AMRL-TR-71-120-Paper-10) Avail: NTIS HC $3.00 CSCL 06T

Dichloromethane, also known as methylene chloride, is used extensively as a solvent in many of the space cabin construction materials. The provisional space cabin limit has been set at 25 ppm for 90-day flights, and 5 ppm for 1000-day flights. To properly assess the inhalation hazard to astronauts, 2 high levels, 1000 and 5000 ppm, were intentionally selected and 4 animal species were exposed continuously to these concentrations for periods of not more than 14 weeks. The following observed changes were most significant: (1) Severe weight losses were observed in all species, most profound in dogs. (2) Dogs and monkeys continued to lose weight throughout the exposure or until death, and rats showed dose related subnormal growth rates when compared with controls. (3) At 5000 ppm dichloromethane, there were considerable deaths during the first 3 weeks; 50% in dogs, 25% in monkeys and 35% in mice. No rats died. At 1000 ppm exposure level, significant deaths occurred only in dogs when 6 died during the 6th and 7th weeks and the remaining 2 dogs became moribund. (4) Monkeys exposed to dichloromethane at 1000 ppm level for 14 weeks showed clinical signs of liver injury. (5) Rats showed no response at either exposure level other than growth depression. (6) Dogs that died exhibited gross lesions associated with hepatic failure. GRA

N73-18130*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

CONTINUOUS EXPOSURE OF ANIMALS TO METHYLISO-BUTYLKETONE

Edmond H. Vernot (SysteMed Corp., Dayton, Ohio), James D. MacEwen (SysteMed Corp., Dayton, Ohio), and Elliott S. Harris Dec. 1971 12 p refs Presented at 2d Ann. Conf. on Environ. Toxicol., Fairborn, Ohio, 31 Aug. - 2 Sep. 1971; Sponsored by SysteMed Corp. Prepared in cooperation with AMRL

(AF Proj. 6302)

(NASA-TM-X-69100; AD-751443; AMRL-TR-71-120-Paper-22) Avail: NTIS HC $3.00 CSCL 06T

Continuous exposure of dogs, monkeys, mice, and rats to MIBK for two weeks and all animals except mice for 90 days resulted in measurable adverse effects only in the case of rats. Rat kidney weights and kidney to body weight ratios were significantly elevated after exposure to 410 mg/cu m for two weeks, and kidney and liver organ weights and organ to body weight ratios were elevated after exposure to 820 mg/cu m for two weeks and to 410 mg/cu m for 90 days. GRA

N73-18131# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

ANALYSIS OF SOLUBLE BERYLLIUM BY GAS CHROMATOGRAPHY Final Report, Jul. 1968 - Nov. 1970

Michael L. Taylor and Eugene L. Arnold Aug. 1972 37 p refs

(Contracts F33615-71-C-1008; F33615-69-C-1062; AF Proj. 6302)

(AD-753112; AMRL-TR-71-117) Avail: NTIS CSCL 06/1

A new microanalytical method for the detection and quantitation of beryllium in aqueous samples and biological specimens has been developed. The method, based upon quantitation of chelated beryllium by gas chromatography, was employed to detect beryllium in both in vitro samples and tissues of rats given beryllium by injection. Beryllium was administered in the form of aqueous solutions of beryllium sulfate, and as little as 10 nanograms beryllium per gram of whole blood were detected and quantitated. In vivo studies which compared gas chromatographic analyses with radiometric analyses confirmed the validity of the new microanalytical technique. Preliminary studies were conducted to determine the ability of fluorinated chelating agents to remove beryllium oxide from the lungs of rats. Author (GRA)

N73-18132# Florida Univ., Gainesville. Communications Sciences Lab.

THE CONTRIBUTION OF THE EXTERNAL AUDITORY MEATUS TO HUMAN AUDITORY SENSITIVITY

Harry Hollien, Howard B. Rothman, and Stephen Feinstein 1 Jul. 1972 16 p refs

(Contract N00014-68-A-0173-0008; NR Proj. 196-114)

(AD-751664; CSL/ONR-40) Avail: NTIS CSCL 06/16

Support for, and a refinement of, the hypothesis that divers hear primarily by bone conduction was provided by Hollien and Brandt. To further test this hypothesis, the thresholds of seven submerged listeners were obtained (at frequencies of 0.25, 0.50, 1.0, 4.0 and 8.0 kHz) under three different conditions: (1) while they wore a full 3/16 in. wet suit with no hood, (2) while wearing a full 3/16 in. wet suit with a 3/16 in. hood and (3) while wearing a full 3/16 in. wet suit and hood with 1/4 in. rubber tubes passing through the hood to the external auditory meatuses. There were no significant differences between the conditions involving the use of a hood but thresholds were significantly lower in the middle and high frequencies for the no-hood condition. These findings provide further support for the hypothesis that underwater sound energy is transduced by bone conduction rather than by the normal middle ear linkage. Author (GRA)

N73-18133*# City Coll. of the City of New York.

NONLINEAR AND DIGITAL MAN-MACHINE CONTROL SYSTEMS MODELING Final Report

Ralph Mekel Nov. 1972 112 p refs

(Grant NGR-33-013-053)

(NASA-CR-112258; Rept-72-447-01) Avail: NTIS HC $7.75 CSCL 05H

An adaptive modeling technique is reported by which controllers can be synthesized to provide corrective dynamics to a human operator's mathematical model in closed loop control systems. The technique utilizes a class of Liapunov functions formulated for this purpose, Liapunov's stability criterion and a model-reference system configuration. The Liapunov function is formulated to possess variable characteristics to take into consideration the identification dynamics. The time derivative of the Liapunov function generates the identification and control laws for the mathematical model system. These laws permit the realization of a controller which updates the human operator's mathematical model parameters so that model and human operator produce the same response when subjected to the same stimulus. A digital computer program which is easily implemented and modified concurrent with experimentation permits the modeling process to interact with the experimentation process. Author

N73-18134*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

COST ANALYSIS OF WATER RECOVERY SYSTEMS

M. M. Yakut 15 Dec. 1912 79 p

(Contract NAS8-28377)

(NASA-CR-124098; MDC-G3994) Avail: NTIS HC $6.00 CSCL 06K

Cost and performance data from Gemini, Skylab, and other aerospace and biotechnology programs were analyzed to identify major cost elements required to establish cost estimating relationships for advanced life support subsystems for long range planning in support of earth orbital programs. Cost analysis are presented for five leading water reclamation systems; (1) RITE waste management-water system;(2) reverse osmosis system;(3) multifiltration system;(4) vapor compression system; and(5) closed air evaporation system with electrolytic pretreatment. Author

N73-18135*# Howard Univ., Washington, D.C.
SUMMER BIOMEDICAL ENGINEERING INSTITUTE 1972 Final Report
Eugene M. DeLoatch 31 Jan. 1973 269 p refs
(Contract NASw-2386)
(NASA-CR-130809) Avail: NTIS HC $15.50 CSCL 06B

The five problems studied for biomedical applications of NASA technology are reported. The studies reported are: design modification of electrophoretic equipment, operating room environment control, hematological viscometry, handling system for iridium, and indirect blood pressure measuring device. F.O.S.

N73-18136# Joint Publications Research Service, Arlington, Va.
INTERACTION OF MAN-MACHINE SYSTEMS
Ye. V. Khrunov and A. G. Bryzhatyy 22 Feb. 1973 23 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 6, 1972 p 80-85, 94-102
(JPRS-58290) Avail: NTIS HC $3.25

Articles are presented on the interaction of man and electronic computer in operational planning, and on psychological engineering and psychophysiological aspects of the activity of a cosmonaut-operator during docking and ship-to-ship transfer.

N73-18137 Joint Publications Research Service, Arlington, Va.
SOME PSYCHOLOGICAL ENGINEERING AND PSYCHOPHYSIOLOGICAL ASPECTS OF THE ACTIVITY OF A COSMONAUT-OPERATOR DURING DOCKING AND SHIP-TO-SHIP TRANSFER
Ye. V. Khrunov *In its* Interaction of Man-Machine Systems 22 Feb. 1973 p 1-8

The assignment of a significant role to the cosmonaut in spacecraft control is discussed for the approach and docking in orbit, during deceleration and descent, orientation and stabilization, and ship systems. Engineering-technical, psychological, and psychophysiological peculiarities in the activity of a cosmonaut are also discussed. F.O.S.

N73-18138 Joint Publications Research Service, Arlington, Va.
INTERACTION BETWEEN MAN AND AN ELECTRONIC COMPUTER IN OPERATIONAL PLANNING
A. G. Bryzhatyy, V. A. Terekhov, and O. K. Tikhnmirov *In its* Interaction of Man-Machine Systems 22 Feb. 1973 p 9-20 refs

A psychological study is presented of man's activity in computerized production control. The human factors, and automated operational planning are discussed. F.O.S.

N73-18139*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CIRCUIT FOR DETECTING INITIAL SYSTOLE AND DICROTIC NOTCH Patent Application
Vernon D. Gebben and John A. Webb, Jr., inventors (to NASA) Filed 30 Jan. 1973 14 p
(NASA-Case-LEW-11581-1; US-Patent-Appl-SN-327921) Avail: NTIS HC $3.00 CSCL 06B

Circuitry for processing an arterial pressure waveform to produce a pulse corresponding to the initial systole and a pulse corresponding to the dicrotic notch is reported. In the initial systole detection channel after the arterial pressure waveform is filtered and caused to lag; it is then compared to the original waveform to produce square pulses which exist when the magnitude of the original pressure waveform is greater than the lagging waveform. These square pulses are fed through a filter to a comparator and then to an initial systole signal means. The arterial pressure waveform is also fed through a dicrotic notch detection channel in which the waveform is differentiated, and then filtered to reduce low frequency components thereby resulting in a signal which is related to a second derivative of the arterial pressure waveforms with respect to time. NASA

N73-18140# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
CHANGES OF THE CIRCADIAN RHYTHM OF THE BODY TEMPERATURE AFTER TRANSMERIDIAN FLIGHTS Ph.D. Thesis - Bonn. Univ. [DIE VERAENDERUNGEN DER TAGESPERIODISCHEN SCHWANKUNGEN DER KOERPERTEMPERATUR NACH TRANSMERIDIANEN FLUEGEN]
Joerg Mertens 1973 77 p refs In GERMAN; ENGLISH summary
(DLR-FB-73-01) Avail: NTIS HC $6.00; DFVLR, Porz-Wahn: 21,40 DM

The oral body temperature of 12 pilots was studied at 2-hour-intervals during periods of 24 hours. Two 24-hour preflight periods revealed the basic normal rhythm of the body temperature. Effects of an 8-hour time shift were evaluated by determining the body temperature after flights from Germany to the U.S.A. and vice versa on day 1, 3, 5, and 8 after arrival. A desynchronization with the local time was observed after flights in both directions; however, the changes were more pronounced after the West-East flight. The resynchronization time amounted to 5 days after westward travel and at least 8 days after traveling in the opposite direction. Considerable individual differences were found in the duration and the extent of time shift effects. Author (ESRO)

N73-18141# Defense Documentation Center, Alexandria, Va.
MAN MACHINE INTERACTION Report Bibliography, Dec. 1953 - Mar. 1972
Nov. 1972 241 p refs
(AD-752800; DDC-TAS-72-71) Avail: NTIS CSCL 05/8

The annotated references include reports which study the human factors involved in solving and learning man-machine interactions, as well as the effective use of men in system design. The indexes included are Corporate Author-Monitoring Agency, and Subject. Author (GRA)

N73-18142# Aerospace Corp., El Segundo, Calif. Lab. Operations.
IR LASER RADIATION EYE PROTECTOR Research Report, Jan. - Jun. 1971
Donald J. Specer and Henry A. Bixler 29 Sep. 1972 11 p ref
(Contract F40701-72-C-0073)
(AD-753080; TR-0073(3240-10)-4; SAMSO-TR-72-277) Avail: NTIS CSCL 06/17

Eye protection equipment has been developed that makes possible safe, unobstructed viewing in environments of potential eye damage caused by IR laser radiation. The viewing window consists of a 3-mm water sheet contained within lucite panes. The water absorbs virtually all the radiation at all wavelengths in the IR = 1.9 micrometers. A 3-micrometers laser beam from a continuous HF laser at a power level of 15 W and a heat flux of 400 W/sq cm for 20 sec produced a depression in the beamward lucite window pane, but did not penetrate to the water. Author (GRA)

N73-18143# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOVIET CYBERNETICS REVIEW (SELECTED ARTICLES)
I. N. Krasavin, K. S. Labets, A. A. Pustovoitenko, Yu. P. Goryunov, V. I. Bogomolov, and G. Boyko 31 Aug. 1972 22 p Transl. into ENGLISH from Soviet Cybernetics Rev. (USSR), v. 4, no. 7, 1970
(AD-751145; FTD-HC-23-0942-72) Avail: NTIS CSCL 05/9

Contents: Computer application in group training; Some methods of applying analog computers in the training process; Branched program for accelerated teaching of algorithmic languages. GRA

N73-19064*# Indiana Univ., Bloomington. School of Medicine.
CONTROL MECHANISMS IN PHYSIOLOGICAL RHYTHMS
Sherwin Mizell 8 Jan. 1973 3 p refs
(Grant NGR-15-003-053)
(NASA-CR-131153) Avail: NTIS HC $3.00 CSCL 06P

A search was made for the factors involved in regulating rhythmic body functions. The basic premise was that at a particular point in time, any cell can normally act in one of two ways. It can either be engaged in dividing or carrying out its particular function. Experimental results indicate rhythmic functions are controlled by a lighting regime and that an inverse correlation exists between rhythms of cell division and cell function. Data also show rhythms are a function of animal sex and environment. E.H.W.

N73-19065# Advisory Group for Aerospace Research and Development, Paris (France).
COLOUR VISION REQUIREMENTS IN DIFFERENT OPERATIONAL ROLES
Nov. 1972 83 p refs In ENGLISH; partly in FRENCH Presented at AGARD Aerospace Med. Panel Specialist Meeting, Brussels, 30 May 1972
(AGARD-CP-99) Avail: NTIS HC $6.25

Proceedings are presented on the theoretical and practical aspects of color vision, the rationale of color vision requirements for air and ground crews, and color vision testing. The requirements for flying personnel of the armed forces for many nations are emphasized.

N73-19066* Duke Univ., Durham, N.C. Dept. of Ophthalmology.
THEORETICAL ASPECTS OF COLOR VISION
Myron L. Wolbarsht *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 10 p refs

(Contract NAS9-11994)

The three color receptors of Young-Helmholtz and the opponent colors type of information processing postulated by Hering are both present in the human visual system. This mixture accounts for both the phenomena of color matching or hue discrimination and such perceptual qualities of color as the division of the spectrum into color bands. The functioning of the cells in the visual system, especially within the retina, and the relation of this function to color perception are discussed. Author

N73-19067 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany). Opthalmological Branch.
PRACTICAL ASPECTS OF COLOR VISION AND ITS DISTURBANCES
Dietrich Kuerschner *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 8 p refs

A number specialities of the German Air Force, except the flying personnel, were assessed to determine the extent of color vision required. It is shown that normal color vision is mandatory only for the activities of the telephone technician and the telephone construction technician. Author

N73-19068 Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).
EXAMINATION OF CHROMATIC SENSE IN FRENCH AERIAL FORCES [L'EXAMEN DU SENS CHROMATIQUE DANS LES FORCES AERIENNES FRANCAISES]
G. Perdriel and J. Chevaleraud *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 5 p In FRENCH

A procedure was developed to test the chromatic aptitude of dyschromatopsia victims who wanted positions as navigators or pilots in France. Security procedures using such personnel and a color signaling process to aid them in perceiving colors are discussed. Transl. by E.H.W.

N73-19069 School of Aerospace Medicine, Brooks AFB, Tex. Ophthalmology Branch.
HISTORY, RATIONALE, AND VERIFICATION OF COLOR VISION STANDARDS AND TESTING IN THE UNITED STATES AIR FORCE
Thomas J. Tredici, James L. Mims, III, and James F. Culver. *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 10 p refs

The color vision testing and selection procedures utilized in World War II by the US Army Air Corps are reviewed. The color vision standards for flying in the US Air Force recently were changed for the first time since World War II. Mild defectives scoring 50 or better on the SAM color threshold tester are now accepted into flying training. A ten-year retrospective study of 4801 experienced flying personnel provides strong evidence that these standards are valid. The handling of color vision defective cases is also outlined. Author

N73-19070 National Defence Medical Centre, Ottawa (Ontario). Dept. of Ophthalomology.
COLOUR VISION IN THE CANADIAN ARMED FORCES
Bryan St. L. Liddy *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 6 p

Color vision in the Canadian Armed Forces is reviewed, including their standard tests: Ishihara standards book test, Green Edwards lantern test, and A.O. isochromatic book test. Different requirements of color vision for the various service branches are described. Minimum color vision standards for the initial assignment to trades within the armed forces are listed in tabular form. J.A.M.

N73-19071 Centre de Medecine Aeronautique, Brussels (Belgium).
STANDARDIZATION OF TEST AND CATEGORIZATION OF COLOR VISION ANOMALIES IN MILITARY CIRCLES, AND METHODS USED BY EMPLOYEES TO TRACK DOWN THEIR PROBLEMS [ESSAI DE STANDARDISATION DE LA CATEGORISATION DES ANOMALIES DE LA VISION DES COULEURS EN MILIEU MILITAIRE, AINSI QUE DES METHODES EMPLOYEES EN VUE DE LEUR DEPISTAGE]
J. M. VanDeCasteele *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 4 p In FRENCH

Sound scientific procedures developed to categorize color vision abnormalities in a uniform manner are discussed. The classification of individuals was made as a function of the number of error responses to tests, the nature of the abnormality and the gravity of the condition. Transl. by E.H.W.

N73-19072 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
COLOUR VISION REQUIREMENTS IN DIFFERENT OPERATIONAL ROLES
D. H. Brennan *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 8 p refs

Color vision in the various operational roles of the Royal Air Force and Army Air Corps was studied. It is considered that good color acuity, although playing a valuable part in the total process of visual perception, is not of paramount importance. It would be possible by altering the present chromaticities of red and green signal colors to admit for all aircrew duties, except those of close air support, the more severe grades of red green defective. It is thought, however, that the small gain in recruiting would not warrant the resulting expense and disruption of present services. The pseudo-isochromatic plates provide a simple and rapid method of detecting even minor anomalies of color vision. With present standards, the lantern is the best trade test for grading color defectives as fit or unfit for aircrew duties. Should standards be lowered it would be necessary to supplement the lantern with a quantitative test which should be related, if possible, to the role envisaged for the candidate. Author

N73-19073 Army Aeromedical Research Lab., Fort Rucker, Ala.
AIRCREW COLOR VISION REQUIREMENTS
Robert W. Bailey *In* AGARD Colour Vision Requirements in

Different Operational Roles Nov. 1972 4 p

A study revealed no statistical difference in accident rates between a selected population of color defectives and a matched sample of normals. The only significant difference demonstrated was between serious accidents in which the color normals were involved in a greater number of accidents (statistically significant) than color defectives. Operational testing of difficult cases are also presented. Author

N73-19074 Walter Reed Army Medical Center, Washington, D.C.
PREDICTING VISUAL PERFORMANCE IN AVIATORS (COLOR VISION)
Budd Appleton *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 5 p

The whole concept of physical standards for personnel selection is reviewed, emphasizing visual performance for aviators. *Color vision tests as predictive indicators of flying task performance* are evaluated. Experience with a battery of tests as part of an aeromedical in-flight evaluation is recorded in tabular form for 12 aviators. J.A.M.

N73-19075 Headquarters Army Aviation, Middle Wallop (England). Dept. of Aviation Medicine.
HELICOPTER FLYING AND COLOUR VISION
I. C. Perry *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 4 p refs

When problems are encountered in low level helicopter flying, under poor light and in featureless terrain, difficulties arise where colors have to be used for information presentation and to isolate certain items of information. Instrument lighting, map colors and marking can all become problem areas when the operators color vision is abnormal. Differences are found in methods of color vision testing. The use of colored smokes against varying backgrounds can lead to mistakes, as can wiring diagrams and wire markings. Author

N73-19076 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
COLOR VISION REQUIREMENTS FOR AIR CREW PERSONNEL OF THE FUTURE
Walter F. Grether *In* AGARD Colour Vision Requirements in Different Operational Roles Nov. 1972 7 p refs

(AMRL-TR-71-116)
Color has unique value as a means of coding visually presented information. This was shown by experimental evaluations of alternate coding methods, such as pattern, size, intensity and flash rate. A reduction in color vision selection standards for flight personnel, such as the pilot, would require the replacement of color with other and potentially less efficient visual coding methods. Such a change would restrict the visual display choices available to the designers of future information *presentation equipment, both airborne and ground. An examination* of past trends and current equipment development indicates that the use of color for coding information used by flight personnel will probably be increasing rather than decreasing in the future. Author

N73-19077*# Techtran Corp., Glen Burnie, Md.
PROBLEMS OF SPACE BIOLOGY, VOLUME 16
V. N. *Chernigovskiy, ed. Washington* NASA Feb. 1973 427 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Volume 16" Nauka Press, Moscow, 1971 427 p
(Contract NASw-2037)
(NASA-TT-F-719) Avail: NTIS HC $6.00 CSCL 06C
Medico-biological studies of the action of diverse space flight factors on the organisms of man and animals are reported with emphasis on overloads and hyperkinesia. The importance of optimum gas atmosphere selection for humans in enclosed spaces is considered.

N73-19078* Techtran Corp., Glen Burnie, Md.
REACTIVITY OF AN ORGANISM IN CONDITIONS OF PROLONGED SPACEFLIGHT
P. V. Vasilyev *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 3-11 refs Presented at the 3d Intern. Symp. on the Basic Probl. of Human Life in Space, Geneva, Nov. 1968

CSCL 06C
It was determined that weightlessness and hypodynamia lead to functional reorganization of the organs of circulation, respiration, and excretion, analyzers, regulatory systems of the organism, as well as different kinds of metabolism. Data show that under the effect of weightlessness and hypodynamia the orthostatic and vestibular stabilities decrease, sensitivity to infections increases, resistance to accelerations and physical stress decreases, and reaction to medication changes. Author

N73-19079* Techtran Corp., Glen Burnie, Md.
CERTAIN RESULTS OF MEDICAL INVESTIGATIONS ABOARD THE VOSKHOD-2 SPACECRAFT
I. I. Kasyan, D. G. Maksimov, I. G. Popov, V. G. Terentyev, L. S. Khachaturyants, and G. F. Khlebnikov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 12-28 refs

CSCL 06E
During flight in the Voskhod-2 spacecraft it was found that reaction of the cardiovascular and respiratory systems in the pre-launch period and during the majority of the stages of the orbital flight did not differ substantially from observations in preceding flights. The frequency of heart contractions and respiration rose in the cosmonauts by only 1.5-2 times during the launching. Clinical examinations for three days after the flight showed an increase in reaction of the cardiovascular system to orthostatic tests and physical loads. Electrocardiographic examination revealed slowing down of intragastric conductivity and increase of the systolic index. EEG analysis showed reinforcement of sluggish activity. Author

N73-19080* Techtran Corp., Glen Burnie, Md.
STUDY OF FEATURES OF HIGH INTENSITY NOISE EFFECTS DURING SPACEFLIGHT
Ye. M. Yuganov, Yu. V. Krylov, and V. S. Kuznetsov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 29-33 refs

CSCL 06S
Experiments were performed to study the effect on man of high intensity noises whose frequency range, length and volume corresponded to the conditions of the active period of spaceflight. The effect of 125-126 and 114-116 db of noise on the auditory and motor analyzers, and also on the condition of the pulse and blood pressure of 24 subjects was studied in 105 experiments during exposure for 20 minutes. It was found that noise at 125-126 db during the given exposure time causes unfavorable reactions on the part of the above mentioned indices. It was concluded that there is no danger from noise at 114-116 db for 20 minutes, considering the demands and particular features of spaceflight. Author

N73-19081* Techtran Corp., Glen Burnie, Md.
EFFECT OF IMMERSION ON CERTAIN MOTOR FUNCTION INDICES
A. A. Korobova, A. V. Ovsyannikov, G. G. Ratishvili, and A. V. Korobkov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 34-48 refs
CSCL 06S
Indices of a simple movement with visual adjustment and without it, and also a determination of the peculiarities of the functional state of the segmentary apparatus of the spinal column during the period of organization of voluntary movements of man during prolonged stay in a physiological solution are reported. Reduction of the threshold value of the H-reflex during a three to four day stay in conditions of immersion is seen as a consequence of the increase of reflector excitability of alpha-motor neurons of the spinal column. Comparative evaluation of execution of a motor problem with visual adjustment and without it shows shifts during shut-off of the visual adjustment both in background

examinations and after immersion on all days of recovery. The immersion medium has a different effect on the postural tonic and phase musculature, and correspondingly also on the nature of execution of motor acts. Author

N73-19082* Techtran Corp., Glen Burnie, Md.
BASAL METABOLISM UNDER CONDITIONS OF SIMULATED WEIGHTLESSNESS
V. I. Sokolkov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 49-55 refs
CSCL 06S

The effect of twenty-four hours' water immersion on the level of basal metabolism and certain functions of external respiration of man was studied. Under conditions of water immersion the indices of basal metabolism of the consumption of oxygen, of elimination of carbon dioxide, pulmonary ventilation and the coefficient of the use of oxygen are higher than under conditions of staying in bed. This confirms that models of weightlessness, such as hypodynamia (bed conditions) and water immersion lead to different levels of metabolisms. Author

N73-19083* Techtran Corp., Glen Burnie, Md.
CHANGE IN THE CAPACITY OF MAN TO WITHSTAND TRANSVERSE STRESSES AFTER HYPODYNAMIA OF VARYING DURATION
A. R. Kotovskaya, R. A. Vartbaronov, and S. F. Simpura *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 56-65 refs Presented at the 18th Congr. of the Intern. Astronautical Federation, Belgrade, 25-30 Sep. 1967

CSCL 06S

The capacity of man to withstand transverse stresses after hypodynamia was studied. Gradual reduction in the resistance to the action of maximum stresses was detected at time periods of hypodynamia from 7 to 15-20 hours. Later resistance to stresses was preserved approximately at the same level up to the 60th hour of hypodynamia. Similar shifts were obtained in a study of the reactivity of the cardiovascular and breathing systems to stresses determined by the level of pulse strain and increase of pulmonary ventilation before and after hypodynamia of varying duration. The results obtained give a basis for supposing the existence of a second phase (stabilization) in the development of a unique adaptation to conditions of hypodynamia. Author

N73-19084* Techtran Corp., Glen Burnie, Md.
CHANGE IN CERTAIN INDICES OF THE FUNCTION OF EXTERNAL RESPIRATION DURING THE ACTION OF G-FORCES
S. F. Simpura *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 66-79 refs
CSCL 06S

In studies on human beings dynamics of changes in the basic indices of the function of external respiration during the action of spike-like type transverse g-forces were studied. Shifts in the systems of respiration and gas exchange during the action of spike-like type g-forces confirm the disturbance of the oxygen balance. Disturbance to the rhythm of respiration under g-forces of up to 13 units did not cause significant shifts in the functions of respiration and gas exchange; during g-forces of higher than 13 units (up to 16 units) there was a marked decrease in the effectiveness of ventilation and gas exchange in lungs. Author

N73-19085* Techtran Corp., Glen Burnie, Md.
EFFECT OF ACCELERATIONS ON REACTIVITY OF THE GASTRO-INTESTINAL TRACT TO PHARMACOLOGICAL AGENTS
P. V. Vasilyev, I. G. Krasnykh, V. Ye. Potkin, and L. A. Tyutin *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 80-86 refs
CSCL 06S

In roentgenographic experiments on white rats, the effects of transversely oriented accelerations on reactivity of an organism to pharmacological agents which act primarily on the gastro-intestinal tract were studied. A change is observed in the sensitivity of the rats to the action of acetylcholine and carbocholine for a period of five minutes after accelerations having a value of twenty. Author

N73-19086* Techtran Corp., Glen Burnie, Md.
CHANGES IN THE NUCLEI OF LIVER CELLS DURING THE ACTION OF TRANSVERSE STRESSES ON ANIMALS
Ye. F. Kotovskiy and G. A. Kosolapov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 87-92 refs

CSCL 06C

A karyometric study of the nucleus of liver cells of intact white rats and rats subjected to the action of stresses was performed with a value of 25 units for 10 minutes in the direction of chest-back. A reduction in the volume of the nuclei and the nucleoli one and two hours after the action of stresses was found. There was reduction in the amount of nuclei of class K sub 3 six and seven hours after the action of stresses, but there was an increase in the number of large nuclei of classes K sub 4 and K sub 8. Simultaneously the mitotic activity increased by eight to nine times and the amounts of small nuclei of class K sub 1 increased. A slight hemorrhaging in the liver which caused destruction of sections of the parenchyma was noticed. Author

N73-19087* Techtran Corp., Glen Burnie, Md.
PROBLEM OF THE INTERACTION OF ANALYZERS AND DEGREE OF VESTIBULAR REACTIONS TO THE ACTION OF EXTERNAL STIMULI
S. S. Markaryan *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 93-113 refs
CSCL 06C

Investigations on human test subjects in order to determine the efficiency of certain methods of inhibiting illusory sensations and postrotational nystagmus based on the action of sound, light and proprioceptive stimuli were conducted. The data obtained show that the action of light of varying intensity causes inhibition of vestibular nystagmus while the duration of the illusion of counter-rotation remains almost unchanged. During the action of sound with a frequency of 1,000 Hz and intensity of 100-110 db the duration of the illusion of counter-rotation is abbreviated and the amplitude and duration of post-rotational nystagmus are reduced. Muscle forces which are developed during manual and especially during postural dynamometry shorten the length of the illusion of counter-rotation, and shortening of the length of the illusion becomes more pronounced along with an increase of the muscular forces. Author

N73-19088* Techtran Corp., Glen Burnie, Md.
CONDITION OF THE VESTIBULAR ANALYZER IN DOGS AFTER PROLONGED IRRADIATION IN SMALL DOSES
P. I. Kumets *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 114-119 refs
CSCL 06C

The functional condition of the vestibular analyzer in sixty dogs, some of which were subjected to continuous radiation action in overall doses of 25-225 rads/year were evaluated. Six dogs were given medical preventive agents. Quantitative evaluation of the functional conditions of the vestibular analyzers showed an increase in excitability of the spatial analyzer by 35-40% in animals which had been irradiated with a total dosage of 225 rads/year. Observed is a tendency towards decrease of excitability and increase of reactivity in the group of animals which had been irradiated with a dose of 225 rads/year and which had received medical preventive agents. Author

N73-19089* Techtran Corp., Glen Burnie, Md.
CONDITION OF METABOLISM DURING PROLONGED STAY OF MAN IN A SMALL ENCLOSURE WITH CYCLICALLY CHANGING ATMOSPHERE
I. G. Popov, Yu. K. Syzrantsev, P. P. Lobzin, I. A. Romanova, S. A. Bugrov, and R. V. Kudrova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 120-132 refs

CSCL 06S

Nitrogen and water-salt metabolisms in two test subjects who stayed for 35 days in a small enclosure with a cyclically changing atmosphere were studied. There is a tendency to reduction of negative nitrogen balance during the action of hypoxic gas mixtures with some excess of carbon dioxide which probably is conditioned by the increase in activity of the respiratory muscles. At this time a change in the structure of the water metabolism is noted. Author

N73-19090* Techtran Corp., Glen Burnie, Md.
CONDITIONS OF ASCERTAINING AND CONDITIONING MAN'S CAPACITY TO DISTINGUISH THE COMPOSITION OF A BREATHING ATMOSPHERE
I. S. Breslav, A. G. Zhironkin, and A. M. Shmeleva *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 133-144 refs

CSCL 06S

The capability of man to distinguish changes in the composition of inhaled air has been studied. Man's ability to distinguish changes in the composition of gas mixtures improved under conditions of a constant (fixed) level of pulmonary ventilation. An individual variability of reactions in different people to hypoxic and hypercapnic environments was noted. During repeated exposures to different respiratory mixtures man can more clearly differentiate between these mixtures according to his sensations. Thus, the ability of man to distinguish definite changes in the amount of separate components of breathed air according to his sensations may be improved. Author

N73-19091* Techtran Corp., Glen Burnie, Md.
EFFECT OF HYPEROXIC MEDIUM ON CELLS, TISSUES AND ORGANS OF EXPERIMENTAL ANIMALS
Ye. F. Kotovskiy and L. L. Shimkevich *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 145-158 refs

CSCL 06S

Data on the general morphology, ultrastructure and histochemistry of various organs of experimental animals during hyperoxia are reviewed. Basically, information is presented on the effect of 100% O2 at normal barometric pressure. Oxygen damages the vascular wall by eosinophilic infiltration of tissues and has a pronounced action on the condition of the ultrastructure and metabolism of cells. Initially there is activation of metabolisms of cells without visible morphological changes. This period (6 hours) is considered on the whole as harmless for the organism. Later (after 12 hours) phenomena of a pathological nature arise. A compensatory increase in the activity of glycolytic enzymes ensures following the appearance of secondary hypoxia in tissues. Author

N73-19092* Techtran Corp., Glen Burnie, Md.
ACTION OF HYPEROXIA ON CONNECTIVE TISSUE
L. L. Shimkevich *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 159-167 refs
CSCL 06S

A general morphological, electron microscopic and cytochemical study of subcutaneous connective tissue of white rats while keeping them under conditions of increased partial pressure of oxygen was conducted. A short term action of pure oxygen at 1 ata caused activation of metabolism in the connective tissue cells without disturbance of ultrastructures. Noticeable pathological changes arose after twelve hours, later they advanced and appeared as destruction of cellular organelles, as suppression of cellular metabolism, and partially as a reduction in the activity of the oxidative enzymes. Destructive changes of collagenic fibers were noticed. Data are also presented on the structure and cytochemistry of connective tissue under other conditions of hyperoxia. Author

N73-19093* Techtran Corp., Glen Burnie, Md.
GAS EXCHANGE AND ELECTRICAL ACTIVITY OF THE SKELETAL MUSCULATURE OF ANIMALS IN A HELIUM AND OXYGEN MEDIUM
G. V. Troshikhin *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 168-174 refs
CSCL 06C

The gas exchange electrical activity of the skeletal musculature (EAM) -- the heat regulating tonus, and the rectal temperature for rats which were kept for one hour in the air, in a helium-oxygen mixture and again in air, were studied. Animals kept in the helium-oxygen atmosphere at room temperature showed a definite increase in the level of gas exchange, an increase of the EAM, and a drop in rectal temperature. Transition to air respiration brought about normalization of almost all the functions. Increasing the temperature by 5 deg (25-27 deg) in comparison with that of air (20-22 deg) led to a small decrease of EAM indices, gas exchange, and body temperature. Author

N73-19094* Techtran Corp., Glen Burnie, Md.
STUDY OF THE PHYSIOLOGICAL EFFECT OF REPLACING ATMOSPHERIC NITROGEN IN THE AIR WITH INERT GASES UNDER CONDITIONS OF OXYGEN INSUFFICIENCY AND INCREASED CONCENTRATIONS OF CARBON DIOXIDE
M. M. Osipova and A. G. Dianov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 175-180 refs

CSCL 06K

In experiments with rats it is shown that replacing atmospheric nitrogen with argon in hermetically enclosed chambers at -22 C does not affect the basic physiological functions and longevity of the animals. This confirmed the supposition that an increase of longevity of animals in hermetically enclosed chambers with a helium-oxygen atmosphere is determined by the high thermal conductivity of helium in comparison with nitrogen. Author

N73-19095* Techtran Corp., Glen Burnie, Md.
POSSIBILITY OF USING ADAPTATION OF HYPOXIC HYPOXIA IN A SYSTEM OF CONDITIONING
A. V. Yeremin, A. N. Azhayev, V. I. Stepantsov, P. V. Buyanov, V. S. Formin, and D. Yu. Arkhangelskiy *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 181-187 refs

CSCL 06P

The possibility of conditioning to increase human resistance to certain extreme factors was studied. Three series of investigations were conducted: The first at an altitude of 4,000 m with optimum air temperature; the second at an altitude of 4,000 m with high air temperature; and the third at an altitude of 2,000 to 5,000 m with changing physical stress at an optimum air temperature. Length of the conditioning cycle was twenty days. Results of the investigation showed that the third series of conditioning was the most effective for increasing resistance to high temperatures, transversely oriented stresses, and vestibular-optical-kinetic stimuli. Author

N73-19096* Techtran Corp., Glen Burnie, Md.
EFFECT OF CERTAIN GASEOUS TOXIC SUBSTANCES ON THE RESISTANCE OF ANIMALS TO ACUTE HYPOXIC HYPOXIA
B. I. Abidin, N. M. Asyamolova, and A. K. Sgibnev *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 188-198 refs

CSCL 06T

The effect of different concentrations of a mixture of gaseous chemical substances on the ability of animals to withstand acute hypoxic hypoxia is examined. Comparative data of the change in EEGs, EKGs, and respiration of inoculated and intact rats under conditions of rarefied atmosphere, which corresponds to an elevation of 10,000 m are analyzed. Gaseous chemical substances change the relationship of the organism of animals to the influence of hypoxic hypoxia, reduce the physiological ceiling, and increase the ability to withstand acute oxygen deficiency. Author

N73-19097* Techtran Corp., Glen Burnie, Md.
CERTAIN PECULIARITIES OF THE BIOLOGICAL ACTION OF GASEOUS TOXIC SUBSTANCES WHICH ARE DISCHARGED INTO THE ATMOSPHERE FROM THE URINE

AND FECES
V. V. Kustov, V. I. Mikhaylov, and L. T. Poddubnaya *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 199-205 refs

CSCL 06T

In tests on white rats it was determined that a variety of gaseous toxic substances which enter the air from fresh and stored excrement has not only an irritating but also a generally toxic action. Author

N73-19098* Techtran Corp., Glen Burnie, Md.
EFFECT OF A CHEMICAL PRESERVATIVE ON THE INTENSITY OF THE DISCHARGE OF CERTAIN GASEOUS TOXIC SUBSTANCES FROM STORED URINE
L. T. Poddubnaya, L. N. Rogatina, V. V. Kustov, and V. I. Mikhaylov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 206-209 refs

CSCL 06T

The effect of a chemical preservative from a class of phenols on the intensity of gas discharges from stored urine was studied. It was determined that addition of a preservative reduces the entrance of substances of a group of ammonia, ketones, fatty acids and nitrogen oxides into the air. In addition the discharge of carbon monoxide and organic compounds, as determined by the total amount of carbon, did not change. Author

N73-19099* Techtran Corp., Glen Burnie, Md.
PRESERVATION OF URINE IN A SYSTEM FOR REGENERATION OF WATER FROM IT c05
L. N. Rogatina, A. M. Karagodina, and V. A. Panchenko *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 210-215

CSCL 06K

Thirty-two substances and their combinations for the preservation of urine during storage for two weeks at 18-20 deg were studied. Five prescriptions were also studied for regeneration of water from urine. During the preservation of the urine a reduction was noted in the amount of ammonia and organic substances in the condensate. The condensate corresponded to standard requirements for drinking water for the amount of microorganisms, transparency and odor. A small amount of preliminary purification of the condensate on ion exchange resins was required in order to obtain water which corresponds to requirements for drinking water based on physical-chemical indices. Author

N73-19100* Techtran Corp., Glen Burnie, Md.
THE RESISTANCE OF ANIMALS TO TOXIC ACTION OF CERTAIN GASES AFTER ADAPTATION TO HYPOXIA
G. A. Vasilyev, L. A. Tiunov, and V. V. Kustov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 216-222 refs

CSCL 06S

In tests of white rats the resistance of animals which had been adapted to hypoxia and to the the toxic action of carbon monoxide, nitrogen oxide, triethylamine and Freon-12 is studied. Preliminary adaptation of the animals to hypoxia increases their resistance to acute poisoning by carbon monoxide, nitrogen oxides and Freon-12 and does not change the sensitivity of the mice to the toxic action of triethylamine. It is assumed that adaptation of the animals to hypoxia may substantially increase the resistance to the toxic action of poisons which disturb the oxygen balance in an organism. Author

N73-19101* Techtran Corp., Glen Burnie, Md.
THE TOXIC ACTION OF GASEOUS PRODUCTS OF THE VITAL ACTIVITY OF AN ORGANISM
T. S. Kolosova, L. A. Tiunov, V. V. Kustov, L. V. Ivanova, G. A. Vasilyev, G. A. Lemesh, and M. A. Akhmatova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 223-232 refs

CSCL 06T

The peculiarities of the biological action of a group of gaseous products of the vital activity of white rats in twenty-six day experiments were studied. It was established that this group of chemical substances causes damage to the pulmonary tissue and development of anemia in the experimental animals, and leads to an increase in oxygen consumption, increase in weight of the thyroid gland, inhibition of the growth of the experimental rats, and changes in the catalase activity of the blood. Author

N73-19102* Techtran Corp., Glen Burnie, Md.
PROBLEM OF STUDYING THE TOXICITY OF INDOLE
A. K. Sgibnev and T. A. Orlova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 233-239 refs

CSCL 06T

Inhalation of indole vapors in a concentration of 9.0 to 10.0 mg/cu m for two to three hours causes no substantial changes in the organism of mice, rats and rabbits. After intravenous injection of rabbits with 10.0 mg of an alkaline solution of indole the latter is quickly rendered harmless and expelled from the organism. The threshold for perception of the unpleasant odor of indole is 0.45 mg/cu m. Inhaling the indole vapors in the concentration of more than 1.0 mg/cu m may lead to negative subjective sensations: headache, nausea. Author

N73-19103* Techtran Corp., Glen Burnie, Md.
PROBLEM TO TOXICITY OF EXHALED AIR
V. V. Kustov, L. T. Poddubnaya, and V. I. Mikhaylov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 240-243 refs

CSCL 06T

Peculiarities of the biological action of air, exhaled by man, were studied in tests on white mice. It was determined that a group of gaseous toxic substances contained in exhaled air cause neural humoral shifts in an organism which involve a certain intensification of the inhibiting reaction in the nervous system. Author

N73-19104* Techtran Corp., Glen Burnie, Md.
PECULIARITIES OF DETERMINING THE OXIDIZABILITY OF WATER DURING ITS REGENERATION c05
V. A. Kryuchkov and N. S. Mareyeva *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 244-253 refs

CSCL 06K

The completeness of oxidation of organic impurities in the condensate of the atmospheric vapors of an inhabited cabin was studied. All of the errors which were determined were analyzed. A conclusion of the possibility of using a different method of determination of oxidizability for the analysis of the regenerated water was provided. These methods have been developed for ground waters, stagnant waters and other waters. Author

N73-19105* Techtran Corp., Glen Burnie, Md.
STUDY OF THE TECHNOLOGY OF DECONTAMINATION OF WATER WHICH HAS BEEN REGENERATED FROM THE LIQUID PRODUCTS OF HUMAN VITAL FUNCTIONS c05
V. A. Kryuchkov and L. I. Rogatina *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 254-261 refs

CSCL 06K

Decontamination of water during its regeneration from products of the vital functions of man is considered. It has been shown that the starting products may contain a large quantity of microflora. In order to guarantee decontamination of the regenerated water the following technological procedures have been developed: conservation of urine, filtration of condensate of water through sorbents, and preparation of components of a system from materials which have antimicrobial properties. Author

N73-19106* Techtran Corp., Glen Burnie, Md.
EFFECT OF THE FREQUENCY OF CHANGING THE NUTRIENT SOLUTION ON PRODUCTIVITY OF PLANTS CULTIVATED ON KERAMZIT
I. V. Tsvetkova, V. P. Zamota, and E. V. Maksimova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 262-279 refs

CSCL 06A

Different time intervals for changing the nutrient solution in order to ensure its regeneration by the conservation of higher plants using the hydroponic method with a keramzit substrate are studied. Experimental data show that in order for the greenhouse to function at the given productivity within limits of a calculated theoretical data, the nutrient solution must be changed once in 90 days. Later use of the solution leads to an increase in the area needed by the greenhouse. The necessity of frequent regeneration of large amounts of nutrient solution and the high absorbing capacity of the substrate make possible its use in greenhouses with closed cycles. Author

N73-19107* Techtran Corp., Glen Burnie, Md.
CERTAIN INDICES OF THE MATERIAL BALANCE OF MAN AS A COMPONENT IN A CLOSED ECOLOGICAL SYSTEM
Ye. I. Pokrovskaya and A. P. Tereschchenko *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 271-279 refs

CSCL 06P

The lack of stabilization in the process of elimination of elements from the human organism when kept on a constant diet is reported. The ratio of minimum and maximum amounts is 1:1.3-2.0. This regularity must be kept in mind when creating cultural media for autotrophic and heterotrophic organisms which are the separate units of biological-technological life support systems. The presence of a correlational relationship between certain elements when eliminating them from the organism along with the urine is weakened when different stress factors act on the organism. Author

N73-19108* Techtran Corp., Glen Burnie, Md.
STUDIES OF THE STABILITY OF THE CHEMICAL COMPOSITION OF A CHLORELLA BIOMASS DURING ITS PROLONGED CULTIVATION WITH RECOVERY OF THE MEDIUM ON NITRATES
Ye. K. Lebedeva, G. I. Meleshko, T. B. Galkina, and N. N. Yegorova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 280-291 refs
CSCL 06C

The chemical composition of a biomass remains sufficiently stable during prolonged cultivation of Chlorella with recovery of the medium. Variations in the amount of carbon and nitrogen in the biomass were respectively 1.5 and 5%, and the fluctuations of other basic elements did not exceed 10% of the average value. Fluctuations in the chemical composition were both spontaneous and related to cultivation conditions. Actual fluctuations of the chemical composition of a biomass, as a biological feature of the strain used, stay within a narrower range than fluctuations which are caused by cultivation conditions that are recorded during the test process. Author

N73-19109* Techtran Corp., Glen Burnie, Md.
USE OF PRODUCTS OF BIOLOGICAL MINERALIZATION FOR CULTIVATION OF HIGHER AND LOWER AUTOTROPHS
S. I. Tsitovich, I. V. Tsvetkova, M. I. Belyakova, V. F. Varlamov, V. P. Zamota, Ye. V. Maksimova, I. L. Chernovich, and V. N. Faleyeva *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 292-297
CSCL 06M

Data on the use of products of the vital functions of man which are mineralized by a biological method are reported. On the basis of these products nutrient solutions are made and subjected to biological tests using lime and higher autotrophs. Results show that the productiveness of the test plan does not differ from the control variants; the nutrient mixtures do not contain toxic substances, which means that they could be used with adjustments for cultivating higher and lower plants. Author

N73-19110* Techtran Corp., Glen Burnie, Md.
PROBLEM OF THE POSSIBILITY OF USING PRODUCTS OF THE VITAL FUNCTIONING OF MAN WHICH HAVE BEEN MINERALIZED BY THE WET BURNING METHOD c05
V. P. Zamota, I. V. Tsvetkova, E. V. Maksimova, A. L. Agre, B. G. Gusarov, and T. V. Nolde *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 298-305 refs

CSCL 06K

Experimental data are reported on the raising of higher plants by the hydroponic method on a porous clay filter using fecal masses which have been mineralized by the wet burning method. In the course of a year during the experiment, no reduction in the productivity of plants in dry and wet matter was noticed. The incompletely oxidized organic compounds of the mineralized products were not incorporated in the nutrient solution during the experiment but were absorbed by the substrate or completely mineralized by biological means and had no toxic effect on the plants. Author

N73-19111* Techtran Corp., Glen Burnie, Md.
PROBLEM OF MINERALIZATION OF VEGETATIVE WASTE PRODUCTS OF A BIOCOMPLEX BY THE METHOD OF THERMAL COMBUSTION c05
I. V. Tsvetkova, B. G. Gusarov, V. P. Zamota, Ye. V. Maksimova, and L. A. Filatkina *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 306-310 refs
CSCL 06I

Carrying out the process of mineralization of waste products depends to a great extent on the specific peculiarities of the culture and the conditions of their cultivation. During cultivation of plants on aluminoferrosilicate heavy metals are washed away and accumulate in the root systems. The buildup of elements with changing valences has a catalytic effect during the use of the thermal combustion method. The greatest quantity of metals is built up in the economically nonuseful part of cabbage which brings about damage to the oxide film of the working surfaces of the burners. A number of requirements for earth burner devices in order to carry out thermal mineralization are necessary. Author

N73-19112* Techtran Corp., Glen Burnie, Md.
STUDY OF A METHOD OF CONSERVATION OF URINE RELATIVE TO SPACEFLIGHT CONDITIONS c05
V. V. Borshchenko, V. I. Vashkov, and L. N. Rogatina *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 310-316 refs

CSCL 06K

Seven phenyl-containing substances were studied for purposes of conservation of urine during storage. The most effective seems to be the preparation called PNF. It easily dissolves in urine and assures its conservation for 100 days under normal conditions of a loss of 0.2 g per 100 ml of urine. The preparation PNF, included in the filler of a sanitation device, practically did not change the physical-mechanical properties of the latter but did give the filler an antimicrobial activity. Author

N73-19113* Techtran Corp., Glen Burnie, Md.
THE FOOD COMPONENT, BASED ON STORES OF DEHYDRATED PRODUCTS, IN LIFE SUPPORT SYSTEMS FOR CREWS OF SPACE VEHICLES DURING PROLONGED FLIGHTS c05
V. P. Bychkov, M. I. Kozar, N. N. Boyko, I. I. Borodulina, V. N. Gryaznova, V. S. Dupik, A. G. Kasatkina, Ye. V. Kolchin, M. V. Markaryan, and T. V. Fedotova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 317-335 refs

CSCL 06K

Tests were conducted on the state of health, the metabolic processes and the immunoreactivity of the organisms of six test subjects who were kept on a ration of dehydrated food products for 120 days. The data obtained in the experiment for the level of elimination of a number of substances from the organisms and for the balance of certain elements are used in calculating the food component, which is based on stores of dehydrated products, in prolonged flight with daily energy consumptions of about 3,000 kcal on the part of the cosmonauts. Adaptation of the organism to such a diet occurs in the first two months. Author

N73-19116* Techtran Corp., Glen Burnie, Md.
PROBLEM OF THE SURVIVAL OF MICROORGANISMS UNDER CONDITIONS SIMULATING THOSE ON MARS
V. M. Rumyantseva, V. L. Levin, and M. A. Rybin *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 366-370 refs

CSCL 06M

An aqueous suspension of microorganisms was placed in sand which was enriched by organic substances. Test tubes with sand were placed open into a low pressure chamber of a photostat device, where they were kept for 2-14 days in an atmosphere of carbon dioxide at a pressure of 10 mm Hg. The temperature throughout the day changed from +25 to -25 C. The most resistant of the museum cultures tested were the strains of Mycococcus luteus, but among the microorganisms separated from Antarctic soil there were two unidentified forms: C sub 1 and A sub 14. Concentration of cells in these cultures increased during the tests by 1-2 orders. Author

N73-19120* Techtran Corp., Glen Burnie, Md.
ACTION OF A SET OF EXTREMAL FACTORS ON RIBONUCLEASE
G. S. Komolova, Ye. V. Belikova, and I. A. Yegorov *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 407-414 refs

CSCL 06C

The actions of a set of certain extremal factors on solutions of ribonuclease: ultraviolet light + X-ray radiation and ultraviolet light + repeated freezing and thawing were studied. The ultraviolet and X-ray radiation caused inactivation of the ribonuclease by chemical modification of tyrosine groups in the molecule. During the combined irradiation of ribonuclease by ultraviolet and X-rays an additive summation of their actions was observed. Cryolysis caused denaturing changes in a molecule of ribonuclease which were different from those observed during photolysis. An irradiation of solutions of an enzyme increased its sensitivity to subsequent actions of freezing-thawing. Author

N73-19121* Techtran Corp., Glen Burnie, Md.
EFFECT OF A GAS ENVIRONMENT ON CATALASE CRYOLYSIS
G. S. Komolova *In its* Probl. of Space Biol., Vol. 16 Feb. 1973 p 415-421 refs
CSCL 06C

Catalase is inactivated during repeated freezing and thawing of its solutions. The effect depends on the temperature of freezing and the gas atmosphere. Gases tested for the degree of their effect on cryolysis in order of increasing effect on inactivation of the enzymes are: N2, He, O2, and H2. In a gas environment consisting of oxygen and nitrogen an additive summation of the effects on cryolysis which were produced by each gas separately is observed. The effect of an atmosphere consisting of hydrogen and argon and cryolysis of an enzyme revealed a significant increase of inactivation in comparison to the expected motivation for the case of additive summation of effects produced by each gas separately. Author

N73-19122*# Food and Drug Administration, Cincinnati, Ohio.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Report, 1 Jul. - 30 Sep. 1972
J. C. Wimsatt Jan. 1973 8 p
(NASA Order W-13411)
(NASA-CR-131103; QPR-30) Avail: NTIS HC $3.00 CSCL 06M

An experimental sterilization facility was developed to simulate conditions that will be encountered during terminal sterilization of space vehicles. The system consists of a temperature controlled oven with a nitrogen gas stream containing a known concentration of water. Moisture analyzers are utilized to monitor the gas flowing over spore samples contained in the oven. In its original configuration, no provision was made for the control of water vapor during the sterilization cycle. Because moisture profoundly influences the thermal inactivation of bacterial spores, an upper limit for the moisture content in the gas used to sterilize the space vehicle was established (25% RH at 0 C STP). Accordingly, a controller was developed and installed to provide these conditions in the experimental sterilization facility. Author

N73-19123*# Public Health Service, Phoenix, Ariz. Environmental Microbiology Section.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Report for Oct. - Dec. 1972
Martin S. Favero Dec. 1972 23 p
(NASA Order W-13062)
(NASA-CR-131086; Rept-40) Avail: NTIS HC $3.25 CSCL 06M

Heat studies with the highly resistant bacterial spore isolated from Cape Kennedy soil were continued, and the D130C was determined. The interior surfaces of the command module of the Apollo 17 spacecraft were studied for microbial contamination during assembly and testing. The thermal resistance of naturally occurring airborne bacterial spores was determined, using the heating times of 2, 4, 6, and 8 hr. at 125 C. The evaluation of a terminal sterilization process for unmanned lander spacecraft is also continuing. J.A.M.

N73-19124*# Techtran Corp., Silver Spring, Md.
CIRCULATION AND WATER BALANCE DURING IMMERSION IN A WATER BATH
D. Kaiser, P. Eckert, O. H. Gauer, and H.-J. Linkenbach Washington NASA Mar. 1973 4 p refs Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), v. 278, no. 52, 1963 p 52-53
(Contract NASw-2485)
(NASA-TT-F-14834) Avail: NTIS HC $3.00 CSCL 06S

Immersion of the human body in a temperature-controlled bath leads to a three-fold increase in water diuresis, mainly at the expense of the blood plasma. Author

N73-19125# Civil Aeromedical Inst., Oklahoma City, Okla.
AUDITORY EFFECTS OF NOISE ON AIR CREW PERSONNEL
Jerry V. Tobias Nov. 1972 9 p refs
(FAA-AM-72-32) Avail: NTIS HC $3.00

Hearing-threshold tests were made on flight personnel of several sorts, including aerial-application pilots, flight instructors, private pilots, stewardesses, and FAA flight inspectors. Excluding those people whose flight experience is of short duration, each group shows some measurable degree of threshold shift, although this shift is frequently not enough to be regarded as a clinically significant entity. Data on the sorts of noise exposures each group commonly receives are presented, and some cautions are offered regarding interpretation of the data. Author

N73-19126*# Techtran Corp., Glen Burnie, Md.
PROBLEMS OF SPACE BIOLOGY. VOLUME 15: FUNCTIONAL MORPHOLOGY DURING EXTREMAL ACTIONS
Ye. F. Kotovskiy, L. L. Shimkevich, and P. V. Vasilyev, ed Washington NASA Feb. 1973 488 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii. Tom 15: Funktsionalnaya Morfologiya pri Ekstremalnykh Vozdeystviyakh" Moscow, Nauka, 1971 385 p
(Contract NASw-2037)
(NASA-TT-F-738) Avail: NTIS HC $6.00 CSCL 06C

Data is presented on the functional morphology of various organs and tissues during action on the organism of several factors of space flight: g-forces, hypoxia and hyperoxia. A detailed account is given of the state of the basic functional systems of the organism: the central nervous system, the respiratory system, the cardiovascular system, the digestive system, the excretory system and the endocrine system. Correlations are made between the physiological and histological indices. Particular attention is given processes occurring at the cellular level. On the basis of data in the literature, and observations on flight and electron microscopy, histochemistry, and biochemistry, changes in the fine structure and metabolism in cells, tissues, and organs are analyzed. The action mechanisms of external factors on the cell are analyzed in detail. Author

N73-19127*# *Naval Biomedical Research Lab., Oakland, Calif.*
STUDIES ON POSSIBLE PROPAGATION OF MICROBIAL CONTAMINATION IN PLANETARY CLOUDS Annual Report
R. L. Dimmick and M. A. Chatigny 15 Jan. 1973 42 p refs
(NASA Order W-13450)
Avail: NTIS HC $4.25 CSCL 06M

Current U.S. planetary quarantine standards based on international agreements require consideration of the probability of contamination (Pc) of the outer planets, Venus, Jupiter, Saturn, etc. One of the key parameters in estimation of the Pc of these planets is the probability of growth (Pg) of terrestrial microorganisms on or near these planets. For example, Jupiter and Saturn appear to have an atmosphere in which some microbial species could metabolize and propagate. This study includes investigation of the likelihood of metabolism and propagation of microbes suspended in dynamic atmospheres. It is directed toward providing experimental information needed to aid in rational estimation of Pg for these outer plants. Author

N73-19128# *Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.*
A PROGRAM FOR AUTOMATIC ANALYSIS OF BIOLOGICAL PARAMETERS
L. Pastena and A. Verdecchia 21 Apr. 1972 34 p refs In ITALIAN; ENGLISH summary
(ISS-72/4) Avail: NTIS HC $3.75

A computer program is described for the evaluation of the stimulated modifications of n biological parameters (n equal to or less than 5). The program forecasts statistical tests on the validity of the variations that parameter suffer in the time and furthermore offers the possibility to comparatively evaluate different variations of the same. Author

N73-19129*# Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex. Dept. of Physiology.
SPECIALIZED PHYSIOLOGICAL STUDIES IN SUPPORT OF MANNED SPACE FLIGHT
U. C. Luft Feb. 1973 164 p refs
(Contract NAS9-12572)
(NASA-CR-128741) Avail: NTIS HC $10.25 CSCL 06S

The areas of physiological research reported include: (1) evaluation of the single-breath method for determining cardiac output, (2) optimum protocol for the assessment of cardiopulmonary competence, (3) body fluids and electrolytes under conditions of single and combined stress, (4) re-evaluation of the open-circuit method for measuring metabolic rate with regard to the alleged metabolic production of gaseous nitrogen, and (5) the use of the forced-oscillation method to determine total respiratory conductance in healthy subjects and pulmonary patients. F.O.S.

N73-19130*# Battelle-Northwest, Richland, Wash. Physics and Instrumentation Dept.
KINETIC ASPECTS OF BONE MINERAL METABOLISM Final Report, 4 Jan. 1972 - 3 Jan. 1973
H. E. Palmer 2 Jan. 1973 34 p refs
(Contract NAS9-12463)
(NASA-CR-128816) Avail: NTIS HC $3.75 CSCL 06C

Two techniques were studied for measuring changes in bone mass in rats. One technique measures the Ar-37 produced from calcium during neutron irradiation and the other measures the changes in the Na-22 content which has been incorporated within the rat bone. Both methods are performed in vivo and cause no significant physiological damage. The Ar-37 leaves the body of a rat within an hour after being produced, and it can be quantitatively collected and measured with a precision of - or + 2% on the same rat. With appropriate irradiation conditions it appears that the absolute quantity of calcuim in any rat can be determined within - or + 3% regardless of animal size. The Na-22 when uniformly distributed in bone, can be used to monitor bone mineral turnover and this has been demonstrated in conditions of calcium deficiency during growth and also pregnancy coupled with calcium deficiency. Author

N73-19131*# Louisiana State Univ., New Orleans. Dept. of Biological Sciences.
ANALYSIS OF CHEMICAL COMPONENTS FROM PLANT TISSUE SAMPLES Final Progress Report
John L. Laseter Dec. 1972 85 p refs
(Contract NAS9-11339)
(NASA-CR-128740) Avail: NTIS HC $6.25 CSCL 06C

Information is given on the type and concentration of sterols, free fatty acids, and total fatty acids in plant tissue samples. All samples were analyzed by gas chromatography and then by gas chromatography-mass spectrometry combination. In each case the mass spectral data was accumulated as a computer printout and plot. Typical gas chromatograms are included as well as tables describing test results. Author

N73-19132*# General Electric Co., Philadelphia, Pa. Space Div.
IMBLMS PHASE B4, ADDITIONAL TASKS 5.0. MICROBIAL IDENTIFICATION SYSTEM
29 Oct. 1971 93 p refs Original contains color illustrations
(Contract NAS9-10741)
(NASA-CR-128747; Doc-70SD5414) Avail: NTIS HC $6.75 CSCL 06M

A laboratory study was undertaken to provide simplified procedures leading to the presumptive identification (I/D) of defined microorganisms on-board an orbiting spacecraft. Identifications were to be initiated by nonprofessional bacteriologists, (crew members) on a contingency basis only. Key objectives/constraints for this investigation were as follows:(1) I/D procedures based on limited, defined diagnostic tests, (2) testing oriented about ten selected microorganisms, (3) provide for definitive I/D key and procedures per selected organism, (4) define possible occurrences of false positives for the resulting I/D key by search of the appropriate literature, and (5) evaluation of the I/D key and procedure through a limited field trial on randomly selected subjects using the I/D key. Author

N73-19133*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
RADIATION PROTECTION HANDBOOK
29 Nov. 1972 62 p
(NASA-TM-X-69410; KHB-1860.1/IS) Avail: NTIS HC $5.25 CSCL 18F

A handbook which sets forth the Kennedy Space Center radiation protection policy is presented. The book also covers administrative direction and guidance on organizational and procedural requirements of the program. Only ionizing radiation is covered. Author

N73-19134# California Univ., Berkeley. Lawrence Berkeley Lab.
BIOLOGICAL EFFECTS DUE TO SINGLE ACCELERATED HEAVY PARTICLES AND THE PROBLEMS OF NERVOUS SYSTEM EXPOSURE IN SPACE
C. A. Tobias, T. F. Budinger, and J. T. Lyman Jul. 1972 30 p refs Presented at COSPAR Conf., Madrid, 10 May 1972
(Contract W-7405-eng-48)
(LBL-1011; Conf-720556-1) Avail: NTIS

A review is presented of studies on light flashes and similar visual phenomena experienced by astronauts during space flight. Studies on light sensations from heavily ionizing particles included exposure to fast neutrons in the 300 to 600 MeV energy range, fission neutrons from Cf-252, helium ions, and nitrogen ions. Studies on light sensation from relativistic particles included production of light flash events by energy transfer in the ionization track, by light from Cherenkov irradiation, and by fluorescence induced in some part of the eye. Discussions are also presented of light sensations from X-rays and the nature of the critical physical interactions. NSA

N73-19135# Oak Ridge National Lab., Tenn. Toxicology Information Research Center.
BIOLOGICAL EFFECTS OF TITANIUM
Martha Gerrard Oct. 1972 11 p refs Sponsored by AEC
(ORNL-TIP/TIRC-72-65) Avail: NTIS

The bibliography is prepared in response to a specific query received by the Toxicology Information Response Center. It covers

the various aspects of titanium health hazards in industrial workers and toxic effects of titanium traces in human and animal organisms. G.G.

N73-19136# Oak Ridge National Lab., Tenn. Toxicology Information Response Center.
TOXICITY AND BIOLOGICAL EFFECTS OF ALUMINUM IN ANIMALS
Martha Gerrard Nov. 1972 18 p
(Contract W-7405-eng-26)
(ORNL-TIP/TIRC-72-76; NLM-IA-40-274-71) Avail: NTIS

A literature search was made on toxicity and biological effects of aluminum and various other chemical compounds in animals, particularly humans. Data cover authors cited and damage noted in tissues, body, or animal observed. E.H.W.

N73-19137# Freiburg Univ. (West Germany). Lab. fuer Chemie.
REACTIVATION OF PHOSPHORYLATED ACETYLCHOLINESTERASE WITH QUATERNARY PYRIDINE OXIMES: DETERMINATION OF INFLUENCING FACTORS [REAKTIVIERUNG PHOSPHORYLIERTER ACETYLCHOLIN-ESTERASE MIT QUATERNIERTEN PYRIDIN-OXIMEN: ERMITTLUNG MASSGEBENDER FAKTOREN]
Ilse Hagedorn Bonn Bundeswehramt 1972 39 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. der Verteidigung
(BMVg-FBWT-72-32) Avail: NTIS HC $4.00; Bundeswehramt, Bonn: 25 DM

The systematic examination of factors influencing the reactivation of phosphorylated acetylcholin-esterase has shown that only oximes with K sub a values between 7.6 and 7.9 are effective (optimum at pK sub a approximately 7.8). Oximes with a pK sub a value less than 7.6 are useless as AChE-reactivators; because their anions are not sufficiently nucleophile, whereas aldoximes with a pK sub a greater than 7.9 are inactive, because their methin-protons are not sufficiently acid. Steric phenomena do not have a decisive influence. The second step of the reactivation is, under physiological conditions in the case of oximes with a pK sub a less than 7.9, an alpha, beta-cis-elimination of phosphoric acid from phosphorylated oximes and takes place as a cyclic mechanism. Author (ESRO)

N73-19138# Fraunhofer-Gesellschaft zur Forderung der Angewandten Forschung e. V., Grafschaft (West Germany). Inst. fuer Aerobiologie.
INHIBITING AND ACTIVATING EFFECT OF MONO- AND BI-QUATERNARY PYRIDINE OXIME REACTIVATORS AND RELATED COMPOUNDS ON STRUCTURE-BOUND ACETYLCHOLINE ESTERASE IN VITRO [INHIBIERENDE UND AKTIVIERENDE WIRKUNG VON MONO- UND BIS-QUARTAEREN PYRIDINIUMOXIMREAKTIVATOREN UND VERWANDTEN VERBINDUNGEN AUF STRUKTURGEBUNDENE ACETYLCHOLINESTERASE IN VITRO]
H. Kuhnen Bonn Bundeswehramt 1972 44 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. der Verteidigung
(BMVg-FBWT-72-9) Avail: NTIS HC $4.25; Bundeswehramt, Bonn: 25 DM

The effects of mono- and bi-quaternary pyridoxine reactivators on membranes of bovine red cells was investigated. Acetylcholine chloride was chosen as a substrate. The derivatives act both as inhibitors and as activators on the enzyme. The effects depend not only on the concentration of the reactivator, but also on that of the substrate. The mechanism of action of the enzyme and the antagonist is a mixed competitive-noncompetitive one. The activation of the enzyme is due to the attachment of the antagonist to a secondary binding site. This induces an activating effect on the active site of the AChE. These suggestions are supported by the results obtained with acetyl-beta-methylcholine as substrate and by the reactivation of AChE inactivated by carbamoylcholine. Author (ESRO)

N73-19139# Defence Research Information Centre, Orpington (England).
APPLICATION OF THE OXYGEN METHOD IN ALGOTOXIC INVESTIGATIONS
L. P. Braginskii Nov. 1972 14 p refs Transl. into ENGLISH from Radioactiva Isotopy V.C-Idrosbiol. i Metody Sanit. Gidrobiol. Acad. Nauk SSR Zool. Inst., 1964 p 108-116
(DRIC-Trans-2991; BR-30357) Avail: NTIS HC $3.00

Research was carried out in the field of algotoxiocology for removing biological nuisances from water supplies. In so far as photosynthesis is a vital process to a growing organism, its retardation or advancement, determined by the amount of oxygen produced by the algae, may give an indication of the toxicity of various substances. Using the oxygen method, test substances (herbicides, chlorine compounds, chloracetic acid derivatives) were introduced to vessels containing different types of algae and the rate of photosynthesis studied. It was found that some species of algae flourished in conditions of contamination while others died. The results are discussed. ESRO

N73-19140# Naval Submarine Medical Research Lab., Groton, Conn.
IMPROVING ABSOLUTE DISTANCE ESTIMATION IN CLEAR AND IN TURBID WATER Medical Research Progress Report No. 9
Steven H. Ferris 25 May 1972 13 p refs
(AD-752976; NSMRL-710) Avail: NTIS CSCL 06/19

Since the errors made in estimating distance under water are dependent on the degree of water turbidity, improvement through training in one body of water will not transfer to another body of water if there is a large difference in turbidity. This experiment demonstrated that the transfer problem can be overcome by training divers under different turbidity conditions so that they learn to tailor their corrections to the prevailing conditions. This training procedure would be useful for all diving tasks in which the estimations of object distances is important. Author

N73-19141# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
ACCURACY OF THE MEAN THRESHOLD AND OF THE VARIABILITY IN THE PSYCHOPHYSICAL METHOD OF CONSTANT STIMULI
Robert M. Herrick 19 Oct. 1972 42 p refs
(MF51524004)
(AD-753009; NADC-72204-CS) Avail: NTIS CSCL 05/10

The methodology used to study the sensory capabilities of man in relation to display systems is psychophysics. One of the most common psychophysical methods in use is the Method of Constant Stimuli (MCS). Although the method has been in use for more than half a century, reliable estimates of the accuracy of the method are not available. To assess the accuracy of the MCS-specifically, the accuracy of the mean and standard deviation-simulations of MCS experiments were performed. In the simulations, the number of stimuli varied from 2 to 13, the number of judgments per stimulus varied from 10 to 320, the range of stimuli varied from a case where the probability (p) of a Yes response for the extreme stimuli were p = .05 and p = = 95. to a case where the extreme stimuli had associated p values of .40 and .60. Curves and equations derived from the simulation data give accurate estimates of the standard error of the mean threshold and of the 90% confidence limits of the standard deviation. Author (GRA)

N73-19142# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF SODIUM PENTOBARBITAL ON RATS IN NORMOCAPNIC AND CHRONICALLY HYPERCAPNIC CONDITIONS
Robert G. Streeter and Robert L. Rogers Sep. 1972 13 p refs
(AF Proj. 7164)
(AD-751234; SAM-TR-72-29) Avail: NTIS CSCL 06/15

Albino rats were exposed to a 160 torr O2, 68 torr CO2 gaseous environment at a total pressure of 380 torr and tested for the response to sodium pentobarbital anesthesia. Measurements of the time to ataxia, supine recombency, and surgical plane (lack of pedal reflex), and total sleep times were made. There was no significant difference in times to ataxia, supine recumbency, and surgical plane between the hypercapnic rats

and controls although the mean time was greater for the hypercapnic rats in each measurement. Hypercapnic rats had increased total sleep times as compared to control animals.
Author (GRA)

N73-19143# Advisory Group for Aerospace Research and Development, Paris (France).
PERFORMANCE AND BIODYNAMIC STRESS - INFLUENCE OF INTERACTING STRESSES ON PERFORMANCE
Nov. 1972 110 p *refs* *Proc. of AGARD Aerospace Med. Panel Specialist Meeting, Brussels, 2 Jun. 1972*
(AGARD-CP-101) Avail: NTIS HC $7.50

The interactions of operational flight stresses and their effects on human performance are considered at this conference.

N73-19144 Royal Aircraft Establishment, Farnborough (England). Environmental Effects Section.
EARLY THOUGHTS ON COMPOUND STRAINS
Geoff Allen *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 8 p refs

Jargon on the subject is briefly discussed, and it is reasoned that the term compound strains may frequently be more appropriate than combined stresses. Two compound strain problems of immediate and widespread importance, on which there is an urgent need to increase the present scanty information, are cited. The first is the effects of other mental and physical stresses on the signal to noise ratios required for communication; the second, the biodynamics of vibratory motion sickness, particularly the interaction with other loads such as vision, heat and odors.
Author

N73-19145 Royal Aircraft Establishment, Farnborough (England). Human Engineering Div.
A FLIGHT TEST PROGRAMME TO STUDY THE EFFECTS OF ENVIRONMENTAL STRESSES ON AIRCREW OPERATING MILITARY STRIKE AIRCRAFT
M. G. Trumper *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 5 p refs

A flight test program is designed to obtain objective measurements of noise, vibration and temperature throughout typical profiles flown by military strike aircraft, and, as far as is possible, to correlate the measurements with aircrew reaction and performance. As a secondary object the program will investigate the usefulness of a water-cooled suit installation as a means of relieving aircrew thermal stress in strike aircraft.
Author

N73-19146 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
TWO EXPERIMENTS ON THE EFFECTS OF COMBINED HEAT, NOISE AND VIBRATION STRESS
Walter F. Grether *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 8 p refs
(AMRL-TR-71-113)

Operational flying often exposes crew members to combinations of environmental stresses. To obtain a better understanding of such combined-stress effects a major experiment was conducted using heat, noise, and vibration, both singly and in combination. Measurements were made of tracking ability, choice reaction time, voice communication, mental arithmetic, visual acuity, body temperature, heart rate, weight loss, and subjective ratings of the stress. On none of these measures did the combined triple stress condition produce greater effects than did the most severe single stress. On the physiological measures only heat stress produced significant effects, and the addition of noise and vibration produced no further effects. On the performance measures, particularly the tracking test, impairment was slightly less for the triple stress condition than for vibration only. Thus there were no additive interactions, and in fact some evidence of antagonistic interactions.
Author

N73-19147 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
COMBINED EFFECTS OF NOISE AND VIBRATION ON COGNITIVE AND PSYCHOMOTOR PERFORMANCE
Henry C. Sommer and C. Stanley Harris *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 10 p refs
(AMRL-TR-71-115)

Five studies on the combined effects of noise and vibration on psychomotor and cognitive performance are reported. Tracking and reaction time tasks were used as measures of psychomotor performance and a short-term memory/subtraction task was used as a measure of cognitive performance. The first study, using tracking performance, suggested an additive effect of noise and vibration on performance, however, this was not confirmed in a second study. Two additional studies conducted with the cognitive task indicated that detrimental effects on this task occurred only when noise and vibration were combined. Further, the effect seemed to be related to frequency of vibration; only 5 Hz - 0.25 gz vibration combined with noise produced an adverse effect on the task. The final investigation was concerned with the effect combined noise and vibration stress had on cognitive performance as a function of time of day. The results indicate that time of day does not appear to be a particularly strong variable.
Author

N73-19148 Institute of Aviation Medicine, Fliegehorst (West Germany).
SOME CRITICAL COMMENTS ON THE MEASUREMENT OF IN-FLIGHT STRAINS
W. Hoffelt and K. Gerbert *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 4 p refs

Ways and means for aviation physicians and aviation psychologists to clarify the question of the overall stress imposed on flying personnel are discussed. Methodical difficulties are presented which result especially in the measurement of psychophysiological reactions to flying stress. Research psychological questionnaires and evaluation techniques are the only means which offer partial assessment possibilities concerning the problem of flying stress.
Author

N73-19149 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
EMOTIONAL AND CARDIOVASCULAR STRESSES OF CENTRIFUGATION: EFFECT OF BETA RECEPTOR BLOCKADE ON HEART RATE RESPONSE
D. H. Glaister, M. F. Allnutt, M. H. Harrison, and P. Fennessy *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 13 p refs

Twenty four subjects were used in a double blind trial to investigate the effect of beta adrenergic blockade on the heart rate response to acceleration. Oxprenolol, 0.2 mg/kg body weight, or saline placebo, was injected in paired trials, and subjects then performed a tracking task and submitted to three centrifuge runs. Heart rate and blood pressure were monitored continuously. Oxprenolol reduced resting heart rate, and abolished a steady increase in base line heart rate seen in placebo experiments, and attributed to activation of the adrenal medulla. Tachycardia in response to +2G sub z acceleration was prevented by beta blockade, except in a group of six subjects experiencing their first ever centrifuge ride. Heart rates at +3G sub z were lowered by oxprenolol, the persistent tachycardia being attributed to a baroreceptor reflex mediated through a reduction in vagal tone. Pulse pressure was reduced by oxprenolol, especially during +3G sub z acceleration, an effect attributed to a reduction in cardiac output secondary to a fall in heart rate. Greyout tolerance was unaffected by beta blockade, but a small and unexplained decrement in tracking performance was observed.
Author

N73-19150 School of Aerospace Medicine, Brooks AFB, Tex.
ESTIMATES OF PHYSIOLOGIC RESERVE AFTER ACCELERATION EXPOSURE IN MAN

Frank R. Lecoco, Richard L. Lipman, and Sidney D. Leverett, Jr. *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 6 p refs

A metabolic stressor was employed to provoke gluco-regulatory hormone response immediately after exposure of subjects to acceleration stress. 2-deoxy-D-glucose, a glucose analog which produces severe intracellular hypoglycemia, was infused in eight normal male volunteers during a control period, immediately after an initial experience with acceleration and after their fourth exposure to acceleration. Blood glucose, free fatty acids, insulin, growth hormone and cortisol and urinary epinephrine and norepinephrine were measured before and after each infusion of 2-deoxy-D-glucose. Although acceleration stress was modest, readily discernible changes in gluco-regulatory response to the metabolic stressor were detected after exposure to acceleration. Author

N73-19151 School of Aerospace Medicine, Brooks AFB, Tex.
FINDINGS ON THE COST OF FLYING TRANSPORT MISSIONS
Bryce O. Hartman and Henry B. Hale *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 7 p refs

Physiologic and psychologic data from airlift missions flying in an operational configuration included inflight measurements during experimental double-crew missions and basic crew missions with staging for crew rest, as well as following approximately 125 basic missions using a special workload log. Psychologic analyses have evaluated subjective fatigue, sleep, and crew workload, and the relationship between these and endocrine-metabolic activity assayed via urine. The cost of flying a transport mission in the face of multiple stresses characteristic of the operational environment is considered. Author

N73-19152 *Centre d'Essais en Vol, Bretigny-sur-Orge (France).*
PHYSIOLOGICAL MODIFICATIONS DURING OPERATIONAL FLIGHTS OF LONG DURATION [MODIFICATIONS PHYSIOLOGIQUES AU COURS DE VOLS OPERATIONNELS DE LONGUE DUREE]
R. Auffret *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 12 p refs In FRENCH

Physiological changes occurring in pilots and navigators during long duration flights are examined as a function of energy fatigue. Data cover cardiac frequency, elimination of hydroxcorticosteroides in urine, elimination of mucoprotein, and glycemia levels over a 24 hour period. Transl. by E.H.W.

N73-19153 Naval Aerospace Medical Research Lab., Pensacola, Fla. Human Factors Engineering Research Div.
EFFECTS OF PART-WHOLE TRAINING PROCEDURES UPON THE ACQUISITION OF COMPLEX SKILLS TO BE PERFORMED UNDER STRESS
Richard S. Gibson *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 4 p refs

Aviation training generally follows a sequential part task approach. The question of how many tasks should be presented at one time is considered. Seventy-two naval officer candidates participated in the experiment. Each subject experienced one of three training conditions prior to being exposed to the final test condition. The results provide insight into the use of part-whole training procedures for the acquisition of complex perceptual psychomotor skills. Author

N73-19154 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
PERFORMANCE MEASUREMENT USING PILOT CONTROLLED Gz MANEUVERING WITH SIMULATED OPERATIONAL TASK
D. B. Rogers, F. M. Holden, C. R. Replogle, G. Potor, C. N. Day, R. E. VanPatten, K. A. Smiles, and G. C. Mohr *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 5 p refs
(AMRL-TR-72-3)

A technique for human performance measurement using a closed loop centrifuge has been validated. The simulation utilized the pitch and roll dynamics of a high performance aircraft. The measurement criteria were hits on target using a display generated heads up gunsight on a maneuvering target aircraft. An important consideration was relationship between man as a passive rider versus man as an active participant in the generation of the Gz stress. Two important demonstrations resulting from this study are: (1) there is a significant difference in the ability of subject pilots to perform in closed versus open loop configuration; and (2) it is feasible to provide a mission related human performance metric in a selective simulation in which the +Gz forces are dynamically realistic. A predictive heads up gunsight display is utilized with target trajectories representative of aerial combat maneuvers. Author

N73-19155 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
PHYSIOLOGICAL STUDIES OF FATIGUE IN ACTIVITIES REQUIRING MENTAL CONCENTRATION IN HOT CLIMATE, THE INFLUENCE OF POSITIONING AND SENSORIAL IRRITATION
J. Meyer-Delius *In* AGARD Performance and Biodyn. Stress - Influence of Interacting Stresses on Performance Nov. 1972 8 p refs

Activities of vigilance without additional influence of psychical stress or energetic upset are demonstrated in hot and temperate climate with noradrenergetic reaction. Mental effort with slightly increased energetic metabolism required 20% more time in hot climate to complete tasks than was required by persons working under temperate conditions. In this case the pulse rate was rising continuously. Under identical conditions of climate and mental work, but with noise, the pulse rate was significantly higher than without sensory irritation. Excitation of the sensorial senses leads to an additional increase in the peripheral vascular constriction. Opposed to thermoregulation it can cause disregulation and thus fatigue. Author

N73-19156 School of Aerospace Medicine, Brooks AFB, Tex. Biodynamics Branch.
THE USE OF PHYSIOLOGICAL PROTECTIVE MANEUVERS IN HIGH ACCELERATION ENVIRONMENTS
S. J. Shubrooks, Jr. and S. D. Leverett, Jr. *In* AGARD Performance and Biodyn. Stress Influence of Interacting Stresses on Performance Nov. 1972 9 p refs

The physiological effects of voluntary maneuvers used for protection against +G sub z acceleration were studied on the human centrifuge. During both 15-sec. and 45-sec. rapid onset +G sub z exposures, the increases in tolerance achieved with the Valsalva straining maneuver (forcefully exhaling against the completely closed glottis) were found to be equivalent to those achieved with the M-1 maneuver (forcefully exhaling against the partially closed glottis), either combined with use of an anti-G suit or without the suit during generalized muscular tensing. Directly measured head level arterial pressure responses correlated with these findings. The use of positive pressure breathing, at levels of 25-40 mm Hg, was also found to result in increases in tolerance, both with and without use of the anti-G suit, at least equal to those obtained with the M-1 maneuver with less accompanying discomfort and fatigue. Author

N73-19157*# *Houston Univ., Tex. Dept. of Civil Engineering.*
FACTORS CONCERNED WITH SANITARY LANDFILL SITE SELECTION: GENERAL DISCUSSION
W. J. Graff and L. J. Stone 31 Aug. 1972 48 p refs
(Contract NAS9-12646)
(NASA-CR-128744) *Avail: NTIS HC $4.50 CSCL 06I*

A general view of factors affecting site selection for sanitary landfill sites is presented. Examinations were made of operational methods, possible environment pollution, types of waste to be disposed, base and cover materials, and the economics involved in the operation. E.H.W.

N73-19158*# Grumman Aerospace Corp., Bethpage, N.Y.
STUDY OF WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS. VOLUME 1: FINAL REPORT SUMMARY
Charles A. Guarneri, Arnold Reed, and Ronald E. Renman Dec. 1972 32 p 2 Vol.
(Contract NAS9-12503)
(NASA-CR-128857; DWR-630-09-Vol-1) Avail: NTIS HC $3.75 CSCL 06I

This study of water reclamation and waste disposal is directed toward a more efficient utilization of natural resources. From an ecological standpoint improved methods of land use, water processing equipment, and ideal population profiles are investigated. Methods are described whereby significant reduction in water usage can be achieved by the adoption of presently available and practically applied technological concepts. Allowances are made for social, natural, and economic contingencies which are likely to occur up to the year 2000. J.M.M.

N73-19159*# Grumman Aerospace Corp., Bethpage, N.Y.
STUDY OF WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS. VOLUME 2: FINAL REPORT
Charles A. Guarneri, Arnold Reed, and Ronald E. Renman Dec. 1972 212 p refs 2 Vol.
(Contract NAS9-12503)
(NASA-CR-128858; DWR-630-09-Vol-2) Avail: NTIS HC $12.75 CSCL 06I

The manner in which current and advanced technology can be applied to develop practical solutions to existing and emerging water supply and waste disposal problems is evaluated. An overview of water resource factors as they affect new community planning, and requirements imposed on residential waste treatment systems are presented. The results of equipment surveys contain information describing: commercially available devices and appliances designed to conserve water; devices and techniques for monitoring water quality and controlling back contamination; and advanced water and waste processing equipment. System concepts are developed and compared on the basis of current and projected costs. Economic evaluations are based on community populations of from 2,000 to 250,000. The most promising system concept is defined in sufficient depth to initiate detailed design. Author

N73-19160*# Beckman Instruments, Inc., Fullerton, Calif. Advanced Technology Operations.
FURTHER DEVELOPMENT AND TESTING OF THE METABOLIC GAS ANALYZER Final Report
31 Jan. 1973 13 p
(Contract NAS9-12759)
(NASA-CR-128842; FR-1107-101) Avail: NTIS HC $3.00 CSCL 06B

Continued development of a metabolic monitor utilizing a mass spectrometer and digital computer to perform measurements and data reduction, is reported. The device prints-out breath-by-breath values for O2 consumption, CO2 production, minute volume and tidal volume. The flow is measured by introduction of a tracer gas to the expired gas stream. Design modifications to reduce pressure drop in the flow splitter to one inch of water at 600 liters/min flow and to extend the range of linear flow measurement to 1000 liters/min are discussed. G.G.

N73-19161*# Martin Marietta Corp., Denver, Colo.
WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS Final Report
Carlos Murawczyk Jan. 1973 42 p
(Contract NAS9-12504)
(NASA-CR-128839; MCR-73-7; MCR-72-277) Avail: NTIS HC $4.25 CSCL 06I

The work is described accomplished in compiling information needed to establish the current water supply and waste water processing requirements for dwellings, and for developing a preliminary design for a waste water to potable water management system. Data generated was used in formulation of design criteria for the preliminary design of the waste water to potable water recycling system. The system as defined was sized for a group of 500 dwelling units. Study tasks summarized include: water consumption, nature of domestic water, consumer appliances for low water consumption, water quality monitoring, baseline concept, and current and projected costs. Author

N73-19162*# Loewy (Raymond)/Snaith (William), Inc., New York.
HABITABILITY STUDY SHUTTLE ORBITER Summary Report, Jan. - Dec. 1972
Dec. 1972 32 p
(Contract NAS9-12479)
(NASA-CR-128863) Avail: NTIS HC $3.75 CSCL 05E

Studies of the habitability of the space shuttle orbiter are briefly summarized. Selected illustrations and descriptions are presented for: crew compartment, hygiene facilities, food system and galley, and storage systems. F.O.S.

N73-19163*# Loewy (Raymond)/Snaith (William), Inc., New York.
HABITABILITY STUDY SHUTTLE ORBITER Final Report, 24 Jan. 1972 - 27 Jan. 1973
27 Jan. 1973 144 p
(Contract NAS9-12479)
(NASA-CR-128864) Avail: NTIS HC $9.25 CSCL 05E

Habitability design concepts for the Shuttle Orbiter Program are provided for MSC. A variety of creative solutions for the stated tasks are presented. Sketches, mock-ups, mechanicals and models are included for establishing a foundation for future development. Author

N73-19164*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Biotechnology and Power Dept.
STUDY TO VALIDATE THE NON-INTERFERENCE PERFORMANCE ASSESSMENT (NIPA) TECHNIQUE Final Report
J. S. Seeman and G. L. Murphy Feb. 1973 73 p refs
(Contract NAS9-13048)
(NASA-CR-128865; MDC-G4465) Avail: NTIS HC $5.75 CSCL 06K

The NIPA (Non-Interference Performance Assessment) technique involves direct observation of group verbal activities by trained observers who rate the emotional content (affect) of each verbal interaction as either positive, negative, or neutral. During the test, in which four men were confined for 90 consecutive days, feasibility of the NIPA technique was demonstrated and observer reliability was verified. However, the validity of the test was not proved because an independent criterion measure of morale for the confined crew was lacking. There were indications, however, that NIPA measures were tracking changes in crew morale. At approximately the two-thirds point (Days 60 to 70), morale apparently fell dramatically for a period of about ten days, and simultaneously NIPA measure of positive verbalization decreased in number. A need was indicated for a separate study to apply the NIPA technique under experimental conditions and using a clearly defined criterion measure against which the ability of NIPA observations to truly measure morale changes could be determined. Author

N73-19531 Joint Publications Research Service, Arlington, Va.
HEALTH EVALUATION OF ELECTRON BEAM WELDING OF BERYLLIUM BRONZE
D. M. Bobrishchev-Pushkin, L. A. Naumova, and N. A. Khelkovskiy-Sergeyev *In its* Selected Transl. in Met. 5 Feb. 1973 p 10-13 refs

N73-19961 British Aircraft Corp. (Operating) Ltd., Bristol (England). Guided Weapons Div.
MODELING OF RANDOM HUMAN VISUAL SEARCH PERFORMANCE BASED ON THE PHYSICAL PROPERTIES OF THE EYE
Ian Overington *In* AGARD Air to Ground Target Acquisition Nov. 1972 12 p refs

N73-19965 Nottingham Univ. (England). Dept. of Psychology.
PERIPHERAL ACUITY WITH COMPLEX STIMULI AT TWO VIEWING DISTANCES
J. R. Bloomfield *In* AGARD Air to Ground Target Acquisition Nov. 1972 10 p refs

N73-19967 Scripps Institution of Oceanography, San Diego, Calif. Visibility Lab.
AIR-TO-GROUND VISIBILITY OF LIGHTS AT LOW BACKGROUND LEVELS
John H. Taylor *In* AGARD Air to Ground Target Acquisition Nov. 1972 8 p refs

N73-19972 University of Technology, Leicester (England). Dept. of Ergonomics and Cybernetics.
THE EFFECTS OF BRIEFING ON TELEVISUAL TARGET ACQUISITION
K. R. Parkes *In* AGARD Air to Ground Target Acquisition Nov. 1972 9 p refs

N73-19974 British Aircraft Corp. (Operating) Ltd., Bristol (England). Guided Weapons Div.
SOME PSYCHOMETRICS IN RELATION TO TARGET ACQUISITION
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LIPID-ABSORBING POLYMERS
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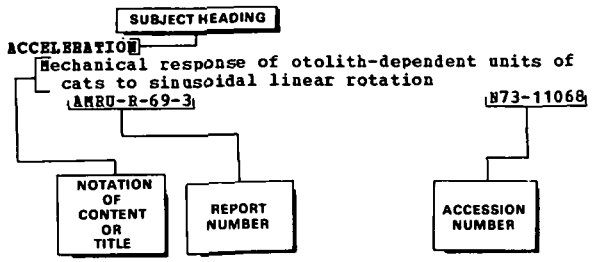

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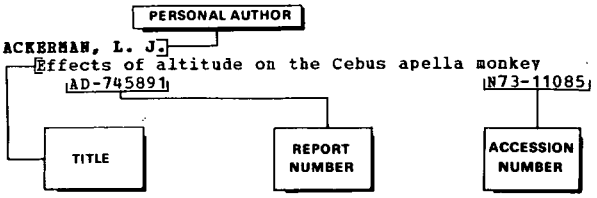

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