NASA SP-7011 (86)

SPECIAL NOTICE INSIDE

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 86)

FEBRUARY 1971

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

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IAA (A-10000 Series)	A71-10001—A71-12960

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Effective with this issue of *Aerospace Medicine and Biology* (NASA SP-7011), two changes in format have been made.

In the Personal Author Index, the title of the document now appears rather than the Notation of Content (NOC).

For reasons of economy, the Corporate Source Index is being omitted for the individual monthly issues. However, this index will be included in the Annual Cumulative Indexes.

NASA SP-7011 (86)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 86)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during January, 1971.

Scientific and Technical Information Office
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WASHINGTON, D.C. FEBRUARY 1971

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 453 reports, articles, and other documents announced during January 1971 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, irregular 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 on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis 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 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 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 1971 Supplements.

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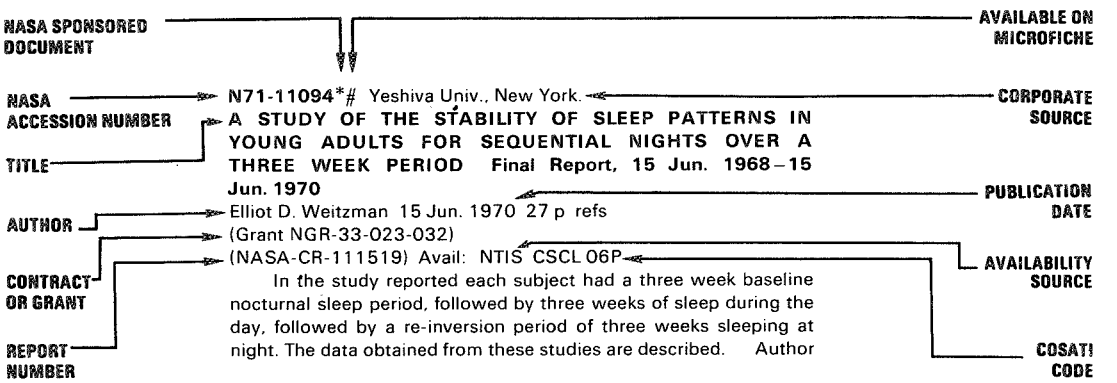

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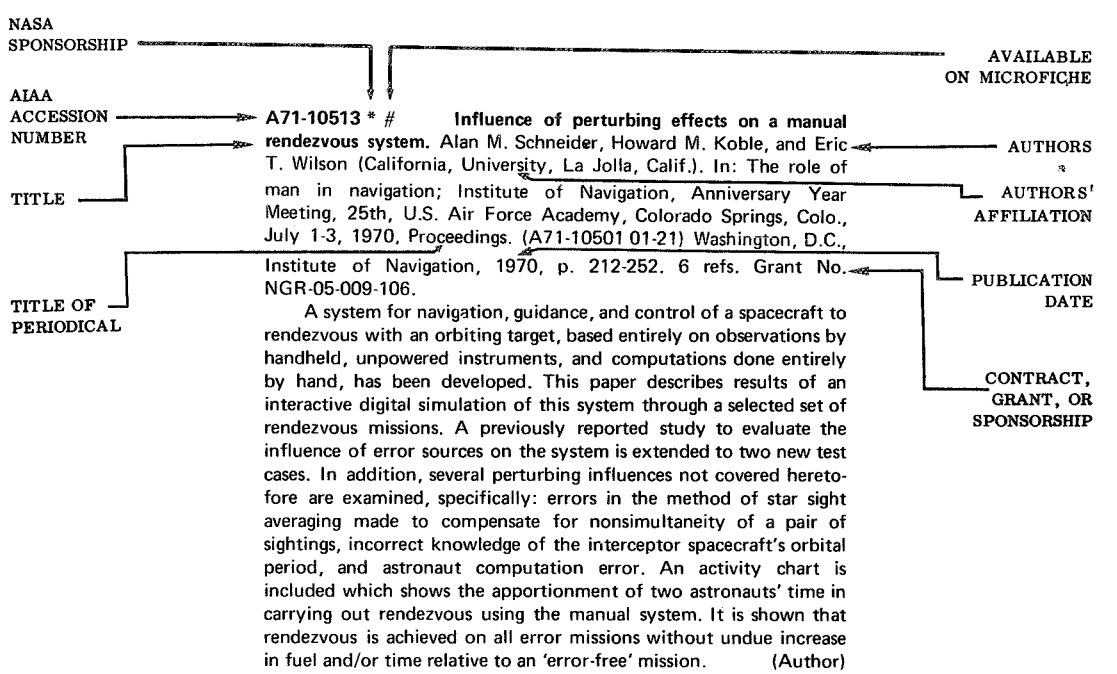

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 86) FEBRUARY 1971

IAA ENTRIES

A71-10008 **Evaluating laser hazards.** John P. Meade (USAF, Systems Command, Norton AFB, Calif.). *Laser Journal,* vol. 2, May-June 1970, p. 13, 14, 32.

Discussion of hazards connected with the operation of laser devices and of measures to be taken to provide protection against these hazards. Some laser applications are briefly reviewed, and facility requirements for laser systems are examined. Some laser operational requirements are discussed, and the use of personnel protective equipment is considered. Harmful biological effects of laser radiation are investigated, and medical surveillance programs are suggested to cover personnel actively involved in the operation of laser systems. The establishment of laser exposure levels is discussed. G.R.

A71-10034 # **Effect of stimulation of the mesencephalic reticular formation on the conditioned-reflex activity (Vliianie razdrazheniia mezentsefalicheskoi retikuliarnoi formatsii na uslovno-reflektornuiu deiatel'nost').** I. A. Kediia (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 58, June 1970, p. 689-692. 6 refs. In Russian.

Description of experiments in which conditioned reflexes were studied in 8 cats whose mesencephalic reticular formation was stimulated by acoustic signals indicating the accessibility of food. It is found that a threshold stimulation of the mesencephalic reticular formation furthers conditioned alimentary reflexes but delays the responses to conditioned food signals, a circumstance which may account for the contradictory conclusions of published studies. It is believed that threshold stimulation, not subthreshold stimulation, should be applied for obtaining useful results when studying these reflexes. V.Z.

A71-10035 # **Comparative estimation of the behavior of arterioles, arteriovenous anastomoses and efferent veins (Sravnitel'naia otsenka povedeniia arteriol, arterio-venoznykh anastomozov i otvodiashchikh ven).** M. O. Andronikashvili (Tbilisskii Gosudarstvennyi Pedagogicheskii Institut, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 58, June 1970, p. 697-700. 9 refs. In Russian.

Description of experiments in which the functional behavior of arterioles, arteriovenous anastomoses and efferent veins was studied in the ears of anesthetized white mice with the aid of a microscope. Micrometric measurements indicated substantial differences between the vasomotor behavior of these three types of vessels but no appreciable differences in the vasomotor behavior of different sections of anastomoses. V.Z.

A71-10071 # **Number of rapid eye movements under different conditions of nocturnal sleep in humans (Kolichestvo bystrykh dvizhenii glaz pri raznom kharaktere nochnogo sna cheloveka).** A. M. Vein, L. L. Latash, V. S. Rotenberg, and N. N. Iakhna (Akademiia Nauk SSSR, Laboratoriia Problem Upravleniia Funktsiiami v Organizme Cheloveka i Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 194, Sept. 1, 1970, p. 222-224. 5 refs. In Russian.

Analysis of polygraphic recordings of the nocturnal sleep of healthy human subjects, insomniacs, and narcoleptics. A considerable decrease in the total number of rapid eye movements in the case of insomniacs is noted in comparison with healthy subjects, while an increase is noted in the case of narcoleptics. An absolute decrease in the representation of 'rapid' sleep is noted in the case of the insomniacs, while an increase is noted in the case of the narcoleptics. However, this decrease in the representation of rapid eye movements noted in the case of insomniacs is not related to a reduction in the length of this phase but to certain peculiarities in the internal organization of this phase. Certain features attesting to differences in the internal organization of 'rapid' sleep in the three test groups are brought out by a study of the presentation of the period without rapid eye movements in the 'rapid' sleep phase. A.B.K.

A71-10072 # **Reactions of reticular neurons of the mid-brain to electrical stimulation of the posterior ventral nucleus of the thalamus (Reaktsii retikuliarnykh neironov srednego mozga pri elektricheskom razdrazhenii zadnego ventral'nogo iadra talamusa).** V. L. Tsaturov and R. A. Durinian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 194, Sept. 1, 1970, p. 238-240. 19 refs. In Russian.

Study of the role played by thalamocortical systems in the generation of cortico-reticular signals. An attempt is made to establish whether discharges of the reticular neurons of the mid-brain occur in response to electrical stimulation of the transfer nucleus of the thalamus and to determine how switching off the corresponding somatosensory region of the cortex affects these discharges. A.B.K.

A71-10073 **Diffusion error and O2 consumption of the Pt electrode during pO2 measurements in the steady state (Diffusionsfehler und Eigenverbrauch der Pt-Elektrode bei pO2-Messungen im steady state).** W. Grunewald (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany). *Pflügers Archiv,* vol. 320, no. 1, 1970, p. 24-44. 18 refs. In German.

Investigation of the quantitative values of the diffusion error and O2 consumption of the Pt electrode which, as systematic errors, influence in the steady state the measurement of the partial oxygen pressure. These errors are shown to depend on the geometric properties of the electrode, on the diffusion properties of the membrane, and on the properties of diffusion and convection of the measuring medium. The diffusion field in front of the Pt surface and the stationary signal of the measurement thus determined are calculated for gaseous and nongaseous media with and without convection. These calculations give quantitative information about the systematic errors. With special regard to measurements in perfused tissues, the influence of O2 consumption of Pt electrodes on the intracapillary decrease of the oxygen pressure in the blood flow direction and on the intercapillary pressure field is found at the measuring point of the electrode. These calculations were performed by means of a digital model. O.H.

A71-10074 **Responses of kidney blood flow and circumference to a blood pressure increase elicited by bilateral carotid occlusion or electrical pacing of the heart (Das Verhalten der Nierendurchblutung und des Nierenumfangs bei Blutdrucksteigerungen durch doppelseitigen Carotisverschluss oder Schrittmachertachykardie).** Hartmut Kirchheim and Rainer Gross (Heidelberg, Universität, Heidelberg, West Germany). *Pflügers Archiv,* vol. 320, no. 1, 1970, p. 79-96. 57 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

Experimental investigation of the effect of changes of arterial blood pressure caused by bilateral carotid occlusion or electrical pacing of the heart on the transient behavior of kidney blood flow

and circumference in healthy conscious dogs. In the experiments, arterial bood pressure, kidney blood flow, and kidney circumference were continuously recorded. The results indicate that during the pressoregulatory reflex, kidney blood flow is controlled by autoregulation. The changes in kidney circumference suggest a preglomerular site of resistance control. The transient behavior of blood flow and resistance indicates that during fast changes of pressure at a given mean blood pressure, the function of the kidney vasculature is characterized by one passive pressure-convex pressure-flow relationship. Any change of mean pressure causes the autoregulating vessels to shift to another pressure-convex pressure-flow relationship. O.H.

A71-10075 Hydrogen exchange through the pial vessel wall and its meaning for the determination of the local cerebral blood flow. K. Stosseck (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany). *Pflügers Archiv,* vol. 320, no. 2, 1970, p.111-119. 10 refs.

Experimental investigation of the hydrogen exchange between the pial arteries, carried out by hydrogen polarography in an effort to measure quantitatively the local cerebral blood flow. In anesthetized cats clearances of inhaled hydrogen were measured by means of microelectrodes in the lumen and at the wall of pial vessels, in the surrounding subarachnoid space, as well as in the cerebral cortex. The results are shown graphically and discussed. O.H.

A71-10091 # Electric responses of the proreal gyrus to the stimulation of the nucleus dorsalis medialis hypothalamicus (Elektricheskie otvety proreal'noi izviliny na razdrazhenie dorosomedial'nogo iadra talamusa). N. G. Eristavi (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 59, July 1970, p. 169-172. 7 refs. In Russian.

Description of experiments in which the nucleus dorsalis medialis of a group of 11 anesthetized cats was stimulated by pulses delivered to the nucleus through glass-insulated steel electrodes. The response potentials of the proreal gyrus and other cortical areas were recorded on oscillograms, showing that the latent period of these responses is about 20 microsec. A theory is proposed according to which the nucleus dorsalis functions as a relay transmitting peripheral stimuli into the proreal gyrus. V.Z.

A71-10092 # Mechanism of the effect of alimentary satiation on the quantitative composition of leucocytes in the blood (K voprosu o mekhanizme deistviia pishchevogo nasyshcheniia na kolichestvennyi sostav leikotsitov v krovi). E. I. Dolidze (Tbilisskii Institut Sanitarii i Gigieny, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 59, July 1970, p. 217-220. 10 refs. In Russian.

Investigation of the effect of the adrenocorticotropic and reticuloendothelial systems on the quantitative composition of the leucocyte population in a group of 8 male dogs kept on special diets providing alimentary satiation, with and without ACTH injections. A comparison with control dogs indicated that alimentary satiation had an inhibiting effect on the adrenocorticotropic and reticuloendothelial systems of the test dogs. A sharp drop in the number of leucocytes is established in the blood of dogs after india ink injections. V.Z.

A71-10111 # Experiments regarding pulsating flow in arterial branches and wave propagation in large blood vessels (Versuche zur pulsierenden Strömung durch arterielle Verzweigungen und zur Wellenausbreitung in grossen Blutgefässen). H. Zeller, N. Talukder, and J. Lorenz (Rheinisch-Westfälische Technische Hochschule, Aachen, West Germany). *Rheinisch-Westfälische Technische Hochschule, Aerodynamisches Institut, Abhandlungen,* no. 20, 1970, p. 41-48. 12 refs. In German.

Discussion of theoretical and experimental investigations concerning the propagation of pulse waves in blood vessels and of studies regarding the mechanisms of branching flow which favor conditions responsible for stenosis and hardening of the arteries. The flow mechanisms are investigated using models of arterial branches and water or glycerol-water solutions. The results of an observation of steady flow in rigid models are discussed. The investigations of the propagation of waves in blood vessels show that the actual velocity of these waves is much greater then would be expected on the basis of calculations according to Moens-Korteweg or according to the linearized theory proposed by Martin (1968). G.R.

A71-10143 # Nonequivalence of backgrounds during photopic dark adaptation. Edward J. Rinalducci, Kent E. Higgins, and Joan A. Cramer (Virginia, University, Charlottesville, Va.). *Optical Society of America, Journal,* vol. 60, Nov. 1970, p. 1518-1524. 27 refs. NSF-supported research; NIH Grant No. EY-00353.

Investigation of equivalence of adaptive states for long-term photopic dark adaptation using two target diameters (0.13 and 0.33 deg) and four chromatic combinations of red and green test and adapting stimuli (red on red, red on green, green on green, and green on red). Except under special conditions employing color-defective observers for which there was more complete isolation of cone mechanisms, equivalence between adaptive states was generally found not to exist. It is concluded that more than one process is needed to control the spatial integration of light in the photopic system, and these are hypothesized to be the wavelength-dependent excitatory and inhibitory processes of the visual receptive field. (Author)

A71-10229 Distribution and evolution of visual pigments in salmonid fishes. C. D. B. Bridges (New York University, New York, N.Y.) and S. Yoshikami (National Institutes of Health, Bethesda, Md.). *Vision Research,* vol. 10, Aug. 1970, p. 609-626. 48 refs. PHS Grant No. NB-08388.

Analysis of the visual pigments and liver retinols of salmonid fishes in Great Britain and southern Germany. It was found that evolutionary pressure has brought about the development of new visual pigments to cope with changing environmental light conditions. If the opsins represent a series of homologous proteins, as some evidence suggests, they evolved by a simple process of amino-acid substitution. Even though the nature of this substitution must be severely restricted, it appears that new visual pigments have evolved over time periods as short as 20,000 to 1,000,000 yr. M.M.

A71-10230 Pathway of incorporation of vitamin A 3H2 into photoreceptors of a snail, Helix aspersa. Jean L. Brandenburger and Richard M. Eakin (California, University, Berkeley, Calif.). *Vision Research,* vol. 10, Aug. 1970, p. 639-653. 15 refs. PHS-supported research.

Description of the results of studies involving fixation of the eyes of a garden snail after administration of a radioactive vitamin to identify the site of initial uptake of tritiated vitamin A and the pathway of intracellular transport. The initial uptake by the eye was in the so-called synthetic centers, deep within the photosensory cells. Photic vesicles appear to function as transporters for a vitamin A containing photopigment or its precursors, moving from their origin in the Golgi apparatus, along the sensory cell columns into the apical hillocks at the distal end of the cell where their contents are liberated and used by the rhabdomeric microvilli, the presumed light-sensitive organelles. M.M.

A71-10231 Process of retinal photoreception and thermodynamics of irreversible phenomena (Processus de photoréception rétinienne et thermodynamique des phénomènes irréversibles). Michel Delmotte (Muséum National d'Histoire Naturelle, Paris,

France). *Vision Research,* vol. 10, Aug. 1970, p. 671-678. 14 refs. In French.

Description of an open thermodynamic system suggested by a study of the constitution of the outer segments of visual cells and of the principal characteristics of retinal photoreception. The behavior of this system is specified by the thermodynamics of irreversible processes. The ATPase activities of rhodopsin or of a closely linked protein are taken into account, together with the possibility of an ionic active transport through the flattened sacs membrane. M.M.

A71-10232 Dark adaptation and spectral sensitivity in the cat. Robert H. LaMotte and John Lott Brown (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). *Vision Research,* vol. 10, Aug. 1970, p. 703-716. 29 refs. Research supported by the National Institute of General Medical Science and the U.S. Navy.

Experimental investigation in which photopic and scotopic spectral sensitivity functions were obtained from dark-adaptation curves using a behavioral tracking procedure. The dark-adaptation process is much more rapid following light adaptation with the natural pupils than is the case when the pupils are artificially dilated. Dark-adaptation curves for test stimuli of various wavelengths in the cat showed a time course for cone and rod processes not unlike those found for humans but different from curves reported in an electrophysiological study of single retinal ganglion cells. M.M.

A71-10233 Variation of the visual threshold with retinal location. I - The central 20 deg of visual field. II - The fovea. B. N. Kishto and R. Saunders (Imperial College of Science and Technology, London, England). *Vision Research,* vol. 10, Aug. 1970, p. 745-767. 59 refs.

Description of threshold measurements performed across the central 20 deg of the visual field using white, red, green, and blue stimuli under conditions of scotopic, mesopic, and photopic adaptation. It was found that whereas the degree of spatial summation increases in the periphery under all conditions of adaptation, the degree of temporal summation is uniform to a first approximation over the region investigated. Some of the results indicate that a group of retinal locations given the same threshold under one set of observing conditions continue to have essentially equal thresholds under other quite different conditions of observation. Measurements with a small test field within 2 deg from the visual axis indicate that the central region of the fovea may have very different properties from the rest. M.M.

A71-10234 Reversal of Weber's law for an extraordinary unit in the cat's retina. Myonggeun Yoon (California, University, Berkeley, Calif.). *Vision Research,* vol. 10, Aug. 1970, p. 769-774. 8 refs. PHS Grant No. NB-05215.

Description of the features and behavior of the extraordinary unit (YCC:1) in the cat's retina. It is noted that the odd behaviors of this extraordinary unit can be explained, at least qualitatively, in terms of known synaptic organization and neural mechanism of the retina. M.M.

A71-10235 Ocular pursuit movement as a function of visual and proprioceptive stimulation. Stephen Jordan (U.S. Navy, Human Factors Laboratory, Orlando, Fla.). *Vision Research,* vol. 10, Aug. 1970, p. 775-780. 5 refs.

Experimental investigation of the capacity to evoke ocular pursuit movement of a variety of stimulus conditions including visual and proprioceptive stimulation. The main experimental result is that ocular pursuit movement is readily and reliably evoked by hand movement in the dark. Except for one subject, the results indicate the same high degree of pursuit movement evocation with active as with passive hand movement. It is concluded tentatively that predictive aspects of pursuit eye movements are facilitated only by active hand motion but that passive hand movements, under certain conditions, may be involved in their evocation. M.M.

A71-10236 The effect of stimulus velocity on human torsional eye movements. Andrew E. Kertesz (California Institute of Technology, Pasadena, Calif.). *Vision Research,* vol. 10, Aug. 1970, p. 781-784. NIH Grant No. B-02165.

Deduction of the torsional response of the human eyes to a stimulus moving across the retina with uniform velocity, using a linear model, from experimentally recorded torsional eye movements elicited by a rotating sectored annulus containing a narrow range of linear velocities. The deduced torsional response of the eyes as a function of the uniform velocity with which the stimulus is assumed to move across retinal receptors provides a more accurate representation of the velocity selectivity of visual sensory neurons involved in the detection of motion. M.M.

A71-10237 Continuous measurement of blood gases in vivo by mass spectrography. A. Wald, W. K. Hass, F. P. Siew, and D. H. Wood (New York University, New York, N.Y.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 111-128. 17 refs. NIH Grant No. NB-07366.

The application of the mass spectrometer to the continuous monitoring of blood gases in humans is described. At the heart of the system is an intravascular catheter consisting of a cannula impermeable to gas tipped with a membrane whose special gas permeability characteristic permits accurate calibration. Expressions are presented which describe gas flow through the membrane in response to a step increase in gas concentration; characterize thermal effects on gas diffusion and illustrate the effect of the cannula and carrier tubing on steady state gas flow. The system has been successfully employed in the study of arterial nitrogen washout and the determination of human cerebral blood flow by the nitrous oxide technique. (Author)

A71-10238 A percutaneous electrode for long-term monitoring of bio-electrical signals in humans. R. Kadefors and J. B. Reswick (Case-Western-Reserve University, Cleveland, Ohio). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 129-135. 14 refs. Swedish Board for Technical Development Grant No. 68-133-r; SRS Grant No. RD-1814-M; NIH Grant No. GM-14267.

Solid percutaneous electrodes made of vitreous carbon were inserted surgically in the forearm of human subjects. The electrodes were left in the arm for several months without any particular care or protection. Evaluation of the electrodes shows good appearance, good mechanical stability, excellent ability of picking up bioelectrical signals and low interface impedance between electrode and tissue. Histological examination shows growth of epidermis around the electrode. No signs of chronic inflammation or foreign body giant cell formation were found. (Author)

A71-10239 Manganese dioxide depolarizer for biomedical electrodes. R. Nencini and E. Pasquali (CNR, Istituto di Psicologia, Rome, Italy). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 137-143. 33 refs.

Description of the electrochemical and toxicological characteristics of manganese dioxide (MnO_2). Details of the construction and testing of a surface MnO_2 electrode are presented. The reported data and the results of tests confirm that an MnO_2 electrode sufficiently stable and free from polarization effects can be constructed. (Author)

A71-10240 The relationship between vessel-wall elasticity and Korotkoff-sound frequency. B. J. Brookman, Jr., C. Dalton (Houston, University, Houston, Tex.), and L. A. Geddes (Baylor

University, Houston, Tex.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 149-158. 21 refs. PHS Grant No. 5-T1-HE-5125.

An experimental investigation of the effect of vessel elasticity on Korotkoff-sound frequency has been conducted. A model was constructed to simulate conditions in the upper arm during blood-pressure determination. The experiment was performed using both cylindrical rubber tubes and fresh canine arteries. The modulus of elasticity of the specimens was measured using an apparatus for determining the pressure-volume relationship of distensible tubes. Sound waves produced by the specimens were recorded with an oscilloscope. Logarithmic plots of the data show that, as the modulus of elasticity increased, the sound frequency decreased. The data presented in this paper provides additional support for the hypothesis that the elastic characteristics of the artery do not play an important part in the genesis of the frequency of the Korotkoff sounds. (Author)

A71-10241 Modifications to a miniature pressure transducer for the measurement of intracranial pressure. I. D. Eversden (Atkinson Morley's Hospital, London, England). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 159-164. Research supported by the British Empire Cancer Campaign.

The performance of miniature silicon diaphragm pressure transducers is discussed with respect to the measurement of pressure inside the cranial cavity. A modification to the basic unit is described which allows the baseline pressure reading and pressure calibration to be checked at any time throughout the period of implantation. There has been no discernable reaction to the presence of the devices inside the cranial cavity and it has been possible to obtain continuous recordings of intracranial pressure for as long as 7 days without complications. (Author)

A71-10243 Differential cinespectrophotometer (Ciné-spectrophotomètre différentiel). R. Chagneux and R. Fayolle (CNRS, Institut de Neurophysiologie et de Psychophysiologie, Marseille, France). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 195-201. 10 refs. In French.

Description of a cinespectrophotometer which allows reactions of oxidation or reduction to be followed in intracellular pigments. It is a double-beam instrument which provides both high stability and accuracy. A single source and a single detector are used, and a chopper disk produces two monochromatic beams by means of filters. The compensation system is purely electronic. This arrangement allows the simultaneous recording of the saturation of an intracellular hemoglobin and of neuronal bioelectrical activity. M.M.

A71-10242 * A wide-range linear beat-by-beat cardiotachometer. W. Morton Caldwell, Larry D. Smith, and Michael F. Wilson (West Virginia University, Morgantown, W. Va.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 181-185. Research supported by the West Virginia Heart Association; Grant No. NGL-49-001-001.

A heart ratemeter operating over a range of 30-900 beats per minute has been designed. The device is triggered from any measured cardiac variable to produce a linear d.c. beat-by-beat readout. The cardiac frequency is found by a true reciprocal computing process provided by a variable-slope ramp generator operating on the period between beats. This computer, and other circuitry within the ratemeter, uses low-cost operational amplifiers to simplify the design and construction. (Author)

A71-10245 Constant current stimulation through a microelectrode. S. M. Ross and B. F. Hoffman (Columbia University, New York, N.Y.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 207, 208. PHS Grant No. HE-08508-06.

Description of a simple feedback system that allows the stimulating current passing through an intracellular microelectrode to be independent of electrode resistance. The maximum current that can be delivered by the feedback amplifier is limited by the microelectrode resistance and the amplifier supply voltage. Constant currents in the required range are delivered in spite of a 100% variation in microelectrode resistance. M.M.

A71-10246 A versatile amplitude analyzer for EEG signals to provide feedback stimuli to the subject. E. A. Pfeiffer and L. B. Usselman (U.S. Veterans Administration Hospital, Sepulveda, Calif.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 209-211. 5 refs.

Description of an amplitude analyzer which offers a convenient method of providing feedback cues to subjects in studies of the modification of the characteristics of an EEG signal by such feedback methods. The versatility of the analyzer design makes it possible to change the experiment easily without changing the electronic circuit. The extensive use of commercially available circuit modules allows the device to be assembled by fairly inexperienced personnel. M.M.

A71-10247 A temperature monitor and proportional direct current controller. M. S. Weiss, J. S. Sobolewski, and P. S. Kreager (Washington State University, Pullman, Wash.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 213-215.

Description of an automatic temperature measuring and controlling device. The solid state device is dc operated and provides proportional control for highly stable temperature regulation. It has been used routinely in a variety of electrophysiological recording experiments with anesthetized cats and has proved capable of maintaining oil bath and brain temperature within 0.1 deg C of 38.5 deg C for several hours. M.M.

A71-10248 * A catheter inserted device for the creation of reversible aortic insufficiency. P. Thompson (Pennsylvania, University, Philadelphia, Pa.). *Medical and Biological Engineering,* vol. 8, Mar. 1970, p. 217, 218. NASA-supported research.

Description of a wire-basket device which may be inserted through a catheter, thus eliminating the need for opening the chest of an experimental animal. The device is more reliable and repeatable than the use of the catheter itself for the generation of a valvular incompetence. Withdrawal of the device leaves the valve undamaged so that other experiments may be performed or control measurements may be taken after generation of an insufficiency. M.M.

A71-10271 Vision and visual pigments in a fish, Scardinius erythrophthalmus (the rudd). W. R. A. Muntz and D. P. M. Northmore (Sussex, University, Brighton, England). *Vision Research,* vol. 10, Apr. 1970, p. 281-298. 32 refs. Research supported by the Medical Research Council and the Scientific Research Council.

Behavioral measurement of the photopic spectral sensitivity curve of rudd kept under different daylengths in order to find out whether the photopic receptors were affected by lighting conditions. Spectral sensitivity was not affected by daylength, even though retinal extracts from fish kept under identical conditions showed marked changes in the proportions of the two visual pigments. This suggests that the pigments of the photopic receptors are unaffected by daylength, even though this has an appreciable effect on the scotopic pigments. M.M.

A71-10272 Landolt's club in the retina of the African lungfish, Protopterus aethiopicus, heckel. N. A. Locket (Institute of Ophthalmology, London, England). *Vision Research,* vol. 10, Apr.

1970, p. 299-306. 34 refs.

Electron microscopic investigation of the existence of Landolt's club in the retina of the African lungfish. The sclerad end of the lungfish Landolt's club of bipolar origin extends beyond the outer limiting zone and is inserted deep into the pigment epithelium. Landolt's clubs are related also to receptors, radial fibers and other clubs. They contain mitochondria, glycogen and microtubules. Urodele amphibian clubs are compared, and possible metabolic or sensory functions are discussed. M.M.

A71-10273 Rod participation in the 'blue' mechanism and its effect on colour matching. P. W. Trezona (Ministry of Technology, National Physical Laboratory, Teddington, Middx., England). *Vision Research,* vol. 10, Apr. 1970, p. 317-332. 47 refs.

Explanation of discrepancies caused by rods in large field color matching as being due to the idea that rod color is blue under photopic conditions. Discrepancies are accounted for when the luminance level is changed, when a matching stimulus is altered in color, and when field trials are undertaken. Because of this rod intrusion, trichromatic matches are often not suitable for an additive system of large field colorimetry. A matching technique suited to such a system is discussed. M.M.

A71-10274 Induced changes in the perceived orientation of line segments. H. Bouma and J. J. Andriessen (IPO, Institute for Perception Research, Eindhoven, Netherlands). *Vision Research,* vol. 10, Apr. 1970, p. 333-349. 40 refs.

Measurements of the perceived orientation of a line segment in a frontal plane (test line). For an isolated test line, perceived orientation is biased toward the horizontal H or vertical V, whichever is nearer, H and V being called preference orientations. The presence of a second line (induction line) brings about an extra bias toward the perpendicular of the induction line, called induced preference orientation. The phenomenon is well known from many visual illusions. H or V induction lines exert greater influence than do oblique induction lines. H or V test lines are less susceptible to induction effects than are oblique test lines. M.M.

A71-10275 Determination of the summation exponent by measuring the critical fusion frequency (La determination de l'exposant de sommation par la mesure de la fréquence critique de fusion). Gaston Lavergne (Liège, Université, Liège; Fonds National de la Recherche Scientifique, Brussels, Belgium) and Marie-Thérèse de Corte (Liège, Université, Liège, Belgium). *Vision Research,* vol. 10, Apr. 1970, p. 351-358. 15 refs. In French.

Demonstration of the possibility of determining a summation coefficient under experimental conditions more favorable than those of classical perimetry, by measuring the critical fusion frequency. This coefficient is higher outside the fovea than inside, and increases when the test surface decreases. M.M.

A71-10347 # Stimulation of the vestibular apparatus in the guinea pigs by static pressure changes - Head and eye movements. M. F. Reschke, D. E. Parker (Miami University, Oxford, Ohio), and H. E. von Gierke (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Acoustical Society of America, Journal,* vol. 48, Oct. 1970, pt. 2, p. 913-923. 25 refs. USAF-sponsored research.

Head and eye movements elicited by static pressure increases of up to 1-min duration in the external auditory meatus were recorded using guinea pigs as subjects. The minimum stimulus intensity required to produce a response was 1.5-2.0 cm Hg. Observations were made of response latencies, durations, and amplitudes as a function of stimulus intensities, durations, and onset rates. Head and eye movements elicited by the pressure stimulation were found to be significantly correlated. The results of this investigation are interpreted as supporting the hypothesis that stapes footplate displacement, and consequently perilymph/endolymph displacement, produce direct mechanical stimulation of the semicircular-canal receptors. Moreover, these results suggest that the same mechanism might be responsible for stimulation of the vestibular system by low-frequency inaudible sound and for the vestibular effects observed in response to audio-frequency high-intensity sound. In the latter case, vestibular stimulation is hypothesized to occur as a result of a shift in the average position of the stapes footplate owing to overdriving the ossicular chain. (Author)

A71-10391 # Renal venous blood renin level in patients with renovascular hypertension. W. Januszewicz, A. Baczko, B. Wocial, B. Pruszyński, and R. Rajszys (Akademia Medyczna, Warsaw, Poland). (*Polskie Archiwum Medycyny Wewnętrznej,* vol. 43, no. 3, 1969.) *Polish Medical Journal,* vol. 9, no. 3, 1970, p. 531-538. 13 refs. Translation.

The level of renin was determined in the blood from the renal veins and from the peripheral ones in 20 patients with arterial hypertension. Aortography disclosed in 17 patients unilateral or bilateral stenosis of the renal arteries. In 2 patients chronic pyelonephritis was diagnosed and in 1 patient chronic glomerulonephritis. The renin level was found to be raised in the samples of venous blood obtained from the kidney supplied by a stenosed renal artery. In most patients the renin level in peripheral blood was increased. In 7 patients with a raised renin level in the renal venous blood the level of this enzyme in the peripheral blood was normal. (Author)

A71-10392 # The effect of detergents on experimental digitalis - Induced arrhythmia. S. Kośmider and W. Smolarz (Śląska Akademia Medyczna, Zabrze, Poland). (*Polskie Archiwum Medycyny Wewnętrznej,* vol. 43, no. 4, 1969.) *Polish Medical Journal,* vol. 9, no. 3, 1970, p. 710-716. 9 refs. Translation.

The antiarrhythmic action of some industrial and household detergents was investigated in experiments carried out on dogs. The effects of sodium alkylarylsulfonate (ionizing, anionic detergent) and nonionizing alphenol-8 on digitalis-induced arrhythmia were examined. Moreover, the study involved the effect of alphenol-8 on sodium and potassium transfer in erythrocytes, as well as the ability of the detergents to bind calcium ions. The surface-active substances tested were found to exert a very potent antiarrhythmic effect, and abolished arrhythmia of quite diverse mechanisms. The action of alphenol-8 was most potent, as compared with all so far applied antiarrhythmic agents. (Author)

A71-10393 # Chronic posttraumatic changes in the central nervous system in pugilists. J. Jedliński, J. Gątarski, and A. Szymusik (Akademia Medyczna, Kraków, Poland). (*Psychiatria Polska,* vol. 3, no. 4, 1969.) *Polish Medical Journal,* vol. 9, no. 3, 1970, p. 743-752. 26 refs. Translation.

In a group of boxers with boxing career of from 5 to 17 years duration neurologic, psychiatric and electroencephalographic examinations were carried out. Slight neurologic changes were found in 55 per cent of cases, EEG changes in 40 per cent and psychic disturbances in 18,4 per cent. The results were processed statistically. The incidence of changes depended on the length of the boxing career and the number of past fights. In heavy weight, the incidence of abnormalities was larger. The authors believe that the observed changes are the result of repeatedly occurring slight traumas to the head caused by blows. It is postulated that neurologic, psychiatric and EEG examinations should be made obligatory for all boxers, that the number of fights should be limited and the organization, training and regulations should be altered. The authors believe that these measures would reduce the frequency of pugilistic encephalopathy without, however, eliminating it completely. The boxers should be informed by the physician about the dangers of boxing. (Author)

A71-10394 # Motor and sensory nerve conduction in upper extremities in the vibration disease. D. Dylewska (Akademia Medyczna, Lublin, Poland). (*Neurologia i Neurochirurgia Polska,* vol.

4, no. 1, 1970.) *Polish Medical Journal,* vol. 9, no. 3, 1970, p. 753-757. 9 refs. Translation.

Studies were carried out on 38 workers with vibration disease who had been working with compressed-air hammers for 5 to 14 years. The sensory and motor nerve conduction was determined in the median and ulnar nerves. In 23% of cases reduction of the velocity of motor nerve conduction and in 55% of cases reduction of the velocity of sensory nerve conduction at the finger-wrist distance were found. Correlation was found between the degree of conduction impairment and the degree of superficial sensation disturbances as well as the duration of work with vibrating tools. (Author)

A71-10398 Effects of sight of the body and active locomotion in perceptual adaptation. Donald Quinlan (Yale University, New Haven, Conn.). *Journal of Experimental Psychology,* vol. 86, Oct. 1970, p. 91-96. 14 refs. NIH Grant No. HD-02570.

The influence of sight of the body and active locomotion on perceptual adaptation to tilted vision was studied in 60 male undergraduate volunteers. Sight of all, a part, or none of the body was examined under conditions of both active and passive locomotion. Judgments of apparent vertical (AV) and apparent body position (ABP) were obtained after 20 min of tilted vision. Active Ss showed more adaptation than passive Ss in the combined AV and ABP judgments, and Ss with sight of their own bodies showed more adaptation than Ss viewing only objects in the environment. AV and ABP did not differ significantly, although there was a tendency for the ABP judgment to show more adaptation in the active body-viewing conditions. The findings were consistent with the reafference hypothesis of Held and his colleagues, and suggested that there are two additive components of adaptation, which could be described as head-trunk orientation and eye-head orientation. (Author)

A71-10400 A standard reference system for spatial vectorcardiography - Comparison of the equilateral tetrahedron and the Frank systems. G. E. Burch, J. A. Cronvich (Tulane University; Louisiana Charity Hospital, New Orleans, La.), and N. P. DePasquale (Lenox Hill Hospital, New York, N.Y.). *American Heart Journal,* vol. 80, Nov. 1970, p. 638-659. 31 refs. Research supported by the Rudolph Matas Memorial Fund and the Rowell A. Billups Fund; NIH Grant No. HE-06769.

Clinical investigation of the relative merits of the equilateral tetrahedral system and the Frank system of electrode placement in spatial vectorcardiography. The spatial vectorcardiogram (sVCG) was recorded with both the equilateral tetrahedral and Frank reference systems and carefully studied in 450 patients and normal subjects, the hearts of 30 of these patients being studied carefully at autopsy. The sVCG recorded with the equilateral tetrahedral system in general revealed abnormalities of the heart earlier and with greater disturbance in contour, direction of rotation, and spatial orientation than the sVCG recorded with the Frank system. The Frank system tended to make the contour of the complexes smooth, thus erasing early and definite irregularities and distortions in configuration which were often related to myocardial disease. The use of the equilateral tetrahedron is strongly advised as the standard system for clinical vectorcardiography the world over. M.M.

A71-10512 # Man's ability to perform useful work in cabin atmospheres and planned space missions. Alfred G. Koestler (USAF, Aeromedical Research Laboratory, Holloman AFB, N. Mex.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 207-211.

Discussion of man's ability to survive and perform useful work in the aerospace environment. Using man's best substitutes, the chimpanzees, studies have demonstrated that sudden unprotected exposure to vacuum can not only be survived but total functional recovery may be expected within a short time, if the exposure to vacuum is not longer than three minutes. In transport aircraft, whether in the subsonic or flying types of today, or the high speed, high altitude aircraft of the near future, cabin atmospheres are normally shirtsleeve environments. Survivability of sudden failures of the pressure hulls has been investigated using unprotected subjects in altitudes between 30,000 and 80,000 ft. Based on physiological information, a survivability envelope has been established using unprotected duration of exposure to these various altitudes as the experimental variable. Man's ability to perform useful work in artificial environments depends largely on the habitable atmosphere provided him. In emergencies his usefulness is sharply curtailed by his physiological limits. It is pointed out that self rescue times during sudden pressure loss are measured in seconds and that rescue by others or by automated rescue systems must be successful within minutes to allow functional survival and completion of the assigned mission. M.M.

A71-10513 * # Influence of perturbing effects on a manual rendezvous system. Alan M. Schneider, Howard M. Koble, and Eric T. Wilson (California, University, La Jolla, Calif.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 212-252. 6 refs. Grant No. NGR-05-009-106.

A system for navigation, guidance, and control of a spacecraft to rendezvous with an orbiting target, based entirely on observations by handheld, unpowered instruments, and computations done entirely by hand, has been developed. This paper describes results of an interactive digital simulation of this system through a selected set of rendezvous missions. A previously reported study to evaluate the influence of error sources on the system is extended to two new test cases. In addition, several perturbing influences not covered heretofore are examined, specifically: errors in the method of star sight averaging made to compensate for nonsimultaneity of a pair of sightings, incorrect knowledge of the interceptor spacecraft's orbital period, and astronaut computation error. An activity chart is included which shows the apportionment of two astronauts' time in carrying out rendezvous using the manual system. It is shown that rendezvous is achieved on all error missions without undue increase in fuel and/or time relative to an 'error-free' mission. (Author)

A71-10519 # Use of planetaria in navigation instruction. Kenneth W. Brotnov (U.S. Air Force Academy, Colorado Springs, Colo.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 332-337.

Discussion of the use of the planetarium in the teaching of celestial navigation. The celestial navigation instruction at the Air Force Academy Planetarium is described, together with the space navigation training at the Morehead Planetarium, Chapel Hill, N.C. The Academy Planetarium can project all the stars that can be seen with the unaided eye and, in addition, may be rotated in various directions to allow the sky to be shown as it would appear at any latitude from the North Pole to the South Pole. The sun, moon and planets are projected independently and have special drives to simulate their motion in the sky. The celestial equator, hour circles, the local meridian and the ecliptic are shown on the dome using special projectors mounted on the basic instrument. Several line projectors are also used to portray the Greenwich meridian and the astronomical triangle. M.M.

A71-10520 # Navigator training. John R. Burgess (USAF, Air Training Command, Randolph AFB, Tex.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting,

25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 408-415.

Description of the challenge faced by the Air Force in training a man to be a navigator. The training philosophy used by the Air Training Command to adapt present and future training capabilities to the demands of the USAF operational commands is discussed. The role of the navigator, training courses, and advanced training are discussed, together with a new training system for both basic and advanced navigator programs. The method used is that of comparing the old with the new and of drawing conclusions that bear on training philosophy, cost, training system design, and flight-simulator use. M.M.

A71-10521 # **Navigator training analysis.** R. E. Hull (Douglas Aircraft Co., Long Beach, Calif.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 416-428.

Brief description of the methods and results of an unfunded study directed at deriving a combination of aircraft and simulators which would best accomplish trainer tasks for the Air Force Undergraduate Navigator Training System. In performing the study, emphasis was placed on developing a rationale for measuring training effectiveness. The methodology is based on the application of a family of student learning curves which were derived from grade data collected at Mather Air Force Base. Cost tradeoffs provided the optimum average grade levels to be achieved for each ground trainer and simulator mission, prior to transferring students to flight missions. The results show that the present system has a well balanced mix of aircraft and ground trainers from a standpoint of cost-effectiveness, but a modernized system would provide improved integration of ground and flight training, producing navigators better qualified to perform operational missions in tomorrow's environment. M.M.

A71-10522 # **Aircraft navigator training system design.** Joel A. Benson and William A. DeTally (Douglas Aircraft Co., Long Beach, Calif.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 429-465. 7 refs. Research supported by the Douglas Aircraft Independent Research and Development Program.

Description of an approach to the design definition and selection of a configuration for an airborne trainer and ground simulator. The Undergraduate Navigator Training System (UNTS) was used as the example. The similarities of requirements, functions, and man/machine interfaces allow the development of configurations for the airborne trainer and ground simulator as a parallel design effort. Training requirements are categorized into crew, environment, and equipment parameters presented as they are represented on board the airborne trainer and within the ground simulator. Student, instructor, and operator task flow and individual assignments are described and related to the airborne trainer and the ground simulator. The functional design concept using a four-factors approach is reviewed for a typical navigation subsystem. Technical risk items and critical design areas are identified as part of the functional design presentation. A specification tree is developed and its role is defined in the total system development program. M.M.

A71-10523 # **Training philosophy for complex navigation systems.** A. Lee Sterzer (North American Rockwell Corp., Autonetics Div., Anaheim, Calif.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 466-476.

Discussion of a training philosophy for complex navigation systems. The training philosophy stresses the functional approach to the navigation system and its components. The problem/solution series technique is presented as an effective method for implementing this philosophy. This is a systematic method of organizing the subject matter in a way that naturally emphasizes the function of the system and its components. The first step in this technique is to identify the purpose of the system. The fundamental concept of the system is presented next. The next step is to consider a major and/or obvious problem associated with the mechanization of the fundamental concept. The instructor defines the problem and explains its effect upon the function of the system. Then he describes the solution to this problem. He selects another problem with the fundamental concept, or a problem associated with the solution of the first problem. As before, he explains the effect of this problem on the system and presents the solution to it. He continues this approach until all the functions of the system and its components have been explained. M.M.

A71-10524 # **Improved crew member training through multi-media instruction or - The process.** Milton E. Wood (USAF, Human Resources Laboratory, Williams AFB, Ariz.). In: The role of man in navigation; Institute of Navigation, Anniversary Year Meeting, 25th, U.S. Air Force Academy, Colorado Springs, Colo., July 1-3, 1970, Proceedings. (A71-10501 01-21) Washington, D.C., Institute of Navigation, 1970, p. 477-485. 6 refs.

Description of a systems approach to flying training (SAT). This process-oriented approach integrates behavioral objectives, media, and instructors in such a way that increased training effectiveness is realized through a greater ability to deal with the learning requirements of the individual student. Based on current U.S. Air Force efforts to employ and evaluate this general approach to training, new efficiencies in instruction are indicated. This system will provide a basis for defining the characteristics of future UPT multimedia systems. It is pointed out that the basic principles inherent in the new look in training appears to be generally applicable to all phases of crew member training. M.M.

A71-10765 * **Auditory evoked potential variability in schizophrenia. I.** Enoch Callaway, III, Reese T. Jones, and Emanuel Donchin (Langley Porter Neuropsychiatric Institute, San Francisco; NASA, Ames Research Center, Moffett Field, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 29, Nov. 1970, p. 421-428. 14 refs. Research supported by the University of California; NIH Grant No. FR-05550; Contract No. Nonr-2931(00).

Experimental investigation of the auditory averaged evoked potential (AEP) as a measure that correlates with the degree of psychopathology in schizophrenia. It is noted that the increased difference between AEPs to tones of two different pitches found in schizophrenia seems to be a function of increased AEP variability. This increase of AEP variability in schizophrenic patients reflects response variability and is not principally the result of increased background EEG variability. M.M.

A71-10766 * **Auditory evoked potential variability in schizophrenia. II.** Emanuel Donchin, Enoch Callaway, III, and Reese T. Jones (NASA, Ames Research Center, Environmental Biology Div., Moffett Field; Langley Porter Neuropsychiatric Institute, San Francisco, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 29, Nov. 1970, p. 429-440. 19 refs. NIH Grant No. FR-05550; Contract No. Nonr-29319000.

Examination, by the Step-Wise Discriminant Analysis (SWDA) technique, of the data collected by Callaway et al. (1965) in a study of dissimilarity of two-tone average evoked potentials (AEPs) in

normal and schizophrenic patients. The results of this analysis, in conjunction with those reported in a companion paper by Callaway et al. (1970), suggest that the previously reported differences between normal and schizophrenic subjects are largely the result of the increased variability in the AEP of schizophrenics rather than of a consistent tendency of the patients to concentrate on trivial differences between the tones. M.M.

A71-10767 A system for quantifying EEG slow wave activity. C. S. Lessard and R. C. Paschall, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Electroencephalography and Clinical Neurophysiology,* vol. 29, Nov. 1970, p. 516-520. 8 refs.

Discussion of the quantification of sleep EEG delta activity and the design of a digital delta activity filter. The system for quantification of sleep EEG slow wave activity is a means of compressing the EEG information and presenting sleep trends. The rationale for the design of this instrument originates from computer studies into signal decomposition and variability of the EEG activity during a normal night of sleep. A digital, time interval, delta filter system sums, and plots the amount of delta activity occurring in each 1 min epoch in discrete steps. M.M.

A71-10768 * The effect of short term exposures to 100% oxygen on the fine structure of proximal convoluted tubules. R. T. Hess and D. B. Menzel (California, University, Berkeley, Calif.). *Experientia,* vol. 26, Oct. 15, 1970, p. 1124, 1125. 9 refs. Grant No. NGR-05-003-090.

Investigation of the effect of the atmosphere of pure oxygen at a pressure of 600 mm Hg on a variety of rat tissues exposed to this atmosphere for a period of 3 and 7 days, respectively. The experimental results demonstrate that while the proximal tubular cells of animals exposed to pure oxygen for 3 days were ultrastructurally essentially normal, the mitochondrial cristae of 7-day oxygen-exposed animals were definitely dilated, and mitochondrial matrix granules present decreased in frequency, size, and electron density. In addition, a definite increase in the number of lipid bodies was observed. A brief discussion of these results is presented. O.H.

A71-10848 * Effect of diet on hepatic fatty acid synthesis. S. Abraham (Children's Hospital Medical Center, Oakland; California, University, Berkeley, Calif.). *American Journal of Clinical Nutrition,* vol. 23, Aug. 1970, p. 1120-1128. 26 refs. Research supported by the American Cancer Society and NSF; Grant No. NGR-05-059-005.

Discussion of contributions to investigations of the effect of diet on hepatic fatty acid synthesis as related to rats and mice. The theory is supported that in the mouse, but not in the rat, regulation of hepatic lipogenesis by dietary fat is specifically related to the linoleate content. The fact that fatty acid synthetase is inhibited fairly nonspecifically by free long-chain fatty acids tends to speak against the idea that free linoleate levels might directly control the activity of fatty acid synthetase. The possibility that free linoleate is involved in repression and derepression of enzyme synthesis cannot, however, be ruled out. M.M.

A71-10849 * Firing of neuron pairs in cat association cortex during sleep and wakefulness. Hiroharu Noda and W. Ross Adey (California, University, Los Angeles, Calif.). *Journal of Neurophysiology,* vol. 33, no. 5, 1970, p. 672-684. 43 refs. NIH Grants No. NB-02501; No. FR-3; Contract No. AF 49(638)-1387; Grant No. NGR-05-007-195.

Study of the modifications in temporal correlation between discharge sequences of pairs of neurons in the association cortex of the cat during natural sleep and wakefulness. Spontaneous discharges of neuronal pairs were recorded simultaneously with single microelectrodes, and individual units were separated on the basis of their amplitude difference. Behavioral shifts were related to changes in discharge rate and altered firing patterns. Modifications in the temporal correlation between paired discharge trains are statistically evaluated by a cross-correlation technique. The results obtained are discussed. O.H.

A71-10850 * The incorporation of isotopic carbon C 14 into the cerebral glycogen of normal and X-irradiated rats. P. R. Lundgren and J. Miquel (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Neurochemistry,* vol. 17, 1970, p. 1383-1386. 7 refs.

Observation that maximal incorporation of C 14 from labeled glucose into cerebral glycogen of the rat occurred at 3 to 6 hours following intravenous injection of the precursor. A reduction of the rate of glycogen breakdown is the most likely cause of the glycogen accumulation observed in rat brain following exposure to 10 krads of X-radiation. (Author)

A71-10886 Telemetering in thermobiology - A study of mammalian hair. Stanley D. Davis (Case-Western-Reserve University, Cleveland, Ohio). In: International Foundation for Telemetering, International Telemetering Conference, Los Angeles, Calif., October 13-15, 1970, Proceedings. (A71-10876 01-07) Conference co-sponsored by the Instrument Society of America and Electronic Industries Association. Woodland Hills, Calif., International Foundation for Telemetering (ITC Proceedings. Volume 6), 1970, p. 103-109. 13 refs.

Radio telemetric evaluation of the effectiveness of hair as insulation in a cold environment. Two adult male rats, telemetered for deep body temperature, were placed in an 18 deg C environment. After five days of monitoring temperature, food intake and body weight, each animal was shaved of all hair and observed an additional five days. Following shaving, both rats increased food intake, lost weight and showed lowered mean daily body temperatures, though in only one was the latter significantly lower. The increased metabolism after shaving was estimated to be between 25.2 and 51.1% greater than the preshave value in one animal, and between 23.4 and 32.9% in the other. The lowest increases were recorded in the rat tolerating the lower mean temperature. On the basis of food intake alone, the metabolic demands of the shaven rats at 18 deg C were shown to be equal to those of normal rats at 12 deg C. The advantages of using telemetry and continuous monitoring of temperature are discussed with regard to the experimental results. M.M.

A71-10887 * A long term remote intragastric pH, temperature, motility and electrical activity monitoring system. Leslie Wise, Paul W. Jones, G. J. Womack, and Walter F. Ballinger (Washington University; McDonnell Douglas Astronautics Co., St. Louis, Mo.). In: International Foundation for Telemetering, International Telemetering Conference, Los Angeles, Calif., October 13-15, 1970, Proceedings. (A71-10876 01-07) Conference co-sponsored by the Instrument Society of America and Electronic Industries Association. Woodland Hills, Calif., International Foundation for Telemetering (ITC Proceedings. Volume 6), 1970, p. 116-121. 13 refs. Contract No. NSR-26-008-036.

Description of a system under development which can monitor intragastric physiological changes over time periods exceeding 14 days. The electronic instrumentation includes a tethered sensor capsule, automatic titration unit, telemetry system, and data display. The system requires minimal maintenance during the prolonged monitoring period. The sensor capsule uses a pH sensitive glass electrode with wet reference, a thermistor, a solid state pressure sensitive transducer, and impedance matching electronics which develop the physically related electrical signals. Signal acquisition is via tether hardline to the multichannel telemetry unit and sub-

sequent rf transmission to a central data receiving system for display and storage. Automatic titration functions, a myograph to record voluntary muscle movement, and the measurement of skin resistance as an indicator of stress, may also be included in the telemetry data. Preliminary human in vivo experiments have confirmed the capsule sensitivity and stability. M.M.

A71-10977 Temperature telemetry for determining the pyrogenic effects of drugs. K. L. Fox, A. A. Beisang, J. E. Carter, and R. C. Lillehei (Minnesota, University, Minneapolis, Minn.). In: NTC 70; Institute of Electrical and Electronics Engineers, National Telemetering Conference, Los Angeles, Calif., April 27-30, 1970, Proceedings. (A71-10976 01-07) New York, Institute of Electrical and Electronics Engineers, Inc., 1970, p. 11-13.

Investigation of the efficacy of using temperature telemetry to test the pyrogenic effects of drugs on dogs as a preliminary step to the application of temperature telemetry in surgical research. Pyrogenic drugs were administered to anesthetized dogs while temperatures were simultaneously recorded from a thermocouple in the stomach of the animal and a transmitter implanted in the abdominal muscles. A number of advantages to the telemetric monitoring of temperatures were noted. Remote monitoring of temperatures eliminates the need to restrain or anesthetize the experimental animals, and this removes variables which tend to confound the experimental results. Small temperature changes which detected the effects of pyrogens were easily observed even though the temperature transmitter was a rather crude device. These results indicate that temperature telemetry could be employed to determine the pyrogenic effect of drugs. M.M.

A71-10981 A physiological data telemetry link. Edwin A. Elpel and Wade H. Foy (Stanford Research Institute, Menlo Park, Calif.). In: NTC 70; Institute of Electrical and Electronics Engineers, National Telemetering Conference, Los Angeles, Calif., April 27-30, 1970, Proceedings. (A71-10976 01-07) New York, Institute of Electrical and Electronics Engineers, Inc., 1970, p. 85-90. 6 refs.

A six-channel good-quality data telemetry link was developed using a time-division-multiplex scheme for the acquisition of physiological data from unconstrained subjects. The transmitting unit measures 7 x 12.3 x 2.2 cm and weighs 380 g, including batteries; transmitted power is about 8 mW on 250 MHz. The receiving unit uses an Astro SR-207 FM receiver and special logic to lock a decommutator to synchronization pulses in the base-band signal. This link has been operated over a range of more than 400 m and is adequate for transmission of ECG's, EMG's and many other biopotentials. It provides high-quality physiological data at a range and activity level not previously available. (Author)

A71-10982 * Implantable biotelemetry systems. Thomas B. Fryer (NASA, Ames Research Center, Moffett Field, Calif.). In: NTC 70; Institute of Electrical and Electronics Engineers, National Telemetering Conference, Los Angeles, Calif., April 27-30, 1970, Proceedings. (A71-10976 01-07) New York, Institute of Electrical and Electronics Engineers, Inc., 1970, p. 91-96. 5 refs.

Discussion of criteria for designing biotelemetry systems implantable into an animal's body. The problems of transmitting an RF signal through the conductive tissue of the body are examined. Single-channel systems that measure biopotentials such as EEG and EKG, temperature and pressure, are described, together with a multichannel system that is suitable for measuring various physiological parameters simultaneously using one RF link. M.M.

A71-11051 # Interhemispherical synthesis of conditioned-reflex motor reactions brought about at various angles (Mezhpolusharnyi sintez uslovnoreflektornykh dvigatel'nykh reaktsii, vyrabotannykh pod razlichnymi uglami). V. L. Bianki (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 20, July-Aug. 1970, p. 493-498. 12 refs. In Russian.

Description of experiments performed with white mice using the method of conditioned defensive motor reflexes and temporary unidirectional functional decortication. Reflexes in the form of runs at different angles to each other were initially conditioned for each hemisphere. Each hemisphere was left intact, and tests demonstrated both the predominance of one of the hemispheres and a process of interhemispherical synthesis. The hemisphere which was the first to function was predominant at small angles of divergence between the runs, while the other hemisphere was predominant at large angles. The interhemispherical synthesis was expressed by the appearance of new directions for running. A distinction is made between (1) an intermediate synthesis involving runs in directions oriented between the vectors of motion impressed in the two hemispheres, and (2) a mirror synthesis involving a mirror-image direction. T.M.

A71-11052 # EEG dynamics and unit responses of the visual cortex to a conditioned stimulus (Dinamika EEG i reaktsii neironov zritel'noi oblasti kory mozga na uslovnyi razdrazhitel'). Iu. A. Fadeev (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 20, July-Aug. 1970, p. 555-562. 21 refs. In Russian.

Investigation of the reactions of 26 neurons in the visual cortex of cats in response to a conditioned optical stimulus during the formation of a conditioned defensive reflex. EEG data show that functional changes associated with the formation of the conditioned reflex in the visual cortex are completed by the 25- to 30-th pairing of the conditioned and unconditioned stimuli. During this period, the reactions of visual cortex neurons in response to both conditioned and unconditioned stimuli underwent a change. A general tendency was observed toward a reduction of the response to both stimuli. Analysis of the dynamics of changes in neuron reactions to the conditioned stimulus shows that the direction of change (inhibition or stimulation) is closely associated with the direction of change in neuron reactions to the unconditioned stimulus, and with the increase in the background activity of neurons after many pairings. T.M.

A71-11053 # Temporary connection of the neurons in the visual and associative cortical regions of the hemispheres in cats (Vkliuchenie vo vremennuiu sviaz' neironov zritel'noi i assotsiativnoi oblastei kory polusharii koshek). G. N. Smetankin (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 20, July-Aug. 1970, p. 563-569. 22 refs. In Russian.

Investigation of the responses of 210 neurons to light in unanesthetized immobilized cats under artificial respiration. Tests showed that 121 neurons did not change impulse activity, while 89 neurons (53 in the associative region and 36 in the visual region) did react to stimuli. These reactions were analyzed before and during the period of light and sound pairing. During the formation of the temporary associative connection, conditioned reflexes were obtained for 25% of the visual neurons and for 50.9% of the associative neurons. In the visual cortex, the rate of formation of temporary connections was lower and their duration was shorter than in the associative cortex. The mechanisms involved in the formation of the temporary connections are examined. T.M.

A71-11054 # Significance of cortical vestibular projection zones in the formation of vestibular conditioned reflexes and in the spatial orientation of cats (O znachenii korkovykh vestibuliarnykh proektsionnykh zon v vyrabotke vestibuliarnykh uslovnykh refleksov i v prostranstvennoi orientatsii u koshek). G. I. Gorgiladze. *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 20, July-Aug. 1970, p. 663-665. 14 refs. In Russian.

Experimental study of the role played by the cortical vestibular projection zones of cats in the formation of conditioned reflexes from the vestibular apparatus and in the spatial orientation function. The vestibular apparatus was stimulated using the method of dc polarization of the labyrinths. The dc stimuli caused head and front torso movements and were applied in conjunction with 500 and 1000 Hz tone signals, depending on the dc polarization. The results obtained show that the vestibular projection regions of the cerebrum play an insignificant role in the formation of relatively simple vestibular conditioned reflexes but a predominant role in spatial orientation. T.M.

A71-11055 # Analysis of fluctuations in the blood content of an organ and of pulsed fluctuations in its volume by studying the orientation reflex (Analiz kolebanii krovenapolneniia organa i pul'sovykh kolebanii ego ob'ema na primere issledovaniia orientirovochnogo refleksa). V. L. Fantalova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 70, Aug. 1970, p. 3-7. 8 refs. In Russian.

Description of experiments in which the orientation reflex was studied in groups of 8 healthy subjects and 5 patients with peripheral nervous disorders by measuring the blood pressure fluctuations in their peripheral vessels in response to acoustic signals. Rheoencephalograms, EKGs and respiration were also recorded during the experiments. It is concluded that rheograms are not sufficient as a basis for determining the state of hyperemia in humans. V.Z.

A71-11056 # Selectivity of vestibular adaptation to the direction of repeated angular acceleration (Ob izbiratel'nosti vestibuliarnogo privykaniia k napravleniiu povtorno deistvuiushchego uglovogo uskoreniia). A. A. Shipov. *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 70, Aug. 1970, p. 14-16. 5 refs. In Russian.

Description of experiments in which 36 guinea pigs were subjected to repeated angular acceleration cycles according to a program designed to produce a nystagmus only during deceleration. It is found that adaptation to repeated angular accelerations is selective to the direction of acceleration and fails to develop when the direction of acceleration is reversed. V.Z.

A71-11057 # Characteristic of the functional state of the thyroid gland when the temperature of the internal medium of the organism is reduced (K kharakteristike funktsional'nogo sostoianiia shchitovidnoi zhelezy pri snizhenii temperatury vnutrennei sredy organizma). Z. Ia. Dolgova and V. A. Glumova (Semipalatinskii Meditsinskii Institut, Semipalatinsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 70, Aug. 1970, p. 39-43. 18 refs. In Russian.

Observation of the reduction of dehydrogenase, phosphotase and cytochromoxidase activities in the tissue of the thyroid gland of albino rats under conditions of deep hypothermia. Lower ascorbic acid contents and a reduced ability of the gland to accumulate radioactive iodine are also established during hypothermia. The depression of the function of the thyroid gland due to general cooling was greater during experimental hypothyrosis than during experimental hyperthyrosis. V.Z.

A71-11058 # Duration of mitosis and the daily rhythm of mitotic activity (Dlitel'nost' mitoza i sutochnyi ritm mitoticheskoi aktivnosti). Iu. A. Romanov and V. P. Rybakov (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 70, Aug. 1970, p. 89-92. In Russian.

Description of experiments in which the daily mitotic activity was investigated in the marrow, intestinal crypts and thyroid gland of 56 albino rats. The rats were slaughtered at various hours of the day six hours after injections of calchicine. It was found that the increase in the numbers of cells participating in mitosis, rather than the increased duration of mitosis, is responsible for the increased frequency of mitotic events at certain hours of the day. V.Z.

A71-11059 # Telemetric measurement of the blood flow with the aid of ultrasound (Telemetricheskoe izmerenie krovotoka ul'trazvukom). D. D. Matsievskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 70, Sept. 1970, p. 119-121. In Russian.

Description of a TV system which uses the ultrasonic Doppler effect for measuring the blood flow in dogs without movement constraints. The 50 x 95 x 25 mm system consists of a master oscillator, an amplifier, a detector and a hf oscillator, and is strapped to the animal's back. The system delivers ultrasonic signals into the blood flow and receives TV pictures of response signals with frequency variations depending on the blood flow parameters. V.Z.

A71-11061 # Participation of carbon dioxide of the air in the metabolism of animals (Pro uchast' CO2 povitria v metabolizmi u tvarin). G. I. Zhurbin, M. F. Gulii, and N. A. Stognii (Akademiia Nauk Ukrains'koi RSR, Institut Biokhimii, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seria B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 32, Aug. 1970, p. 733-735. 8 refs. In Ukrainian.

Description of experiments in which rabbits were exposed to an atmosphere containing C14O2 in an attempt to determine the transport of inhaled air CO2 into their organs and tissues. Radioactivity was measured in the liver, kidneys, spleen, lungs, blood serum proteins and lipids, liver glycogen and erythrocytes of the decapitated animals. With the exception of the spleen, considerable amounts of CO2 were detected in all other samples after 30-min exposures. Radioactivity levels reached a maximum after exposures of 2 hr. V.Z.

A71-11073 # Modern vestibularimetric chairs and stands for an objective study and training of the function of the vestibular apparatus (Sovremennye vestibulometricheskie kresla i stendy dlia ob'ektivnogo izucheniia i trenirovki funktsii vestibuliarnogo analizatora). S. S. Markarian. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Sept.-Oct. 1970, p. 643-659. 25 refs. In Russian.

Description of recent designs of ground test equipment for studying the activity of the vestibular analysor in the clinic. Several types of universal vestibularimetric chairs and stands developed by the author and others, and also a universal swing and a set of stands for studying interactions between the visual and vestibular analysors are discussed specifically. The performance of this equipment in tests and adaptation studies is assessed. Angular rotation at various rates with or without vertical motion, with controlled doses of visual and acoustic stimulation, and Coriolis forces can be realized with the aid of this equipment. V.Z.

A71-11074 # Changes in the rate of the process of vestibular compensation in relation to the position of the head in space (Izmenenie skorosti protsessa vestibuliarnoi kompensatsii v zavisimosti ot polozheniia golovy v prostrantve). A. A. Shipov, V. A. Galichii, and E. L. Epshtein (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Sept.-Oct. 1970, p. 673-678. 23 refs. In Russian.

Description of an experiment in which the effect of the position of the head on the rates of vestibular compensation was studied in a group of 13 unilaterally labyrinthectomized rabbits whose heads were rigidly fixed in the horizontal plane while their nose-to-sacrum line was kept in the sagittal plane of their heads. A comparison with labyrinthectomized control rabbits free of movement restrictions shows a depression of the vestibular compensation function in the experimental rabbits. V.Z.

A71-11075 # **Effect of antioxidants on free radical activity in organs of mice under conditions of hyperbaric oxygenation (Vliianie antioksidantov na svobodnoradikal'nuiu aktivnost' organov myshei v usloviiakh giperbaricheskoi oksigenatsii).** L. A. Piruzian, I. A. Maksimova, E. Ia. Kaplan, M. A. Rozenfel'd, and T. I. Makolina (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Sept.-Oct. 1970, p. 773-777. 21 refs. In Russian.

Investigation of free radical activity in the tissues of blood, brain, spleen, lungs, liver and heart of white mice which were exposed to an atmosphere of oxygen at 5 C after injections of 5-methoxytryptamine or BH3. The EPR spectra of lyophilized tissue samples indicate variations in the free radical activity depending on the duration of exposures. A relation is also established between the survival rates and the depression of free radical activity due to the action of these antioxidants. V.Z.

A71-11077 # **Electroretinogram with closed eyes.** V. S. Gavriysky (Institute of Physical Education, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady,* vol. 23, no. 7, 1970, p. 871-874. 6 refs.

Discussion of experiments in which ERG recordings were obtained with a special lamellar electrode placed on the lower eyelid of the test person. It was found that this electrode is superior to other types of electrode in studying the bioelectrical reaction of the retina both with open and closed eyes. Indices of electroretinograms with open and closed eyes are tabulated, and ERG recordings obtained with open and closed eyes are compared. V.P.

A71-11081 # **Ultrastructural parallels and differences between vessels in young individuals and newly-formed ones in adults.** K. Ichev (Vissh Meditsinski Institut, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady,* vol. 23, no. 8, 1970, p. 1015-1018. 7 refs.

Investigation of blood vessels taken from different organs of newborn pups, as well as vessels in the corneas of adult rabbits formed as a result of excitation with silver nitrate. Comparing the ultrastructure of newly formed capillaries in adults with that of vessels in young animals, it is concluded that the young vessels have traits of increased functional activity, while the newly formed vessels show signs of hypoactivity. Consequently, the morphological data indicate a relatively low value of newly formed vessels in relation to their main function - namely, to supply tissues and organs with the necessary nutritive substances. A.B.K.

A71-11091 # **Structure of carbohydrate chains of group blood substances (O strukture uglevodnykh tsepei gruppovykh veshchestv krovi).** N. K. Kochetkov, V. A. Derevitskaia, L. M. Likhosherstov, M. D. Martynova, S. N. Senchenkova, G. S. Kikot', and L. S. Bogdashova (Akademiia Nauk SSSR, Institut Organicheskoi Khimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 193, Aug. 11, 1970, p. 1181-1184. 15 refs. In Russian.

Development of a general scheme for constructing carbohydrate chains of group blood substances. The nature of the monosaccharide residue directly incorporated into the node of the carbohydrate-peptide bond and the structure of that portion of the carbohydrate chains adjacent to this residue are determined on the basis of a study of the kinetics of the evolution of the alkali decomposition products of the monosaccharide components. Two fundamental features of the proposed scheme are stressed - namely, the high degree of branching of the carbohydrate chains and the presence of a portion added to the peptide skeleton of the molecule and consisting only of N-acetylhexoseamines. A.B.K.

A71-11097 # **Structure of the respiratory neuron system of the medulla oblongata (O strukture sistemy dykhatel'nykh neironov prodolgovatogo mozga).** I. A. Keder-Stepanova and A. N. Chetaev (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 193, Aug. 21, 1970, p. 1433-1436. 8 refs. In Russian.

Evaluation of certain experimental data which have served as a basis for the development of general concepts concerning the structure of the respiratory neuron system in the lateral zone of the medulla oblongata of the cat. The distribution of the neuron activity with respect to phases of the respiratory cycle is determined. Stability of the characteristics of many neurons in the presence of widely varying methods of altering the rhythm and depth of respiration is established. It is shown that respiratory neurons may be naturally divided into two main classes - inspirator and expirator. Within each class (the two classes are symmetrical) different groups of neurons are found to react differently to given stimuli. A.B.K.

A71-11109 # **Preflight feeding of pilots (O predpoletnom pitanii letchikov).** Iu. F. Udalov, I. M. Alpatov, V. P. Artemov, S. E. Komshaliuk, R. V. Kudrova, M. I. Kuznetsov, P. P. Lobzin, Iu. K. Syzrantsev, and E. E. Sheludiakov. *Voenno-Meditsinskii Zhurnal,* Aug. 1970, p. 47-50. 5 refs. In Russian.

Description of laboratory and flight tests conducted for the purpose of determining optimum feeding rations for pilots before flights (breakfast or supper) and in between flights. Two preflight rations were studied. One ration was based on existing regulations for allotment of the food products. The second ration had higher contents of animal protein to ensure a maximum balance of the amino acid system and to maintain its metabolic reserves. The first ration had no mandatory vitamin additions; the vitamins were issued separately and pilots took them at their discretion. The second ration was enriched with vitamins C, P, B1, B2, B6, PP, and others. Observations were made with 18 pilots. Tables show the behavior of the nitrogen metabolism, amino acids in the blood, sugar content, the vitamin metabolism, and cholesterol content in subjects fed by the two ration systems. T.M.

A71-11110 # **Investigation of the speed and accuracy of motions in flight personnel (Issledovanie skorosti i tochnosti dvizhenii u letnogo sostava).** B. S. Frantsen. *Voenno-Meditsinskii Zhurnal,* Aug. 1970, p. 68-70. In Russian.

Study of the influence of professional flight activities on certain properties of arbitrary motions, particularly the simple and complex sensomotor reaction rates and the temporal characteristics of their constituent components. Tests were performed with flight-personnel and ground-personnel groups of 20 men each. The results show that the flyers exhibit shorter latent periods of motor reactions, smoother and more accurate performance of motions, and faster rates of information processing with less errors. T.M.

A71-11118 # **Effect of preparation Mumie on the nucleic acid content in hemopoietic organs during acute radiation sickness caused by low-power radiation (Vliianie preparata Mumie na soderzhanie nukleinovykh kislot v krovetvornykh organakh pri ostroi luchevoi bolezni, vyzvannoi obluchieniem maloi moshchnosti).** T. M. Tukhtaev and S. I. Pauk (Tadzhikskii Gosudarstvennyi Meditsinskii Institut, Dyushambe, Tadzhik SSR). *Akademiia Nauk Tadzhikskoi SSR, Doklady,* vol. 13, no. 7, 1970, p. 62-65. 23 refs. In Russian.

Description of experiments in which the DNA and RNA contents were determined in the marrow and spleen of 80 rats on the 3rd to 30th day after single exposure to 450 r doses of X rays. The rats were given 500 mg/kg daily doses of preparation Mumie over a period from the 3rd through the 25th day after exposure. The positive effect of this preparation on DNA and RNA metabolism of irradiated rats is noted. V.Z.

A71-11126 # **Analysis of blood pressure changes in heart cavities and large vessels of dogs exposed to different accelerations (Analiz izmenenii krovianogo davleniia v polostiakh serdtsa i magi-**

stral'nykh sosudakh sobak pri uskoreniiakh razlichnogo napravleniia). A. S. Barer, Iu. D. Volynskii, K. I. Murakhovskii, E. I. Sorokina, E. P. Tikhomirov, and L. L. Shik. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 3-9. 11 refs. In Russian.

Dogs were exposed to accelerations of 2, 4, 6, 10 g in the pelvis-to-head direction (at an angle of 0 deg), of 4, 6, 10, 12 g in the back-to-chest direction (at an angle of 78 deg), of 10, 12 g in the back-to-chest direction (at an angle of 90 deg), and of 4, 6, 10 g in the head-to-pelvis direction (at an angle of 180 deg). Miniature sensors were implanted into the right auricle and ventricle, the pulmonary artery, the thoracic and abdominal aortas to measure blood pressure. The ECG, pneumogram and rectal pressure were also recorded. During transverse accelerations the systolic and diastolic pressure increased in all organs tested which seems to be due to an increased resistance in the systemic and pulmonary circulation. It may also be associated with the intraperitoneal pressure. During the pelvis-to-head accelerations (0 deg) the pressure fell in every organ studied with the exception of the right ventricle where the systolic, diastolic and pulse pressure rose. It is supposed that during these exposures the resistance in the exit from the right ventricle may sharply increase. During the exposures to the head-to-pelvis accelerations the systolic and diastolic pressure in the right ventricle increased while the pulse pressure decreased. During exposures to accelerations of every direction respiratory variations of blood pressure took place. (Author)

A71-11127 # Analysis of stability of external mass balance in closed life support systems (K analizu ustoichivosti vneshnego massoobmena v sistemakh zhizneobespecheniia, osnovannykh na krugovorote veshchestv). V. M. Volynets and A. P. Tereshchenko. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 9-14. 5 refs. In Russian.

The paper presents a mathematical model for mass balance in closed life support systems. It describes a method of solving equation systems and gives an evaluation of the mass balance stability. (Author)

A71-11128 # Sanitary and chemical studies of some polymeric materials (Sanitarno-khimicheskie issledovaniia nekotorykh polimernykh materialov). S. M. Gorodinskii, E. I. Semenenko, G. A. Gaziev, E. I. Kosterina, O. N. Shevkun, and T. G. Ivanova. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 15-20. In Russian.

Description of a procedure for comparative evaluation of the sanitary and chemical properties of polymeric materials. This procedure is related to such specific conditions as isolation of the chamber, high contamination of its atmosphere with the outgassing material, and moderate temperature of the chamber atmosphere (from 10 to 50 C). The sanitary and chemical studies of polymeric materials were conducted under different pressure conditions: vacuum (.001 to .0001 mm Hg), low oxygen pressure (0.2 to 0.4 atm abs) and normal atmospheric pressure. The experiments were carried out at temperatures ranging from room temperature to 200 C. A total of 25 materials were investigated, including those based on polyvinyl chloride, caprolactam, polycarbonate, polyurethane, natural and synthetic fibers, rubbers, sealings, fiberglass-reinforced plastics, and Plexiglas. Fiberglass-reinforced plastics and sealings appeared to be most toxic whereas rubbers and caprolite were least toxic. It was demonstrated that the hygienic properties of polymeric materials can be improved by means of vacuum exposure, stabilizer addition, heating, and washing with water. (Author)

A71-11129 # Comparative experimental study of continuous and intermittent effect of carbon tetrachloride on the microstructure of animal organs (Sravnitel'noe eksperimental'noe izuchenie nepreryvnogo i preryvistogo deistviia chetyrekhkhloristogo ugleroda na mikrostrukturu organov zhivotnykh). G. P. Tikhonova, G. M. Gorban', and Iu. P. Bizin. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 20-25. In Russian.

The pattern and level of pathomorphological and histochemical processes that developed in the liver of test animals breathing carbon tetrachloride in a concentration of 0.5 mg/l continuously or intermittently were proportional to the total exposure time. Structural and metabolic disturbances developed in the liver 3 to 4 times earlier during a continuous exposure as compared to an intermittent effect of similar duration (6 hours). (Author)

A71-11130 # Hypokinetic effect on the protein composition of skeletal muscles (Vliianie gipokinezii na belkovyi sostav skeletnykh myshts). M. S. Gaevskaia, L. M. Slez, and N. A. Iliushko. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 25-29. 10 refs. In Russian.

The experiments conducted on rats showed that the animals developed hypokinesia not immediately after their enclosure but only with the extinction of the freedom reflex. During the period of muscular activity that preceded hypokinesia the content of sarcoplasmatic proteins decreased and the amount of myofibrillar proteins increased in hind limb muscles. The hypokinetic period to follow significantly reduced the content of myofibrillar proteins in skeletal muscles, causing no changes in the concentration and composition of sarcoplasmatic proteins. (Author)

A71-11131 # Morphological and histochemical changes in liver and kidneys of rats exposed to long-term hypothermy (O morfologicheskikh i nekotorykh gistokhimicheskikh izmeneniiakh v pecheni i pochkakh krys pri dlitel'noi gipotermii). V. I. Starostin and L. A. Karaseva. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 29-34. 14 refs. In Russian.

The liver and kidneys of rats exposed to 20 to 24 hr hypothermy were examined histologically and histochemically. The animals that were sacrificed during deep hypothermy displayed the greatest changes which involved decrease of phosphorylase activity and glycogen depletion (liver), fat dystrophy and cloudy swelling (liver and kidneys) that developed together with blood vessel congestion. Later most animals exhibited granulation tissue modules in liver and some animals revealed structural damages of certain glowerules in kidneys. After a long period of time the majority of animals showed complete repair of the liver and kidney structures. (Author)

A71-11132 # On the selection of criteria to evaluate radiation damage at different depth-dose distributions (O vybore kriteriia otsenki luchevogo porazheniia pri razlichnykh glubinnykh raspredeleniiakh dozy). Iu. G. Grigor'ev and N. Ia. Savchenko. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 34-39. 19 refs. In Russian.

Investigation of the influence of a nonuniform distribution of depth doses on the radiobiological effect on dogs. The tissue dose in the midbody line was 20% of the surface dose. A comparison of the biological effect at similar average tissue doses showed significant differences in the clinical picture and severity of the radiation disease. The value of the absorbed bone marrow dose at LD sub 50 was 210 to 250 rad, and was rather stable in different models of the tissue distribution. (Author)

A71-11133 # Medical support of extended manned space missions (K probleme meditsinskogo obespecheniia dlitel'nykh kosmicheskikh poletov). T. N. Krupina, I. P. Neumyvakin, and G. P. Mikhailovskii. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 40-44. 14 refs. In Russian.

Various problems involved in medical support of extended manned space missions are discussed. The importance of experimental studies that may facilitate a reliable prediction and better

understanding of mechanisms of functional disturbances and diseases during extended flights is stressed. This is a necessary prerequisite of proper planning and timely rendering of medical aid inflight. It is also important to investigate the effect of various drugs on the human body whose reactivity may change due to space flight effects, and to develop proper drugs and doses. Some aspects of rendering specialized medical aid in flight conditions are described. It is emphasized that the above problems can be solved only through combined efforts of experts in different branches of science.
(Author)

A71-11134 # **Structure of human heat exchange and overheating mechanism at high ambient temperatures (Struktura teploobmena cheloveka i mekhanizm peregrevaniia pri vysokikh temperaturakh vneshnei sredy).** E. Ia. Shepelev. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 44-48. 10 refs. In Russian.

The paper gives experimental data on the structure of human heat exchange at high ambient temperatures at sea-level and lowered pressures. The most probable primary mechanism of a body temperature increase at high ambient temperatures is discussed on the basis of the data obtained. It is shown that at high ambient temperature and low humidity the body temperature increases due to the produced heat retention rather than to heat supply from the environment. The concept of external heat load is clarified. (Author)

A71-11135 # **Some symptoms characterizing the limit of human tolerance to heat loads (O nekotorykh pokazateliakh, kharakterizuiushchikh predel perenosimosti chelovekom teplovykh nagruzok).** R. F. Afanas'eva, I. I. Dedenko, and S. G. Okuneva. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 48-52. 8 refs. In Russian.

Description of some symptoms of the thermal state of man exposed to heat loads at rest and during physical exercises of different intensity. The tolerance limit coincides with the following subjective feelings: sharp deterioration of the overall health condition, nausea, impaired breathing, headache, fatigue, weakness, and heartbeating; and the following objective symptoms: irritability, cyanosed skin, and face puffiness. The average body temperature of 38.5 to 38.8 C and corresponding heat accumulation of 160 to 200 kcal can be used as an objective criterion of the human tolerance to heat loads. Such characteristics of the human thermal state as rectal temperature, skin temperature, heart rate, and water losses depend on the ambient temperature and humidity, as well as on the work performed. During external heat loads it is mainly the 'membrane' temperature which increases, whereas during heat loads aggravated by physical exercises it is mainly the 'core' temperature which increases; however, the average body temperature that is in conformity with the tolerance limit is similar both at rest and work.
(Author)

A71-11136 # **Some peculiarities of external respiration and energy expenditures during orthostatic tests before and after 18-hour immersion experiment (Nekotorye osobennosti vneshnego dykhaniia i energeticheskikh zatrat pri ortostaticheskikh probakh do i posle 18-chasovogo prebyvaniia v immersionnoi srede).** V. I. Sokolkov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 52-58. 21 refs. In Russian.

The external respiration, gas exchange, and energy expenditures were examined during orthostatic tests before and after 18-hr immersion experiment. Tilt tests were performed for 15 min at an angle of 90 deg. According to the orthostatic tolerance, the test subjects were divided into two groups, the first of which comprised people with high tolerance and the second included people with low tolerance who developed regularly orthostatic collapses. During tilt tests statistically significant increases of the pulmonary ventilation, oxygen consumption, carbon dioxide production, and energy expenditures were observed in the 2nd group test subjects as compared with the 1st group. (Author)

A71-11137 # **Modeling of the neuron network generating stable rhythmic impulsation (Modelirovanie neironnoi seti, generiruiushchei ustoichivuiu ritmicheskuiu impul'satsiiu).** B. G. Sushkov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 58-63. 5 refs. In Russian.

A system capable of generating a stable rhythmic impulsation is built from elements whose behavior is similar to that of the nerve cells. The relationship between the performance of the system and its parameters is discussed. The paper may help in controlling similar neuron networks in living organisms, particularly in interpreting the genesis of the vestibular nystagmus. (Author)

A71-11138 # **On the functional state of the right heart (O funktsional'nom sostoianii pravykh otdelov serdtsa).** N. P. Mironenko. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 63-66. 9 refs. In Russian.

The experiments were performed on 61 male test subjects of the age ranging from 20 to 40 years of which 47 subjects were healthy, 8 suffered from autonomic vessel dysfunction of the hypertension type, and 6 were patients with the hypertension disease of the 1 stage. The activity of the right heart was recorded by means of electrokymograph. The test subjects performed the Valsalva maneuver. It was found that during the provocative test the right ventricle with a normally short ejection period at rest is capable of increasing its contraction force to a greater extent than the ventricle with a shorter ejection period. (Author)

A71-11139 # **Electronystagmographic characteristics of habituation processes in the vestibular system (Elektronistagmograficheskaia kharakteristika protsessov privykaniia v vestibuliarnoi sisteme).** A. A. Shipov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 66-70. 24 refs. In Russian.

The experiments on intact and unilaterally labyrinthectomized guinea-pigs were performed to investigate extinction of the nystagmus beat number, duration, and frequency during repeated exposures to angular accelerations of different value and similar duration. It was demonstrated that extinction curves of each of the parameters of the nystagmus reaction may be approximated by exponential functions. The number of beats extinguished most rapidly (with the least rotation constant) while the nystagmus frequency extinguished most slowly. The higher rate of the nystagmus reaction corresponded to higher acceleration values. Unilaterally labyrinthectomized guinea-pigs showed slower nystagmus extinction than intact animals. (Author)

A71-11140 # **Some clinical and biochemical indices of human tolerance to impact accelerations (Nekotorye kliniko-biokhimicheskie pokazateli perenosimosti chelovekom udarnykh uskorenii).** L. A. Rubashkina. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 71-75. 27 refs. In Russian.

An attempt was made to compare the degree of increase of aspartic aminotransferase activity with some indices indicating high level of human tolerance to impact accelerations. Accelerations applied to the short and long axes of the body were investigated. Upon an increase of the value from 25 to 35-40 g and the rate of transverse accelerations from 2000 to 4000 g/sec, the appearance of limiting symptoms (shock, hematuria, proteinuria, bradycardia, EVG changes) was also accompanied by an increase of aspartic aminotransferase activity in the blood serum. The enzyme activity reached maximally 200-240% of the initial value during exposures to both transverse and longitudinal accelerations. (Author)

A71-11141 # **Some results of the performance of a self-contained life-support system during the flights of the Soiuz 4 and Soiuz 5 spacecraft (Nekotorye rezul'taty raboty avtonomnoi sistemy zhizneobespecheniia pri polete kosmicheskikh korablei 'Soiuz-4' i 'Soiuz-5').** I. P. Abramov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4,

July-Aug. 1970, p. 75-78. In Russian.

Description of a regeneration type life-support system used by the cosmonauts Khrunov and Eliseev during extravehicular activities. A block diagram of the principal components of the system is given and discussed. Telemetered data on the physical condition of the cosmonauts indicate that the system described can operate satisfactorily for a period of several hours. V.P.

A71-11142 # Method of investigating the gas metabolism in man under conditions of a rarefied atmosphere with the aid of gas chromatography (Metodika issledovaniia gazovogo obmena u cheloveka v usloviiakh razrezhennoi atmosfery s pomoshch'iu gazovoi khromatografii). V. I. Chadov, E. E. Sotnikov, E. I. Kuznetsov, and G. A. Gaziev. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 79-82. In Russian.

Description of a procedure for determining the human gas metabolism in a rarefied atmosphere using special equipment for collecting the exhaled gas mixture for gas chromatographic analysis. A structural diagram is given of the ducts, valves, manometers, and tanks comprising the apparatus for determining pulmonary ventilation and for collecting exhaled gas samples from subjects contained in a pressure chamber. The operation of the system in typical experimental situations is explained, and the design of the gas chromatograph is outlined. The sensitivity of the instrument is 0.002 ml for oxygen and nitrogen, and 0.01 ml for carbon dioxide. The duration of gas chromatographic analysis is from 4 to 5 min. T.M.

A71-11143 # Role of proprioception in the perception of body arrangement by man during flight along a Kepler parabola (Rol' proprioretseptsii v vospriiatii skhemy tela u cheloveka v usloviiakh poleta po parabole Keplera). I. F. Chekirda and I. A. Kolosov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 83, 84. 13 refs. In Russian.

Investigation of factors affecting the perception of the relative position of arm segments by subjects exposed to weightlessness and accelerations during aircraft flight along a parabolic trajectory. Blindfolded subjects were restrained in a chair and were asked to assume a 90-deg angle at the elbow. The tests involved both the bending of a maximally outstretched arm and the extension of a maximally bent arm. The results show that transition to heavier weight leads to an overestimation of the true angle in bending and extending the arm. T.M.

A71-11144 # Investigation of the stability of medications with respect to unusual factors of the ambient medium (Issledovanie stabil'nosti medikamentov primenitel'no k neobychnym faktoram vneshnei sredy). I. P. Neumyvakin, L. A. Semeikina, and F. N. Uskov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 84, 85. In Russian.

Investigation of the stability of certain medications with respect to elevated temperatures, humidity, changes in the ambient gas composition, increased oxygen content, radiation, vacuum, vibration, and accelerations. The medicines tested consisted of tablet forms of Barbamyl, caffeine, madribone, codeine phosphate with soda, and etaparazine. It is shown that the set of external effects considered caused certain discernible changes. The strength of the tablets was reduced by half, and the disintegration time for Barbamyl and madribone tablets increased from 10 to 40 min. Pharmacological properties remained unchanged. T.M.

A71-11145 # Influence of a ration with unicellular algae on the state of the internal organs of mice after protein malnutrition (Vliianie ratsiona s odnokletochnymi vodorosliami na sostoianie vnutrennykh organov krys posle belkovogo golodaniia). A. V. Novikova, N. S. Kliushkina, and V. I. Fofanov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 85-87. 5 refs. In Russian.

Investigation of the influence of a ration with chlorella on the state of the internal organs in mice with protein deficiency. Rations with casein and soybean protein were used for comparison purposes. The results show that the chlorella protein was as efficient as casein in overcoming protein deficiency in the rats. The soybean protein rations were not as efficient and the recovery progressed much more slowly. T.M.

A71-11146 # Influence of chronic gamma-irradiation on the fission processes and the chromosome apparatus of bone marrow cells in dogs (Vliianie khronicheskogo gamma-obliucheniia na protsessy deleniia i khromosomnyi apparat kletok kostnogo mozga sobak). T. P. Tsessarskaia, T. M. Zukhbaia, and A. V. Iliukhin. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, July-Aug. 1970, p. 87-89. In Russian.

Description of cytogenetic data and the results of studies of the physiological regeneration of the bone marrow in dogs subjected to chronic gamma irradiation for the period of a year. Attention was also given to the effects of increased single radiation doses, imitating solar flares, superimposed on the chronic radiation background. The dogs were studied in three groups subjected to yearly doses of 25, 75, and 150 rem. Another group received a total of 225 rem due to the additional periodic events. At the end of the year, the qualitative and quantitative characteristics of the proliferation processes in the bone marrow remained unchanged. However, some observed cytogenetic effects are attributed to the low-level chronic irradiation. T.M.

A71-11149 # Functional characteristics of the cerebral system sections controlling psychic and motor functions in man (Funktsional'naia kharakteristika zven'ev mozgovykh sistem kontrolia psikhicheskikh i dvigatel'nykh funktsii u cheloveka). N. P. Bekhtereva, D. K. Kambarova, and Iu. K. Matveev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Aug. 1970, p. 1081-1097. 21 refs. In Russian.

Investigation of the impulsive activity of the neuron populations in deep cerebral structures during psychological and motor-function tests in normal conditions and after administering neurotropic media. Specific regions were discovered in different nucleus structures which exhibited characteristic reproducible dynamics of the impulsive activity during performance of the test functions. The characteristic reproducible rearrangements of the impulsive activity during motor function tests arose in different nuclei or in different regions of the same nucleus during motion of extremities on both sides of the body or during motion of only the contralateral extremity. Administration of such neurotropic preparations as L-dopa changed the background frequency of the impulsation and varied its dynamics to the point of either eliminating characteristic reactions or stimulating them in cases where they were insignificant or nonexistent. T.M.

A71-11150 # Water supply of cosmonauts (Vodoobespechenie kosmonavtov). N. Radchenko. *Aviatsiia i Kosmonavtika,* Sept. 1970, p. 31, 32. In Russian.

Brief review of the water regeneration problem in a spacecraft and the progress currently made toward a closed ecological system with a self-contained biological cycle. Experimental research work performed in the Soviet Union, including a medicotechnological experiment in which three volunteers were enclosed for one year in a capsule simulating a space cabin, depending solely on regeneration for water supply, is noted. Regenerative methods developed in the U.S. are also noted. V.P.

A71-11153 # Some problems of continuous EKG analysis (Niakoi problemi na prod'lzhitelniia analiz na elektrokardiogramata). Toni Ianev and Garo Astardzhiian. *B'lgarska Akademiia na Naukite,*

Institut po Tekhnicheska Kibernetika, Izvestiia, vol. 12, 1970, p. 53-71. 6 refs. In Bulgarian.

Discussion of approaches to the determination of the structure of a digital computer for a continuous analysis of changes in EKG configurations over extended periods of time. Dynamic curves which describe the translation of the coordinate system during the measurement of the ST interval of an EKG are plotted. Sets of such curves represent the images of pathological patterns in EKGs. An automatic control technique for conducting a continuous prolonged EKG analysis for the detection of pathological changes in EKGs is described. The effects of wave processes and of occasional irregularities in the heart rhythm on the duration of the ST interval are considered. V.Z.

A71-11154 # **Possibility of an analysis of irregularities in the cardiac rhythm (Otnosno v'zmozhnostta za analiz na rit'mnite narusheniia v s'rdechnata deinost).** Garo Astardzhiian, Khristo R. Khristov, and Chudomir Nachev. *B'lgarska Akademiia na Naukite, Institut po Tekhnicheska Kibernetika, Izvestiia,* vol. 12, 1970, p. 73-92. 21 refs. In Bulgarian.

Description of a technique for conducting a complete differential analysis of cardiac rhythm irregularities over an extended period of time. The technique involves a comparison of observed EKG RR-intervals with normal and abnormal reference intervals. A classification of abnormal heart contractions based on the differences between their time intervals and normal reference intervals is set up. Cardiac activity can be presented as a sequence of categorized pulses when this classification is used. The computer types applicable in the analysis of cardiac rhythm irregularities by this technique are discussed. V.Z.

A71-11176 **Simulation of electrical interaction of cardiac cells.** Dennis B. Heppner (General Dynamics Corp., Convair Div., San Diego, Calif.) and Robert Plonsey (Case-Western-Reserve University, Cleveland, Ohio). *Biophysical Journal,* vol. 10, Nov. 1970, p. 1057-1075. 11 refs. PHS Grants No. HE-10417; No. 5-F1-GM30,573-02.

Use of a model of the electrical activity of excitable membrane to simulate action potential propagation in cardiac cells. Using an implicit method for solving finite-difference equations, propagation through the intercalated disk region between two abutting cells is studied. A model of interaction is constructed, and parameters of the cellular junction are determined. Estimates of the intercalated disk resistance are then made from these junction parameters, using a field analysis of the junction. Values of approximately 4 ohm-sq cm are found and correlate well with experimentally measured values. (Author)

A71-11177 **The potential in the gap between two abutting cardiac muscle cells - A closed solution.** J. W. Woodbury and W. E. Crill (Washington, University, Seattle, Wash.). *Biophysical Journal,* vol. 10, Nov. 1970, p. 1076-1083. PHS Grants No. NS-01752; No. GM-00739.

Discussion of the nature and sources of the discrepancies between the authors' original approximate solution for the voltage in the gap between two closely abutting cylindrical muscle cells and the rigorous series solution given by Heppner and Plonsey. A differential equation is developed describing the potential in this gap and permitting an approximate calculation of the degree of current that spreads from an active to an abutting, inactive cell. The closed solution not only simplifies calculations but yields additional insights into the nature of the coupling resistances used by Heppner and Plonsey in their detailed analysis of the cell-to-cell transmission process. O.H.

A71-11182 * **Counterflow of sodium across short-circuited acid-killed turtle bladders.** Dominick E. Gentile, Adil E. Shamoo, Herman R. Wyssbrod, and William A. Brodsky (New York, City University, New York, N.Y.). *American Journal of Physiology,* vol. 219, Nov. 1970, p. 1192-1199. 15 refs. NASA-supported research; NIH Grant No. AM-13037; NSF Grant No. GB-7764.

Study of the counterflow of sodium from the serosal to the mucosal surface of a short-circuited urinary bladder of the freshwater turtle. Experiments were carried out to measure the unidirectional fluxes of sodium in the presence of transmural gradients of hydrogen, to determine the nature of interaction of hydrogen and sodium with each other and the membrane, and finally, to determine whether such interactions depended upon the presence of a viable sodium pump and/or oxygen consumption. The results show that the counterflow of sodium from the serosal to the mucosal surface is induced by a transmural gradient and flow of hydrogen from the mucosal to the serosal surface. O.H.

A71-11183 * **Coronary and visceral vasoactivity associated with eating and digestion in the conscious dog.** Stephen F. Vatner (California, University, San Diego, Calif.), Dean Franklin (Scripps Clinic and Research Foundation, La Jolla, Calif.), and Robert L. Citters (Washington, University, Seattle, Wash.). *American Journal of Physiology,* vol. 219, Nov. 1970, p. 1380-1385. 25 refs. NASA-supported research; NIH Grants No. HE-12373; No. HE-08337; No. HE-05147-13; No. HE-07293; No. HE-08433.

Study of the effects of eating and digestion on the regional circulations, especially the coronary, in conscious mongrel dogs, with the goal of resolving some of these problems. Particular emphasis was placed on the problems of whether an increase in mesenteric flow is associated with a general increase in flow to all circulatory beds with consequent increases in cardiac output, and whether coronary vessels constrict in response to eating or dilate as a result of the increased left ventricular work and increased myocardial oxygen requirements. The results are discussed and analyzed. O.H.

A71-11184 **Interactions of vasoactive substances in exercise hyperemia - O2, K(+), and osmolality.** N. Sheldon Skinner, Jr. and Jimmy C. Costin (Emory University, Atlanta, Ga.). *American Journal of Physiology,* vol. 219, Nov. 1970, p. 1386-1392. 25 refs. NIH Grant No. HE-12566.

Study of the vascular interactions and interrelationships among oxygen, potassium, and osmolality in the hyperemia of muscular contraction. Experiments were carried out using a vascularly isolated, innervated, constant-flow and reservoir-perfused dog gracilis muscle. The experimental data obtained indicate that decreased oxygen supply relative to demand, potassium, and osmolality interrelate to contribute to the vasodilatation associated with muscular contraction. O.H.

A71-11185 **Effects of hypoxia on cerebral autoregulation.** K. Kogure, P. Scheinberg, M. Fujishima, R. Busto, and O. M. Reinmuth (Miami, University, Miami, Fla.). *American Journal of Physiology,* vol. 219, Nov. 1970, p. 1393-1396. 16 refs. Research supported by the Meyer Gold Research Fund; PHS Grant No. NB-05820-04.

The effects of hypoxia induced by inhalation of 6% O2-N2 gas mixture on cerebral vascular autoregulation to arterial perfusion pressure was studied in 18 dogs. Cerebral blood flow (CBF) was measured by methods which do not require a steady state and provide instantaneous and constant measurements. Pa sub CO2 was controlled by artificial respiration. Cerebral arterial perfusion pressure was altered in three ways: 1) pharmacologically, 2) by increasing intracranial pressure, and 3) by removing and restoring the animal's blood. Autoregulation is not lost until PaO2 is maintained below 25 mm Hg for 4-6 min. Autoregulation is maintained even after hypoxia produces increased CBF and decreased cortical pH, indicating that loss of autoregulation is not due to the parenchymal acidosis. Loss of autoregulation in hypoxia is not due to maximal vasodilatation. Autoregulation to increased arterial perfusion pressure occurred after a momentary increase in CBF, whereas autoregulation to reduced perfusion pressure appeared to be instantaneous, without an initial drop in CBF. (Author)

A71-11189 **The sound attenuation of flight helmets.** John R. Forstall (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *Sound and Vibration,* vol. 4, Oct. 1970, p. 12-17. Navy-supported research.

The noise attenuation of flight helmets can best be measured by the manikin method. This technique allows a helmet to be optimally fitted quickly, variability introduced by human factors is kept at a minimum, high-level noise can be used as the test stimulus, and visual/auditory monitoring of the attenuated noise provides the experimenter with a precise appraisal of the fit as adjustments are made. The method is particularly useful in screening earmuff-type protective devices for selecting those which should be subjected to real-ear tests. (Author)

A71-11220 **Differentiation between slow cortical potentials associated with motor and mental acts in man.** T. Järvilehto and H. Fruhstorfer (Helsinki, University, Helsinki, Finland). *Experimental Brain Research,* vol. 11, no. 3, 1970, p. 309-317. 28 refs.

In six human subjects negative slow potentials associated with voluntary movements and discrimination tasks were studied. On the basis of their spatial distribution on the scalp the slow potentials could be divided into three groups: (1) a central-dominant potential ('readiness potential') which is suggested to be a sign of general readiness to perform a task; (2) a frontal-dominant potential which seems to be related to the uncertainty of the subject; (3) a centro-frontal ('contingent negative variation') which probably results from a summation of the electric fields of the central-dominant and the frontal-dominant potential. (Author)

A71-11250 * # **Regenerated pure nutrients as foods for long duration space missions.** Jacob Shapira (NASA, Ames Research Center, Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 20th, Mar del Plata, Argentina, Oct. 5-10, 1969, Paper.* 8 p. 6 refs.

Discussion of the use of physicochemical methods to convert metabolically produced carbon dioxide and water into materials that will be able to provide an appreciable fraction of the caloric requirement of a crew for a long duration space mission. Certain individual nutrients considered appropriate for physicochemical regeneration are discussed, together with some of the nutritional studies conducted with these compounds, and the current status of systems under development for the synthesis of these compounds in the aerospace environment. It is pointed out that prototype demonstration systems for both formaldehyde synthesis and formaldehyde conversion to glycerol are currently under construction. These prototype systems will provide information concerning the weight, volume, and power for projected spacecraft systems and thus permit a realistic estimate to be made regarding the potential utility of this approach to regenerating food during long duration missions. M.M.

A71-11298 **The 'new' electrocardiographs - A step toward greater fidelity in recording.** Hubert V. Pipberger. *Circulation,* vol. 42, Nov. 1970, p. 771, 772.

Brief review of recent advances of electrocardiograph designs toward a higher recording fidelity. Suggestions are given as to how advanced cardiographs should be checked to make sure that they meet all recommended requirements. Sources of possible errors are indicated. V.Z.

A71-11299 **The Oslo diet-heart study - Eleven-year report.** Paul Leren (Ullevaal Hospital, Oslo, Norway). *Circulation,* vol. 42, Nov. 1970, p. 935-942.

Discussion of an experiment in which mortality was studied in a group of 412 male myocardial infarction patients kept on a diet low in saturated fats and cholesterol and high in polyunsaturated fats. A significant reduction of mortality was observed after five years, while the rate of 'sudden death' remained unchanged. After eleven years the total number of coronary deaths was 79 in the diet group and 94 in the control group while death from all causes occurred in 101 cases of dieters and in 108 cases in the control group. The coronary heart disease mortality showed a relation to age, serum cholesterol level, blood pressure, body weight and smoking habits. V.Z.

A71-11313 * # **The cerebellum - A substrate for list processing in the brain.** James S. Albus (NASA, Goddard Space Flight Center, Data Techniques Branch, Greenbelt, Md.). *American Society for Cybernetics, Annual Symposium, 4th, Washington, D.C., Oct. 8, 9, 1970, Paper.* 44 p. 19 refs.

Review of cerebellar anatomy and physiology assuming that the cerebellum performs as a classical Perceptron and that the mossy fiber rosettes, granule cells, and Golgi cells produce an expansion recoding on mossy fiber input patterns to increase the pattern discrimination capabilities of the cerebral Perceptron. It is further suggested that the input/output relationships of the cerebellum have the properties of an associative memory and that mossy fiber inputs correspond to address bits, climbing fiber inputs correspond to data to be stored, and Purkinje cell axons constitute the memory output lines. It is also maintained that thalamus and cerebral cortex anatomies suggest that a memory mechanism similar to that of the cerebellum might exist in other areas of the brain. V.Z.

A71-11330 * **Behaviorally induced hypertension in the squirrel monkey.** Herbert Benson, J. Alan Herd (New England Regional Primate Research Center, Southboro, Mass.), W. H. Morse (Harvard University, Boston, Mass.), and R. T. Kelleher (Boston City Hospital, Boston, Mass.). *Circulation Research, Supplement no. 1,* vol. 27, July 1970, p. I-21 to I-26. 5 refs. PHS Grants No. HE-09154; No. MH-02094; No. MH-07658; No. 5-PO-1 HE-10539; Grant No. NGR-22-007-137.

Experimental confirmation and extension of previous studies of behaviorally induced hypertension in the squirrel monkey. Increased mean arterial blood pressure was found to occur during behavioral experiments in five unanesthetized squirrel monkeys. It is pointed out that operant conditioning schedules that continuously exert strong control over an animal's behavior also induce marked, persistent elevations in systemic mean arterial blood pressure. M.M.

A71-11343 **Three-dimensional Fourier synthesis of human deoxyhaemoglobin at 3.5 A resolution.** Hilary Muirhead and J. Greer (Medical Research Council, Laboratory of Molecular Biology, Cambridge, England). *Nature,* vol. 228, Nov. 7, 1970, p. 516-519. 21 refs.

Analysis of electron density maps of human deoxyhemoglobin at a resolution of 3.5 A. New conformations of the C-terminal residues of the beta chain are revealed, and their contribution to the alkaline Bohr effect is confirmed. A preliminary comparison of this structure with that of horse oxyhemoglobin shows that the main differences occur at the chain termini and at certain side chains in the alpha sub 1 beta sub 2 interface. (Author)

A71-11346 **Bimodal cochlear response curves in rodents.** Ann M. Brown (King's College, London, England). *Nature,* vol. 228, Nov. 7, 1970, p. 576, 577. 12 refs. USAF-sponsored research.

Investigation of the cochlear microphonic high frequency response of wild wood mice (Apodemus sylvaticus Linnaeus), voles (Clethrionomys glareolus Schreber) and laboratory bred gerbils (Meriones shawi Rozet). Cochlear responses were recorded from the round window membrane. The most significant feature of the results was the bimodal appearance of the curves obtained. The frequency of the second peak was found to be closely related to the ultrasonic frequencies emitted by the animals, and the height of this peak appears to be inversely related to the intensity of the sounds produced. G.R.

A71-11347 **Control of moulting in an insect.** S. Bonner Weir (Case-Western-Reserve University, Cleveland, Ohio). *Nature,* vol. 228, Nov. 7, 1970, p. 580, 581. 26 refs. PHS-supported research.

Discussion of experiments which show that the head and thorax of Calpodes ethlius larvae isolated with intact activated prothoracic glands do not moult. Moulting can only take place if moulting hormone is injected or if at least part of the abdomen is present. This suggests that more than an activated prothoracic gland is needed for moulting. G.R.

A71-11376 **Survival.** Ted S. Ferry (Southern California, University, Los Angeles, Calif.). *VertiFlite,* vol. 16, Nov. 1970, p. 2-5. 7 refs.

Discussion of methods by which a helicopter pilot can provide for survival of himself and his passengers in an emergency. A knowledge of g forces, human tolerances, and pilot techniques under conditions of autorotation is essential. Crash survival is also a function of the design of certain crash-safety concepts. These design implications can be narrowed to impact survival and timely evacuation, which is dependent upon functioning emergency hatches, doors, windows, fire-extinguishing devices, and properly sized exits. F.R.L.

A71-11388 **Eye movements in the dark during the attempt to maintain a prior fixation position.** Leonard Matin, Ethel Matin, and Douglas G. Pearce (Columbia University, New York, N.Y.; Defence Research Establishment Toronto, Downsview, Canada). *Vision Research,* vol. 10, Sept. 1970, p. 837-857. 20 refs. NSF Grants No. GB-18120; No. GB-944; No. GB-5947; PHS Grant No. 5 RO1 EY-00375.

Experimental investigation in which the horizontal eye movements of two subjects were measured during a series of 3-sec intervals of total darkness as they attempted to maintain the ocular position defined by prior viewing of a fixation target. Systematic changes in the mean and variance of displacements of the eye occurred between successive portions of the dark interval. The pattern of correlations between eye position at a given moment in the dark interval and subsequent displacements contained statistically significant deviations from expectation based on a random walk model indicating some control of eye position by an extraretinal signal; however, these deviations were not large. It is suggested that the extraretinal signal is the subject's perception of a discrepancy between the effort pattern exerted in attempting to hold the same position and his memory for what this effort pattern was during fixation of the visible target; the ocular displacements in the dark are a manifestation of the noisiness of this signal. M.M.

A71-11389 **The glare effect of monochromatic light on the human eye (Die Blendwirkung monochromatischen Lichtes auf das menschliche Auge).** Horst König. *Vision Research,* vol. 10, Sept. 1970, p. 875-885. 17 refs. In German.

Investigation of the glare effect of monochromatic light on the human eye, based on measurements of the glare effect as a function of wavelength, the variation of the visual threshold serving as criterion. Test light (35 min visual angle) and glare light (3 deg 19 min visual angle) were presented to the eye in light flashes of 0.06 and 0.1 sec duration respectively at different retinal places. The measurements were carried out by four observers on three groups of subjects. In the first group the test light was white, while in the second one, it was of the same color as the glare light; in both cases glare lights of the same subjective brightness were used. In the third group, glare lights were used of the same radiance. The difference of the logarithms of radiance for the visual thresholds with and without glare were plotted as a function of the wavelength and the results obtained are discussed. O.H.

A71-11390 **The wavelength discrimination ability of the eye in the case of linear dispersion spectra (Das Wellenlängenunterscheidungsvermögen des Auges an Spektren linearer Dispersion).** H. Munker and B. Kratzer (Institut für medizinische Optik, Munich, West Germany). *Vision Research,* vol. 10, Sept. 1970, p. 887-890. 10 refs. In German.

Discussion of measurements of the wavelength discrimination ability of the eye performed for fields with linearly decreasing or increasing wavelength. The results are found to be similar to those known from literature for bipartite fields. When the test field was divided by a black bar, the threshold was lowered at three characteristic wavelengths. O.H.

A71-11391 **Human cyclofusional response.** Andrew E. Kertesz (California Institute of Technology, Pasadena, Calif.) and Richard W. Jones (Northwestern University, Evanston, Ill.). *Vision Research,* vol. 10, Sept. 1970, p. 891-896. 16 refs. NIH Grant No. B-02165.

Objective measurement of the human cyclofusional response. Disparities up to 5 deg were fused but no rotation of the globes was detected. It was concluded that the observed cyclofusional responses were mediated centrally rather than through cyclotorsion of the eyes. It was found that the maximum fused vertical disparity introduced by the cyclofusional stimulus for various peripheral angles of the retinas was close to, but always less than, the disparity threshold for diplopia values obtained by Volkman (1859). The observed cyclofusional response was described in terms of the disparity threshold for diplopia. M.M.

A71-11400 **Glycogen reduction in a working muscle during an 8-hour ergometer work period and its inhibition by a moderate elevation of the blood glucose level (Der Glykogenabbau im arbeitenden Muskel während 8 stündiger Ergometerarbeit und seine Hemmung durch mässige Blutzuckerspiegelerhöhung).** Wolfgang Ehrenstein, Christian Emans, and Wolf Müller-Limmroth (München, Technische Universität, Munich, West Germany). *Pflügers Archiv,* vol. 320, no. 3, 1970, p. 233-246. 20 refs. In German.

Investigation of the glycogen content of musculus vastus lateralis in 10 male subjects during an 8-hour bicycle work period below the pulse endurance limit, carried out to determine whether the glycogen reduction during work can be decreased by additional glucose infusions raising the blood glucose level in the subjects within a physiological range. The experimental results are tabulated, shown graphically, and evaluated. O.H.

A71-11407 **Cardiovascular and ventilatory responses to exercise breathing 100 per cent oxygen.** Ronald J. Byrd and Steven M. Horvath (California, University, Santa Barbara, Calif.). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 28, no. 4, 1970, p. 263-268. 16 refs. Grant No. AF AFOSR 69-1653.

Five young male subjects worked at loads corresponding to 25, 50, and 67% of their maximum oxygen uptake while breathing either room air or 100% oxygen. Cardiac output, blood pressure, heart rate, oxygen uptake, and ventilation were measured during these steady state conditions. Ventilatory volumes decreased progressively at increasing work loads while breathing oxygen. Heart rate was lower, while cardiac output and stroke volume tended to be higher at each work load while breathing oxygen when compared with values obtained with air breathing at the same work level. Diastolic and mean blood pressures were also higher when working under hyperoxia although the differences became less as the level of work increased. (Author)

A71-11408 Exercise training and resting oxygen consumption. Ronald L. Terjung and Charles M. Tipton (Iowa, University, Iowa City, Iowa). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 28, no. 4, 1970, p. 269-272. 12 refs. PHS Grant No. AM-08893-4.

Resting oxygen consumption was measured in trained and nontrained normal, hypophysectomized and thyroidectomized rats. No training effect was found for resting oxygen consumption in any of the groups after the 10 week training program. Evidence is presented which indicates that for animals of homogeneous body size, expressing metabolism as a function of body weight is no less valid than expressing metabolism as an exponential function of body weight. (Author)

A71-11409 Arrangement for high-speed analog and digital recording of metabolic rates and other ergometric data (Eine Einrichtung zur schnellanzeigenden, analogen und digitalen Registrierung der Stoffwechselgrössen sowie weiterer ergometrischer Daten). Hans-V. Ulmer (Deutsche Sporthochschule, Cologne, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 28, no. 4, 1970, p. 292-320. 74 refs. In German. Research supported by the Nordrhein-Westfalen Landesamt für Forschung.

Discussion of an arrangement consisting of an open system with constant air flow for measuring metabolic rates and of analog and digital systems for continuous recording of ergometric data. Molecular oxygen intake and carbon dioxide discharge are continuously recorded and printed. Furthermore, the ventilation, the respiration and pulse frequencies, and the pedaling speed and friction of the Astrand ergometer are recorded. The accuracy of the arrangement and its error sources are examined, and recording and computing examples are discussed. V.P.

A71-11410 Diversified reactions of resistance and capacitance vessels of the arm skin during leg-muscle exercise to the point of exhaustion (Unterschiedliche Reaktionen von Widerstands- und Kapazitätsgefässen der Haut an den Armen bei Beinmuskelarbeit bis zur Erschöpfung). B. Drappatz and E. Witzleb (Münster, Universität, Bad Oeynhausen, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 28, no. 4, 1970, p. 321-331. 12 refs. In German. Research supported by the Nordrhein-Westfalen Landesamt für Forschung.

Investigation of the middle-finger and forearm skin blood flow and of the venous tone of the forearm of 14 healthy relatively well-trained subjects during work on a bicycle ergometer to the point of complete exhaustion. During the initial phase of the exercise, the finger-skin blood flow first decreased in all cases. It then increased above the initial value in some cases, while it decreased in other cases, remaining at a lower level until the end of the exercise. After termination of the exercise, the skin blood flow increased distinctly in all cases. The venous tone increased regularly as soon as the exercise was begun, remaining at a higher level throughout the test. However, the value of the venous tone differed distinctly among the subjects tested. The various reactions are discussed in terms of the general adaptation of the vascular system to conditions of strenuous muscular exercise. V.P.

A71-11411 Distribution of motor activity during the human circadian period (Die Verteilung der motorischen Aktivität in der circadianen Periode des Menschen). Peter Rieger (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andechs, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 28, no. 4, 1970, p. 332-343. 16 refs. In German.

Discussion of experiments in which circadian cycles of activity and rest were studied on 26 subjects confined for 23 days in separate underground completely isolated chambers without any information on time. With the aid of an elaborate monitoring system it was found that the average circadian period is 24.99 hr, that the average activity time is 16.56 hr, and the average rest time is 8.43 hr. The fact that the period deviates by 1 hr from the 24-hr period of the environment is seen to support the hypothesis of an endogenous origin of the circadian periodicity. V.P.

A71-11414 Analysis of task difficulty under varying conditions of induced stress. Jerry W. Thornton and Paul D. Jacobs (Oklahoma, University, Norman, Okla.). *Perceptual and Motor Skills,* vol. 31, Oct. 1970, p. 343-348. 5 refs.

Two tasks (simple and choice reaction time) were examined while varying three types of stressors (shock, threat of shock, and noise) and the stressor task relationship (i.e., task-related stress, task-unrelated stress, and no-stress). Four specific hypotheses were tested and 3 were supported in the simple reaction-time task. There were no significant differences among stressors for either task, although greater differences were reported in the simple than in the choice reaction-time task. A significant difference between the 'task-relatedness' of stress levels in the simple task was interpreted as possibly due to a 'coping' or 'protective adaptive mechanism' in which increases in performance serve to reduce stress. Practical applications were examined. (Author)

A71-11415 Some effects of inflating information feedback on the acquisition of a discrete lever-positioning response. Pat-Anthony Federico (USAF, Human Resources Laboratory, Lowry AFB, Colo.). *Perceptual and Motor Skills,* vol. 31, Oct. 1970, p. 447-459. 11 refs.

Study of the effects of information feedback (IF) distortion and countertraining (CT) on learning and performance. Four groups of subjects were taught to displace a lever to an initial target by an error training procedure. After a secret shift of the target position, the subjects were trained to move the lever to the new target position. During this CT phase, IF was inflated by different factors for each of the three experimental groups. The control group received the same unamplified IF which all groups were given initially. Subjects receiving exaggerated IF neither engaged in more hunting behavior for the CT target, nor oscillated around it over and above those subjects who were not given misproportioned IF. Individual differences in responding were greater for the control group than any of the experimental groups. M.V.E.

A71-11416 Decrease and increase in target detection induced by adjacent borders. Robert Rousseau and J. Yves Lortie (Université Laval, Quebec, Canada). *Perceptual and Motor Skills,* vol. 31, Oct. 1970, p. 483-488. 20 refs.

The purpose of this study was controlling the facilitatory effect on target detection due to the distance between inducing fields and the duration of target presentation. The experiment was carried on with 2 experienced observers. It appeared that such an effect does exist for a distance of 1 deg 3 min between the active fields. However, it seems to be strongly related to a critical range of duration of target presentation. (Author)

A71-11417 Relative effects of figural noise and rotation on the visual perception of form. Earl A. Alluisi and John B. Thurmond (Louisville, University, Louisville, Ky.). *Perceptual and Motor Skills,* vol. 31, Oct. 1970, p. 547-554. 17 refs. Contract No. DA-49-193-MD-2567.

Study of the responses of 48 subjects in a paper-and-pencil figure-cancellation task to 4-by-4 metric histoforms. Both random and constrained or redundancy-1 figures were used with both rotated

and nonrotated noisefree choice figures, and with nonrotated choice figures perturbed by 12.5 and 25.0% visual cell noise. In terms of both speed and accuracy of cancellation, perceptual performance with random figures was better than with constrained, and increases in visual noise produced monotonic decrements in performance. Although choice-figure rotation had no significant effect on accuracy, it produced decrements in speed equivalent to decrements that might be expected with nonrotated choice figures perturbed by 3.6 and 9.4% visual noise in the random and constrained-figure conditions, respectively. M.V.E.

A71-11418 Vigilance performance under hypoxia. II - Effect of work-rest schedule. Richard L. Cahoon (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Perceptual and Motor Skills,* vol. 31, Oct. 1970, p. 619-626. 13 refs.

18 Ss were required to perform a visual vigilance task for 2 hr while breathing either 21% O2 (sea level) or 10.9% O2 (17,000 ft). The 2-hr trial period contained either no rest periods, one 10-min rest period, or three 10-min rest periods. Vigilance performance deteriorated under 10.9% O2, and the introduction of rest periods did not reduce this decrement. Of two individual difference measures taken, IQ and sensation-seeking score, only IQ related to vigilance performance and only at sea level (21% O2). (Author)

A71-11437 Real-time display system of response characteristics of manual tracking systems. Jin-ichi Nagumo, Shunsuke Sato (Tokyo, University, Tokyo, Japan), and Atsuhiko Noda (Tokyo Medical and Dental University, Tokyo, Japan). *IEEE Transactions on Man-Machine Systems,* vol. MMS-11, Dec. 1970, p. 211-216. 10 refs.

A new method is proposed that can identify a linear system with a random input signal in a short time for application to the identification of manual tracking systems whose response characteristics vary slowly with time. Making use of this method of identification, a display system including an on-line computer is constructed, which displays the slowly varying response characteristics of manual tracking systems on a CRT screen in real time. A software system that facilitates performance of various kinds of tracking experiments is developed. Finally, some results of simple pursuit tracking experiments are described and the mode of the tracking operation is discussed. (Author)

A71-11453 # The photochemical formation of self-sustaining coacervates. Krishna Bahadur and S. Ranganayaki (Allahabad, University, Allahabad, India). *British Interplanetary Society, Journal,* vol. 23, Dec. 1970, p. 813-829. 65 refs.

Study of the photochemical formation of cell-like microstructures showing such properties as growth, multiplication, and metabolic activity. The method of formation, chemical composition, and catalytic properties of particles prepared from formaldehyde ammonium molybdate, diammonium hydrogen phosphate, minerals and water are described. O.H.

A71-11454 * # Space experiment thermal design. Milton Schach (NASA, Goddard Space Flight Center, Greenbelt, Md.). *(NATO, Advanced Study Institute in Space Experiment Design, University College, London, England, Aug. 25-Sept. 12, 1969.) British Interplanetary Society, Journal,* vol. 23, Dec. 1970, p. 830-840.

The goal of the thermal design of a space experiment is to provide a temperature regime acceptable to all the elements of the experiment for its desired lifetime. The designer constructs an analytical model to represent the energy transfer processes and utilizes experimental methods to establish unknown thermal parameters and to verify the design. The design is implemented by a variety of techniques which control the rate at which heat enters or leaves a given region. These techniques include: (1) thermal control coatings, (2) multilayer insulation, (3) electrically powered heaters, (4) louvers, and (5) heat pipes. (Author)

A71-11455 * Higher olfactory centres. W. R. Adey (California, University, Los Angeles, Calif.). In: Ciba Foundation, Symposium on Taste and Smell in Vertebrates, London, England, September 23-25, 1969, Proceedings. Edited by G. E. W. Wolstenholme and Julie Knight. London, J. & A. Churchill, 1970, p. 357-378. 87 refs. NIH Grant No. MH-03708; Contracts No. NSR-05-007-158; No. AF 49(638)-1387.

Review of the evidence concerning the terminal distribution of the olfactory tract in the prepyriform cortex. Interactions at many levels between the so-called primary cortical olfactory areas and the diencephalic structures are emphasized. The central olfactory organization is considered in terms of projections of the olfactory bulb to the primary olfactory cortex, projection of the olfactory bulb to the diencephalon and rostral midbrain reticular formation, secondary projections of the olfactory cortex to di- and mesencephalon, centrifugal projections from diencephalon and mesencephalon to the olfactory bulb, and neurohumoral influences on odor sensitivity of the bulb. O.H.

A71-11542 The effect of physical exercise on the mitochondrial energy production in the heart muscle and the liver (Die Wirkung von körperlichem Training auf die mitochondriale Energieproduktion im Herzmuskel und in der Leber). H. Kraus and R. Kirsten (Berlin, Freie Universität, Berlin, West Germany). *Pflügers Archiv,* vol. 320, no. 4, 1970, p. 334-347. 51 refs. In German.

Study of the chronic effects of exercise in female albino rats which were subjected to a strenuous program of swimming or treadmill running. It was found that the heart ventricles of the exercised animals hypertrophied significantly. Concomitantly, the level of activity of glycerol-P dehydrogenase doubled in heart mitochondria of the exercised rats, and the activity of succinate dehydrogenase increased approximately 40%. Almost the same results were found for liver mitochondria. G.R.

A71-11451 # Ground-based medical supervision of crew members during extended space missions. F. T. de Dombal (Leeds University, Leeds, England). *British Interplanetary Society, Journal,* vol. 23, Dec. 1970, p. 789-798. 8 refs.

Discussion of the problems inherent in the ground-based biomedical supervision of crew members during extended space missions both in close-earth orbit and beyond the earth-moon system. The short-term and long-term aims of ground-based medical supervision are outlined. The physiological and biomedical variables which are to be measured and the respective methods are discussed. The problems involved in data transmission and the disadvantages of monitoring devices are examined. Finally, the sufficiency of ground-based supervision and the possible levels of onboard medical competence replacing the ground-based supervision are analyzed. O.H.

A71-11551 Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970. 322 p. $19.60.

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Mechanisms of action of light on circadian rhythms in the monkey. C. M. Winget, L. S. Rosenblatt, C. W. DeRoshia, and N. W. Hetherington (NASA, Ames Research Center, Moffett Field, Calif.), p. 247-258. (For abstract see issue 15, page 2556, Accession no. A69-31336)

Symposium on nutrition of man in space.

Problems of space nutrition of man. A. A. Pokrovskii and A. S. Ushakov, p. 261-264. (For abstract see issue 15, page 2560, Accession no. A69-31462)

Food technology problems related to space feeding. H. A. Hollender, M. V. Klicka (U.S. Army, Natick Laboratories, Natick, Mass.), and M. C. Smith (NASA, Houston, Tex.), p. 265-279. (For abstract see issue 15, page 2560, Accession no. A69-31459)

Evaluation of foods for space flights. J. E. Vanderveen (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), p. 280-286. (For abstract see issue 15, page 2560, Accession no. A69-31470)

Research in space nutrition. L. Fox (NASA, Office of Advanced Research and Technology, Washington, D.C.), p. 287-294. 7 refs. (See A71-11572 01-05)

The proportions of carbohydrate, fat and protein in space feeding. D. H. Calloway (California, University, Berkeley, Calif.), p. 295-301. 8 refs. (See A71-11573 01-05)

Some aspects of utilization of higher plants as a nutrition source in space missions. V. G. Chuchkin, A. S. Ushakov, V. I. Rozhdestvenskii, V. N. Golovin, K. S. Arbuzova, I. V. Tsvetkova, and A. V. Kostetskii, p. 302-304. (For abstract see issue 15, page 2560, Accession no. A69-31408)

Synthetic monosaccharides for nutrition of man in space. A. M. Ugolev, B. A. Adamovich, O. B. Krylov, Iu. E. Siniak, V. A. Uspenskaia, A. S. Ushakov, and I. L. Shulgina, p. 305-308. (For abstract see issue 15, page 2557, Accession no. A69-31471)

Calcium metabolism in space flight. W. F. Neuman (Rochester, University, Rochester, N.Y.), p. 309-315. (For abstract see issue 15, page 2557, Accession no. A69-31468)

Dietary modification of calcium metabolism of the astronaut - Fact or fantasy. S. Margen (California, University, Berkeley, Calif.), p. 316.

Author index, p. 317.

A71-11552 Experiments with Drosophila on board the spacecraft Zond-5. Ia. L. Glembotskii, T. I. Grozdova, and G. P. Parfenov (Akademiia Nauk SSSR, Moscow, USSR). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 1-3.

A container with 257 eggs of Drosophila melanogaster of the D-32 line, which is characterized by a very low spontaneous mutability, was placed on board Zond-5. The results of two tests on the frequency of lethal recessive point mutations: (1) sex-linked and (2) autosomal (in the second chromosome) were studied. A significant increase in the frequency of lethals in the X-chromosome of males, presumably caused by the influence of earth conditions after the return of the spacecraft, was found. No substantial increase of such mutations in the X-chromosome of females was found, but a substantial increase in the frequency of autosomal recessive lethals was discovered. Possible explanations of the causes of these events are discussed. (Author)

A71-11553 * Biological responses of Habrobracon to spaceflight. R. C. von Borstel, Roger H. Smith, Anna R. Whiting (Oak Ridge National Laboratory, Oak Ridge, Tenn.), and Daniel S. Grosch (North Carolina State University, Raleigh, N.C.). In: Life sciences and space research VIII; COSPAR; Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 6-11. 9 refs. AEC-sponsored research; Grant No. NsG-678.

Investigation of approximately 30 different genetic, mutational, biochemical, behavioral, and physiological parameters in the parasitic wasp Habrobracon during one spaceflight. The most profound effects of spaceflight in conjunction with radiation were decreased hatchability and enhanced fecundity of eggs exposed to spaceflight at different stages of oogenesis. Behavioral and biochemical differences were found. Mating activity of orbited males was severely disrupted and xanthine dehydrogenase activity was sharply decreased in the irradiated flight animals. M.M.

A71-11554 The influence of spaceflight on Chlorella. E. N. Vaulina and I. D. Anikeeva (Akademiia Nauk SSSR, Moscow, USSR). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 12-18. 12 refs.

Three strains of Chlorella were investigated following spaceflight aboard Zond-5. Synchronized suspensions of Chlorella cells were grown in special containers. Each of these contained 0.1 x 1,000,000 cells. In the laboratory the strains LARG-1 and LARG-3 were examined microscopically. Nearly all the cells were in an autospore stage (94-98% for LARG-1 and 96-98% for LARG-3). Space effects on survival, mutation and cell development were studied. During the study of cell sporulation dynamics, the number of autospores resulting from the first sporulation was estimated. Percentage survival of the exposed cells is lower than that of the control. In the experimental material development of cells has been delayed and the percentage of visible mutations has been increased. (Author)

A71-11555 Current status of French research on the biological effects of heavy ions in cosmic radiation as observed in high-altitude balloons. L. Miro (Compagnie Générale d'Électricité de Paris, Marcoussis, Essonne, France), G. Deltour, A. Pfister (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France), R. Kaiser (CNRS, Groupes de Laboratoires, Strasbourg-Cronenbourg, France), and R. Grandpierre (Ecole Pratique des Hauts Etudes, Paris, France). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 39-44. 14 refs. Research supported by the Centre National d'Etudes Spatiales.

Description of the results of histological and radioautographic studies of the biological hazard of heavy ions in cosmic radiation on animals. Experiments with black mice in balloons at 30,000 m

altitude show white-haired tufts along the tracks of heavy ions. Similar investigations on black rabbits gave similar results and confirm those obtained with black mice. The ionization distribution induced by heavy ions is analyzed. M.M.

A71-11556 Specific problems of physical training of cosmonauts. Z. Jethon (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *(COSPAR, Plenary Meeting, 12th, Prague, Czechoslovakia, May 11-24, 1969, Paper.)* In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 46-50. 8 refs.
(For abstract see issue 15, page 2560, Accession no. A69-31460)

A71-11557 * Effect of ultraviolet on the survival of bacteria airborne in simulated Martian dust clouds. C. A. Hagen (IIT Research Institute, Chicago, Ill.; California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), E. J. Hawrylewicz, B. T. Anderson, and Marjorie L. Cephus (IIT Research Institute, Chicago, Ill.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 53-58. 9 refs. Contract No. NASr-22.

A chamber was constructed to create simulated Martian dust storms and thereby study the survival of airborne microorganisms while exposed to the rigors of the Martian environment, including ultraviolet irradiation. Representative types of sporeforming and nonsporeforming bacteria present in spacecraft assembly areas and indigenous to humans were studied. It was found that daily ultraviolet irradiation of 2 to 9 x 10 to the 7th power erg per sq cm was not sufficient to sterilize the dust clouds. The soil particles protected the organisms from ultraviolet irradiation since the numbers of survivors from irradiated environments were similar to those from unirradiated environments. Pending further data of the Martian environment, the contamination and dissemination of Mars with terrestrial microorganisms is still a distinct possibility. (Author)

A71-11558 Multiplication of certain soil micro-organisms under simulated Martian conditions. A. A. Imshenetskii, L. A. Kusiurina, and V. M. Iakshina (Akademiia Nauk SSSR, Moscow, USSR). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 59-61.

Experimental investigation of microbial multiplication under simulated Martian conditions. Several microorganisms were isolated from harsh environments. A strain of an oligonitrophilic mycococcus, isolated from Dixon Island, proved to be most resistant to low humidity. It multiplied in a mixture of limonite + 2% garden soil kept in a chamber simulating Martian conditions. It was shown that even in earth soils there are xerophytic microorganisms which are able to multiply in limonite of low humidity. M.M.

A71-11560 Free radical production in photodynamically inactivated cells of Rhodotorula glutinis. W. A. Maxwell (U.S. Army, Medical Research Laboratory, Fort Knox, Ky.) and C. O. Chichester (California, University, Davis, Calif.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 68-76. 23 refs.

Experimental investigation of the possible involvement of free radicals in the inactivation of Rhodotorula glutinis when irradiated with light of wavelengths 300 nm and longer. Presumptive evidence that free radicals were involved in the photodynamic inactivation of the cells was found when it was shown that compounds capable of trapping free radicals were able to provide some protection to the cells. Further presumptive evidence that free radicals are involved was provided when it was shown that lipid peroxidation, which can be mediated by free radicals, is caused when the cells are irradiated. The actual production of free radicals was demonstrated by the detection of the presence of unpaired electron paramagnetic resonance spectra. M.M.

A71-11563 * Sterilization compatibility of growth media for extraterrestrial use. John B. Opfell, James W. Mason, and Dennis E. Gelvin (Philco-Ford Corp., Newport Beach, Calif.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 119-130. 10 refs. NASA-supported research.

Examination of the thermal stabilities of selected reagents and growth media substances of possible use in the biological exploration of the planets. A dry-heat sterilization-compatibility test-environment exposure, consisting of two separate 92-hr periods at 135 C, was applied to 104 candidate substances. Following exposure, 33 of these substances passed sensitive tests for evidence of degradation. Of the others, 15 were only slightly degraded. Among the substances which survived exposure to the compatibility test environment there are enough essential microbial nutrients and growth factors to establish the feasibility of a dry-heat sterilized, chemically defined growth medium. M.M.

A71-11564 * Dry heat destruction rates for micro-organisms on open surfaces, in mated surface areas and encapsulated in solids of spacecraft hardware. I. J. Pflug (Minnesota, University, Minneapolis, Minn.). *(COSPAR, Plenary Meeting, 12th, Prague, Czechoslovakia, May 11-24, 1969, Paper.)* In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969,

Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 131-141. 11 refs. Grant No. NGL-24-005-1601.
(For abstract see issue 15, page 2560, Accession no. A69-31444)

A71-11565 * Methyl bromide as an aid to ethylene oxide sterilization. D. M. Portner, D. R. Spiner, and R. K. Hoffman (U.S. Army, Fort Detrick, Md.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 142-147. 8 refs. NASA-supported research.

The sporicidal activity of ethylene oxide (EtO), methyl bromide (MeBr) and a mixture of EtO and MeBr was determined against B. subtilis var niger spores on cloth patches either uncovered or sealed within polyethylene or polyvinyl chloride plastic. No difference in activity between the mixture and EtO alone was observed against spores on cloth not protected by plastic. However, the mixture was (1) measurably more effective than EtO alone against spores sealed within polyvinyl chloride, and (2) possibly slightly more effective against spores sealed in polyethylene. The bacterial activity of MeBr alone was considerably less than that of EtO alone and the individual activity of both was curtailed by the plastics. The indication is that MeBr does not have a synergistic effect upon the rate of EtO sterilization, but rather promotes the rate of EtO penetration, at least through some plastics. (Author)

A71-11566 Stable circadian rhythms as a property of cell populations. E. E. Sel'kov and L. A. Sozinov (Akademiia Nauk SSSR, Moscow, USSR). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 157-167. 19 refs.

Analysis of the main difficulties which the theory of circadian rhythms encounters in an attempt to explain the mechanisms of biological clocks. It is shown that the assumption of a small concentration of the enzymes involved in the cell-clock mechanism makes it possible to explain many well-known properties of biological clocks. It is also shown that the self-oscillating clock mechanism may exist at the level of cell populations. This mechanism is considered to be a temperature-dependent component of the circadian clocks in multicellular organisms. M.M.

A71-11567 Circadian rhythm as response to the compulsory 'constant' conditions. V. B. Chernyshev. *(COSPAR, Plenary Meeting, 12th, Prague, Czechoslovakia, May 11-24, 1969, Paper.)* In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 168-170.
(For abstract see issue 15, page 2557, Accession no. A69-31469)

A71-11568 Evaluation of circadian dyschronism during transmeridian flights. Alain Reinberg (CNRS, Laboratoire de Physiology, Paris, France). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 172-174. 8 refs.

Changes in parameters characterizing circadian rhythms of human biological and physiological functions can be detected objectively after what we use to call an intercontinental flight. Under these conditions the organism can be submitted to the influence of a shift in environmental factors after crossing several time zones. The expression transmeridian flight is more specific than intercontinental or long distance flight if this type of shift is being considered. Biorhythms are concerned with these problems, thus it seems pertinent to keep in mind a chronobiologic background from a theoretical as well as practical point of view. (Author)

A71-11569 * Frequency spectra and cosinor for evaluating circadian rhythms in rodent data and in man during Gemini and Vostok flights. F. Halberg (Minnesota, University, Minneapolis, Minn.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 188-214. 61 refs. PHS Grant No. 5-K6-GM-13, 981; Grant No. NGR-29-005-006; Contracts No. NAS-2738; No. AF 29(600)-69-C-001.

Discussion of the advisability of rigorous rhythmometric evaluation of lifeforms before and during their removal from earth effects, as well as following their return to earth. Methods lending themselves to such studies, during and after travel in extraterrestrial space, are illustrated, and their applications may be of value to preventive medicine as well as to basic science. It is pointed out that plans should be implemented in unmanned space vehicles for explicit chronobiologic studies so designed that daily cosinor analysis can determine, for example, whether circadian phase control or the desynchronized period length be altered as we move away from the earth. M.M.

A71-11570 Data analysis of biological time series. M. D. Godfrey (Bell Telephone Laboratories, Inc., Murray Hill, N.J.), H. Hoffman, R. Madden, C. S. Pittendrigh (Princeton University, Princeton, N.J.), and S. Skopik (Delaware, University, Newark, Del.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological

Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 215-233. 6 refs.

This paper presents some of the results of analyses of body temperature data of two species of mammals. The animals were subjected to various environmental conditions with respect to variations in periodic light cycle with a period close to 24 hr. New statistical techniques are used to study the animals as a function of time and change in environment. These techniques confirm some previously observed behavior and indicate new aspects of the dynamics of adjustment to change in photoperiod. (Author)

A71-11571 Circannual rhythmicity - Evidence and theory. E. T. Pengelley and Sally J. Asmundson (California, University, Riverside, Calif.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 235-239. 34 refs. Research supported by the University of California; NSF Grant No. GB-8605.

The evidence for the existence of endogenous circannual rhythms is reviewed, together with the special problems involved in their study. The latter include discussion of the free running period, potential zeitgebers and desynchronization. These are compared to the same phenomena in circadian rhythms, and it is argued that terminology associated with the latter may easily be applied to circannual rhythms. So far very few parameters of circannual rhythms have been studied, but other important parameters are suggested. Finally an attempt has been made to indicate the importance of circannual rhythms to space science, as well as their overall theoretical significance. (Author)

A71-11572 * Research in space nutrition. Leo Fox (NASA, Office of Advanced Research and Technology, Washington, D.C.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 287-294. 7 refs.

The problem of providing a balanced, palatable diet for astronauts being approached by a program designed to provide food through the advanced Apollo missions in a nonregenerative mode, and by a long range program designed for a closed-loop regenerative cycles. The short range requirements are established nutritionally and are modified principally on the basis of acceptability and palatability. There is some current research in improvement of packaging for these foods. The long range program is aimed at chemical and biological solutions. The chemical approach is directed at the synthesis of water and carbon dioxide into self condensing formaldehyde, then to sugars. Two methods are being investigated. The biological approach involves the conversion of nitrogenous body waste to protein by Hydrogenomonas bacteria. (Author)

A71-11573 * The proportions of carbohydrate, fat and protein in space feeding. D. H. Calloway (California, University, Berkeley, Calif.). In: Life sciences and space research VIII; COSPAR, Plenary Meeting, 12th, Open Meeting of Working Group V, Symposium on Biological Rhythms, and Symposium on Nutrition of Man in Space, Prague, Czechoslovakia, May 11-24, 1969, Proceedings. (A71-11551 01-04) Meeting and symposiums co-sponsored by the International Union of Biochemistry, the International Union of Biological Sciences, the International Union of Physiological Sciences, the International Union of Pure and Applied Biophysics, and the International Union of Nutritional Sciences. Edited by W. Vishniac and F. G. Favorite. Amsterdam, North-Holland Publishing Co., 1970, p. 295-301. 8 refs. NIH Grant No. AM-10202; Grant No. NGR-05-003-232.

Discussion of criteria for selecting appropriate space diets. It is pointed out that lower limits than those necessary in terrestrial environment, thought to be about 45 g protein, 7 g fat, and 70 g carbohydrate, may need to be increased somewhat in space due to altered oxygen concentration, hypokinesia and other stresses. High intakes of protein result in increased water requirement, loss of minerals and excessive urinary uric acid. Provisional allowance ranges are, in % of total calories: 8 to 50 protein, 2 to 75 fat, and 10 to 90 carbohydrate. M.M.

A71-11596 Hemorrhagic rectocolitis and flying personnel (Rectocolite hemorragique et personnel navigant). G. Leguay, A. Didier, M. Cren, and R. Pannier. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 3rd Quarter, 1970, p. 121-124. 7 refs. In French.

Study of a case of hemorrhagic rectocolitis, a rare infection in France, which is occasionally encountered in air crew members. The subject was a fighter pilot aged 28, who exhibited abdominal colic, bloody diarrhea, tenesmus, and loss of weight. The problem is discussed with reference to its etiological, evolutive, and therapeutic aspects. F.R.L.

A71-11597 The physiological effects of a thermal shock. III - Determination of the effective surface of exchange by radiation (Les effets physiologiques d'un choc thermique. III - Détermination de la surface effective d'échange par radiation). C. Boutelier, J. Timbal, and J. Colin. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 3rd Quarter, 1970, p. 125-128. 15 refs. In French.

Quantitative analysis of heat exchanges between the human organism and the ambient medium. These exchanges are accomplished by evaporation, radiation, conduction, and convection. Coefficients of heat exchange by convection are experimentally determined. It is pointed out that the formulas are applicable only for radiation from objects at relatively low temperature, e.g., the walls of an aircraft. F.R.L.

A71-11598 Statistical data on flight unfitness due to psychic disorders in an airline company (Données statistiques sur les inaptitudes au vol pour troubles psychiques dans une compagnie aérienne). J. Lavernhe, C. Blanc, and E. Lafontaine (Compagnie Nationale Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 3rd Quarter, 1970, p. 129, 130. 10 refs. In French.

Discussion of psychic disorders in aircrew which constitute, after cardiovascular illness, the most frequent cause of unfitness for flight. The statistics of definitive unfitness acquired over the past seven years among Air-France personnel are analyzed. The observed psychopathology can be classified as isolated neurotic syndromes (59 per cent) and neurotic syndromes partially induced by a somatic affection (41 per cent). F.R.L.

A71-11599 Test of a method of individual protection against fire - The antismoke hood (Essai d'un moyen de protection individuel contre l'incendie - La cagoule antifumée). J. Timbal and J.

Colin (Ministère des Armées, Service de Santé des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 3rd Quarter, 1970, p. 131-134. 5 refs. In French.

Description and evaluation of an antismoke hood of cylindrical form made of transparent plastic. Toward the top the cylinder is closed by a metallized dome. The collar at the base is elastic to ensure tightness around the neck. The available respiratory volume is about 15 liters, and the air supply appears to be sufficient to keep the user conscious for five or six min. F.R.L.

A71-11600 Renal lithiasis in aircrew (Lithiase rénale dans le personnel navigant). A. Didier, G. Leguay, and R. Pannier. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 3rd Quarter, 1970, p. 135-138. 14 refs. In French.

Attempt to define the relationship existing between urinary lithiasis and aeronautical activity, with discussion of its treatment. It appears that urinary lithiasis occurs more frequently among aircrew than among the general population (3 per cent vs 1 per cent). Etiopathological factors are sedentariness, diet, age, and oliguria. An augmented fluid intake is recommended. F.R.L.

A71-11663 An analysis of O2 debt contracted in submaximal exercise. P. E. di Prampero, C. T. M. Davies, P. Cerretelli, and R. Margaria (Milano, Università, Milan, Italy). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 547-551. 16 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Demonstration that the kinetics of O2 uptake in man performing a submaximal exercise, in the transition from light to heavier work appears to be faster than in the transition from rest to work. The difference in O2 uptake at the onset of exercise - i.e., the gross O2 debt - is reduced correspondingly. This reduction presumably does not take place at the expense of the net O2 debt; this, being the expression of the amount of split phosphagen present in the muscle at steady state, should be related only to the work intensity, independent of the previous history of muscle activity. It is presumably due to the greater utilization of the O2 stores of the body when the exercise starts from rest and to a certain amount of LA formation from glycogen. This has been found to take place to a limited extent at the onset of work, but not in the transition from light to heavier exercise. In the transition from mild to heavier work only the gross alactic O2 debt is then affected. The velocity of the O2 uptake in this condition would tend to approach the velocity of the contraction of the net alactic O2 debt. (Author)

A71-11664 Blood glucose in high-altitude natives and during acclimatization to altitude. E. Picon-Reategui, E. R. Buskirk, and P. T. Baker (Pennsylvania State University, University Park, Pa.; Lima, Universidad Nacional, Lima, Peru). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 560-563. 21 refs. Contract No. DA-49-193-MD-2709.

The presence of lower fasting blood glucose levels in high-altitude than in sea-level residents was confirmed. Although the cause of this difference remains unknown, genetic background and food habits fail to explain it. High-altitude natives, who resided 2 years at sea level, had fasting blood glucose levels comparable to sea-level natives, and the dietary habits among the Peruvian groups studied were comparable. Plasma glucose concentration in US lowlanders acutely exposed to 3,992 m remained unchanged for 44 days. A reduction in glucose content of the erythrocytes plus a reduction in plasma volume and total plasma glucose explained the decrease in glucose in whole blood. (Author)

A71-11665 Energy cost of 'hard work.' A. L. Hughes and R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 570-572. 9 refs.

This study tests the hypothesis (based on data derived from a field study) that men working hard tend to adjust their work level to work at energy expenditures of 425 kcal/hr plus or minus 10%, regardless of the terrain or load carried. Subjects carried loads ranging from 0 to 60 kg on a servo-controlled treadmill which automatically and imperceptibly adjusted its speed in response to changes in the progression rate of the subject. Subjects thus 'hunted' an average progression rate for each load without being aware that they were making any adjustment whatever. Oxygen consumption was measured periodically during each trial. The results showed that: (1) the average progression rate decreased nearly linearly with increasing load; (2) the energy expenditures for the nonzero load conditions fell within the expected range of 425 kcal/hr plus or minus 10%; and (3) the most economically carried loads under the conditions of this study were 30 and 40 kg. (Author)

A71-11666 Lactate, ATP, and CP in working muscles during exhaustive exercise in man. Jan Karlsson and Bengt Saltin (Gymnastik- och Idrottshögskolan, Stockholm, Sweden). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 598-602. 15 refs. Research supported by the Swedish Medical Research Council.

Study of the dynamics of lactate accumulation in working muscle in three subjects performing maximal bicycle exercise of 2, 6, and 16 min duration. It was found that low adenosine triphosphate (ATP) and creatine phosphate (CP) stores were not the reason for muscular fatigue. It is noted that, if the muscle tissue lactate concentration was the reason for exhaustion on the two heaviest work loads, another factor must be present to explain the exhaustion in the 16-min experiment. M.M.

A71-11667 Sensitivity to central and peripheral thermal stimulation in man. Ethan R. Nadel, Steven M. Horvath, Christopher A. Dawson, and Alan Tucker (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 603-609. 16 refs. Grant No. AF AFOSR 69-1653.

Experimental investigation in which a thermoregulatory response in man was stimulated by inducing a constant central temperature increase or decrease in each of seven ambient environments ranging from 10 to 44 C. The characteristics and magnitude of this thermoregulatory response were found to be dependent on the thermal information at the skin surface. Alterations in each physiological response were attributed to deep body and mean skin temperature interrelations along mean skin temperature response curves. This hypothesis was able to describe the physiological regulation without the necessity of postulating a shift in hypothalamic set point. M.M.

A71-11668 Oxygen debt after submaximal physical exercise. H. G. Knuttgen (Boston University, Boston, Mass.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 651-657. 56 refs. PHS Grant No. AM-10906.

Oxygen debt after steady-state work (45-98% aerobic capacity) was studied in human subjects. After work at all intensities, a total debt was found to which both a fast and a slow component of repayment rate contributed. The total debt after 15 min work showed small increases in magnitude throughout the lower (45-65%) work range and then increased exponentially toward an upper average of 69 ml/kg weight. At 45% aerobic capacity, the fast and slow components averaged 9.0 and 10.0 ml/kg and at 98%, 20.8 and 48.0 ml/kg, respectively. The factors contributing to the fast component appear collectively to be relatively independent of metabolic level at the lower work intensities. Extending the duration of work increased the total debt by increasing the slow component only, while blood lactate concentration usually decreased. The slow component appears to be strongly influenced by more factors than lactate resynthesis; its magnitude varies directly with both the intensity and the duration of work. Therefore, these findings support the concept that a general disturbance of body resting conditions by exercise has a major effect on oxygen debt. (Author)

A71-11669 **Role of air temperature and wind in the time necessary for a finger to freeze.** Ove Wilson and Ralph F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 658-664. 16 refs. Research supported by the Swedish Medical Research Council and the Swedish Delegation for Applied Medical Defence Research.

Measurement of the time to freeze exposed finger skin at wind speeds of 5, 10 and 15 m/sec at -5, -15, and -25 C. Fifty exposures resulted in freezing; in twenty-two other exposures the skin temperature leveled off and cyclic rewarming, by cold-induced vasodilatation (CIVD), set in. Marked supercooling, usually below -10 C, occurred prior to freezing as well as during CIVD. If CIVD occurred, freezing did not take place. There is no well-defined value of wind-chill index above which freezing regularly occurs, although it rarely occurs below a wind chill of 1400. Air temperature is the main factor in determining whether freezing, or CIVD, occurs at wind-chill indices predicting risk for freezing. This implies that, whatever the wind chill, the skin very often will not freeze above the temperature to which it readily supercools, which is probably between -10 and -15 C. (Author)

A71-11670 **Effects of water intake on composition of thermal sweat in normal human volunteers.** Gary W. Cage, Sidney M. Wolfe, Ronald H. Thompson, and Robert S. Gordon, Jr. (National Institutes of Health, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 687-690. 8 refs.

Normal young volunteers were made to sweat in an environmental chamber at 110 F and 50% relative humidity. Overall sweat rate was measured by weight loss, and local sweat rate and sweat composition were studied on the forehead by collections on filter paper. Ingestion of 1-3 l of water at body temperature induced an increase in overall sweat rate, but appeared to have no independent, direct effect on the relationship of sweat composition to sweat rate. (Author)

A71-11671 * **Brain temperature and cutaneous blood flow in the anesthetized pig.** Douglas L. Ingram and Robert El. Smith (California, University, Davis, Calif.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 698-704. 37 refs. Grants No. DA-DA-17-67-C-7116; No. NGL-05-004-031; No. NGR-05-004-053; Contract No. AF 41(609)-68-C-0035.

Cutaneous blood flow in the forelimb of the anesthetized pig has been modified by changes in brain temperature. The carotid blood of 15- to 30-kg domestic pigs was circulated through an extracorporeal heat exchanger and returned to the carotid artery in order to control the temperature of the brain. Blood flow was measured in the carpal region by means of a mercury-in-rubber strain gauge, and hypothalamic, rectal, skin, and ambient temperatures were also monitored. Some anesthetics produced persistent vasodilatation or otherwise prevented meaningful blood flow measurement. Under Metofane or urethan, however, the results indicated a curvilinear relation between brain temperature and peripheral blood flow over the entire range of physiologically plausible brain temperatures, though cooling of the brain never produced complete vasoconstriction. The effect of ambient temperature (neutral or warm) on peripheral blood flow was minimal, and the effects of direction and rate of change of brain temperature were equivocal. (Author)

A71-11672 * **An electrooptical monitoring technique for heart cells in tissue culture.** Allen J. Sinclair, Harry A. Miller, and Donald C. Harrison (Stanford University, Palo Alto, Calif.). *Journal of Applied Physiology,* vol. 29, Nov. 1970, p. 747-749. 7 refs. Research supported by the American Heart Association; NIH Grants No. HE-09058; No. HE-05709; No. HE-5107; Grant No. NGL-05-020-305.

An automated system and technique to monitor single isolated heart cell activity is reported. Particular attention has been given to discuss components and accuracy of the electrooptical system. By employing noncontact, noninvasive techniques, quantitative measurements of beat rate, rhythm, and contractile properties of a single cell are readily obtained. These parameters can be measured both continuously and on a beat-to-beat basis. Design of this method is intended to allow continuous monitoring and accurate measurement of dynamic cellular responses to cardioactive agents and effects of environmental variables heretofore unattainable. (Author)

A71-11684 # **Diurnal variations of the reaction time in the case of choice reactions (Tagesperiodische Veränderungen der Reaktionszeit bei Wahlreaktionen).** Ernst Pöppel, Jürgen C. Aschoff, and Henner Giedke (Max-Planck-Institut für Psychiatrie, Munich; Ulm, Universität, Ulm, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie,* vol. 17, 4th Quarter, 1970, p. 537-552. 35 refs. In German.

Experimental investigation of the effect of disturbances of the natural rhythm of sleep and wakefulness on the diurnal variations of the reaction time to optic and acoustic stimuli. Four different experiments carried out to examine this effect are described. The greatest amplitude of the diurnal variations is found to be in the case when the subjects are allowed to sleep during the experimental night and are awakened for the measurements. Staying awake during night tests results in a decrease of the diurnal amplitude. The attitude of the subjects to the experiment and its repetition is shown to be an important factor which has to be taken into account during all studies on the diurnal variations. O.H.

A71-11694 **Left ventricular abnormality with late mitral insufficiency and abnormal electrocardiogram.** Kathryn H. Ehlers, Mary Allen Engle, Aaron R. Levin, Herman Grossman, and Richard J. Fleming (New York Hospital, New York, N.Y.). *American Journal of Cardiology,* vol. 26, Oct. 1970, p. 333-340. 47 refs.

Examination of the observed case of an abnormal left ventricular contour with a late systolic murmur at the apex preceded by a click and with abnormal T waves in the electrocardiogram. An abnormal contraction that alters the contour of the left ventricle only during systole but not in diastole and results in mild mitral insufficiency has been demonstrated in six girls with apical systolic click, late systolic murmur, and T wave inversion. The subjects remained asymptomatic during a period of follow-up studies ranging from 3 to 17 years. Their young age and the absence of myocarditis, pericarditis and coronary arterial abnormality suggest that they have a congenital anomaly in a localized area of the left ventricular myocardium which results in late systolic dysfunction of the mitral apparatus. It is believed that the findings in this group constitute a distinctive syndrome among the heterogeneous causes of mitral insufficiency late in systole. O.H.

A71-11695 **Muscular apparatus of the mitral valve in man and its involvement in left-sided cardiac hypertrophy.** Milka M. Montiel (Chicago Medical School and Mount Sinai Hospital Medical Center, Chicago, Ill.). *American Journal of Cardiology,* vol. 26, Oct. 1970, p. 341-344. 10 refs.

Investigation of the presence and physiologic role of muscular fibers in the mitral valves in man and their response to pathological changes involving the myocardium of the left side of the heart. Observations on the anterior (septal) leaflet of the mitral valve in normal human hearts and in pathologic conditions involving the left heart chambers suggest that in man, as in animals, the muscular apparatus of the valve is not an accidental, isolated or inactive structure; instead, it is a functioning structure closely related to the rest of the myocardium. Its response to strain is similar to that of the rest of the myocardium. This response is found to be more complex

in cases with direct damage resulting from previous attacks of rheumatic fever and may be associated with disarrangement, fibrosis, and calcification without loss of actual muscular mass. O.H.

A71-11696 Complete heart block associated with acute myocardial infarction. William John Kostuk and Donald Stewart Beanlands (Toronto Western Hospital, Toronto, Canada). *American Journal of Cardiology*, vol. 26, Oct. 1970, p. 380-384. 29 refs. Research supported by the Ontario Heart Foundation.

Complete heart block, a serious, early complication of acute myocardial infarction, occurred in 9.1 per cent of 308 patients with acute myocardial infarction. Patients with anterior infarction have a poor prognosis (80 per cent mortality rate) and a widened QRS complex, probably due to involvement of both bundle branches. In inferior wall infarction a narrow QRS complex is associated with the heart block, and the mortality rate is 45 per cent. The high mortality rate appears to be due to the extent of the infarction and not to the heart block itself. The use of transvenous pacemakers in this condition, although widely accepted as an adjunct to treatment of all forms of complete heart block due to myocardial infarction, may reduce mortality in only a small group of patients. (Author)

A71-11705 The computerization of high speed cineangiocardiographic left ventricular volume determination. Edwin S. Beckenbach and Donald T. Desilets (Aerospace Corp., El Segundo, Calif.). In: Pattern recognition studies; Society of Photo-optical Instrumentation Engineers, Seminar-in-Depth, New York, N.Y., June 9, 10, 1969, Proceedings. (A71-11701 02-08) Seminar co-sponsored by the U.S. Army Materiel Command and the Pattern Recognition Society. Redondo Beach, Calif., Society of Photo-optical Instrumentation Engineers (SPIE Seminar Proceedings. Volume 18), 1969, p. 173-192. 7 refs. Research supported by the Los Angeles County Heart Association.

Angiocardiographic methods of determining left ventricular volume are well established, but the amount of labor involved in any manual procedure reduces the applicability of these techniques to myocardial function studies. An automated method of ventricular volume computation from unaltered X-ray images is clearly needed. This capability is offered by the amalgamation of state-of-the-art radiographic equipment with sophisticated programmable film readers. Problem areas are many, but primary attention should be paid to methods of determining boundaries for the objects in question from X-ray images and to utilization of accurate volume computation algorithms. Preliminary investigations in these areas are reported involving maximum likelihood estimation of boundary location and modified Simpson integration volume determination. (Author)

A71-11805 * # Digital simulation of human temperature control. H. J. Winton (Santa Clara, University, Santa Clara, Calif.) and R. N. Linebarger (NASA, Ames Research Center, Biomedical Research Branch, Moffett Field, Calif.). In: Summer Computer Simulation Conference, Denver, Colo., June 10-12, 1970, Proceedings. Volume 2. (A71-11804 02-08) Conference sponsored by the Association for Computing Machinery, S.H.A.R.E., and the Simulation Councils. New York, Association for Computing Machinery, 1970, p. 830-836. 21 refs.

A feedback control system model of human temperature regulation is developed. Body thermal properties are represented by an electric circuit analog. The sudomotor, vasomotor, and metabolic parameters in this circuit are made to be nonlinear functions of an error signal derived from hypothalamic and cutaneous thermoreceptors. The system state equations are derived and a digital simulation of the model using System 360/CSMP is discussed. Comparison of model static and dynamic response with published data from physiological experiments shows reasonable agreement over a broad spectrum of conditions. (Author)

A71-11806 # Mathematical simulation of simultaneous energy and mass transfer process in a clothing-airspace-skin system. Yi Hua Ma (Worcester Polytechnic Institute, Worcester, Mass.), L. W. Rust, R. E. Larson (Litton Industries, Inc., Applied Science Div., Minneapolis, Minn.), and L. A. Spano (U.S. Army, Natick Laboratories, Natick, Mass.). In: Summer Computer Simulation Conference, Denver, Colo., June 10-12, 1970, Proceedings. Volume 2. (A71-11804 02-08) Conference sponsored by the Association for Computing Machinery, S.H.A.R.E., and the Simulation Councils. New York, Association for Computing Machinery, 1970, p. 859-867. 10 refs.

A mathematical model has been developed to describe the response of a fabric-skin system subjected to various environmental stresses. Computer results based on this model were obtained for an individual exercising at various metabolic rates under different environmental conditions. It was found, for example, that after initiation of vigorous exercise (metabolic rate of 1500 Btu/hr) in humid. conditions (relative humidity of 73.2%) the skin temperature of an individual rises to a maximum. This is followed by a slow decrease due to evaporative cooling and then a subsequent rise because of the excess heat generated by the heavy work. Effects of humidity as well as working load were also investigated. (Author)

A71-11807 # Parameter optimization for a model of the cardiovascular system. A. I. Katz (Rutgers University, New Brunswick, N.J.), N. C. Fromm (Electronic Associates, Inc., Princeton, N.J.), and A. H. Moreno (Lenox Hill Hospital, New York, N.Y.). In: Summer Computer Simulation Conference, Denver, Colo., June 10-12, 1970, Proceedings. Volume 2. (A71-11804 02-08) Conference sponsored by the Association for Computing Machinery, S.H.A.R.E., and the Simulation Councils. New York, Association for Computing Machinery, 1970, p. 889-898. 7 refs.

The blood flow in the inferior vena cava (IVC) of a canine was modeled and simulated on a hybrid computer. The model's parameters were optimized by utilizing an optimization software package called OPTRAN. Results of the optimization produced reasonable estimates of the IVC model parameters and responses that were an excellent match to experimental results. (Author)

A71-11823 # Perception of the respiratory medium and gas preference in man and animals (Vospriiatie dykhatel'noi sredy i gazopreferendum u zhivotnykh i cheloveka). I. S. Breslav. Leningrad, Izdatel'stvo Nauka, 1970. 176 p. 579 refs. In Russian.

Experimental results are analyzed which were gained in studies of the ability of humans and animals to sense changes in the contents of basic respiratory mixture components. A special technique was developed which involved active choice of preferred mixtures by the subject. Experiments with rodents used special chambers in which the animals could control their respiratory medium by freely moving to sections having a preferred mixture composition. Human experiments utilized respiratory masks with which the subject could regulate his medium. Both animal and man avoided mixtures with less than 12% oxygen or more than 3% carbon dioxide. The ability to detect hypoxic or hypercapnic media increased with longer inhalation times. Helium-oxygen mixture were preferred over nitrogen-oxygen media. Denervation of sinocarotid zones in rats reduced the discriminatory ability, showing that arterial chemoreceptors are part of the afferent path for the gas preference reaction. Repeated exposures revealed adaptation to the prevailing mixtures. T.M.

A71-11846 # Blood hydrodynamics (Gidrodinamika krovi). Iu. N. Pavlovskii, S. A. Regirer, and I. M. Skobeleva. In: Hydromechanics 1968 (Gidromekhanika 1968). Edited by L. I. Sedov. Moscow, Izdatel'stvo VINITI, 1970, p. 5-96. 571 refs. In Russian.

Certain problems of blood rheology and blood circulation hydrodynamics are considered. The composition and rheological properties of the blood are discussed, and rheological models of the

blood are described. The structure of the circulatory system is reviewed, and certain questions related to mathematical modeling of this system are considered. A detailed investigation is made of the motion of blood in large and small blood vessels and in capillaries. In the case of large blood vessels a study is made of pulsating flows. In the case of small blood vessels and capillaries a theoretical description is given of concentration effects, the hydrodynamics of blood in narrow tubes and arterioles is considered, and an analysis is made of the mass transfer in small blood vessels. A.B.K.

A71-11899 # **Investigation of inductive processes in the visual analysor during ascents in a pressure chamber (Issledovanie induktivnykh protsessov zritel'nogo analizatora pri pod'emakh v barokamere).** V. D. Zapol'skaia. *Voenno-Meditsinskii Zhurnal,* Sept. 1970, p. 50, 51. 6 refs. In Russian.

Description of pressure chamber experiments in which the characteristics of induced visual images were investigated in a group of 55 aircraft crew members some of whom had minor health problems. The subjects were instructed to watch a red circle on a background of white paper for 15 sec during exposures to atmospheric pressures corresponding to an altitude of 5,000 m. The latent period and the persistence of sequences of visual images of the original visual stimulus in the subjects are discussed. V.Z.

A71-11900 # **Investigation of hemodynamics under the action of acceleration (Issledovanie gemodinamiki v usloviiakh vozdeistviia uskorenii).** P. M. Suvorov, L. N. D'iachenko, V. A. Degtiarev, and A. V. Gusev. *Voenno-Meditsinskii Zhurnal,* Sept. 1970, p. 52-56. 8 refs. In Russian.

Description of mechanocardiographic equipment for determining the minute blood volume and basic cardiac activity characteristics in subjects exposed to acceleration of gravity forces. The basic components of this equipment are cuff-fitted capacitance sensors recording tachooscillograms and sphygmograms of the carotid, radial and femoral arteries. Substantial increases of the general peripheral resistance of the arterial system, of cardiac output and of heart contraction power are observed in subjects enduring well accelerations of 3 to 5 g. In contrast, the minute blood volume and the peripheral vessel resistance were insufficient in subjects with a low acceleration endurance. The effectiveness of mechanocardiography under conditions of acceleration is noted. V.Z.

A71-11951 **Radiographic measurements.** R. S. Singh (Illinois, University, Urbana, Ill.). *Photogrammetric Engineering,* vol. 36, Nov. 1970, p. 1137-1146. 33 refs.

Discussion of the application of photogrammetric techniques to precision three-dimensional measurements of X-rays. The technique for obtaining stereoradiographs and the geometry of stereoradiography is examined, and the results of experimental investigations are presented. It is demonstrated that the technique of photogrammetry can be effectively applied to precise radiographic measurements in depth. Stereoradiography is shown to be less hazardous in X-ray doses than other conventional methods such as Kymography, Tomography, and Seriescopy which need four to sixteen times greater X-ray doses than for normal radiographs. Stereoradiography also gives perception of the three-dimensional space which brings about a splendid effect as if X-rays could be sensed by normal vision, which is limited to the spectrum of visible light. O.H.

A71-11976 * # **Space station crew operations.** Robert Aller (NASA, Washington, D.C.). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 14 p.

Description of the areas of crew functions, crew composition, habitability and crew training as they have been developed in space station studies. The activities in which the space station crew will participate are described in the three basic categories of vehicle operations, research operations, and personal duties. A representative crew composition and organization based on an analysis of those functions necessary to maintain an efficient and safe space station capable of accommodating 12 men is shown. It is concluded that the 12-man station used as a reference design may be achieved directly or by an evolution or buildup from a smaller capacity station. However, the eventual result will be to allow hundreds of people to experience living in orbit and to exploit the uses of that vantage point. The facility will be safe, comfortable, efficient and convenient for use by a wide cross section of humans. M.M.

A71-11979 # **Prevention of reflex vestibular disturbances and motion sickness by natural means and by drugs.** Ashton Graybiel (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 41 p. 14 refs.

Discussion of background material and early guidelines for the prevention of vestibular side effects on space missions involving the generation of artificial gravity. A conceptual framework underlying the vestibular problem as a whole is presented, and discrete experimental findings are discussed. Early experiments representing attempts at incremental adaptation to a given terminal velocity in a slow rotation room (SRR) are briefly reviewed to indicate the problems involved and to draw abstractions from the findings. It is pointed out that the evidence available strongly indicates that it is possible to rank persons with regard to their acquisition and retention of adaptation to 4 rpm in the SRR and that persons fully adapted can make the transition between the stationary and rotating environments without experiencing either motion sickness or reflex vestibular effects, except insofar as they contribute to ataxia. M.M.

A71-12047 * **Biogeochemistry of molecular complexes of amino acids with chlorins and porphyrins.** Gordon W. Hodgson, Margot A. Holmes, and Berthold Halpern (Stanford University, Stanford, Calif.). *Geochimica et Cosmochimica Acta,* vol. 34, Oct. 1970, p. 1107-1119. 29 refs. Grant No. NGR-05-020-004.

Demonstration of the possibility of formation of chemical bonds between synthetic porphyrins and specific amino acids, for example between mesoporphyrin IX and phenylalanine, under conditions that are plausible in a geochemical context. Not only can peptide bonds be formed using carboxylic acid substituents of porphyrin molecules, but molecular complexes can be synthesized by adding the amino group of amino acids to vinyl substituents of porphyrins and chlorins. This is illustrated by reacting phenylalanine with protoporphyrin IX. The biogeochemical significance of such intermolecular complexes lies not only in the simple diagenesis of biogenic compounds, as indicated by the observation that porphyrins of ancient sedimentary rocks and petroleum may possibly retain primary and secondary associations with bound amino acids, but also in prebiotic aspects of chemical evolution, wherein demonstration of the coupling of such compounds is of importance in establishing basic structures for the onset of life processes. M.M.

A71-12051 **Movement control (Upravlenie dvizheniiami).** Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970. 168 p. In Russian.

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Tracking time intervals while performing a sequence of movements (Slezhenie za intervalami vremeni pri vypolnenii posledovatel'nosti deistvii). N. A. Rokotova and I. M. Gorbunova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 57-70. (See A71-12056 02-05)

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Role of visual feedback in precision movements (O roli zritel'noi obratnoi sviazi v tochnostnykh dvizheniiakh). E. K. Berezhnaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 71-82. (See A71-12057 02-05)

Controlling the temporal structure of cyclic arbitrary movements by external signals (Ob upravlenii vremennoi strukturoi tsiklicheskikh proizvol'nykh dvizhenii vneshnimi signalami). Iu. T. Shapkov, p. 82-92. (See A71-12058 02-05)

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Imitation of the duration, intensity, and frequency of the fundamental tone of an isolated vowel (Imitatsiia dlitel'nosti, intensivnosti i chastoty osnovnogo tona izolirovannogo glasnogo). N. A. Fedorova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 101-110. (See A71-12060 02-05)

Imitation of the pitch interval of a sequence of two tonal signals (Imitatsiia vysotnogo intervala posledovatel'nosti dvukh tonal'nykh signalov). V. V. Liublinskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 110-117. (See A71-12061 02-05)

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Simulation of movement control systems and certain methodological questions (Modelirovanie sistem upravleniia dvizheniiami i nekotorye metodicheskie voprosy).

Structure of biological movement control systems from the standpoint of structural linguistics (O strukture biologicheskikh sistem upravleniia dvizheniiami s tochki zreniia strukturnoi lingvistiki). A. M. Pokrovskii, M. B. Ignat'ev, and G. S. Kan, p. 123-130. (See A71-12063 02-05)

Study of a movement control system as a data processing system (Ob issledovanii sistemy upravleniia dvizheniiami kak sistemy pererabotki informatsii). G. S. Kan, L. A. Makarova, A. A. Troianovskii, and Iu. T. Shapkov, p. 130-139. (See A71-12064 02-05)

Study of the kinematics and estimation of the degrees of mobility of an upper extremity (Issledovanie kinematiki i otsenka stepenei podvizhnosti verkhnei konechnosti). Z. V. Apshtein, V. M. Velikson, and F. S. Vorontsov (Nauchno-Issledovatel'skii Institut Protezirovaniia, Leningrad, USSR), p. 139-147.

Hardness of muscles in man as an indicator reflecting the isometric stress force (Tverdost' myshts u cheloveka kak pokazatel', otrazhaiushchii silu izometricheskogo napriazheniia). I. P. Blokhin, p. 148-154. (See A71-12065 02-04)

A71-12052 # **Rhythmical organization of a sequence of movements in humans (O ritmicheskoi organizatsii posledovatel'nosti deistvii cheloveka).** I. M. Gorbunova and N. A. Rokotova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 7-17. In Russian.

Study of the temporal characteristics of the performance of a standard sequence of homogeneous discrete motor acts (pressing the levers of a console and moving the hand from lever to lever) in tests on 14 human subjects. A high degree of stability of the time required to perform an entire series of movements, individual groups of movements, and each separate movement is noted. On the basis of an analysis of the distributions of the above-mentioned intervals and a comparison with the model proposed by McGill a hypothesis is advanced regarding the existence of a central nervous mechanism generating the rate of the movements. A.B.K.

A71-12053 # **Certain patterns of control of precision cyclic movements in humans (Nekotorye zakonomernosti upravleniia tochnostnymi tsiklicheskimi dvizheniiami cheloveka).** M. A. Alekseev (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) and A. A. Asknazii (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 17-37. In Russian.

Investigation of precision movements in humans during rhythmical bending of the forearm on an ergograph up to angular positions at which an acoustic stop signal occurred. The given amplitude, the acoustic signals, a mechanogram of the movements, and an electromyogram of the antagonistic muscles were recorded. It is shown that both fast and slow movements are constructed according to a single principle, the basis of them being the initial exertion of the agonist, which is accompanied by a simultaneous activity of the antagonist characteristic of precision movements. Both slow and fast movements are corrected as they are performed, the nature of the correction depending on the magnitude of the initial exertion of the agonist and the rate. Slow movements the initial exertion of which is insufficient to reach a given level are corrected by an additional exertion of the agonist at the end of the movement. Sometimes slow movements are corrected by a group tremor-like activity of the agonist. In the case of fast movements not reaching a given level no additional exertions of the agonist occur; it is the subsequent movements which are corrected. The correction of movements exceeding a given level depends on their rate. In the case of slow movements the initial exertion of the subsequent movement is reduced. Fast movements can be corrected while they are being performed by an additional exertion of the antagonist. A.B.K.

A71-12054 # **The problem of the regulation of the rate of simple rhythmical movements (K voprosu o reguliatsii tempa prostykh ritmicheskikh dvizhenii).** I. N. Krylov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 38-49. In Russian.

Investigation of the nature of the arbitrary control of the rate of simple movements of two types - discrete (tapping) and continuous (rotational movements) - in the absence of external correcting signals. It is found that the minimum change in the rate of the

movements is a function of the initial time interval (the duration of a single motor cycle). The ratio between these quantities is approximately constant over the entire investigated time scale and amounts to 20 to 22% of the initial interval. In some of the subjects tested studies were made of the differential thresholds of perception of time intervals and the accuracy of reproduction of a given rate of rhythmical movements. It is shown that the differential thresholds of perception amount to 4 to 10% of the interval, while the accuracy of reproduction of the rate improves during active tracking of the intervals. The quantitative characteristics of the movement rate control thus obtained are considered in relation to the concept of the presence of a central nervous rate-controlling mechanism generating the time intervals. A.B.K.

A71-12055 # **Temporal characteristics of coordinated movements of the fingers of the human hand (Vremennye kharakteristiki soglasovannykh dvizhenii pal'tsev ruk cheloveka).** I. D. Bogina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 49-57. In Russian.

Study of the temporal characteristics of alternating movements of two adjacent fingers of one hand and the corresponding fingers of different hands. The subjects studied were required to strike the keys of a teletype machine at three arbitrarily chosen rates - fast, optimal, and slow. Measurements were made of the duration of the key pressings and of the duration of the motor cycles of each finger, and also of the duration of mixed cycles (from the start of a pressing by one finger to the start of a pressing by another finger). The mean values of these quantities were calculated, as well as their rms deviations and the variance coefficients. It is concluded that the controlled variables ensuring coordinated rhythmical work of two fingers in different time regimes are the durations of the motor cycles of each finger and the duration of the mixed motor cycles. Individual elements of the movements are not significant in the organization of coordinated movements of the fingers. A.B.K.

A71-12056 # **Tracking time intervals while performing a sequence of movements (Slezhenie za intervalami vremeni pri vypolnenii posledovatel'nosti deistvii).** N. A. Rokotova and I. M. Gorbunova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 57-70. In Russian.

Study of the tracking of time intervals during the performance of a standard sequence of homogeneous discrete motor acts (pressing the levers of a console and moving the hand from lever to lever). The time allowed to perform an entire series of movements was given by external signals, and during a test sudden changes in the given time were produced (in jumps lasting 2 sec or 1 sec). An analysis is made of the temporal characteristics of the performance of an entire series of movements, individual groups of movements, and each separate movement for a constant value of the given time (steady regime) and after a change in the given time (transient regime). It is found that during work in the steady regime the total time required to perform a series of movements corresponds to the length of the given time interval and fluctuates only slightly. During the transient process a change occurs in all the performance time intervals after receiving a single signal denoting mismatch between the given time and the performance time. The length of the transient process is 2 to 3 times that required to perform a sequence of movements. A.B.K.

A71-12057 # **Role of visual feedback in precision movements (O roli zritel'noi obratnoi sviazi v tochnostnykh dvizheniiakh).** E. K. Berezhnaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 71-82. In Russian.

Investigation of the accuracy of tracking targets given externally and targets which are projections of various points of the body of the subject onto external scales. The tests were performed both in the presence and in the absence of visual feedback. It is shown that target indications without visual feedback are accompanied by considerable static errors, which are the errors of the system itself. The accuracy of projection by the subject of various points of his body onto external scales is in no way inferior to the accuracy of indications of external targets, which makes it possible to advance a hypothesis regarding the presence in humans of an intrinsic coordinate system based on such reference points as the middle sagittal cross section, the shoulder line, etc. The introduction of visual feedback is a sufficient condition for the elimination of the observed static errors. Errors introduced into the system artificially by prismatic distortion of the target position may be corrected by comparing the distorted visual information with information of nonvisual modality concerning the true target position. A.B.K.

A71-12058 # **Controlling the temporal structure of cyclic arbitrary movements by external signals (Ob upravlenii vremennoi strukturoi tsiklicheskikh proizvol'nykh dvizhenii vneshnimi signalami).** Iu. T. Shapkov. In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 82-92. In Russian.

Study of the possibility of controlling the time realization of a motor program by means of external acoustic signals in subjects who are first-class athletes and master oarsmen. It is established that the problem of coordinating the beginning of the work phase with the beginning of the signal action may be solved more rapidly and more accurately than the analogous problem for the preparatory phase. The solutions of the problem of coordinating the start of a movement with the signal action have common features when the signal repetition rate is increased or when the time during which movements are performed under the direction of a sound leader is increased. These features consist in an alternation of groups of motor cycles in which the start of a movement occurs in advance of the signal with groups in which a lag behind the signal occurs. It is established that the problem of controlling the time required for an entire cycle to occur may be solved more easily and in a wider range than in the case of control of the length of an element of the cycle (the work phase). It is hypothesized that the nervous system, in solving the problem of coordinating a motor act with an external

A71-12059 # **Temporal structure of rhythmical movements under conditions of sensory limitations - The problem of the role of interaction between afferent systems in the regulation of dynamic work (Vremennaia struktura ritmicheskikh dvizhenii v usloviiakh sensornykh ogranichenii - K voprosu o roli vzaimodeistviia afferentnykh sistem v reguliatsii dinamicheskoi raboty).** Iu. T. Shapkov. In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 92-100. In Russian.

Investigation of the effect of sensory limitations on rhythmical movements of athletes during rowing. Three types of limitation were applied in these tests - namely, limitation of peripheral vision, total exclusion of vision, and drowning out by means of a tone of the sounds accompanying a movement. Limitation and complete exclusion of visual control of a movement are found to cause changes in the temporal and spatial structure of the movement. The magnitudes of the exertions developed tend to decrease. The nature of the reaction depends on the athletic qualifications of the subject. Drowning out the usual sounds accompanying a movement causes a revamping of the temporal structure and a lengthening of the cycle performance time, regardless of the motor experience of the subject. This action has no effect on the other characteristics of a movement. It is hypothesized that individual characteristics of the structure of a movement are independently controlled and that the visual afferentation plays various roles in the control of movements, depending on the degree of automation of the movements. A.B.K.

signal, uses a description of signal durations to make the time dimensionality of the entire movement and individual phases of it subject to given parameters. At the same time, a description of the change in sign of the signal is used to coordinate the start of a movement with the start of the signal action. The work of the servosystem which coordinates the start of the realization of a program of movement with an external signal apparently occurs fairly independently of the movement programming system. A.B.K.

A71-12060 # **Imitation of the duration, intensity, and frequency of the fundamental tone of an isolated vowel (Imitatsiia dlitel'nosti, intensivnosti i chastoty osnovnogo tona izolirovannogo glasnogo).** N. A. Fedorova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 101-110. In Russian.

Study of the nature of the imitation by the voice of a synthesized vowel characterized by three parameters under conditions where only one parameter varies while the other two remain constant and under conditions where all three parameters vary. It is found that only the values of the frequency of the fundamental tone of the stimulus vowels and the reaction vowels are fairly close to each other. In the case of the values of the intensity level and the duration no such correspondence between the reaction and the stimulus occurs. The effect of passing from variation of only one parameter to variation of all three parameters is the same for all three parameters and manifests itself in a contraction of the range of values of the reaction vowel parameters in comparison with the range of values of the stimulus vowel parameters, while the variations of the responses increase. This corresponds to the fact that the number of so-called distinguishable levels of each parameter - i.e., the quantity of information which could be transmitted with the aid of a single stimulus parameter - decreases, if information about the other two parameters is transmitted simultaneously. Moreover, the number of distinguishable levels is maximum at the frequency of the fundamental tone. A.B.K.

A71-12061 # **Imitation of the pitch interval of a sequence of two tonal signals (Imitatsiia vysotnogo intervala posledovatel'nosti dvukh tonal'nykh signalov).** V. V. Liublinskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 110-117. In Russian.

Study of the reproduction by the human voice of two tonal signals the frequency difference between which varies randomly within given limits. The mean frequency of the fundamental tone of the response sounds was measured, and an analysis is made of the nature of the relation between the parameters of the initial stimuli and the responses. It is established that in the range of frequency differences between stimuli from 10 to 300 Hz the relation between the stimuli and the responses is of nonlinear nature. A.B.K.

A71-12062 # **Relation between stimulus and response intensity levels during the imitation of a consonant (Sviaz' mezhdu urovniami intensivnosti stimula i otveta pri imitatsii soglasnogo).** T. G. Malinnikova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 117-122. In Russian.

Study of the nature of the relation between the intensity level of an input signal (a synthesized glottal consonant) and the intensity level of the sound produced in imitation of this signal. The intensity range of the stimuli presented to the subject for imitation was varied in the tests, and the intensity level of the response signal was measured. An analysis of the relation between the stimulus intensity level and the response intensity level showed that this relation is not straightforward, but varies with a variation in the intensity range of the stimuli test sets. A.B.K.

A71-12063 # **Structure of biological movement control systems from the standpoint of structural linguistics (O strukture biologicheskikh sistem upravleniia dvizheniiami s tochki zreniia strukturnoi lingvistiki).** A. M. Pokrovskii, M. B. Ignat'ev, and G. S. Kan. In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 123-130. In Russian.

Study of the analogy between the structure of a natural language and the structure of the movements of biological objects. Using certain concepts of structural linguistics, it is shown that the extremely complex structure of a movement control system can be reduced to an encompassable form. It is shown that the memory of a movement control system stores a finite number of basic rules and a finite number of transformation rules, with the aid of which a large number of motor acts can be constructed. A.B.K.

A71-12064 # **Study of a movement control system as a data processing system (Ob issledovanii sistemy upravleniia dvizheniiami kak sistemy pererabotki informatsii).** G. S. Kan, L. A. Makarova, A. A. Troianovskii, and Iu. T. Shapkov. In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 130-139. In Russian.

Consideration of the work of the nervous system in controlling skeletal muscles, using the regulation of the vertical position of a human subject as an example. The problem of studying the processing logic of afferent (input) signals contributing to the observed behavior of the system (output signals) when making a quantitative estimate of effector commands (intermediate variables or 'states') is formulated. The possibility of using the operation of a system of finite automata for this analysis is demonstrated. On the basis of experimental data, input, output, and intermediate variables are chosen. Constraints are imposed on the system: body elements located above the knee joint are combined into a single rigid element by a special corset. Taking into account the current state of computer technology, it is concluded that the solution of the problem of analyzing the operation of a system consisting of four joints and 12 muscles on both legs is entirely realistic. A.B.K.

A71-12065 # **Hardness of muscles in man as an indicator reflecting the isometric stress force (Tverdost' myshts u cheloveka kak pokazatel', otrazhaiushchii silu izometricheskogo napriazheniia).** I. P. Blokhin. In: Movement control (Upravlenie dvizheniiami). (A71-12051 02-05) Edited by V. A. Levtov. Leningrad, Izdatel'stvo Nauka, 1970, p. 148-154. In Russian.

Comparison of muscle exertion and hardness in human subjects, using the method of continuous local tensomyotonography. The apparatus for recording muscle hardness consisted of a sensor, a strain gauge amplifier, and a recorder. It is shown that muscle hardness is related to the resulting exertion by a near-linear dependence over a wide range of exertions. Deviation from this dependence is observed in the range of minimal and maximal exertions. The range of linear dependence expands into the region of maximal exertions when the exertion developed in a joint is compared with the overall change in hardness of the muscles of the functional and anatomical synergists and antagonists. The hardness of an individual muscle or group of muscles as an informative parameter reflecting the magnitude of an exertion is more indicative than changes in the shape of the muscles, since a change in hardness is related to the magnitude of the developed exertion by a simpler linear relationship and over a considerably larger range. A.B.K.

A71-12106 Data acquisition in medicine; French Conference, 2nd, Nancy, France, June 30-July 5, 1969, Communications (L'informatique en médecine; Congrès Français, 2nd, Nancy, France, June 30-July 5, 1969, Communications). *Génie Biologique et Médical,* vol. 1, July-Sept. 1970. 280 p. In French.

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Mathematical model scheme of the respiratory function - Identification problems (Esquisse de modèle mathématique de la fonction respiratoire - Problèmes d'identification). G. Matisse and J. Lacoste (CNRS, Nancy, France), p. 133-137. (See A71-12108 02-05)

Progress report of the project of computerizing the medical records of the Quinze-Vingts ophthalmology clinic (Etat d'avancement du projet d'exploitation sur calculateur des dossiers médicaux de la clinique ophtalmologique des Quinze-Vingts). P. Chougnet and M. Massin (Hospice National des Quinze-Vingts, Paris, France), p. 172-177. (See A71-12109 02-05)

Available technical means in electrocardiography and effort vectorcardiography (Moyens techniques utilisables en électrocardiographie et en vectographie d'effort). R. Koechlin, J.-C. Hourde, B. Courtois, and F. Neel (CNRS, Paris, France), p. 195-200. (See A71-12110 02-05)

Method for comparing superficial electrocardiographic and global vectorcardiographic manifestations (Méthode pour comparer les manifestations électrocardiographiques de surface et vectographiques globales). F. Neel, B. Courtois (CNRS, Paris, France), and R. Koechlin (Centre Médico-Chirurgical Foch, Suresnes, Hauts-de-Seine, France), p. 212-218. (See A71-12111 02-05)

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A71-12107 Adaptation of multichannel analyzers to cardiology (Interface d'adaptation d'analyseurs multicanaux à la cardiologie). J.-C. Hourde, R. Koechlin, and J. Cywinski (Centre Médico-Chirurgical Foch, Suresnes, Hauts-de-Seine, France). *(Congrès Français sur l'Informatique en Médecine, 2nd, Nancy, France, June 30-July 5, 1969.) Génie Biologique et Médical,* vol. 1, July-Sept. 1970, p. 53-57. In French.

Study of the adaptation to cardiology of multichannel analyzers normally used in neurophysiology. An input-output interface was studied and completed for this adaptation. The cardiac cycle is spontaneous and not stimulated by the experimenter. Usual analyzers prevent the visualization of vectorcardiographic loops, while the adapted multichannel analyzer makes this visualization possible. M.V.E.

A71-12108 Mathematical model scheme of the respiratory function - Identification problems (Esquisse de modèle mathématique de la fonction respiratoire - Problèmes d'identification). G. Matisse and J. Lacoste (CNRS, Institut de Génie Biologique et Médical, Nancy, France). *(Congrès Français sur l'Informatique en Médecine, 2nd, Nancy, France, June 30-July 5, 1969.) Génie Biologique et Médical,* vol. 1, July-Sept. 1970, p. 133-137. In French.

Discussion of the problems associated with the development of a meaningful mathematical model of the respiratory function. It is pointed out that a model merely providing a correct description of the real system cannot be adequate as long as it does not accurately mirror the very structure of the real system. The road to an adequate model is illustrated by a series of block diagrams. M.V.E.

A71-12109 Progress report of the project of computerizing the medical records of the Quinze-Vingts ophthalmology clinic (Etat d'avancement du projet d'exploitation sur calculateur des dossiers médicaux de la clinique ophtalmologique des Quinze-Vingts). P. Chougnet and M. Massin (Hospice National des Quinze-Vingts, Paris, France). *(Congrès Français sur l'Informatique en Médecine, 2nd, Nancy, France, June 30-July 5, 1969.) Génie Biologique et Médical,* vol. 1, July-Sept. 1970, p. 172-177. In French. Research supported by the Université de Paris and the Ministère des Affaires Sociales.

Review of the problems of organizing the medical observation data of the National Ophthalmology Clinic at Quinze-Vingts for their recording on magnetic tape and statistical utilization through a computer. The computerization project is sponsored by the Paris School of Medicine whose computer has been made available for this project. M.V.E.

A71-12110 Available technical means in electrocardiography and effort vectorcardiography (Moyens techniques utilisables en électrocardiographie et en vectographie d'effort). R. Koechlin, J.-C. Hourde, B. Courtois, and F. Neel (CNRS, Institut Blaise Pascal, Paris, France). *(Congrès Français sur l'Informatique en Médecine, 2nd, Nancy, France, June 30-July 5, 1969.) Génie Biologique et Médical,* vol. 1, July-Sept. 1970, p. 195-200. In French.

Critical review of the techniques and equipment used in the recording, storage, preselection or verification, analysis, and graphic presentation of medical observation data. The review is aimed at the definition of ways and means for facilitating clinical and paraclinical follow-up studies of electrocardiographic anomalies observed on trained or overtrained athletes. M.V.E.

A71-12111 Method for comparing superficial electrocardiographic and global vectorcardiographic manifestations (Méthode pour comparer les manifestations électrocardiographiques de surface et vectographiques globales). F. Neel, B. Courtois (CNRS, Institut Blaise Pascal, Paris, France), and R. Koechlin (Centre Médico-Chirurgical Foch, Suresnes, Hauts-de-Seine, France). *(Congrès Français sur l'Informatique en Médecine, 2nd, Nancy, France, June 30-July 5, 1969.) Génie Biologique et Médical,* vol. 1, July-Sept. 1970, p. 212-218. In French.

Description of a method of comparing isopotential maps of the thorax with vectorcardiograms. Vectorcardiograms from various surface-potential distribution zones have been calculated. McFee's Mercator-projection map describing the course of the instantaneous vector is compared with a map of the maximum and minimum shifts at the surface. M.V.E.

A71-12349 # Adaptive response characteristics of the human operator. Hidefumi Kobatake and Takashi Isobe (Tokyo, University, Tokyo, Japan). *Society of Instrument and Control Engineers, Transactions,* vol. 6, June 1970, p. 221-227. 7 refs. In Japanese, with abstract in English.

Study of the adaptive response characteristics of a human operator to step changes in the dynamics of a compensatory tracking system. It is found that the operator adjusts not only his gain but also some other response characteristics. An analysis reveals the following important characteristics: (1) the delay in taking action in a transient state is smaller than that in a steady state; (2) the operator responds in an open loop fashion and the greater part of the actions seems to be determined by the initial state of the control error; and (3) the response characteristics in a transient state are similar to those of the response to a step input. M.M.

A71-12364 * Scanning electron microscopy of the organ of Corti. Göran Bredberg, Henrik H. Lindeman, Harlow W. Ades, Roger West (Illinois, University, Urbana, Ill.), and Hans Engström (Uppsala, University, Uppsala, Sweden). *Science,* vol. 170, Nov. 20, 1970, p. 861-863. 12 refs. Grant No. NGL-14-005-074.

With the scanning electron microscope we have examined normal cochlear sensory epithelium of the guinea pigs and cat and that damaged by noise. The studies demonstrate how the regular surface architecture of the organ of Corti is altered after exposure to noise. The changes include loss of sensory hairs, formation of giant hairs, and complete degeneration of circumscribed areas of the organ of Corti. Our method greatly reduces the artifacts. (Author)

A71-12365 * Sexual behavior of male cats after administration of parachlorophenylalanine. Arthur Zitrin (New York University, New York, N.Y.), Frank A. Beach (California, University, Berkeley, Calif.), Jack D. Barchas, and William C. Dement (Stanford University, Stanford, Calif.). *Science,* vol. 170, Nov. 20, 1970, p. 868-870. 14 refs. PHS Grant No. MH-04000; Grant No. NGR-05-020-168.

The behavior of 12 male cats was observed before and after six or eight daily injections of parachlorophenylalanine. Sexual performance was either unchanged or diminished; aggressive behavior was not seen. Serotonin concentrations in the brains were uniformly lowered. (Author)

A71-12381 * Influence of vestibular stimulation and display luminance on the performance of a compensatory tracking task. Richard D. Gilson, Fred E. Guedry, Jr., and Alan J. Benson (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1231-1237. 17 refs. Army-Navy-NASA-sponsored research.

The effects of vestibular nystagmus and luminance level on the hand-eye coordination required in tracking an aircraft instrument were studied in 20 men. Increases in display luminance within a range from the lowest to the highest levels normally used in aircraft cockpits significantly improved tracking performance during vestibular stimulation, whereas the same luminance change without concomitant vestibular stimulation produced no significant alteration in performance. Vestibular nystagmus produced by strong angular acceleration stimuli was approximately the same with display luminances between 0.01 and 10-ft-L. Thus a given speed of image movement across the retina degrades vision-dependent performance less as luminance level is increased. The results indicate that increased instrument lighting can improve flight performance during flight conditions that would introduce strong vestibular stimulation. Moreover, the results illustrate that cockpit lighting should be evaluated under dynamic as well as static conditions to insure that human factors safety requirements are met. (Author)

A71-12382 Atmospheric oxygen - Effect on resistance of mice to pneumococcal pneumonia. Jerome P. Schmidt and Robert J. Ball (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1238, 1239. 6 refs.

This study was made to determine the effect of hypobaric pressure (equivalent to an altitude of 18,000 feet) and hypoxic, normoxic or hyperoxic atmospheres on resistance of mice to Diplococcus pneumoniae. Groups of animals were exposed to the test environment before, after, or before and after infectious challenge. Similarly infected control groups were maintained under normal ground level conditions. No significant differences were found in the mortality data from normoxic groups, indicating that reduced pressure per se was without demonstrable effect. However, when animals were exposed to hypoxic atmospheres prior to challenge they were more resistant to the infection. Survival was not affected by exposure after challenge only. Though hypoxia appears to be beneficial, continued exposure to hyperoxic conditions may be detrimental since mice exposed both before and after infection did not retain the increased resistance afforded by preinfection exposure. (Author)

A71-12383 # Effect of UDMH on blood coagulation, the blood-aqueous barrier and the cornea. E. B. Smith and F. A. Castaneda (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1240-1243. 14 refs.

Study of blood and aqueous humor samples obtained from anesthetized male mongrel dogs to which varying quantities of UDMH as a single dose had been applied to a 300-sq-cm area of the chest. Thromboelastographic studies of blood coagulation showed that thromboplastin generation times were decreased after 120 minutes, but were unaffected by the size of dose of UDMH applied to the skin. No change was found in the other factors affecting blood clotting. The blood-aqueous humor barrier in the eye did not prevent UDMH from entering the aqueous humor from the systemic circulatory system. An increased opacity of the cornea was visually observed. The mean of the differences between the UDMH levels of blood and aqueous humor from concurrent samples was not statistically different from zero. The correlation between these UDMH levels is 0.938. No relationship was found between the aqueous humor and blood glucose levels. Generally, the aqueous humor glucose level increased with time following application of UDMH to the animal. Possible mechanisms for the effect of UDMH on blood coagulation and corneal swelling are discussed. (Author)

A71-12384 * Real-time contourogram as an ECG monitoring technique. Roger A. Wolthuis, Donald P. Golden, Donald G. Mauldin (NASA, Manned Spacecraft Center, Houston, Tex.; Technology, Inc., Dayton, Ohio), G. W. Hoffler, and Robert L. Johnson (NASA, Manned Spacecraft Center, Biomedical Laboratories Div., Houston, Tex.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1247-1250. Contract No. NAS 9-7675.

A new, real-time contourogram is described which greatly facilitates the monitoring of ECG waveform data. This contourogram uniquely measures and displays instantaneous cardiac rate, trends in cardiac rate, arrhythmias and alterations in cardiac conduction activity. Contourograms are presented to illustrate these features. (Author)

A71-12385 Some characteristics of optokinetic eye-movement patterns - A comparative study. William E. Collins, David J. Schroeder, Nancy Rice, Ruth Ann Mertens, and Gail Kranz (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1251-1262. 34 refs.

Optokinetic stimulation of parrots and cats showed that both slow-phase displacement and frequency of eye movements increased during the initial 18 sec or more of stimulation before leveling off. There was no significant difference between right-beating and left-beating responses. Cats were studied more extensively and showed no clear adaptation effects for stimuli up to two min in duration. Cats also displayed a smoothly declining afternystagmus (in the dark) following stimulus termination; this response consistently gave way to a secondary nystagmus, the magnitude of which did not seem to be affected by the longer stimulus durations. Vertical nystagmus from cats was less regular and could be obtained consistently only in a down-beating direction. Human subjects showed no consistent directional differences in either horizontal or vertical optokinetic nystagmus but differed from the cats in that no build-up period was evident, a sharp drop in nystagmus followed stimulus termination, the output of afternystagmus tended to be greater following longer durations of stimulation, and secondary responses were both infrequent and weak. Some striking but apparently normal asymmetries in the vertical responses of humans were noted. (Author)

A71-12386 Thermal loads in lunar ambulation. Jan A. J. Stolwijk (Yale University, New Haven, Conn.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1266-1268. 6 refs.

Extravehicular activity on the lunar surface takes place in a severe thermal environment which can range from very high to very

low operative temperatures. The Apollo EVA suit system incorporates extremely effective insulation. The major thermal stress is thus due to internally produced metabolic heat. Average metabolic, heat production during the Apollo XI extravehicular activity was estimated at about 400 watts, based on indirect measurements. The use of conductive skin cooling with inhibition of sweat production causes some limitation in the ability of the liquid-cooled garment to eliminate metabolically produced heat under conditions of thermal comfort. In contrast to undersea operations where the major thermal hazard is hypothermia, the lunar environment with the use of current technology represents a hazard of hyperthermia. (Author)

A71-12387 Problems of body heat loss in water immersion. Robert W. Bullard and George M. Rapp (Yale University, New Haven, Conn.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1269-1277. 35 refs. PHS Grant No. F 03 GM 45, 192-01.

Use of a simple model for development of the concepts involved in body heat loss in water immersion. In the model, metabolically produced heat and heat stores from the core are transferred down the thermal gradient to the skin surface. The fixed resistance to heat flow of subcutaneous fat and body structural components is discussed, as well as the more complex resistance varied by alteration in skin and extremity blood flow. Extremely high resistance to heat flow or minimal conductance is developed by a marked reduction in extremity blood flow and establishment of countercurrent heat exchange. The highest attainable resistance to heat flow is quite dependent on subcutaneous fat deposits. Transfer of heat from body surface to water encounters a very low resistance. This problem is treated herein by utilizing classical heat transfer physics and nondimensional quantities derived from the thermal physical properties of water. (Author)

A71-12388 Tolerances to thermal extremes in aerospace activities. P. F. Iampietro (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1278-1281. 13 refs.

Tolerance for all hot environments cannot be defined by a single criterion. At least three types of tolerance are discussed which might occur in aerospace activities. These tolerance categories have been designated (1) pain-limited, (2) heat-load-limited, and (3) systems-limited. Pain-limited exposures are of short duration and require very high temperatures. Heat-storage-limited exposures may last from minutes to hours and result from exposures to high temperatures and low humidities. Systems-limited exposures are of intermediate duration and involve exposures to moderately high temperatures and high humidities. (Author)

A71-12389 Physiological studies of military parachutists via FM/FM telemetry - The data acquisition system and heart rate response. Donald H. Reid (U.S. Navy, Naval Aerospace Recovery Facility, El Centro, Calif.) and Joseph E. Doerr (USAF, Test Group /Parachute/, El Centro, Calif.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1292-1297. 7 refs.

The objective is to determine and correlate physiological and force-field responses of parachutists to the aerospace recovery environment. Multichannel FM/FM telemetry physiological/force-field data acquisition systems were developed. The man-borne instrumentation consists of three components (signal conditioning unit, battery package and RF transmitter), weighing less than 5 pounds and mounted beneath the reserve parachute. Microminiaturized 'chip' circuitry utilizing IRIG SCO bands are used with nickel-cadmium power supplies and 220.0 MHz FM transmitters. Bisternal ECG electrodes, linear accelerometers and a carbon microphone are man-borne sensors. Seven parachutists have participated in 27 free-fall jumps to date. Highest heart rates are at manual ripcord pull with a second peak at landing. In one novice jumper heart rate at pull was 220 BPM and at landing 205 BPM. Fifteen jumps later heart rate values had decreased to 170 BPM (pull) and 176 BPM (landing). Heart rates of more experienced parachutists are not as high but the same qualitative pattern is generally observed. (Author)

A71-12390 * Lymphocyte cultures under varied logistical conditions - Stability of nucleic acid synthesis. Jerry C. Daniels, Elaine K. Cobb, Craig L. Fischer, William C. Levin, and Stephan E. Ritzmann (Texas, University, Galveston; NASA, Houston, Tex.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1298-1301. 30 refs. Contract No. NAS 9-8122.

The increasing importance of in vitro lymphocyte antigen response measurements in the evaluation of cellular immunity may necessitate application of this technique under adverse field conditions. We have studied the effects of transporting cultures long distances by various modes and of sample handling under field conditions. Specifically, the RNA and DNA synthesis rates of both unstimulated and PHA-stimulated lymphocytes obtained from healthy adult males were studied. The results indicate that even under nonlaboratory conditions valid data can be obtained from lymphocyte cultures assayed for antigenic responsiveness. (Author)

A71-12391 Heparin efficacy in burns. II. Michael J. Saliba, Jr. *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1302-1306. 22 refs.

Without controls, large topical and parenteral doses of Heparin appeared effective in 28 first-, second-, and third-degree human thermal burns 1 to 15% size. Heparin, tetanus toxoid, dry dressings and oral erythromycin were used. Clinical results paralleled the significant experimental findings reported earlier. Heparin appeared to prevent burn extension in that initial size was maximum size. Burns subsequently decreased in size and healed with minimal scarring. Healing time appeared to be shortened. Pain relief was significant. No infection nor serious hemorrhage occurred. Larger burns have responded favorably and Heparin's strong effect on assumed pathophysiological burn factors (microthrombi, histamine, serotonin, proteolytic enzymes, disseminated intravascular clots), has been demonstrated in other fields. A modified, nonanticoagulant Heparin that retained Heparin's other properties might be a useful research and therapeutic tool in space, military, and civilian medicine. (Author)

A71-12392 Cardiovascular disease in the younger age group. S. W. Berkheiser (Harrisburg Polyclinic Hospital, Harrisburg, Pa.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1307-1309. 12 refs.

With the projected yearly growth of 50,000 new airmen to the system, practical methods of detecting coronary artery heart disease are controversial. The possible sudden incapacitation of active pilots up to the age of 45 years due to coronary heart disease is of prime importance. A retrospective autopsy study of such individuals disclosed sudden death occurred in 50% of the subjects. Approximately the same incidence of recent coronary artery thrombosis and recent infarction was noted. Associated and easily detectable conditions of hypertension, obesity, and diabetes were found in 17 to 21% of the subjects. Increased utilization of specialized technics, such as coronary angiography may aid in evaluation of problem cases, and could be extended to aircrews, particularly those involved in commercial and military aviation. Careful physical examination, and adequate clinical history still provide the most practical means of evaluating cardiac problems due to coronary artery disease in the general aviation population. (Author)

A71-12393 # USAFSAM neurology conference - Proposed system for standardized EEG recordings. Earl A. Zimmerman and E. Liske (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 41, Nov. 1970, p. 1309-1313. 7 refs. USAF-sponsored research.

Though the EEG has accrued increasing value in Air Force neurological evaluations, no standard routine method of recording has come into general use. The combined EEG staffs of the USAF School of Aerospace Medicine and Wilford Hall USAF Medical Center devised a system in November 1969, have used it clinically since then and altered it in May 1970. The proposals reported here are the result of these conferences and they indicate that a standard EEG recording system is needed. (Author)

A71-12413 Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970. 300 p. $18.

Contents:

A71-12414 Contribution on the morphology of coronary sclerosis. H. Meessen (Düsseldorf, Universität, Düsseldorf, West Germany). In: Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. (A71-12413 02-04) Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970, p. 3-19. 58 refs.

Consideration of three aspects of coronary sclerosis. Attention is first given to investigations of the quantitative morphology of coronary sclerosis in humans. Findings obtained with the aid of the electron microscope and immunofluorescent methods are demonstrated. Morphological findings regarding the disturbances of the microcirculation in the myocardium are dealt with. Numerous case histories are discussed in some detail. F.R.L.

A71-12415 Physical factors in arterial sclerosis and stenosis. S. Rodbard (City of Hope Medical Center, Duarte, Calif.). In: Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. (A71-12413 02-04) Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970, p. 72-93. 31 refs. PHS Grant No. HE-08721.

Examination of some of the adaptive responses of the connective and vascular tissues to mechanical forces. Vessels are generally adapted to the mechanical stresses (pressure, tension, compression, rates of change of these, friction, etc.) which they must bear. It is suggested that the cells of the vascular system sense these stresses, and that they respond with specific negative feedback mechanisms which relieve them of the stress. Stresses produced by pressure, drag, and friction on blood vessels are discussed. Dissection of the arterial wall can result from a high stream velocity which lifts the lining from the outer media; the lifting process increases the likelihood of hemorrhage into the media via the vasa vasorum. F.R.L.

A71-12416 Fibrinolytic activity in human coronary arteries - Review and quantitative studies. S. Fischer (Frederiksberg Hospital; Bispebjerg Hospital, Copenhagen, Denmark; J. F. Mitchell Foundation, Washington, D.C.). In: Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. (A71-12413 02-04) Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970, p. 187-210. 37 refs. Research supported by the Medical Research Foundation for Greater Copenhagen; NIH Grant No. HE-05020.

Study of the role of fibrin, which forms and disappears in a few minutes, in human coronary arteries. This rapid formation and disappearance is a phenomenon which, in vivo, is quite particularly apt to influence symptoms. Previous studies by Astrup and others indicate that there is reason to assume that thrombolysis takes place before as well as after death. Studies were undertaken by the author which supplement the histochemical method of investigation by a quantitative method applicable for human coronary arteries with arteriosclerosis and occlusion. Vascular areas and lysed areas in a

fibrin film were measured by planimetry and correlated mutually for the purpose of elucidating the lytic activity of the endothelial cells in the various layers of the arterial wall. This method is particularly suited for arterial cross sections which make up a well-defined organ unit with easily defined areas of lumen, vessel wall, and adventitia. F.R.L.

A71-12417 Fibrinolysis and its pharmacological enhancement in occlusive vascular disease. G. R. Fearnley (Gloucestershire Royal Hospital, Gloucester, England). In: Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. (A71-12413 02-04) Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970, p. 211-224. 21 refs.

Consideration of natural or endogenous fibrinolysis, and with its pharmacological enhancement as a possible approach to the prophylaxis of vascular occlusions. Because thromboembolic disease is a malfunctional situation, and insofar as fibrinolysis is the physiological antithesis of blood coagulation, its study should have some relevance to the problem. It is considered that the possible prophylactic value of pharmacological defibrination in occlusive vascular and perhaps other disorders can be settled only by controlled clinical trial. F.R.L.

A71-12418 The search for an anti-thrombotic agent. J. R. A. Mitchell (Nottingham University, Nottingham, England). In: Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. (A71-12413 02-04) Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970, p. 233-240. 22 refs.

Appraisal of efforts to find an agent with which to prevent and treat thrombosis. In England and Wales diseases of the heart, the most important of which is cardiac infarction, are the major cause of death. Anticoagulants are useful antithrombotic agents in respect of the venous system. It is suggested that the search for an effective antithrombotic agent can be resolved by either the logical approach or the empirical approach. F.R.L.

A71-12419 The experimental basis for the choice of an anti-arrhythmic drug. E. M. Vaughan Williams (Oxford University, Oxford, England). In: Thrombosis and coronary heart disease; Proceedings of the First Paavo Nurmi Symposium, Porvoo, Finland, September 25-27, 1969. (A71-12413 02-04) Symposium sponsored by the Paavo Nurmi Foundation. Edited by P. I. Halonen and A. Louhija. Basel, S. Karger AG (Advances in Cardiology. Volume 4), 1970, p. 275-289. 36 refs.

Evaluation of old and recent antiarrhythmic drugs, in terms of advances made in knowledge of the biophysics of excitable tissues. The contrast between cardiac muscle and nerve is considered, followed by a discussion of the effectiveness of acetylcholine, the results of anoxia, and the employment of catecholamines, beta-receptor blocking drugs, bretylium, and thyroidectomy. The desirable actions of future drugs are investigated. F.R.L.

A71-12474 Extremely small motions of the basilar membrane in the inner ear. P. Allaire, M. Billone, and S. Raynor (Northwestern University, Evanston, Ill.). *Nature,* vol. 228, Nov. 14, 1970, p. 678, 679. 6 refs.

Calculation of the motion of the basilar membrane in the inner ear at low intensities, using a model based on the anatomical descriptions of von Békésy (1960) and Iurato (1962). On the basis of the model described, the calculated values of the motion of the basilar membrane are between one and two orders of magnitude larger than those based on von Békésy's linear model. The calculated values for the model used are in agreement. Von Békésy's calculated basilar membrane motion gives an SNR just above unity, while calculations from the model described give an SNR an order of magnitude higher. The latter value is stated to appear to be more reasonable. M.M.

A71-12475 Further evidence for reduced role of photorespiration in low compensation point species. A. Goldsworthy and P. R. Day. *Nature,* vol. 228, Nov. 14, 1970, p. 687, 688. 16 refs.

Investigation of the ability of low compensation point species to fix CO2 supplied through the vascular bundles. The investigation was performed to test the hypothesis that both high and low compensation point species may have differing potentialities for the fixation of photorespired CO2, which would, of course, be generated internally. The experimental results obtained indicate that carboxylation reactions of Zea and Phragmites are about equally efficient at fixing internally derived CO2. The differences in compensation points are explained as a lack of photorespiration in the mesophyll layer, and the possible partial inhibition of photorespiration in the bundle sheath of low compensation point species. M.M.

A71-12531 # Pathogenesis of hypercholesterinemia (O patogeneze giperkholesterinemii). I. D. Mishenin (Minskii Meditsinskii Institut, Minsk, Belorussian SSR) and S. V. Tkachev (Akademiia Nauk Belorusskoi SSR, Institut Fiziologii, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady,* vol. 14, Sept. 1970, p. 856-859. 28 refs. In Russian.

Study of the genesis of hypercholesterinemia in patients afflicted with hypothalamic syndromes. In studying the blood of such patients, a considerable increase in the cholesterine content in the blood is noted, as well as a change in the protein coefficient and in certain protein fractions. It is shown that the mechanism governing this increase in the cholesterine content in the blood is of significance in the prevention and treatment of atherosclerosis. A.B.K.

A71-12608 * Intestinal absorption of glucose, and blood glucose and hematocrit in pregnant and nonpregnant hamsters. X. J. Musacchia and Ann M. Hartner (Missouri, University, Columbia, Mo.). *Society for Experimental Biology and Medicine, Proceedings,* vol. 135, Nov. 1970, p. 307-310. 13 refs. PHS Grant No. AM-10402-01; Grant No. NGR-26-004-021.

Measurement of the functional alteration in the intestinal absorption of glucose in hamsters in order to relate differences in physiologic modifications relevant to pregnancy. It was found that glucose absorption was highest during pregnancy, diminished during lactation and, at late postpartum and postweaning stages, the levels were comparable to those found in older breeders. In general, there was an inverse relationship between blood glucose concentrations and amounts of glucose absorbed. M.M.

A71-12714 Problems and physicochemical principles of artificial photosynthesis. A. N. Sidorov. (*Optiko-Mekhanicheskaia Promyshlennost',* vol. 37, Apr. 1970.) *Soviet Journal of Optical Technology,* vol. 37, Apr. 1970, p. 270-274. 11 refs. Translation.

Discussion of the phenomena underlying the photoenergetics of molecular systems, including those which can be used in photosynthesis models. These phenomena are shown to pose difficult problems whose complexity calls for approaches from various quarters. Physical chemists are solving some problems on the molecular level, using their own special research methods. In particularly wide use is spectroscopy: optical and magnetic, absorption and emission. In conjunction with other methods of physical-chemical analysis such as the isotopic method, pulsed photoexcitation of molecules, high-speed recording methods, photogalvanic methods, spectroscopy makes it possible to see the fine details of the

molecular apparatus of biological systems. Further progress in the field of artificial photosynthesis is intimately bound up with the development of these physical-chemical research methods. M.V.E.

A71-12836 Variability of physiological parameters of unacclimatized males during a two-hour cold stress of 5 C. P. R. Raven and S. M. Horvath (California, University, Santa Barbara, Calif.). *International Journal of Biometeorology,* vol. 14, Sept. 1970, p. 309-320. 15 refs. PHS Grant No. HD-00235; Grant No. AF AFOSR 69-1653.

Experimental investigation of the magnitude, duration, and variability of changes in both the temperatures and metabolism occurring in unacclimatized males during a two-hour cold stress. Metabolic and temperature responses of 11 male Caucasians to a two-hour exposure to 5 C, 70% RH were compared with control data obtained in an ambient environment of 28 C, 45% RH. The heat production increased during the cold exposure attaining an approximately stable level during the final 30 min. The group variability in response to the cold was greatest during the final 30 min and declined for the remainder of the cold exposure. All skin temperatures approached a stable value during the final 30 min of cold exposure. The correlation between mean skin temperature and thigh temperature was significant and the use of thigh temperature as an approximate mean skin temperature was suggested. The calculation of tissue conductance with or without the inclusion of heat exchanges due to changes in body heat content and respiratory losses was in agreement only during the final 30 min of cold exposure, thus indicating a stage of physiological equilibrium. All measured parameters except the toe and finger temperatures approached minimum variability of response during the final 30 min of cold exposure. O.H.

A71-12838 Moderate acoustic stimuli - The interrelation of subjective importance and certain physiological changes. G. R. C. Atherley, S. L. Gibbons, and J. A. Powell (Salford, University, Salford, Lancs., England). *Ergonomics,* vol. 13, Sept. 1970, p. 536-545. 19 refs.

A preliminary study was carried out to determine the interrelation between 'moderate' acoustical stimulation and certain physiological changes. It has been shown that 'subjective importance' of the noise was a material factor effecting changes in skin resistance. Further studies were made of the effect of whole-day exposure to aircraft noise, typewriter noise and white noise. The noises of high subjective importance, the aircraft and the typewriter, both showed measurable physiological changes, whereas that of low subjective importance (white noise) showed no significant change compared with control levels. Estimations from four subjects showed a marked decrease in 24-hour urinary 17-ketosteroid and eosinophils, and an increase in total white cell count, lymphocytes and neutrophils. It is suggested that 'moderate' noise does not appear to act as a 'conventional' stressor and it is further postulated that it may result in a characteristic syndrome which is comparable with a mild form of anxiety-depression. (Author)

A71-12845 Effects, precautionary measures, and medicomilitary aspects involved in handling microwaves (Wirkung, Schutzmassnahmen und wehrmedizinische Geischtspunkte bei Umgang mit Mikrowellen). H.-R. Baerwald (Akademie des Sanitäts- und Gesundheitswesens der Bundeswehr, West Germany). *Wehrmedizinische Monatsschrift,* vol. 14, Nov. 1970, p. 249-257. 14 refs. In German.

Description of the uses of microwaves and of their effects in nature on plants and animals, and discussion of the precautionary measures the safe handling of microwaves calls for. The thermal and nonthermal effects of microwaves on living creatures and the particular conditions determining the magnitude of these effects are reviewed, along with the mechanisms of microwave effects on individual body organs and systems. Observations made on persons accidentally exposed to excessive microwave radiation did not corroborate all of the subjective complaints, but indicated changes in the blood system followed by self-restoration within 2 to 8 months, and changes in organs that were irreversible. The safety recommendations presented include avoidance to prolonged radiation exposure exceeding the intensity limit of 10 mW per sq cm. M.V.E.

A71-12874 * Consumption of a combined glucose-NaCl solution during normal and food deprivation conditions. Verne C. Cox (Fels Research Institute, Yellow Springs, Ohio). *Psychonomic Science,* vol. 20, Sept. 10, 1970, p. 300, 301. 11 refs. NASA-supported research; NIH Grant No. M-4529.

A solution containing glucose and sodium chloride proved highly palatable to rats and in the majority of cases was preferred during food deprivation over a calorically equivalent solution containing saccharin and glucose. (Author)

A71-12875 * Emotionally induced increases in effective osmotic pressure and subsequent thirst. Edward Deaux (Antioch College, Yellow Springs, Ohio) and Jan W. Kakolewski (Fels Research Institute, Yellow Springs, Ohio). *Science,* vol. 169, Sept. 18, 1970, p. 1226-1228. 9 refs. NASA-supported research; NIH Grant No. M-4529.

Following a brief period of handling or enclosed rotation, rats increased the frequency of drinking relative to eating. Handling also delayed or eliminated eating behavior in hypoosmotic rats. Osmometric analysis revealed a rapid increase in serum osmolality during stress which may account for the emergence of thirst and disruption of eating. (Author)

A71-12915 Pressure-flow relationships and vascular impedance in man. C. J. Mill, I. T. Gabe, J. P. Shillingford (Hammersmith Hospital, London, England), J. H. Gault, J. Ross, Jr., E. Braunwald (National Heart Institute, Bethesda, Md.; California, University, San Diego, Calif.), and D. T. Mason (California, University, Davis, Calif.). *Cardiovascular Research,* vol. 4, Oct. 1970, p. 405-417. 34 refs.

Experimental investigation of pressure-velocity relationships in the major systemic arteries, the pulmonary artery, and the venae cavae in twenty-three patients by means of a catheter-tip velocity probe. Computations of the input impedance of the arterial system showed a rapid fall from the value for peripheral resistance at zero frequency to the level at and above heart rate frequency. The phase angles of impedance were negative at the lower frequencies. Some of the changes in the waveforms of velocity were interpreted as reflections from sites distal to the innominate artery and the descending aorta. In five patients in whom pulse wave velocity appeared to be low, reflected velocity waves were seen in early diastole in the innominate artery; their sign and timing suggested that they originated as reflected waves from the descending aorta. Similar phenomena were produced in other patients by reducing the pulse wave velocity with the Valsalva maneuver. M.M.

A71-12916 Effects of physical training on exercise blood flow and enzymatic activity in skeletal muscle. E. Varnauskas, P. Björntorp, M. Fahlén, I. Převoský, and J. Stenberg (Göteborg, University, Göteborg, Sweden). *Cardiovascular Research,* vol. 4, Oct. 1970, p. 418-422. 17 refs. Research supported by the Swedish National Research Council and the National Association against Heart and Lung Diseases.

Six weeks' physical training of seven healthy subjects was followed by a mean decrease of exercise muscle blood flow (ml./100g/min) from 32.7 to 22.6 and an increase of succinic dehydrogenase activity (VO2 microliter/g/min) from 33.0 to 47.4 in vastus lateralis muscle. Estimated maximal aerobic power (VO2 max.) increased by 30 percent. These results support the hypothesis based on previous evidences that the main circulatory changes in physical training occur in the circulation of the skeletal muscle. (Author)

A71-12917 **Effects of oxygen inhalation on intramyocardial oxygen tension.** Arthur J. Moss and James Johnson (Rochester, University, Rochester, N.Y.). *Cardiovascular Research,* vol. 4, Oct. 1970, p. 436-440. 10 refs. Research supported by the Ernest L. Woodward Fund; PHS Grant No. HE-10251-03.

Quantitative intramyocardial oxygen tension measurements were made in seven anaesthetized dogs using a polarographic technique. One hundred percent oxygen inhalation produced only a modest 7 mm Hg increase in intramyocardial oxygen tension (16 to 23 mm Hg pO2) despite a five-fold increase in arterial blood oxygen tension. These experimental findings are in agreement with basic theoretical considerations and raise certain fundamental questions about the value of oxygen therapy in acute myocardial infarction.

(Author)

A71-12949 **Theoretical and practical aspects of analog-to-digital conversion of the electrocardiogram.** Josef Wartak, John A. Milliken, and Denis W. Lywood. *Medical Research Engineering,* vol. 9, Sept. 1970, p. 21-23. 7 refs. Research supported by the Hotel Dieu Hospital Trust Fund; Medical Research Council of Canada Grant No. ME-2413; Department of National Health and Welfare Grant No. 605-7-447.

Discussion of the sampling rate and quantizing accuracy of an analog-to-digital conversion of the ECG signal. It is shown that this conversion should be accomplished at a sampling rate and quantizing accuracy that are not only practical but guarantee minimal losses and/or distortion of the original losses. To achieve this, both the theoretical and practical aspects of this problem are examined. It is found that sampling at a rate of 250 samples per second and quantizing with a 7 bit accuracy is practical and sufficient for an off-line analog-to-digital conversion. For an on-line conversion, more accuracy should be used since noise is not such a critical factor. O.H.

STAR ENTRIES

N71-10006# Harry Diamond Labs., Washington, D.C.
ARMY HEART MONITOR: MODEL 4
Charles W. Ragsdale Mar. 1970 135 p refs
(AD-710221; HDL-TM-70-2) Avail: NTIS CSCL 6/2

Model 4 of the Army Heart Monitor is an electronic device that monitors the electrocardiogram (ECG); sounds an alarm on diagnosing a high or low heart rate, excess electrical noise, cardiac arrest, or ventricular fibrillation; and displays the diagnosis on a meter. Ventricular fibrillation is sensed on the basis of five parameters related to the shape and rate of occurrence of the ECG signals. A noise discrimination system using several frequency and pulse-width criteria allows accurate determination of heart rate when the ECG signal is accompanied by high levels of electrical noise. The monitor will function for long periods on self-contained batteries and will operate in the military temperature range. Because it operates automatically (analysis of an ECG by trained personnel is unnecessary), it may be used in situations where oscilloscopes and paper writers are not available or where their use is not feasible. Author (TAB)

N71-10026*# Tracor, Inc., Austin, Tex.
PUBLIC REACTIONS TO SONIC BOOMS
Washington NASA Sep. 1970 317 p refs
(Contract NASw-1704)
(NASA-CR-1665) Avail: NTIS CSCL 05K

The nature of public reaction to sonic booms was assessed in selected metropolitan areas of the United States. The major social or psychological factors were identified that are associated with one or another type of public reaction to sonic booms of relatively modest overpressure levels. The sonic booms were generated by the supersonic SR-71 reconnaissance airplane during Air Force training and test flights. A bibliography of boom studies and a bibliography re news media studies are included. A tentative causal model relating the hearing of sonic booms to attitudes and reactions indicates that a negative attitude to the boom must be developed before the respondent reports an increase in disturbance of his activities. It is this disturbance of activities that then relates to the level of annoyance of the respondent. The importance of this finding is that the reaction pattern appears to be different for sonic booms and subsonic aircraft noise. Author

N71-10034# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
COMBINED EFFECTS OF NOISE AND VIBRATION ON PSYCHOMOTOR PERFORMANCE Final Report, May Sep. 1969
C. Stanley Harris and Richard W. Shoenberger May 1970 29 p refs
(AD-710595; AMRL-TR-70-14) Avail: NTIS CSCL 6/19

Tracking performance and reaction time to the appearance of a light (red lights) and disappearance of a light (green lights) of highly trained subjects were measured during four experimental conditions. There were two conditions of 85 dB and 110 dB broadband noise exposure, and two conditions in which these noise exposures were combined with 0.25G vertical vibration at 5 Hz. Duration of exposure for each condition was 19 minutes. Vibration was found to have an adverse effect on both the horizontal and vertical dimensions of the tracking task and on reaction time to both sets of lights. Noise had a significant effect, both with and without vibration, but only on the vertical part of the tracking task. On vertical tracking, the detrimental effect of noise was additive to that of vibration when both noise and vibration were presented simultaneously (110dB noise and 0.25G vertical vibration at 5 Hz). Author (TAB)

N71-10124# Rutgers Univ., New Brunswick, N.J. Center for Transportation Studies.
COMPARISON OF AIR POLLUTION FROM AIRCRAFT AND AUTOMOBILES. PROJECT EAGLE Final Report
Cooper Bright, Toivo Lamminen, James Mullaly, Forest Markowitz, and Stanford M. Singer Sep. 1970 174 p refs
(Contract FAA-W1-70-1919-1)
(FAA-NO-70-14) Avail: NTIS

The investigation into the environmental aspects of establishing an urban air transportation system for the tri-state area of Connecticut, New Jersey, and New York for daily commuting demonstrates that air pollution and its associated physiological effects, which are created by automobile engine emissions, can be drastically reduced. Similar results pertain when STOL air transportation is substituted for automobiles to provide service for the same area to the three major airports around New York City. The study shows that air pollution at a STOLport in Manhattan supporting such a system would be less than the normal background concentration, even during peak travel periods. Author

N71-10125*# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Sep. 1970 151 p refs
(NASA-SP-7011(80)) Avail: NTIS CSCL 06E

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

N71-10175# Advisory Group for Aerospace Research and Development, Paris (France).
PHYSIOPATHOLOGY AND PATHOLOGY OF AFFECTIONS OF THE SPINE IN AEROSPACE MEDICINE
Roland-Paul Delahaye, Roger Pannier, Henry Seris, Robert Auffret, Raymond Carre et al Aug. 1970 83 p refs
(AGARD-AG-140-70) Avail: NTIS

A review is presented on the aitiology, diagnosis, and prognosis of spinal injuries where these are associated with aviation (in rotary or fixed wing aircraft, in parachuting or gliding). Emphasis is placed on methods of prophylaxis. The opening shocks of static line parachuting are compared where two packing methods are employed.

The adoption of various sitting positions in a pilot's seat, particularly in regard to method of bracing immediately before ejection or before crash landing, is discussed. The importance of keeping a radiographic record of the individual's spine for subsequent comparison should he be involved in an accident resulting in spinal injury is stressed. Author

N71-10177# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

COMPARATIVE EFFECTS OF AUDITORY AND EXTRA-AUDITORY ACOUSTIC STIMULATION ON HUMAN EQUILIBRIUM AND MOTOR PERFORMANCE Final Report, Jul.–Dec. 1968

Henry C. Sommer and C. Stanley Harris Jun. 1970 21 p refs

(AD-711046; AMRL-TR-70-26) Avail: NTIS CSCL 5/10

Human equilibrium and psychomotor performance of subjects exposed to free-field broadband noise was compared to that for subjects exposed to similar spectra of noise presented through earphones. The major difference between exposures was the extra-auditory acoustic stimulation received by the free-field exposure groups. In the present experiment, the performance of subjects was tested during three different conditions of noise exposure. The noise spectra and levels presented through earphones approximated those delivered to the ear canals of subjects wearing ear protectors in a free-field broadband noise of 140 dB. The types of ear protectors used to create the noise conditions in the preceding experiments and the corresponding intensity levels of the present experiment were earplugs and muffs (100 dB overall SPL in each earphone), earplugs (115 dB overall SPL in each earphone), and earplugs with one earmuff covering only the right ear (115 dB in the left earphone and 100 dB in the right earphone). Author (TAB)

N71-10245# Universidad Peruana de Ciencias Medicas y Biologicas, Lima (Peru). Inst. de Investigaciones de La Altura.

PHYSIOLOGY OF RESPIRATION OF HIGH ELEVATIONS Annual Report, 1 Aug. 1969 31 Jul. 1970

Julio C. Cruz-Jibaja Jul. 1970 12 p refs

(Contract DAHC19-70-G-0003)

(AD-710327; AR-2) Avail: NTIS CSCL 6/19

A hypoxic isocapnic test was used to study 40 sea level (SL) subjects. The data suggest that a high elevation environment produces a sensitization of the peripheral chemorreceptors in SL subjects. The lower the response at SL the higher the response at HA. The possibility of using the hypoxic isocapnic test as a tool of predicting the degree of adaptation to altitude is discussed. TAB

N71-10248# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

PERCEPTION OF ULTRALOW FREQUENCY SINUSOIDAL PROPRIOCEPTIVE STIMULI

Richard W. Shoenberger, C. Stanley Harris, and Henning E. Von Gierke Jun. 1970 14 p refs

(AD-711045; AMRL-TR-69-81) Avail: NTIS CSCL 6/16

Subjects judged change of direction of a sinusoidally oscillating table during exposure to seven frequencies within the range of 0.0125 to 0.8 Hz. Phase differences were computed by taking the difference between subjective judgment of change of direction and the actual change of direction of the table. These phase angles were obtained during four experimental conditions. Two conditions in which the subjects sat on the oscillating table with braces applied either to the hips or shoulders so that total body movement was constrained. And two conditions in which only the leg rested on the oscillating platform. The phase angles obtained at these conditions were compared with those obtained by previous investigators from subjects who experienced whole body displacement, that is, they received a vestibular stimulus in addition to stimulation of the skin, muscles, and joints as occurred in the present study. The pattern of phase angles between experiments was sufficiently different to cast doubt on the hypothesis that receptors of the skin, muscles, and joints accounted for the results in the prior experiment. Author (TAB)

N71-10269*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

SYSTEMS ANALYSIS: MISSION ANALYSIS DIVISION

In its Space Programs Summary 37-64, Vol. 3 31 Aug. 1970 p 170 172 refs (See N71-10251 01-34)

Copyright. Avail: NTIS CSCL 05J

Several individual preference patterns were combined into a single preference pattern for the society composed of those individuals. In combining orderings from several sources into a single ordering that represents a consensus, numerical techniques try to produce results that contain more information than is present in the input. It is suggested that if the statement, 'The data do not specify the consensual relationship between certain objects,' is admitted, it is possible to present a consensus that contains no more and no less information than can be inferred from the partial orderings. R.B.

N71-10274# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

STUDIES ON THE STORAGE STABILITY OF HUMAN BLOOD CHOLINESTERASES, 1

Charles R. Crane, Donald C. Sanders, and John K. Abbott Jan. 1970 11 p refs

(AM-70-4) Avail: NTIS

Whole blood, red cell, and plasma preparations were stored at room temperature, refrigerated, and frozen. Samples were assayed over a 50-day period using the technique of constant-pH titration (pH-Stat). At least 90% of the cholinesterase activity in the whole blood and plasma preparations was retained for 6 days at room temperature and over 6 weeks when refrigerated or frozen. Red cell preparations retained 90% activity for less than 12 hours at room temperature, for up to 3 days if refrigerated, and up to 6 weeks when frozen. Author

N71-10286# National Academy of Sciences-National Research Council, Washington, D.C.

A STUDY OF TRANSPORTATION OF HAZARDOUS MATERIALS

31 Jul. 1969 277 p refs

(Contract DOT-OS-A9-106)

(AD-692182) Avail: NTIS CSCL 15/5

The findings of a technical and engineering investigation of hazardous materials transportation by highway, rail, air and water are presented. The aspects of the overall problem studied are the transportation environment, hazard classification, packaging, and hazardous identification. F.O.S.

N71-10293# Human Engineering Labs., Aberdeen Proving Ground, Md.
EFFECTS OF THE THERMAL STRESS ON HUMAN PERFORMANCE: A REVIEW AND CRITIQUE OF EXISTING METHODOLOGY
R. Douglas Jones May 1970 78 p refs
(AD-711012; HEL-TM-11-70) Avail: NTIS CSCL 5/10

A critical review of the literature provides the basis for an analysis of the effects of thermal stress on human performance. Research in this area to date reflects a wide divergence of opinion regarding the magnitude, direction and significance of performance changes occurring under conditions of high temperature, humidity, solar radiation, etc. An attempt to resolve major conflicts in experimental findings leads to a detailed examination of such factors as thermal stress indices, exposure times and acclimatization. The role of the subject in thermal stress research is discussed with emphasis on the contribution of such psychological variables as personality and motivation to performance change. Recommendations for future research are advanced. Author (TAB)

N71-10298# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
INDEX TO FAA OFFICE OF AVIATION MEDICINE REPORTS, 1961 - 1969
Sep. 1970 18 p
(AM-70-1) Avail: NTIS

An index to Office of Aviation Medicine Reports (1964 69) and Civil Aeromedical Research Institute Reports (1961 - 63) is presented as a quick reference for those engaged in aviation medicine and related activities. It provides a listing of all FAA aviation medicine reports published from 1961 through 1969 by year, number, author, subject, and title. Author

N71-10340*# Translation Consultants, Ltd., Arlington, Va.
SOME RESULTS OF THEORETICAL AND EXPERIMENTAL STUDIES OF MASS EXCHANGE IN LIFE SUPPORT SYSTEMS DURING A ONE-YEAR MEDICAL TECHNOLOGICAL EXPERIMENT [NEKOTORYYE REZULTATY TEORETICHESKOGO I EKSPERIMENTAL'NOGO ISSLEDOVANIYA MASSOOBMENNYKH KHARAKTERISTIK SISTEM ZHIZNEOBESPECHENIYA V GODOVOM MEDIKO-TEKHINCHESKOM ESKPERIMENTE]
B. A. Adamovich et al Washington NASA Nov. 1970 20 p Russian Presented at the 21st Intern. Astron. Congr., Constance, West Ger., 4-10 Oct. 1970
(Contract NASw-2038)
(NASA-TT-F-13371) Avail: NTIS CSCL 06K

The practice of life support system development and analysis has demonstrated the need for coordination of theoretical and experimental studies. Two main directions in theoretical investigation are briefly outlined. The first is concerned with the elaboration of a theory for life support system development, quality evaluation and selection of algorithms to control the system as a whole. The second direction of theoretical investigation consists in isolation of the links with processes not connected (or slightly connected) to those in the rest of the system, and includes simulation and optimization of autonomous links. Some results of experimental studies in course of the one year medical technical experiment are described, concerning the intensity of mass exchange processes in man. The principal directions of experimental studies are discussed and characteristics of the rates of CO2 excretion, O2 consumption, urine elimination and water consumption are given. Author

N71-10341*# Techtran Corp., Glen Burnie, Md.
MORPHOLOGICAL AND CYTOLOGICAL ASPECTS OF THE STUDY OF HYPOKINESIA
V. V. Portugalov et al Washington NASA Nov. 1970 13 p refs Transl. into ENGLISH from the Russian Presented at the 21st Intern. Astron. Congr., Constance, West Ger., 13 p Oct. 1970
(Contract NASw-2037)
(NASA-TT-F-13376) Avail: NTIS CSCL 06S

Histological, histochemical, electron microscopical and biometrical techniques were used to examine the state of antigravity muscles of rats exposed to hypokinetic conditions for 1 to 60 days. Changes occurred in the skeletal muscles at very early stages of the experiment, being most pronounced in the red slow soleus muscle. Of interest was the formation of the so called target fibers and fibers with central core disease that did not develop in the mixed fast--quadriceps and gastrocnemius--muscles. It was demonstrated biometrically that at the beginning of the experiment soleus fibers showed hypertrophic changes and only 30 days later they displayed strophic changes. Red and white fibers of mixed fast muscles displayed progressive atrophy that was detected from the 15th day of the experiment. Hypokinetic conditions produced not only direct effects on the structure and metabolism of skeletal muscle but also side effects closely associated with the fixation method used. Author

N71-10357*# Translation Consultants, Ltd., Arlington, Va.
DETERMINATION OF EUGLOBULIN LYSIS TIME WITH THE LYSOGRAPH [DIE BESTIMMUNG DER EUGLOBULIN-LYSEZEIT MIT DEM LYSOGRAPHEN]
E.Kuhnke et al Washington NASA Nov. 1970 5 p refs Transl. into ENGLISH from Thromb. Diath. Haemorrhag. (Stuttgart), v. 9, 1963 p 475 - 478
(Contract NASw-2038)
(NASA-TT-F-13389) Avail: NTIS CSCL 06E

Photometric measurements of euglobulin lysis times and their recording by direct printer are reported. The preparation of the euglobulin for lysography is described, and the lysogram is analyzed. F.O.S.

N71-10367*# Translation Consultants, Ltd., Arlington, Va.
PECULIARITIES OF THE HUMAN HEAT EXCHANGE UNDER REDUCED ATMOSPHERE PRESSURE AND SUFFICIENT OXYGEN SUPPLY [OSOBENNOSTI TEPLOOBMENA CHELOVEKA V USLOVIYAKH PONIZHENNOGO BAROMETRICHESKOGO DAVLENIYA PRI DOSTATOCHNOM KISLORODNOM OBESPECHENII]
Ye M. Kuz'micheva et al Washington NASA Oct. 1970 11 p refs Transl. into ENGLISH from the Russian Presented at the 21st Intern. Aeron. Congr., Constance, West Ger., 4-10 Oct. 1970
(Contract NASw-2038)
(NASA-TT-F-13374) Avail: NTIS CSCL 06P

The heat balance in man under normal conditions and reduced atmospheric pressure was studied by comparing the body heat production with the heat transfer through convection, radiation and evaporation. The results of the experiments conducted show the extent of decreasing convection heat loss as well as the increasing heat transfer through evaporation in man under the rarified atmosphere (0.42 and 0.27 kg/sq cm) and air temperature of 25 C. Author

N71-10368*# Translation Consultants, Ltd., Arlington, Va
HOMEOSTASIS DURING WEIGHTLESSNESS [GOMEOSTAZ

V USLOVIYAKH NEVESOMOSTI]

B. B. Yegorov Washington NASA Nov. 1970 12 p Transl. into ENGLISH from the Russian Presented at the 21st Intern. Astron. Congr., Constance, West Ger., 4-10 Oct. 1970

(Contract NASw-2038)

(NASA-TT-F-13373) Avail: NTIS CSCL 06S

A model was developed to show changes that occur during weightlessness when there is inadequate afferentation from the muscle proprioceptors. Effects from the interoceptors are also taken into account. Weightlessness-induced changes in blood circulation regulation and hydrostatic impairments in the body are examined. Transition from acceleration to weightlessness can cause a marked blood redistribution in the body including intensified diuresis and natriuresis; the latter are considered in detail. It is shown that water balance is determined by the relationship among suprarenal hormones, ADH, Na, Cl, K, and other elements, the volume of extracellular fluid, cardiac minute volume, and state of catalytic enzymes. The marked imbalance between the level of circulating blood required for ensuring metabolic processes and the mass of circulating blood stable during weightlessness causes periodic regularly alternating manifestations of polyuria and water retention. This is accompanied by impairment of the body electrolyte balance. Author

N71-10369*# Translation Consultants, Ltd., Arlington, Va.

RESULTS OF BIOLOGICAL STUDIES PERFORMED ABOARD THE ZOND-5, 6, 7 STATIONS [REZUL'TATY BIOLOGICHESKIKH ISSLEDOVANIY, VYPOLNENNYKH NA STANTSIYAKH ZOND-5-6-7]

O. G. Gazenko et al Washington NASA Nov. 1970 19 p refs Transl. into ENGLISH from the Russian Presented at the 21st Intern. Astron. Congr., Constance, West Ger., 4-10 Oct. 1970

(Contract NASw-2038)

(NASA-TT-F-13372) Avail: NTIS CSCL 06C

These stations carried tortoises, Drosophila, Tradescantia, common onion bulbs, dry seeds of wheat, barley, etc., different strains of Chlorella, enteric bacilli, and other objects. Physiological, morphological, histochemical, genetic, and other methods were used to study possible effects. Details are given for each biological object used in the experiment. It was found that flight conditions on these three vehicles did cause definite shifts in the physiological functions and hereditary structures of some objects but both qualitatively and quantitatively these changes did not suffer from the shifts observed in experiments made in orbits below the radiation belts. Accordingly, radiation conditions on the investigated earth-moon-earth trajectory are not dangerous for manned flight provided that solar activity is at a low level. Author

N71-10374*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

BIOLOGICAL MONITORING OF THE CAPSULE MECHANICAL TRAINING MODEL DURING ASSEMBLY IN THE STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY

D. M. Taylor and G. H. Redmann 25 Aug. 1969 22 p refs Sponsored by NASA

(NASA-CR-111093; JPL-611-7) Avail: NTIS CSCL 06M

Low microbial burden assembly procedures were developed using a rigorous monitoring program capable of providing estimates of the microbiological burden on the hardware during assembly. The resulting data provided a basis for the selection of optimum assembly processes and the design and operation of support facilities. The biological monitoring plan for the hardware assembly integrated with the CMTM assembly procedure is outlined. Author

N71-10381# National Aviation Facilities Experimental Center, Atlantic City, N.J.

HUMAN FACTORS IN USE OF TERMINAL RADAR (ANALOGUE) DISPLAY SYSTEMS Final Report, Jan. 1969 -Jun. 1970

Donald W. Connolly and W. Robert McCosker Nov. 1970 23 p refs

(FAA-NA-70-55; FAA-RD-70-66) Avail: NTIS

An experiment was performed to measure the accuracy with which observers could estimate the separation (distance apart) of two aircraft targets as displayed by continuous film strips of current operational terminal radar equipment. Experimental materials consisted of scan-by-scan photos of two types of display devices; namely, the ASR-4 plan position indicator (PPI) and the RBDE-5 scan-converted PPI. Two types of target or aircraft radar returns were used--primary radar echoes and beacon transponder (secondary radar) returns. Eighteen observers with varying degrees of radar experience made approximately 1,600 judgments of target separation. The mean and variable error or discrepancy between judged separation and displayed (not actual) separation were computed for all combinations of conditions. The major variables (equipment type, target mode, dimension of separation and observer experience) did not have statistically significant effects. Nearly all individual judgments fell within plus or minus 1 1/2 miles of the target separation as displayed to the observer. Author

N71-10382*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

A FEASIBILITY STUDY OF LIQUID STERILE INSERTION

D. M. Taylor, G. M. Renninger (Avco Corp.), and M. D. Wardle 21 Jul. 1969 24 p

(Contract NAS7-100)

(NASA-CR-111095; Rept-611-5) Avail: NTIS CSCL 06M

The development of a concept for liquid sterile insertion into a previously sterilized spacecraft and a test program to evaluate the feasibility of such a system are summarized. The system concept developed had two basic criteria: 1) a method of reducing system reliability requirements by verifying the probability of sterility of the filtrate prior to actual insertion into the sterile spacecraft, and 2) a method for verifying the probability of sterility without assaying the filtrate. Author

N71-10393*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

PROBLEMS OF SPACE BIOLOGY. VOLUME 10: NERVE MECHANISMS OF VESTIBULAR REACTIONS

A. N. Razumeyev et al Washington NASA Oct. 1970 336 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii. Tom 10: Nerunyye Mekhanizmy Vestibulyarnykh Reaktsiy" Moscow, Nauka Press, 1969 p 4-317

(Contract NASw-1692)

(NASA-TT-F-605) Avail: NTIS CSCL 06P

Recent achievements in the electrophysiological investigations of specific links of conducting paths of the vestibular analyzer, its interaction with stimuli, character of impulses arising in the receptor, and the characteristics of their conduction along the vestibular tract are summarized. A significant place is given to questions of the mathematical description of the functioning principles of peripheral portions of the vestibular analyzer, to the stimulation of the activities of the oculomotor apparatus, and to the mathematical treatment of rhythmic changes of neurons in various regions of the cortex and subcortical formations of the brain with adequate stimulation of the vestibular apparatus. Author

N71-10414*# California Univ., Berkeley. Dept. of Nutritional Sciences.

INTEGRATED RESEARCH PROGRAM IN SPACE

NUTRITION Semiannual Report, 1 Feb. - 31 Jul. 1970
Doris Howes Calloway, Sheldon Margen, and Rosemarie Ostwald Sep. 1970 14 p refs
(Grant NGR-05-003-351)
(NASA-CR-110908) Avail: NTIS CSCL 06C

Research on the nutrition and breeding behavior of the pocket mouse is reported and includes: (1) Baseline data for the growth of P. pe. fed a diet of mixed seeds were established. This was intended as a preliminary for the determination of the adequacy for growth of a semi-synthetic diet. (2) The study of the effects of photoperiod on estrus behavior of P. pe. was completed. (3) A study of the intestinal absorption and metabolism of calcium, magnesium, and phosphorus by P. pe. was undertaken. Author

N71-10423*# Translation Consultants, Ltd., Arlington, Va.
ON THE CONTINUOUS RECORDING OF FIBRINOLYSIS [ZUR KONTINUIERLICHEN REGISTRIERUNG DES FIBRILLOLYSEVERLAUFES]
E. Kuhnke et al Washington NASA Nov. 1970 8 p refs Transl. into ENGLISH from Pfluegers Arch. (West Germany), v. 272, 1960 p 191 194
(Contract NASw-2038)
(NASA-TT-F-13405) Avail: NTIS CSCL 16P

Several examples are used to show that the photometric method is suited for continuous recording of fibrinolysis. Author

N71-10425# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
SOME CHARACTERISTICS OF OPTOKINETIC EYE MOVEMENT PATTERNS: A COMPARATIVE STUDY
William E. Collins, David J. Schroeder, Nancy Rice, Ruth Ann Mertens, and Gail Kranz Jul. 1970 31 p refs
(AM-70-10) Avail: NTIS

Optokinetic (OPK) nystagmus is an eye movement reaction which occurs when a series of moving objects crosses the visual field or when an observer moves past a series of objects. Similar continual movement of the eyes (and head) was reported to produce an undesired occupational nystagmus. Responses of animals and men to durations of OPK stimulation varying between 15-120 seconds were examined. Characteristics of the animal responses differed considerably from those of men in both the horizontal and vertical planes. The data were compared with vestibular eye-movement patterns (those which can blur vision during pilot's vertigo) to differentiate aspects of the eye-movement responses which can be attributed primarily to vestibular rather than oculo-motor origins. Author

N71-10435# RAND Corp., Santa Monica, Calif.
TOLERANCE GEOMETRY
Fred S. Roberts Aug. 1970 23 p refs
(AD-710642; P-4430) Avail: NTIS CSCL 6/16

In his work on visual perception, Zeeman points out that any model of perception must take account of the fact that one cannot distinguish between points that are sufficiently close. A similar observation has been made for choice behavior by Luce. This observation suggests that in order to study perception and choice behavior, it is necessary to replace classical geometrical primitives, such as betweeness, straightness, perpendicularity, parallelism, etc., with more general notions, obtained from the classical ones by substituting closeness for identity. The term tolerance geometry is used for any geometry whose primitives are obtained by such a perturbation. This paper gives axioms for tolerance geometry on the line, where the classical ternary relation of betweeness is replaced by the tolerance relation of epsilon-betweeness. In particular, these axioms are stated in terms of a pair (A, B) where A is a finite set and B is a ternary relation on A (epsilon-betweeness). Author (TAB)

N71-10445*# Translation Consultants, Ltd., Arlington, Va.
CIRCADIAN DEVELOPMENT OF RECTAL AND CUTANEOUS TEMPERATURE IN MAN WHILE AT REST IN A CONTROLLED ENVIRONMENT
J. Timbal et al Washington NASA Nov. 1970 4 p refs Transl. into ENGLISH from J. Physiol. (Paris), v. 61, no. 1, 1969 p 181
(Contract NASw-2038)
(NASA-TT-F-13400) Avail: NTIS CSCL 06P

A study of the daily cycles of the rectal and cutaneous temperatures in man when external factors are controlled, is presented. Author

N71-10449# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
A COMPARISON OF THREE SERUM CHOLINESTERASE METHODS
Charles R. Crane, Donald C. Sanders, and John K. Abbott Aug. 1970 9 p refs
(AM-70-13) Avail: NTIS

Aerial applicator personnel dispensing organophosphate pesticides have become increasingly aware of the health and safety benefits of periodic blood cholinesterase (CHE) assays. More precise comparisons of pre-season and in-season values can be made if both measurements are expressed in the same units. Three laboratory methods for assaying CHE were evaluated and the mathematical relationships for interconversion among the three sets of activity units are presented. Author

N71-10472# General Electric Co., Philadelphia, Pa. Space Div.
WASTE MANAGEMENT SYSTEM FUNCTIONAL MODEL *Final Report, Feb. - Oct. 1969*
Joseph R. Katz and Robert W. Murray May 1970 46 p
(Contract F33615-69-C-1372)
(AD-710623; AMRL-TR-69-137) Avail: NTIS CSCL 6/11

A functional model for the collection and storage of fecal wastes in a biologically safe and psychologically acceptable manner for aerospace vehicles has been designed, fabricated and successfully tested. The design is a commode type collector similar to the previously developed Dry-John slinger system; however, the new design extends the useful life of the previous unit by use of a replaceable liner. The functional model provides vacuum drying and storage of 200 man-days of feces and toilet tissue prior to liner replacement. Each liner contains a motor-slinger and an air flow bacteria filter. The filter prevents contamination of all downstream lines and permits changing of the liner without contamination of the cabin. The full liner can be sealed and stored while the new liner functions for an additional 200 man days; thus, the useful life of the basic hardware is governed by the number of available liner assemblies, and cabin storage. Additional features of the functional model are a quick acting slide valve assembly to open and close the commode, provision for feces sampling and a subassembly for dispensing a disinfectant onto the feces. Author (TAB)

N71-10480# California Univ., Livermore. Lawrence Radiation Lab. Bio-Medical Div.
AUTOMATIC GEL-FILTRATION APPARATUS FOR THE

PURIFICATION OF LIPID EXTRACTS
Gary J. Nelson 22 Apr. 1970 11 p ref Sponsored in part by AEC
(UCRL-50861) Avail: NTIS

An automatic chromatographic apparatus has been developed which can operate untended once the sample has been introduced, thereby relieving the operator of the inconveniences of the manual procedure. The entire elution sequence for the purification of lipid extracts from various sources is carried out automatically; the process includes the separation of the gangliosides from the other lipids in the sample. The apparatus contains four solvent reservoirs, five program-timers, automatic valves, a metering pump, and one chromatographic column. The design, construction, and operation of the system are described in detail. Author

N71-10499*# Naval Aerospace Medical Inst., Pensacola, Fla. Aerospace Medical Center.
INFLUENCE OF VESTIBULAR STIMULATION AND DISPLAY LUMINANCE ON THE PERFORMANCE OF A COMPENSATORY TRACKING TASK
Richard D. Gilson, Alan J. Benson, and Fred E. Guedry, Jr. Feb. 1970 21 p refs Prepared in cooperation with Army Aeromed. Res. Lab.
(NASA Order R-93)
(NASA-CR-111111; AD-704859; NAMI-1097; NAVMED-MF12.524.004-5001B; USAARL-70-10) Avail: NTIS CSCL 06P

Loss of acuity for visual details in aircraft during unusual maneuvers has been documented. Recent investigations of this problem have served to define the magnitude of semicircular canal stimulation necessary to produce nystagmus of sufficient strength to degrade visual acuity. Present work extends former observations by investigating the effects of levels of illumination during semicircular canal stimulation on the performance of a task requiring vision. The illumination levels were selected to encompass the range used in aircraft cockpits. A compensatory tracking task with an aircraft instrument as the display provided an indirect measure of this loss of visual acuity and a direct practical measure of performance. Author (TAB)

N71-10536# Naval Postgraduate School, Monterey, Calif.
INFORMATION CAPACITY OF DISCRETE MOTOR RESPONSES COMPARED FOR DIFFERENT DIRECTIONS AND AMPLITUDES OF MOVEMENT
Edison Earl Scholes (M.S. Thesis) Sep. 1970 68 p refs
(AD-710713) Avail: NTIS CSCL 5/10

The report describes research and analysis conducted to determine if direction of movement has an effect on the movement and reaction times of personnel when completing discrete motor tasks in response to a visual stimulus. Information theory was an inherent part of the research and was used to specify more precisely an individuals capacity in this area. Linear models were developed which characterize the effect that direction of movement has on movement time. Multiple correlation analysis tested correlation between movement time and the two variables – index of difficulty and direction of movement – used in the models. Author (TAB)

N71-10541*# Southwest Research Inst., San Antonio, Tex.
SOUTHWEST RESEARCH INSTITUTE ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Final Report, 1 Feb. 1969 - 24 Aug. 1970
David F. Culclasure and Linda Eckhardt 24 Aug. 1970 103 p
(Contract NASw-1867; SwRI Proj. 13-2538)
(NASA-CR-111131) Avail: NTIS CSCL 06P

The medical institutions participating in the Biomedical Application Team program are listed and their research progress is reported. During the period from 1 February 1969 to 1 September 1970, 11 transfers of technology were accomplished and 29 potential transfers were identified. The transfers of technology include flexible, conducting electrodes for use in treating patients suffering from angina pectoris, instrumentation for use in a screening test for cystic fibrosis, and specialized instrumentation for use in ecological investigations. Author

N71-10575# National Institutes of Health, Bethesda, Md. National Inst. of Environmental Health Sciences.
MAN'S HEALTH AND THE ENVIRONMENT: SOME RESEARCH NEEDS Report of the Task Force on Research Planning in Environmental Health Science
1970 276 p refs
Avail: SOD $1.25

The results are presented of a program to: (1) determine the status of current knowledge, primary problems, impediments to research progress, and objectives in selected areas of environmental health science; and (2) identify key research needs and opportunities, as well as directions and strategies for future developement. The material presented is divided into three main categories that include recommendations for research on (1) specific environmental problem areas; (2) methods and specific disease conditions; and (3) social and behavioral sciences, technological trends, training and organizational needs. D.L.G.

N71-10594# Naval Aerospace Medical Inst., Pensacola, Fla.
ANNOTATED BIBLIOGRAPHY OF REPORTS: SUPPLEMENT NO. 2, 1 JULY 1969 30 JUNE 1970
Catherine F. Kasparek and Christine E. Turner, comps. 30 Jun. 1970 37 p refs Supplement to AD-674914
(AD-710764) Avail: NTIS CSCL 6/19

Contents include: Mechanisms underlying disorientation and other vestibular disturbances in flight; Physiological effects of null magnetic fields; Influence of vibrations of flight vehicles on chromosomes; Physiological effects of high magnetic fields; Individual differences with selected sensory stimuli related to orientation and performance in flight; Identification of causes of pilot/vertigo disorientation accidents; Development and improvement in auditory testing methods; Human vestibular function: Motion sickness and other vestibular disturbances in unusual gravitoinertial force environments; Experimental and theoretical studies in radiation hazards on Apollo missions and in supersonic aircraft. TAB

N71-10613# Massachusetts General Hospital, Boston. John Collins Warren Lab.
AN INVESTIGATION OF THE MECHANISM OF PROTEIN AND NUCLEIC ACID SYNTHESIS: A BACKGROUND STUDY RELATED TO THE BIOLOGICAL EFFECTS OF RADIATION Progress Report, 1 Sep. 1969 - 31 Aug. 1970
31 Aug. 1970 12 p refs
(Contract AT(30-1)-2643)
(HUX-2643-60) Avail: NTIS

The mechanisms involved in the biosynthesis of proteins and the possible relationship of radiation to these systems was studied. The details of the early steps in protein synthesis and their relationship to the regulation of growth are discussed. The main focus is on the initial steps of the reaction where an aminoacyl tRNA-synthetase recognizes its own cognate tRNA. There are in reality three distinct sites on the aminoacyl synthetase which are involved in the activation reaction, for the enzyme must recognize the specific amino acid, ATP, and its cognate tRNA. Detailed reports are presented including: further development of micro procedures for oligonucleotide mapping, detection and identification of minor

bases in tRNA; studies on the isolation and biochemical characterization of multiple species of methionine specific tRNA from E. coli; optical properties of ribonucleic acids; a search for the tRNA recognition site on the aminoacyl synthetase; attempts to produce in E. coli genetically altered aminoacyl synthetases which contain mutations in the tRNA recognition area; and an investigation of the dinucleoside polyphosphates formed in vitro by aminoacyl synthetases and attempts to establish their biological significance in vivo. Author

N71-10685# Massachusetts Inst. of Tech., Cambridge. Dept. of Psychology.
FACTORS AFFECTING DEPTH PERCEPTION Annual Report
Whitman Richards Jul. 1970 22 p refs
(Contract F44620-69-C-0108)
(AD-711660; AFOSR-70-2364TR) Avail: NTIS CSCL 6/16

The report describes ongoing work on certain factors that affect depth perception. Research has been directed to a study of the relation between depth and disparity, and to obvious individual differences in these relations. This work has led to the discovery that a sizeable portion of the population is stereoblind: many individuals are unable to utilize fully all available disparity cues. The character of these deficits suggests a new basis for depth perception. Author (TAB)

N71-10690# School of Aerospace Medicine, Brooks AFB, Tex.
AUDIOMETER ATTENUATOR CALIBRATION METHOD Final Report, 15 Oct. 1969 15 Apr. 1970
F. A. Brogan Jul. 1970 12 p ref
(AD-711659; SAM-TR-70-40) Avail: NTIS CSCL 6/5

The implementation of standards for audiometers--together with a general upgrading of those for audiometer calibration--requires calibration checks of the steps of the audiometer hearing-level attenuator. The aim of the study was to determine the feasibility of using transformer and common base preamplifier impedance-matching, in conjunction with laboratory voltmeters or sound-level meters, to detect the very-low-level electrical signals from the audiometer. Additional applications of this device are suggested. Author (TAB)

N71-10692# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
PHYSIOLOGIC RESPONSES TO SHORT DURATION G SUB z Final Report
George H. Kydd and Archie Ashley 14 Aug. 1970 40 p refs
(AD-710986; NADC-MR-7012) Avail: NTIS CSCL 6/19

Subjects were subjected to Gz (positive) haversine accelerations of short duration, high magnitude on the centrifuge and their responses to peripheral lights have been recorded. Whereas, most subjects lost the peripheral lights during the 6-second haversine, only one did so during the 4-second run. Since the acceleration is maximum one half way through these accelerations this means that a rise time to 6 Gz in 3 seconds was more effective in producing peripheral light loss (P.L.L.) than a rise to 10 Gz in 2 seconds. The data thus indicate that the response tends to become independent of maximum Gz and become more a function of the duration of the acceleration. With the shorter duration haversine (10 and 8 seconds) the response tends to occur after maximum Gz when acceleration is decreasing. Author (TAB)

N71-10695# Naval Aerospace Medical Inst., Pensacola, Fla.
ORIENTATION-ERROR ACCIDENTS IN THE REGULAR ARMY AIRCRAFT DURING FISCAL YEAR 1967: RELATIVE INCIDENCE AND COST
Carroll W. Hixsom, Jorma I. Niven, and Emil Spezia 22 Jun. 1970 51 p refs
(AD-710987; NAMRL-1107; NAVMED-MF12.524.005-50168) Avail: NTIS CSCL 1/2

The report deals with the magnitude of the pilot disorientation/vertigo accident problem in Regular Army fixed wing and rotary wing flight operations. Factors involved in the development of an operational definition of the orientation-error class of aircraft accidents are discussed. Incidence and cost data presented for fiscal year 1967 include a total of 57 major and minor orientation-error accidents (19 of which were fatal), resulting in 45 fatalities, 105 nonfatal injuries, and a total aircraft damage cost of $10,144,034. The contribution of rotary wing orientation-error accidents to this total was 55 accidents (18 of which were fatal), resulting in 44 fatalities, 104 nonfatal injuries, and a total aircraft damage cost of $10,116,847. Author (TAB)

N71-10699# Air Force Cambridge Research Labs., Bedford, Mass.
DURATION AND UNUSUAL EXTREMES OF COLD
Irving I. Gringorten 26 Jun. 1970 35 p refs *Its* Environ. Res. Papers No. 326
(AD-710611; AFCRL-70-0381) Avail: NTIS CSCL 15/5

Duration, in hours and days, of low temperature during which equipment must operate and long term durations of extreme cold which equipment should withstand without irreversible damage, are provided in the revision of MIL-STD-210A, Climatic Extremes for Military Equipment. A low temperature of -60F was established (in guidance from the Joint Chief of Staff) at which equipment should still be operable. But still lower temperatures, persisting from one to several days, at which the equipment must be able to withstand on standby for periods of 2 to 25 years, had to be inferred by modelling, to supplement the evidence of several scant data sources in the remote frigid areas of the world. The operational 20 percent extreme cold, equalled or exceeded continuously for 12 hours in the cold heart of Siberia, is -60F. The withstanding 10 percent extreme is lower than -80F in 2 to 4 days exposure for a planned life of 2 to 25 years. Author (TAB)

N71-10712# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
COMPARISON OF AIR POLLUTION MODELS WITH AEROMETRIC DATA FOR THE AIR QUALITY REGION CENTERED ON NEW YORK CITY
S. N. Milford, G. C. McCoyd, L. Aronowitz, and J. H. Scanlon Oct. 1970 54 p refs Presented at the 2d Intern. Air Pollution Conf., Washington, D.C., 6-11 Dec. 1970
(RE-392J) Avail: NTIS

A steady-state, nondivergent, Gaussian model was investigated to determine the improvement that empirical corrections add to computerized simulation of air quality. Determinations were made by matching observations and calculations of the stability classes which provide the best predictions. In the third of three stages considered, the data are divided into six categories corresponding to three wind speed ranges and two mixing depths representing day and night. Monthly average stability classes are determined for each category from the data at nine measuring stations. Hourly validation calculations for sulfur dioxide at the individual telemetry stations of the aerometric network were made using the average stability values. The monthly averages of the calculated concentrations agree with average measured values within a factor of two for most stations and categories. Author

N71-10723# Naval Medical Neuropsychiatric Research Unit, San Diego, Calif.
AQUANAUT SLEEP PATTERNS DURING TEKTITE 1: A 60

DAY HABITATION UNDER HYPERBARIC NITROGEN SATURATION Final Report

Paul Naitoh, Laverne C. Johnson, and Marion Austin 1970 36 p refs

(AD-711671; Rept-70-36) Avail: NTIS CSCL 6/19

Four aquanauts lived in the TEKTITE I habitat at a 43-foot depth of sea water for 60 days under nitrogen saturation. The effects of this underwater habitation on quality and quantity of sleep were studied by sleep logs for all four aquanauts; and by electroencephalogram (EEG), electroculogram (EOG), and electrocardiogram for two aquanauts on selected nights during the dive. Sleep was not a problem during the dive. Compared to pre- and postdive records, total sleep time increased during the dive. EEG delta activity, recorded from two aquanauts during sleep in TEKTITE I, was elevated over baseline levels. As the dive progressed, time of going to bed shifted to a later hour as did the time of arising in three aquanauts. Sleep logs agreed with EEG and behavioral data with respect to hours of sleep. Heart rate during sleep was increased in TEKTITE I compared to pre- and postdive sleep heart rates. Author (TAB)

N71-10753# School of Aerospace Medicine, Brooks AFB, Tex.

A COMPARATIVE STUDY OF THE EFFECTS OF ULTRAVIOLET RADIATION ON THE EYE Final Report, 1 Oct. 1968 30 Sep. 1969

Donald G. Pitts, William R. Bruce, and Thomas J. Tredici Jul. 1970 83 p refs

(AD-711360; SAM-TR-70-28) Avail: NTIS CSCL 6/18

A fluid transpiration arc (FTA) filled with argon gas was used to produce a high intensity continuous spectrum. Animal and human exposures were made to establish the photokeratitis threshold and abiotic action spectrum. The abiotic action spectrum ranged from 210 to 320 nm. The peak of the ultraviolet threshold curve was at 270 nm for the rabbit and the primate. The rabbit photokeratitis threshold was 0.05 X 10 to the 6th power ergs/sq cm at 270 nm. The primate threshold was 0.04 X 10 to the 4th power ergs/sq cm at 270 nm. The human threshold at 280 nm was 0.05 X 10 to the 6th power ergs/sq cm. Formulas and calculations are given for protection against ultraviolet encountered in the space environment. Author (TAB)

N71-10810# Woods Hole Oceanographic Institution, Mass.

CHEMICAL EVOLUTION OF PHOSPHATES, PART 3

[1970] 111 p refs

Avail: Issuing Activity

The mechanism by which inorganic and mineral phosphate groups become part of the cellular structure is considered. It is proposed that some time between the formation of abiotic organic molecules and their final organization into the cell, a number of phosphate compounds interacted with the prebiotic structures of life. The criteria used in the study are derived from the knowledge of cellular chemistry and from the understanding of geochemical processes operating in geological environments that occurred at or close to the surface of the earth millions of years ago. Each reaction step is considered independently and the reason for its formulation and selection is outlined. The merger of metabolism and genetic control devices which lead eventually to the formation of a primordial cell is considered, with emphasis on the principle of crystallinity as the basis of all molecular processes. See also N70-32861 and N70-32862. R.B.

N71-10844# Naval Postgraduate School, Monterey, Calif.

A SIMULATOR EVALUATION OF PILOT PERFORMANCE AND ACCEPTANCE OF AN AIRCRAFT RIGID COCKPIT CONTROL SYSTEM

Donald M. Layton 15 Jul. 1970 97 p refs

(AD-711296; NPS-57LN70071A) Avail: NTIS CSCL 5/10

A ground-based simulator facility employing a two-axis compensatory tracking task with a random appearing signal was used to evaluate the performance of one hundred five pilot and non-pilot test subjects using four separate control sticks -- two moveable and two rigid. Pilot acceptance of the rigid cockpit controllers was determined by comparing individual pilot ratings of the sticks. In general, in both performance and opinion, the rigid systems were found to be superior to their moveable counterparts. Steps were taken to avoid errors due to pilot bias, learning, fatigue, or adaptation. The results obtained are subject to several test limitations, including the low stick-force levels employed the lack of aircraft vibration effects, and the realism of the simulation. Author (TAB)

N71-10880# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

THE USE OF COMPUTERS FOR MAN-MACHINE MODELLING: STATUS AND PLANS

Gerald P. Chubb, Julia T. Apter, William W. Graessley, Lorenz P. Schrenk, and Patrick W. Ryan Jun. 1970 77 p refs

(AD-711638; AMRL-TR-70-60) Avail: NTIS CSCL 5/8

Four papers, each describing a different approach to modelling man, are presented. The first paper describes an extension of the servo theoretic approach to describing the human operator as an active element of a control system. The model presented has been developed to describe and predict muscular actions. The second paper addresses the monte carlo simulation of human performance within a task and time analytic framework, and illustrates the current state-of-the-art. A third paper deals with man-computer interaction in information-processing and decision-making tasks. An attempt was made to describe such interactions in a manner that facilitates the allocation of tasks to man and the computer. The fourth paper demonstrates the feasibility of graphically portraying human biomechanical movements on an IBM graphic display console. Such techniques can simulate human movements and aid the designer in optimizing workplace geometry. Together, these papers illustrate the breadth of techniques available for modelling man in a man-machine environment. Author (TAB)

N71-10881# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

HUMAN PERFORMANCE EFFECTS OF REPEATED EXPOSURE TO IMPULSIVE ACOUSTIC STIMULATION Final Report, Aug. 1969 -Jan. 1970

C. Stanley Harris Apr. 1970 22 p refs

(AD-711637; AMRL-TR-70-38) Avail: NTIS CSCL 6/19

To determine the effects of repeated exposure to an impulsive auditory stimulus, ten subjects were tested on a pursuit rotor task during exposure to the stimulus for four consecutive days. The stimulus (peak intensity of 112 dB with a 400 millisecond duration) was presented nine times on each day in a semi-random fashion. Performance of these subjects was compared to the performance of an additional group of ten subjects who served as a control group. Author (TAB)

N71-10883# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

BASIC KINEMATICS AND DYNAMICS OF THE HUMAN CENTRIFUGE AND OTHER AEROSPACE SIMULATORS, INCLUDING A SIMPLE EXPLANATION OF CORIOLIS AND GYROSCOPIC EFFECTS

Otto Schueller and Fred W. Berner May 1970 38 p

(AD-711635; AMRL-TR-69-126) Avail: NTIS CSCL 6/19

This treatise is intended to familiarize medical and technical monitors of experiments on human centrifuges and other dynamic flight simulators with the various inertia effects produced by these facilities. It should fill the gap between the most elementary superficial explanations and the complicated derivations of these effects by abstract vector differential equations. The centrifugal, Coriolis, and gyroscopic effects are explained simply and in a manner that everybody interested in this field should be able to understand. Author (TAB)

N71-10891# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
COMBINED EFFECTS OF NOISE AND VIBRATION ON MENTAL PERFORMANCE AS A FUNCTION OF TIME OF DAY Final Report, Feb. 1969 Mar. 1970
Henry C. Sommer and C. Stanley Harris Jul. 1970 20 p refs
(AD-711636; AMRL-TR-70-36) Avail: NTIS CSCL 6/19

To determine the combined effects of noise and vibration on mental performance as a function of time of day, subjects were randomly exposed to each of the following conditions: stress (5 Hz vibration, 110 dB noise) at 6 AM; no stress (no vibration - 85 dB noise) at 6 AM; stress at 3 PM; and no stress at 3 PM. Subjects performance on a mental arithmetic task was measured during each of these exposures on consecutive days. The average exposure time was approximately 20 minutes. The results are discussed in the context of arousal theory. Author (TAB)

N71-10947# IIT Research Inst., Chicago, Ill.
EXPLORATORY DEVELOPMENT OF PRESSURE SUIT MOBILITY JOINTS, GLOVES AND HELMET Final Report, Mar. 1966 Apr. 1969
Jozef Slowik, Alfred Marcum, and Marvin Burns Wright-Patterson AFB, Ohio AMRL Apr. 1970 115 p
(Contract AF 33(615)-3468)
(AD-711676; IITRI-J6028-FR; AMRL-TR-69-64) Avail: NTIS CSCL 6/11

A research program was conducted to investigate and develop approaches for improving pressure suit mobility and comfort. Novel concepts were generated and unique properties of materials were exploited to implement these concepts for various pressure suit components. Single plane mobility joints of low profile fabric materials were made with mobility approaching that of hard joints. Work was begun to adapt the same principles to biaxial joints. Advanced concepts for improving the tactility and mobility of pressure gloves were implemented in several models of experimental gloves. Exploratory development of partial pressure helmet was initiated. As a part of the broad systems study, the thermal control problems and micrometeoroid threat to the extravehicular crewman were also investigated. Author (TAB)

N71-10952# Joint Publications Research Service, Washington, D.C.
MAMMAL REACTION TO HYDRODYNAMIC FORCES STUDIED
Yu. G. Aleyev 21 Oct. 1970 11 p refs Transl. into ENGLISH from Zool. Zh. (Moscow), v. 49, no. 8, 1970 p 1173 - 1180
(JPRS-51614) Avail: NTIS

An experimental study of the pattern of movement of dolphin and human bodies using an underwater camera demonstrated the possibility of the passive formation of mobile roughness in the skin of mammalia, due exclusively to the effect of external hydrodynamic forces. It is noted that this mobile roughness of running waves of deformation in the skin facilitate the reduction of hydrodynamic resistance. Author

N71-11066*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.
PLANETARY QUARANTINE PROGRAM Quarterly Progress Report, Period Ending 31 Mar. 1970
Mar. 1970 50 p refs
(NASA Order W-12853)
(NASA-CR-111386; QR-16) Avail: NTIS CSCL 06M

Research progress is reported on the following topics: (1) the effect of dry heat sterilization in bacterial spore inactivation modeling, (2) modeling of thermoradiation inactivation of spores, (3) a computerized identification scheme, (4) a general approach to estimating and predicting bioburdens, (5) the effectiveness of thermoradiation on inactivation of B. subtilis, (6) fabrication and testing of a microbiological air samples, and (7) spore inactivation by ultraviolet radiation. R.B.

N71-11067*# Stanford Univ., Calif. Dept. of Genetics.
SEARCH FOR PORPHYRINS IN LUNAR FINES FROM APOLLO 11 AND 12 Final Report
B. Halpern and G. W. Hodgson 15 Aug. 1970 133 p refs
(Contract NAS9-9439)
(NASA-CR-108671; SU-IRL-1111) Avail: NTIS CSCL 06A

Fluorescence spectrometry and analytical demetallation show that lunar fines from Apollo 11 and 12 samples contain porphyrin-like pigments. It is suggested that the pigments from samples close to the lunar landing modules are probably products of rocket combustion which were introduced during landing of the vehicles. Pigments were also found in lunar soil samples collected at a distance from the landing site. Fluorescent demetallation analysis indicates that the pigments were present as metal complexes, with an abundance estimated at 0.00005 microgram/g. Author

N71-11068# Battelle Memorial Inst., Columbus, Ohio.
ELECTRON MICROPROBE ANALYSIS OF ATMOSPHERE AEROSOLS Final Report
D. K. Landstrom and Doyle Kohler 31 Dec. 1969 52 p refs
(Contract PHS-CPA-22-69-33)
(PB-189282) Avail: NTIS CSCL 13B

The report describes a research effort to determine the feasibility and capability of electron microprobe analysis as a method for obtaining detailed compositional and structural information about pollutant aerosol particles in the atmosphere. Extensive data is presented from known test aerosols, automobile engine exhaust, and atmospheric samples. It was determined that the sampling method is presently the limiting factor in the detection and analysis of small particles, and, by preparing samples to minimize X-ray background, particles as small as 0.1 micron can be successfully analyzed. The theoretical limitations of the microprobe for both wavelength-dispersive and energy-dispersive spectrometers are discussed, and recommendations are made about analysis systems for small particles. Author (USGRDR)

N71-11069# National Air Pollution Control Administration, Raleigh, N.C.
CHARACTERISTICS OF PARTICULATE PATTERNS, 1957–1966
Robert Spirtas and Howard J. Levin Mar. 1970 105 p refs
(PB-192223; NAPCA-Pub-AP-61) Avail: NTIS CSCL 13B

Collected samples of suspended particulate matter since 1957 are considered. The resulting suspended particulate data are graphically summarized by the application of Whittaker – Henderson Type A curve-smoothing formulas to 10 years of data. Data from 60 urban stations and 20 nonurban stations were studied by this technique, which brings out the underlying cyclical patterns and long-term trends in nationwide levels of suspended particulate

matter. Seasonal patterns are evident for many urban and nonurban stations, and the seasonal characteristics of the two types of stations contrast sharply. Long-term trends are downward at many center-city urban sites, but are upward at some nonurban sites. Author (USGRDR)

N71-11070# Washington Univ., Seattle. Dept. of Mechanical Engineering.
EVALUATING THE NOISES OF TRANSPORTATION: PROCEEDINGS OF A SYMPOSIUM ON ACCEPTABILITY CRITERIA FOR TRANSPORTATION NOISE
James D. Chalupnik, ed. Apr. 1970 401 p refs Conf. held at Seattle, 26–28 Mar. 1969
(Contract DOT-OS-A9-036)
(PB-191117; OST-ONA-70-2) Avail: NTIS CSCL 20A

Contents: Transportation noise sources; Scales for expressing noise level; Laboratory methods for evaluating human response to noise; Methods for evaluating community response to noise; Relation between laboratory results and community response. USGRDR

N71-11071# National Air Pollution Control Administration, Cincinnati, Ohio. Div. of Air Quality and Emission Data.
INTERSTATE EFFECTS SURVEILLANCE NETWORK: TABULATION OF DATA, JANUARY–DECEMBER 1969
May 1970 200 p
(PB-192446; NAPCA-APTD-70-3) Avail: NTIS CSCL 13B

Raw data are tabulated on air pollution effects on materials at 274 stations throughout the U.S. and in Ontario, Canada, for calendar year 1969. The tables are titled: Station and Area Type Code; Effects Stations Identification List; Cumulative Frequency Distributions; Metal Corrosion; Dyed Fabrics; Silver Tarnishing; Lead Plates; Dustfall; Nylon Deterioration; Rubber Cracking; Sticky Paper (wind blown particulates); and Station Index (alphabetized by state). Author (USGRDR)

N71-11072# TRW Systems Group, Washington, D.C.
AIR QUALITY DISPLAY MODEL
Nov. 1969 187 p refs
(Contract PH-22-68-60)
(PB-189194) Avail: NTIS CSCL 13B

The Air Quality Display Model was developed for the computation of seasonal and annual concentration estimates. It is to be considered as a provisional dispersion model for estimating air quality until continuing research indicates an improved model is available. USGRDR

N71-11073*# Food and Drug Administration, Cincinnati, Ohio. Div. of Microbiology.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Jan.–31 Mar. 1970
R. B. Read, Jr. Jun. 1970 13 p ref
(NASA Order R-36-015-001)
(NASA-CR-111387; QPR-20) Avail: NTIS CSCL 06A

Thermal inactivation determinations of Bacillus subtilis var. niger spores at 125 C under 0.25 micrograms of water per ml of headspace air were analyzed for the ecology and thermal inactivation of microbes in and on interplanetary space vehicle components. An inactivation curve was established using experimental designs which statistically identified the within-run and between-run variations. Experiments using the same conditions except with 100 micrograms of water per ml of headspace air were also performed. Inactivation curves for B. subtilis var. niger spores at 125 C with 0.25 micrograms of water per ml headspace air when the spores were dried in distilled water were compared with similar data using phosphate buffer as the suspending fluid before drying. The dry-heat resistance of two strains of B. subtilis spores was established to have a high wet-heat resistance. J.M.

N71-11074# Bureau of Radiological Health, Rockville, Md.
REGULATIONS, STANDARDS, AND GUIDES FOR MICROWAVES, ULTRAVIOLET RADIATION, AND RADIATION FROM LASERS AND TELEVISION RECEIVERS: AN ANNOTATED BIBLIOGRAPHY
Lloyd R. Setter, David R. Snavely, Duane L. Solem, and Rodman F. Van Wye Apr. 1970 84 p refs *Its* PHS Publ. No. 999-RH-35
(PB-189360) Avail: NTIS CSCL 13L

This report is an annotated bibliography of guidelines, standards, and regulations pertaining to public health protection against electromagnetic radiation from television receivers, lasers, ultraviolet radiation, and microwaves. Each category of radiation is treated in a separate section. The annotated documents are designated as Class A (established or adopted by a governmental body acting under the authority of an act, law, or statute), Class B (adopted by consensus of a committee(s) or commission(s) of technical competence in standard-setting organizations), or Class C (not adopted by a standards-setting organization, but contains information pertinent to the preparation of suitable standards or regulations). The annotations include identification of the document, type of standard, intended compiler, intended benefitter, limits and specifications, and general guidance. Author (USGRDR)

N71-11075# Battelle-Northwest, Richland, Wash.
THE MEASUREMENT OF RADIATION EXPOSURE OF ASTRONAUTS BY RADIOCHEMICAL TECHNIQUES Quarterly Research Report, 5 Jan.–5 Apr. 1970
R. L. Brodzinski, L. A. Rancitelli, and W. A. Haller 15 Apr. 1970 27 p refs
(Contract AT(45-1)-1830)
(BNWL-1183-4) Avail: NTIS

The urine and feces specimens from the Apollo 12 mission were analyzed for their radionuclide content. Estimates of the cosmic radiation dose received by the astronauts were difficult to determine because of the decay of the short-lived radionuclides during quarantine; however, estimates of the dose to the Apollo 12 astronauts are similar to those received on the Apollo 7 and Apollo 9 missions. The concentrations of Be-7, Na-22, K-40, Fe-59, Co-60, and Cs-137 were determined. The radioactivity levels of Be-7, Na-22, and Co-60 in both the urine and feces and the levels of K-40 and Fe-59 in the feces were comparable to those of previous missions. The Cs-137 concentration in the feces was lower than in previous missions, while the concentrations of K-40, Fe-59 and Cs-137 in the postflight urine specimens were higher than those observed in previous missions. No Pm-147 was observed in any of the samples. Author (NSA)

N71-11076*# Ocean Systems, Inc., Tarrytown, N.Y. Research and Development Lab.
RELATIVE DECOMPRESSION RISKS OF SPACECRAFT CABIN ATMOSPHERES
Gerald F. Doebbler and Robert W. Hamilton, Jr. Washington NASA Nov. 1970 66 p refs
(Contract NAS2-5481)
(NASA-CR-1694) Avail: NTIS CSCL 06S

The miniature pig was examined as a possible model for the study of altitude decompression sickness. With suitable qualifications, it is acceptable for use as a decompression model. It was necessary to separate hypoxic and decompression sickness symptoms by calibration of each animal. Rats were used to

compare relative decompression risks after saturation with nitrogen, argon, neon, a neon-helium mixture, and helium. Neon and neon-helium were relatively less hazardous than even helium in terms of overall incidence of decompression sickness. Helium and neon-helium were least hazardous in terms of severe symptoms. Incidences of severe symptoms were similar for neon (21%) and argon (26%). With nitrogen and, to a lesser extent, argon, neon, and neon-helium, but not helium, a dependence of decompression sickness severity on body weight was observed. Weight must be controlled as a parameter when using rats to compare gas environments. Neon-helium and helium appear to be possible inert gas diluents to be considered most carefully in further large animal or manned studies of two gas space cabin atmospheres as these relate to decompression hazards. Author

N71-11077# Pennsylvania State Univ., University Park. Center for Air Environment Studies.
GUIDE TO RESEARCH IN AIR POLLUTION: PROJECTS ACTIVE IN CALENDAR YEAR 1969
Apr. 1970 198 p refs *Its* PHS Publ. No. 981; NAPC-Publ-AP-47
(Contract PHS-CPA-22-69-37)
(PB-192220) Avail: SOD $1.50; NTIS CSCL 13B

Information about 1383 projects active in calendar year 1969 was compiled from respondents to a questionnaire. The compilation has three main parts. (1) The project listing for United States projects are arranged alphabetically by States, and for foreign projects they are arranged alphabetically by country. Within each geographic location, the listing is further alphabetized by performing organization. Each entry also includes the project title, name of the investigator and address, the sponsor, and the type of support. The entries are numbered sequentially with project numbers. (2) The categorical listing or subject index, is arranged alphabetically by 19 subject categories. Within each category, the listing is further alphabetized by project title. Following each project title, its project number appears. (3) The principal investigator listing or index is arranged alphabetically. Following each investigator's name, the project number and citations of publications and presentations resulting from the project appear. Author (USGRDR)

N71-11078# Clearing House for Federal Scientific and Technical Information, Springfield, Va.
ENVIRONMENTAL POLLUTION: A SELECTED BIBLIOGRAPHY. INFORMATION FOR BUSINESS AND INDUSTRY, REPORT FOR JANUARY 1968–APRIL 1970
May 1970 37 p refs
(OB-192318; NTIS-BIB-70-01) Avail: NTIS CSCL 13B

The document is a selective bibliography of 333 references pertaining to the causes, detection, and control of air and water pollution including noise, pesticides, population, wastes, oil, radioactivity, sulfur oxides, engine exhausts, and temperature. Author (USGRDR)

N71-11079# Advanced Metals Research Corp., Burlington, Mass.
ELECTRON MICROPROBE X-RAY ANALYSIS OF ATMOSPHERIC AEROSOL PARTICLES, 1 DECEMBER 1968–31 AUGUST 1969
31 Aug. 1969 85 p refs
(Contract PHS-CPA-22-69-26)
(PB-189283) Avail: NTIS CSCL 13B

Electron microprobe analysis was applied to the chemical identification of the airborne particles characteristic of air pollution contaminants. A conventional AMR electron microprobe and a Philips EM200 electron microscope equipped with an AMR X-ray spectrometer attachment were employed to investigate size-fractioned samples of laboratory generated aerosol particles of NaCl and Zn (NH4)2 (SO4)2, as well as specific pollution sources, e.g. Los Angeles smog and auto exhaust. The effect of instrument variables, including electron beam size, acceleration potential, and beam current was determined for particles ranging in size from 3 to 0.5 microns. X-ray spectral patterns obtained from Los Angeles smog particles are presented and limitations in the analytical technique are also discussed. Scanning electron microscopy was employed as a supplement to conventional electron microscopy. Author (USGRDR)

N71-11080# Food and Drug Administration, Washington, D.C.
INTERBUREAU BY-LINES, VOLUME 6, NO. 4
John P. Erickson, Michael Gruenfeld, George Wilamowski, Thomas L. Barry, and Jane Kaminski Jan. 1970 55 p refs
(PB-189204) Avail: NTIS CSCL 06O

Contents: Study of bacterial growth in a mouthwash containing a preservative: Separation of some solvent mixtures on several GLC columns; Spectrophotometric method for determination of diiodohydroxyquin in drugs; Combined GLC-mass spectrometry; and Spectra of colors. USGRDR

N71-11081# Atomics International, Canoga Park, Calif.
RADIATION CHEMISTRY OF CHROMOSOMES Final Report, 1 Jul. 1969–27 Jun. 1970
M. D. Sevilla 27 Jun. 1970 122 p refs
(Contract AT(04-3)-701)
(AI-AEC-12974) Avail: NTIS

The effects of ionizing radiation on chromosomes and chromosome constituents were investigated. This work concentrated on the reactions of radical intermediates produced by ionizing radiation with chromosome constituents. Reactions of hydrogen atoms and electrons with these constituents were investigated previously. Studies of reactions of electrons with chromosome constituents were continued with an investigation of peptides, pyrimidines, and nucleosides. The electrons were photolytically generated in an alkaline D2O glass and allowed to react with the peptide solute; the radicals produced were identified by means of ESR spectroscopy. This work suggests that in the chromosome positive ions or holes formed in the DNA during radiolysis would localize unpaired spins on thymidine by production of R-CH2 · radicals. A study of the radiolysis of frozen aqueous solutions of DNA suggests that the thymidine anions formed by electron attachment protonate at the C6 position to form the usual thymyl radical. Author (NSA)

N71-11082# Pittsburgh Univ., Pa.
EFFECTS OF CERTAIN COMPOUNDS ON ANIMALS SUBJECTED TO SIMULATED HIGH ALTITUDE Final Report, 20 Oct. 1969–31 Jul. 1970
Joseph P. Buckley, Herbert Barry, III, and Souheir El Masry Aug. 1970 27 p refs
(Contract DADA17-67-C-7089)
(AD-711554; Rept-3) Avail: NTIS CSCL 6/15

There was a 50% reduction in hepatic glycogen content of male Wistar rats treated with phenformin hydrochloride, 100 mg/kg, or decompressed for 4 hours at 24,000 feet. There was also an increase in the glycogen content of the heart and diaphragm of the decompressed animals. There was a 5-fold increase in the myocardial glycogen content of rats treated with phenformin for 7 days as well as a marked increase in glycogen content in both the liver and diaphragm. Blood lactate increased approximately 3-fold following phenformin treatment and approximately 8-fold after a single dose of phenformin plus 4 hours of decompression. The data suggest that prolonged treatment with phenformin enhances the efficiency of recycling carbohydrate under anaerobic conditions and increases utilization of carbohydrate at the expense of lipid stores. Author (TAB)

N71-11083 Iowa Univ., Iowa City.
A METHOD FOR THE KINEMATIC ANALYSIS OF AN INACCESSIBLE THREE-DIMENSIONAL MECHANISM FOR APPLICATION TO HUMAN SKELETAL KINESIOLOGY
Ernest Byron Marsolais (Ph.D. Thesis) 1969 122 p
Avail: Univ. Microfilms: HC $6.00/Microfilm $3.00 Order No. 69-21709

The problem becomes that of determining the position of a concealed three-dimensional link relative to a former position and the solution requires the combination of several techniques. There are three major divisions in this problem. First, a method is found for observing the link in the initial and final positions. Following this, a method for quantitative comparison of the shape of the unknown projection with that of the projections of selected nearby known positions is found, and finally, a method for choosing the best matching projections is developed. An asymmetric metal model is used for illustration but a parallel development of the method for the scaphoid bone of the wrist joint is included. The basic assumption necessary in the analysis is that each link in the mechanism has no plane of symmetry and that any projection of each link is thus unique. It is further held that from the past anatomical investigations, gross translational and rotational limits may be assumed. Dissert. Abstr.

N71-11084 Northwestern Univ., Evanston, Ill.
ANALYSIS AND MEASUREMENT OF HUMAN TORSIONAL EYE MOVEMENTS
Andrew Endre Imre Kertesz (Ph.D. Thesis) 1969 84 p
Avail: Univ. Microfilms: HC $4.40/Microfilm $3.00 Order No. 70-87

An objective method was developed to measure the time course of torsional eye movements about the line of sight. The resolution of the system was better than 1/2 deg. Torsional movements of one eye monocularly fixating the center of a rotating sectored disc were measured. The eye rotated in the same direction as the disc did, and attained a fairly constant angular deflection over the range of 2 to 28 rpm. Superimposed upon this deflection, nystagmus-like movements were sometimes observed. Using only an annular portion of the disc, it was found that the eye deflection exhibited a peak at 17 rpm, which was not apparent when the entire disc was viewed. Experiments with a disc of fewer sectors suggested that the response was proportional to the number of receptors exposed to the moving boundaries contained in the stimulus and that some form of spatial summation of receptor responses takes place. The response of retinal receptors and higher order sensory neurons as a function of stimulus velocity was computed from experimental data using a postulated linear model. Dissert. Abstr.

N71-11085# School of Aerospace Medicine, Brooks AFB, Tex.
LECTURES IN AEROSPACE MEDICINE, 9-12 FEBRUARY 1970, SEVENTH SERIES
1970 498 p refs
(AD-711792; SAM-TR-70-229) Avail: NTIS CSCL 6/11

Contents: Ultraviolet radiant energy and the eye; Visual performance decrements in aerospace operations; Vision toward the ground from the cockpits of selected tactical aircraft; Silent myocardial infarction in USAF flyers detected solely by annual required electrocardiogram; Tolerance limits to acute hypercarbia under normobaric and hypobaric conditions; Toxicological evaluation of carbon monoxide in humans and other mammalian species; Performance decrement in nonhuman primate decompression exposures; Review of motion sickness of patients referred to the USAF School of Aerospace Medicine; Microbiological aspects of aeromedical evacuation; Alteration of drug action and metabolism under reduced pressure; Human cytogenetics and aerospace environments; Environmental pharmacology; and An evaluation of human restraint systems during-Gx impact. TAB

N71-11086# Naval Air Development Center, Johnsville, Pa. Aerospace Crew Equipment Dept.
RESPIRATION SYSTEM HEAT EXCHANGE WITH EMPHASIS ON THE TRACHEAL REGION Interim Report
Stephen L. Gordon 1 Jul. 1970 90 p refs
(AD-711844; NADC-AC-7008) Avail: NTIS CSCL 6/16

In order to measure details of respiratory heat exchange in the trachea of the dog, temperature probes with three sensors were positioned at four axial locations. The recorded inspiration temperatures, in conjunction with the assumed symmetrical nature of the flow, produced inspiratory temperature profiles for various respiration conditions and various gases. Based upon measurements obtained from three of the dogs, tracheal inspiration profiles show undeveloped entrance conditions and the developing nature of the flow along the axial direction. Tracheal wall probes indicate a cooler than body core temperature condition, which could effect the cooling of expired gases returning from the warmer lung region. Dry air and helium gas tests produced similar results. Saturated air tests indicated a lesser mid-stream to wall temperature differential, which is believed to be a result of coupling effects between the energy and mass transfer equations. Author (TAB)

N71-11087*# SysteMed Corp., Dayton, Ohio.
TOXIC HAZARDS RESEARCH UNIT ANNUAL TECHNICAL REPORT, 1969 Final Report, Jun. 1968 - May 1969
J. D. MacEwen and E. H. Vernot Sep. 1969 60 p refs
Supported in part by NASA
(Contract F33615-67-C;1025)
(NASA-CR-111394; AD-699594; W-69006; AMRL-TR-69-84; AR-5) Avail: NTIS CSCL 06T

The activities of the Toxic Hazards Research Unit (THRU) are reviewed in this report. The experimental research program was conducted concurrently with construction activities for additional facilities. The construction activities did not stop the research program but required cooperative scheduling of both activities to permit installation of utilities without interruption of experimentation. At scheduled periods, experiments were suspended to permit major corrective and preventive maintenance programs on both the ambient and altitude laboratory facilities. The Apollo materials toxicity screening tests have continued with no further evidence of toxicity exhibited by their gas-off products. A repeat eight-month study of the effects of a mixed gas (oxygen-nitrogen) atmosphere at 5 psia was completed with the only confirmed adverse effect being the depressed growth of albino rats. Experiments conducted in the ambient facility included studies on the effects of ethylene glycol vapor on rodents, studies on emergency exposure limits for monomethylhydrazine (MMH) and nitrogen trifluoride (NF3), and preliminary acute toxicity experiments on oxygen difluoride (OF2) and chlorine trifluoride (ClF3). Author (TAB)

N71-11088# Armed Forces Radiobiology Research Inst., Bethesda, Md.
THE EFFECTS OF 15,000 RADS PULSED GAMMA-NEUTRON RADIATION ON THE BEHAVIORAL PERFORMANCE OF MONKEYS (MACACA MULATTA)
R. W. Young and W. L. McFarland Jun. 1970 15 p refs
(AD-712054; AFRRI-SR70-7) Avail: NTIS CSCL 6/18

Seven male monkeys trained to a visual discrimination task were exposed to a pulsed 15,000-rad midline tissue dose of gamma-neutron radiation. Of these seven animals, five were unable to perform within 5 minutes postirradiation and remained in a state of total nonperformance until death. The two remaining animals experienced periods of severe performance decrement followed by a return of performance capability which approached the preirradiation value. This performance capability deteriorated rapidly at 58 and 88 minutes postirradiation in these two animals, after which time the subjects failed to perform until death. The median survival time for all animals was 1 hour and 18 minutes. Author (TAB)

N71-11089# Tokyo Medical and Dental Univ. (Japan). Dept. of Physiology.
THE INHIBITORY AND ACCELERATORY SYNAPSES IN A CRUSTACEAN HEART GANGLION Final Report, 23 Dec. 1965 - 30 Jun. 1970
Akira Watanabe APO San Francisco, Calif. ARDG (FE) Jun. 1970 29 p refs
(Contract DA-CRD-AG-S92-544-66-G3)
(AD-711971; ARDG(FE)-J-227-1; Rept-1) Avail: NTIS CSCL 6/16

The purpose of the research is to elucidate the mechanism of inhibition and acceleration at the synapse in the nervous system. The heart ganglion of astomatopod Crustacea supplies an excellent material for the study. The inhibitory and acceleratory axons are stimulated, and the potential changes are recorded from the postsynaptic cells with intercellular microelectrodes. It is concluded that the acceleratory effect is not mediated by the excitatory postsynaptic potential EPSP but is due to a direct action of the transmitter in the pacemaker membrance. Author (TAB)

N71-11090# Boston State Hospital, Mass. Sleep and Dream Lab.
A STUDY OF LONG AND SHORT SLEEPERS Final Report
Ernest Hartmann and Geogre Zwilling 14 Jul. 1970 77 p refs
(Contract DADA-17-67-C-7115)
(AD-711579) Avail: NTIS CSCL 5/10

Adult males who always sleep less than six hours or more than nine hours per day were studied. Over 400 were screened; smaller numbers had various psychological tests and psychiatric interviews, and finally 29, free of overt medical or psychiatric pathology, were studied in the laboratory for 8 nights each of all-night polygraphic recording. Psychologically the short sleepers were efficient, hard-working, and somewhat hypomanic. The long sleepers tended to be anxious, depressed, or withdrawn. The two groups spent an almost identical amount of time -- 75 minutes -- in deep slow-wave sleep (stages 3-4), but the long sleepers had twice as much D-time (REM-time). It is suggested that there are two separate sleep requirements, a requirement for stage 3-4 sleep which is relatively constant across persons, and a requirement for D-time which is related to the personality and life-style of the individual. Author (TAB)

N71-11091*# Aerojet-General Corp., El Monte, Calif. Medical and Biological Systems.
DEVELOPMENT OF TECHNIQUES AND REAGENTS FOR ASSESSMENT OF VIRAL ECOLOGY Final Report
30 Sep. 1970 119 p
(Contract NAS9-9740)
(NASA-CR-108687) Avail: NTIS CSCL 06F

The feasibility of the Passive Immunological Agglutination (PIA) system was examined using a myxovirus, adenovirus, echovirus, herpesvirus, coxsackievirus and one mycoplasma species. The sensitivity of the PIA technique was compared with conventional assay techniques for detecting the presence of infective organisms. With the exception of the mycoplasma, the PIA system was shown to be up to 100 times as sensitive as the conventional assay system with a response time of 1-2 hours versus 2-14 days for the conventional methods. The production of high titered antibody and its subsequent attachment to polystyrene latex particles has increased the sensitivity of the PIA test for mycoplasma from 500 cfu/ml to 100 cfu/ml. Different readout systems were examined during the course of the program. Three systems appeared most conducive to automating the readout: (1) an electronic particle connector; (2) a light scattering system; and (3) a microscope video computer system. Author

N71-11092*# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
DETERMINATION OF SURFACE TENSION IN BIOLOGIC FLUIDS
Leopoldo L. Rodriguez, Kenneth G. Ikels, and J. Ryan Neville Dec. 1969 9 p refs
(NASA Order T-82170)
(NASA-CR-11132; AD-700755; SAM-TR-69-89) Avail: NTIS CSCL 06C

Determination of meaningful surface tension in biologic fluids poses numerous problems because of the presence of diverse solutes and surface-active agents and the spontaneous changes of the exposed surface. During the course of an investigation of decompression sickness, particularly the biophysical basis of bubble formation, it became desirable to measure surface tension in samples of human blood in order to evaluate the effect that differences in surface tension might have on susceptibility to decompression sickness. A device was developed that utilizes a horizontally placed capillary tube of 1 mm. or less I.D. into which a sample of approximately 10 microliters or less is placed. After forcing the liquid to the end of the capillary tube, the pressure required to flatten the meniscus is measured. Conductive properties of the sample are used to determine the pressure end point. The instrument permits reproducible measurements (plus or minus 1 dyne/cm) to be made rapidly (less than 1 min) on small quantities of fluid. Author (TAB)

N71-11093# Northrop Corp Silver Spring, Md. Electro-Mechanical Div.
REPORT OF EXPERIMENTAL DIVES FOR ADS-4: DECOMPRESSION SCHEDULES
M. N. Kahn and J. K. Summitt Washington Navy Exptl. Diving Unit 26 Aug. 1970 115 p ref
(Contract N00024-70-C-5558)
(AD-711842; NEDU-RR-4-70) Avail: NTIS CSCL 6/19

The report provides a detailed description of the developmental decompression schedules tested for use with the Advanced Diving System (ADS) IV. The evolution of the developmental schedules into the final decompression schedules is presented. A brief description of facilities and procedures used in performing these dives is also provided. The report is based on an analysis of the diving logs of 121 dives over the period March 1967 through May 1968, personnel interviews with divers, and Navy records. Author (TAB)

N71-11094*# Yeshiva Univ., New York.
A STUDY OF THE STABILITY OF SLEEP PATTERNS IN YOUNG ADULTS FOR SEQUENTIAL NIGHTS OVER A THREE WEEK PERIOD Final Report, 15 Jun. 1968 - 15 Jun. 1970
Elliot D. Weitzman 15 Jun. 1970 27 p refs
(Grant NGR-33-023-032)
(NASA-CR-111519) Avail: NTIS CSCL 06P

In the study reported each subject had a three week baseline nocturnal sleep period, followed by three weeks of sleep during the day, followed by a re-inversion period of three weeks sleeping at right. The data obtained from these studies are described. Author

N71-11095# Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.
THE HILL'S ALTERNATIVE TO NAVAL DECOMPRESSION CONCEPTS: A CRITICAL VIEW
Ruport Hester 24 Mar. 1970 55 p refs
(AD-711809; SMRL-620) Avail: NTIS CSCL 6/19

The approach by Hills is based upon two hypotheses: (1) inert gas transport is limited by diffusion in a single radial model of extra-vascular tissue, and (2) nucleation and phase equilibration between dissolved gas and gas in silent bubbles may preclude supersaturation in excess of 74 mmHg. Actually, two different models, not always clearly distinguished, are presented. One, expounded in theoretical analysis is concerned with gas concentration in a certain average sense over the extra-vascular space. The other,

used for his proposed optimum decompression method presumes a restraint on point tensions to 74 mmHg over the diffusion field is necessary to preclude nucleation. Author (TAB)

N71-11096 Pennsylvania State Univ., University Park.
HUMAN GROWTH, PHYSIQUE, AND PULMONARY FUNCTION AT HIGH ALTITUDE: A FIELD STUDY OF A PERUVIAN QUECHUA POPULATION
Andres Roberto Frisancho (Ph.D. Thesis) 1969 177 p
Avail: Univ. Microfilms: HC $8.20/Microfilm $3.00 Order No. 70-670

The potential effect of low partial pressure of oxygen and the concomitant reduction in oxygen availability or hypoxia on the growth and development of men at high altitude was studied. The mean barometric pressure at 4267 meters was 446.4 mm/Hg with an oxygen partial pressure of 93.6 mm; at this altitude there is about a 32 percent reduction in the partial pressure of oxygen. The cross-sectional sample consisted of 1,152 subjects of which 702 were males and 450 females, aged two to 22 years. The samples were measured by anthropometric and roentgenogrametric techniques. The interrelationship between measurements of pulmonary function and body morphology was analyzed through correlation and multivariate regression equation techniques. It is suggested that the slower and prolonged physical growth of the Nunoa Quechua children is probably related to the effects of hypoxic stress of high altitude, while the greater chest size and higher forced expiratory lung volumes reflect the developmental adaptive response to altitude hypoxia. Dissert. Abstr.

N71-11097 Illinois Univ., Urbana.
THE EFFECT OF LOW BAROMETRIC PRESSURE ON HUMAN AND CHICKEN RBC ACTIVE SODIUM EFFLUX
Joel Langdon Mattsson (Ph.D. Thesis) 1969 81 p
Avail: Univ. Microfilms: HC $4.40/Microfilm $3.00 Order No. 70-924

The transport model selected was active Na-22 extrusion by human and chicken erythrocytes. Since the human RBC differs from other cells of the body in not needing oxygen for metabolism, the chicken nucleared erythrocyte was also employed because it does depend on oxygen for energy metabolism. Erythrocyte Na-22 extrusion was measured at barometric pressures of 760 and 130 mm Hg, in samples that contained the active transport inhibitor oubain and in samples that were oubain-free. The Na-22 extruded from oubain-free samples was considered to be total efflux, and that from oubain treated cells as passive efflux. The difference between total and passive efflux was taken to be active efflux. Data accumulated during the pilot studies of low pressure effects on active transport showed that lowering the partial pressure of oxygen caused an increase in passive sodium influx and efflux, the effect being more marked in chicken than in human erythrocytes. The results of the experiments indicated that acute exposure to barometric pressures utilized in aerospace programs are not detrimental to human or chicken RBC active cation transport. Dissert. Abstr.

N71-11098# Army Medical Research and Nutrition Lab., Denver, Colo. Fitzsimons General Hospital.
EFFECTS OF DIET AND ALTITUDE ON THE BODY COMPOSITION OF RATS
Kenneth S. K. Chinn and John P. Hannon Repr. From J. Nutr., v. 100, no. 7, Jul. 1970 p 732-738 refs
(AD-712239) Avail: NTIS CSCL 6/19

The body composition of growing albino rats maintained on diets high in carbohydrate, fat or protein was studied at Denver 5,280 feet and climax 11,400 feet, Colorado. The higher altitude has no significant effect on growth rate. It did, however, lead to decreased body fat deposition under all three of the dietary conditions. At both elevations rats receiving a high fat diet accumulated more body fat than those receiving carbohydrate or protein diets. Altitude did not affect the fat-free body mass, but a calculated shift of protein from muscle to nonmuscle tissue was observed in the animals at climax. The effect of diet on the relative amount of estimated muscle protein at both elevations was in the following order protein carbohydrate fat. Although total body water from the extra- to the intracellular space was observed. Author (TAB)

N71-11099# Army Medical Research and Nutrition Lab., Denver, Colo. Fitzsimons General Hospital.
THIAMINE METABOLISM IN MAN
M. R. Ariaey-Nejad, M. Balagni, E. M. Baker, and H. E. Sauberlich Repr. From Amer. J. Clin. Nutr., v. 23, no. 6, Jun. 1970 p 764-778 refs
(AD-712238) Avail: NTIS CSCL 6/16

The metabolism of 2-14 C-thiazole-labeled thiamin and 2-14 C-pyrimidine-labeled thiamin was studied in four healthy young adult men. The orally administered labeled thiamin was almost completely absorbed with no measurable amount of 14 CO2 detected in the respiratory air. The half excretion time of the ingested label occurred within 9 1/2 -18 1/2 days and appeared to be related to the weight of the subject and the daily dietary intake of thiamin. Four radioactive peaks were obtained from the urine of three subjects who has ingested 2-14 C-thiazole-labeled thiamin and three peaks from the urine of subject who has received 2-14 C-pyrimidine-labeled thiamin. Approximately 50% of the thiamin activity present in the urine was thus found due to metabolites other than that of free thiamin. One of the major urinary metabolites of 2-14 C-thiazole-labeled thiamin was positively identified as 4-methylthiazole-5-acetic acid. Also the thiazole moiety of thiami and thiamin. One of the major urinary metabolites of thiamin, which contained both the pyrimidine and the thiazole moieties, appeared to be a conjugation of thiamin or a derivative with a peptide moiety. Author (TAB)

N71-11100# National Air Pollution Control Administration. Washington, D.C.
CONSULTATION ON THE PHOENIX-TUCSON INTRASTATE AIR QUALITY CONTROL REGION (ARIZONA)
Sep. 1969 58 p refs
Avail: Issuing Activity

Air pollution as a regional problem is studied in southern Arizona, including the Phoenix and Tucson metropolitan areas (designated the Phoenix-Tucson Intrastate Air Quality Control Region by the Department of Health, Education and Welfare). Topological factors, pollutant emissions, and meteorological factors are discussed. F.O.S.

N71-11101 Pennsylvania Univ., Philadelphia.
STUDIES OF THE TOXIC EFFECTS OF OXYGEN AT ONE ATMOSPHERE ON TISSUE METABOLISM IN VITRO
Carolyn Diane Williams (Ph.D. Thesis) 1969 161 p
Avail: Univ. Microfilms: HC $7.60/Microfilm $3.00 Order No. 69-21459

The mechanisms by which oxygen produces toxic effects on cellular metabolism was investigated. Several metabolic systems were studied in vitro including glycolysis, the tricarboxylic acid cycle and reactions of isolated mitochondria. Oxygen increases latent mitochondrial ATP-ase activity. This toxic effect of oxygen is potentiated by either ferrous or cupric ions. The action of Fe(++) may be related to a stimulation of lipid peroxidation while that of Cu(++) may involve the oxidation of sulfhydryl groups. Oligomycin, an inhibitor of oxidative phosphorylation reverses the stimulation of ATP-ase activity produced by oxygen. Since oligomycin also

inhibits DNP-stimulated ATP-ase activity, it is possible that oxygen and DNP act at the same step in oxidative phosphorylation. Dissert. Abstr.

N71-11102# Army Medical Research and Nutrition Lab., Denver, Colo.

SUBJECTIVE SYMPTOMATOLOGY AND COGNITIVE PERFORMANCE AT HIGH ALTITUDE

David A. Stamper, Robert A. Kinsman, and Wayne O. Evans Repr. from Percept. Motor Skills, no. 31, 1970 p 247-261 refs Prepared in cooperation with Army Res. Inst. of Environ. Med.

(AD-712182) Avail: Copyright. NTIS CSCL 6/16

Further standardization of the General High Altitude Questionnaire GHAQ for use in quantifying the severity of acute mountain sickness is described. The results are related to changes in symptom severity. The amount of decrement on a number of psychomotor tasks is related to the degree of severity of the subjective symptomatology of acute mountain sickness. The results also are related to several conceptually clear symptom clusters of the GHAQ that appear to reflect different states of subjective symptomatology. Author (TAB)

N71-11103# Aerospace Medical Div. Aeromedical Research Lab. (6571ST), Holloman AFB, N. Mex.

CIRCULATORY IMPAIRMENT DURING EXPOSURE TO AMBIENT PRESSURES OF 4 mm Hg and 55 mm Hg

Alfred J. Pratt, Hubert L. Stone, Hugh F. Stegall, and William C. Kaufman Repr. from J. Appl. Physiol., v. 29, no. 2, Aug. 1970 p 177-180 refs Prepared in cooperation with AFSC, Brook AFB, Tex.

(AD-712188; ARL-TR-70-16) Avail: NTIS CSCL 6/19

The extent that the circulation is impaired under near vacuum conditions was investigated in five anesthetized dogs and one anesthetized chimpanzee decompressed from 380 mm Hg to 4 mm Hg in 1-2 sec and maintained at 4 mm Hg for 60 sec. Blood flow velocity, measured within the thoracic aorta with a catheter-tip Doppler flowmeter, severely decreased in dogs within 30 sec and approximated cessation in the chimpanzee after 10 sec. Aortic and vena caval pressures tended to equalize in dogs equilibrium and subsequent pressure gradient inversion resulted in the chimpanzee. Mechanical events associated with gas expansion and especially water vaporization were believed largely responsible for these effects. Anoxi bradycardia, similar in both species, ensued also. Anoxic anoxia, uncomplicated by water vaporization after decompression from 431 mm Hg to 5 mm Hg, failed to seriously impair cardiovascular function in dogs, but apparently was accompanies in the chimpanzee by mechanical events from gas expansion sufficient to block the circulation. Differences in responses in these two species probably involved the physical characteristics of the torso. Author (TAB)

N71-11104 California Univ., San Diego.

THE MECHANISM OF HYDROGEN EVOLUTION BY ALGAE

Frederick Patrick Healey (Ph.D. Thesis) 1969 146 p

Univ. Microfilms: HC$7.00/Microfilm $3.00 Order No. 70-1040

During the present study, H2 evolution has been observed only in species of Chlamydomonas, Chlorella, and Scenedesmus. Based primarily on the response of photoevolution of H2 to DCMU, it appears that algae can obtain reductant for the photoevolution of H2 from either the oxidation of organics or the photooxidation of H2O, or from both these sources. Dissert. Abstr.

N71-11105# Joint Publications Research Service, Washington, D.C.

BIOMEDICAL PROBLEMS OF SPACE FLIGHT

Yu. G. Grigoryev, et al 28 Oct. 1970 335 p refs Transl. into ENGLISH from Russian reports

(JPRS-51660) Avail: NTIS

Conference papers are presented on space-oriented microbiology, physiology, biochemistry, pharmacology, radiobiology, bioengineering, psychology, and related topics. N.E.N.

N71-11106# National Air Pollution Control Administration. Washington, D.C. Div. of Abatement.

CHATTANOOGA INTERSTATE AIR QUALITY CONTROL REGION

Robert S. Russo Jun. 1970 13 p refs

Avail: Issuing Activity

A schematic map of the Chattanooga interstate quality control region is presented, along with data tables on (1) fuel usage and refuse disposal for Federal facilities, (2) annual fuel consumption of Federal facilities, (3) Federal contribution to air pollution, (4) Federal point sources, and (5) abatement program for Federal problem areas. A volunteer army ammunition plant in Hamilton County, Tennessee is briefly discussed. J.A.M.

N71-11107*# Techtran Corp., Glen Burnie, Md.

STUDIES OF THE SULPHUR-MAT FORMATION AND THE SULPHUR BACTERIA OF THE HOT MINERAL SPRINGS OF YUMOTO NEAR NIKKO [STUDIEN UEBER DIE SCHWEFELRASENBILDUNG UND DIE SCHWE-ELBACTERIEN DER THERMEN VON YUMOTO BEI NIKKO]

M. Miyoshi Washington NASA Nov. 1970 31 p refs Transl. into ENGLISH of J. of the Faculty of Sci., Imperial Univ. of Tokyo, v. 10, 1897 p 143-173

(Contract NASw-2037)

(NASA-TT-F-12738) Avail: NTIS CSCL 06M

A detailed description of the formation is given, including water temperature and currents data. The bacteria responsible for the formation, divided into colorless and colored varieties, are carefully enumerated and described. Laboratory experiments relating to the chemotactic sensitivities of Chromatium weissii, one of the colored varieties are described. The organism is also found to be sensitive to tactile stimuli. Author

N71-11108# National Air Pollution Control Administration. Washington, D.C. Div. of Abatement.

METROPOLITAN BALTIMORE INTRASTATE AIR QUALITY CONTROL REGION

L. L. Nagel Feb. 1970 29 p refs

Avail: Issuing Activity

The current status is presented of the federal facilities in the region with regard to implementation of the objectives prescribed by the Clean Air Act. Quantitative data on fuel burning and refuse disposal practices, air pollutant emissions, and abatement plans are included. Author

N71-11109# National Air Pollution Control Administration, Washington, D.C.

CONSULTATION ON THE METROPOLITAN DETROIT-PORT HURON INTRASTATE AIR QUALITY CONTROL REGION

Oct. 1969 53 p refs

Avail: Issuing Activity

A proposal for the boundaries of the metropolitan Detroit-Port Huron intrastate air and quality control region is presented along with the urban and engineering factors evaluations supporting the proposal. The urban factors evaluation consists of a review of existing governmental jurisdictions, current air pollution control

programs, demographic data, current urbanization, and projected patterns of urbanization. The engineering factors evaluation considers pollutant source locations, emissions, and the geographic extent of air pollutant concentrations in the ambient air. D.L.G.

N71-11110# Joint Publications Research Service, Washington, D.C.

HYPERBARIC EPILEPSY AND NARCOSIS

4 Nov. 1970 93 p refs Transl. into ENGLISH from the book 'Giperbaricheskiye Epilepsiya i Narkoz' Leningrad, 1968 p 3–5, 139–185, and 243–249

(JPRS-51714) Avail: NTIS

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1. DATA ON THE NARCOTIC EFFECT OF INCREASED PRESSURES OF NITROGEN, ARGON, AND HELIUM ON MAN V. V. Smolin et al p 5–25 refs (See N71-11111 02-04)

2. INITIAL MANIFESTATIONS OF NITROGEN NARCOSIS IN MAN G. L. Zaltsman p 26–35 refs (See N71-11112 02-04)

3. INITIAL MANIFESTATIONS OF HELIUM NARCOSIS IN MAN G. L. Zaltsman p 36–43 refs (See N71-11113 02-04)

4. DYNAMICS OF MANIFESTATIONS OF HYPERBARIC NARCOSIS IN MAN DURING EXPOSURE TO CONSTANT PRESSURE Z. S. Gusinskiy et al p 44–53 refs (See N71-11114 02-04)

5. COMBINED EFFECT OF INERT GASES UNDER PRESSURE ON MAN V. V. Smolin et al p 56–66 refs (See N71-11115 02-04)

6. GENERAL FEATURES OF EPILEPTIC AND NARCOTIC TYPES OF CENTRAL NERVOUS SYSTEM BREAKDOWN G. L. Zaltsman p 67–75 refs (See N71-11116 02-04)

N71-11111# Joint Publications Research Service, Washington, D.C.

DATA ON THE NARCOTIC EFFECT OF INCREASED PRESSURES OF NITROGEN, ARGON, AND HELIUM ON MAN

V. V. Smolin et al *In its* Hyperbaric Epilepsy and Narcosis 4 Nov. 1970 p 5–25 refs (See N71-11110 02-04)

Avail: NTIS

The investigations were conducted in a recompression chamber in which the pressure was increased with compressed air. The test subjects were placed in the apparatus and breathed a mixture of oxygen and one of the inert gases. A multichannel electroencephalograph and a special device for study of conditioned reflex activity were used in the experiments. The studies show that initial shifts and disorders of higher nervous activity and EEG changes have a unidirectional character and are regularly intensified with an increase of pressure. The effect of increased nitrogen and argon pressures on the following disorders of higher nervous activity are: reduced ability to do intellectual work, disorder of the fine coordination of hand movements, weakening of memory and attention span, changes in conditioned reflex motor activity, and reduction in distinction of auditory signal frequency. Changes in EEG patterns were revealed in a reduction of the amplitude and index of the alpha-rhythm and an increase in its frequency. R.B.

N71-11112# Joint Publications Research Service, Washington, D.C.

INITIAL MANIFESTATIONS OF NITROGEN NARCOSIS IN MAN

G. L. Zaltsman *In its* Hyperbaric Epilepsy and Narcosis 4 Nov. 1970 p 26–35 refs (See N71-11110 02-04)

Avail: NTIS

External manifestations of the initial stages of nitrogen narcosis and neurophysiological investigations were conducted on a group of test subjects who breathed air at pressures of 2, 4, 6, 8, and 10 atmospheres. Analysis of the test results and also of data of other investigators shows that the narcotic effect of atmospheric nitrogen appears in man at pressures of 6 atmospheres or higher in the form of various disorders of normal behavioral reactions, thinking activity, and perception, progressing from light euphoria to loss of consciousness. Different initial narcotic shifts and disorders have a diffuse and descending character, affecting primarily the most complexly organized and philogenetically 'young' functional formations of the brain. The principle EEG changes are reduced to suppression of the alpha-rhythm, domination of the rapid activity, and subsequent appearance of hypersynchronous slow activity. It is assumed that the nonspecific thalamo- and reticulo-cortical systems are the substrate of the shifts which set in. Author

N71-11113# Joint Publications Research Service, Washington, D.C.

INITIAL MANIFESTATIONS OF HELIUM NARCOSIS IN MAN

G. L. Zaltsman *In its Hyperbaric Epilepsy and Narcosis* 4 Nov. 1970 p 36–43 *refs* (See N71-11110 02-04)

Avail: NTIS

The external manifestations of helium narcosis and neurophysiological investigations were conducted on a group of test subjects who breathed 10 to 14% helium-oxygen mixtures at pressures of 10, 12, 14, and 16 atmospheres. Analysis of the results, and also of the data of other investigators, reveals an initial *narcotic effect of a helium environment at pressures of* 13 to 16 atmospheres or higher. The initial narcotic symptom is specific helium tremor of the upper extremities and trunk, with accompanying initial signs of bradykinesis, amimia, and rigidity of the muscles. Qualitative disturbances of the complex forms of cortical activity were not evident in a study of higher nervous activity. There was a definite general sluggishness of motor and verbal reactions, some reduction of ability to do intellectual work, and deterioration of *memory. The changes in the general tonus of the cortex are* connected with a direct change in the activity of the nonspecific thalamo-cortical system. The EEG studies showed a suppresion of alpha activity and a general shift of the biopotentials in the direction of higher frequencies. Author

N71-11114# Joint Publcations Research Service, Washington, D.C.

DYNAMICS OF MANIFESTATIONS OF HYPERBARIC NARCOSIS IN MAN DURING EXPOSURE TO CONSTANT PRESSURE

Z. S. Gusinskiy et al *In its* Hyperbaric Epilepsy and Narcosis 4 Nov. 1970 p 44–55 refs (See N71-11110 02-04)

Avail: NTIS

The dynamics of narcotic manifestations of nitrogen, argon, and helium in test subjects exposed to constant pressure for one hour was investigated. The studies show that the value of the partial gas pressure and the time of its effect weaken or intensify the narcotic effect. Constant pressures of an inert gas which cause initial narcotic effects improve the well-being of the test subjects and produce normalization of behavioral and EEG shifts. Constant inert gas pressures having a well-expressed narcotic effect lead to wavelike *changes in EEG patterns. High inert gas pressures lead* initially to improvement in the well-being of the subjects, with a later deterioration, and an increase of EEG shifts. Author

N71-11115# Joint Publications Research Service, Washington, D.C.

COMBINED EFFECT OF INERT GASES UNDER PRESSURE ON MAN

V. V. Smolin et al *In its* Hyperbaric Epilepsy and Narcosis 4 Nov. 1970 p 56–66 refs (See N71-11110 02-04)
Avail: NTIS

Ten investigations were conducted on four test subjects for the complex effect of nitrogen, argon, and helium used in the composition of three- and four-component respiratory mixtures at total pressures of 9, 16, and 17.5 atmospheres. The studies show an intensification of initial symptoms and narcosis during the simultaneous effect of 4 atmospheres of nitrogen and 3.5 atmospheres of argon on the organism. The simultaneous effect of 5 atmospheres of nitrogen and 12 atmospheres of helium produces no apparent intensification of narcosis. Author

N71-11116# Joint Publications Research Service, Washington, D.C.
GENERAL FEATURES OF EPILEPTIC AND NARCOTIC TYPES OF CENTRAL NERVOUS SYSTEM BREAKDOWN
G. L. Zaltsman *In its* Hyperbaric Epilepsy and Narcosis 4 Nov. 1970 p 67–75 refs (See N71-11110 02-04)
Avail: NTIS

The functional state of the central nervous system during development of epilepsy and narcosis in man and animals subjected to the effect of elevated pressures of oxygen and inert gases is discussed from the standpoint of evolutionary physiology. The two opposite processes of generalized pathological excitation of the central nervous system and generalized pathological inhibition are considered. The evolutionary approach assumes comparison of different types of regressive development of functional systems with each other and requires study of how the regularities of their progressive development are reflected in the disintegration of functions. R.B.

N71-11117# California Inst. of Tech., Pasadena. Kerckhoff Labs. of Biology.
EFFECT OF PROCAINE ON ASPHYXIAL RIGIDITY
Janett Trubatch and A. Van Harreveld Repr. from Exp. Neurol., v. 27, no. 1, Apr. 1970 p 76–89 refs
(Contract Nonr-220(34))
(AD-712212) Copyright. Avail: NTIS CSCL 6/15

Procaine 0.2-0.5% was applied to the motor nerve of the gastrocnemius-soleus muscle of cats showing either "secondary" or "late" tone after asphyxiation of the cord for appropriate periods of time. The drug tended to abolish the responses both to sinusoidal slow and fast 0.2-2 cycle/sec stretch of the muscle before the muscle action potentials elicited by a single shock to the sciatic nerve started to decline. Although secondary tone in contrast to the late tone is characterized by considerable gamma-efferent activity, both forms of asphyxial rigidity were similarly affected by procaine. It was, therefore, postulated that, in addition to the selecteive effect of procaine on the gamma-efferents, this local anesthetic also affects the transmission of high frequency impulse trains in the Ia fibers, which represent the input for the myotatic reflex underlying the response of the muscle to stretch. Evidence was obtained that in the concentrations and time of application used to affect the stretch responses procaine impedes the transmission of high frequency trains of impulses. Author (TAB)

N71-11118# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.
EFFECTS OF TEMPORAL AND QUANTITATIVE DIETARY VARIABLES ON VIGILANCE PERFORMANCE
Margaret E. Kassouny, Charles G. Halcomb, and Barry P. McFarland Jun. 1970 16 p refs Submitted for publication
(Contract DAAD05-69-C-0102; Proj. Themis)
(AD-711564) Avail: NTIS CSCL 6/5

The purpose of the study was to define the effects of temporal as well as quantitative dietary variables on the performance of a vigilance task by a select group of subjects. A major objective was to determine intervals of time between ingestion and performance, and of meal size, which resulted in optimal maintenance of performance. Author (TAB)

N71-11119# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.
MONITORING PERFORMANCE WITH A TIME-SHARED MEMORY TASK
Charles G. Halcomb, Barry P. McFarland, and Nathan R. Denny Jun. 1970 16 p refs Submitted for publication
(Contract DAAD05-69-C-0102; Proj. Themis)
(AD-711565) Avail: NTIS CSCL 5/10

Thirty subjects participated in an auditory vigilance task, time-shared with a memory task. The results were examined for change in memory performance when performed independently or time-shared with the vigilance task. The vigilance performance demonstrated the classical vigilance decrement. Theoretical implications are suggested. Author (TAB)

N71-11120# *Dunlap and Associates, Inc., Santa Monica, Calif.*
ADAPTIVE TECHNIQUES IN PSYCHOPHYSIOLOGICAL MEASUREMENT
Daniel J. Prosin Aug. 1970 22 p refs
(Contract Nonr-4986(00))
(AD-712124) Avail: NTIS CSCL 6/16

The document reports on five studies in which different adaptive technique mechanizations were undertaken to demonstrate the possible uses of such technique in psychophysiological research. Galvanic skin response, respiratory cycle phase and reaction time were the responses utilized to control, in each case, some aspect of the task or stimuli. In the first study, galvanic skin response (GSR) was to be used to control the difficulty of a tracking task; in the second, GSR was used to control the presence or absence of a noxious stimulus in a conditioning paradigm; the third used GSR to control the time of presentation of stimuli in measurement of reaction time (RT), while respiratory cycle phases were used to control the presentation of RT stimuli in the fourth. In the last study reported, reaction times were used to control the intensity of subsequent reaction time stimuli. Author (TAB)

N71-11121# Army Aeromedical Research Lab., Fort Rucker, Ala.
MEDICAL AND PHYSIOLOGIC EFFECTS OF EJECTION AND PARACHUTING, AN OVERVIEW
Stanley C. Knapp Aug. 1970 20 p refs
(AD-711928; USAARL-71-9) Avail: NTIS CSCL 6/7

Design requirements for ejection seats and personal survival equipment sometimes omit as a criterion - man's physiologic and psychologic limitations. Man's ability to come through the ejection and parachute descent sequences uninjured is influenced directly by the design of the equipment and his experience in the techniques of proper use. Many limiting physiologic factors must be considered. Response to multiple accelerations in multiple axes, wind blast, effects of temperature extremes, anthropomorphic problems, and neuromuscular response are among the factors discussed. Engineers will find a knowledge of human factors vital to the design of seat restraint systems, cushions, accessory packs, control placement, catapults, the parachute, and etc. This broad overview reviews significant literature on sport free fall, military static line, HALO, and ejection parachuting statistics. Modes of injury and morbidity during ejection and parachuting are detailed. Author (TAB)

N71-11122# Duke Univ., Durham, N.C. Medical Center.
BRAIN ADENOSINE TRIPHOSPHATE: DECREASED CONCENTRATION PRECEDES CONVULSIONS
Aaron P. Sanders, Richard S. Kramer, Barnes Woodhall, and William D. Currie Repr. from Science, v. 169, 10 Jul. 1970 p 206–208 refs
(Contracts N00014-67-A-0251-0002; PHS-GM-14226-03)
(AD-712242) Copyright. Avail: NTIS CSCL 6/1

The concentration of adenosine triphosphate in the brain decreased before the onset of generalized convulsions in unanesthetized rats subjected to acute hypoxia or treated with hydroxylamine or pentylenetetrazole Metrazol. As the convulsive

episode continued, adenosine triphosphate decreased further. Stimulation of adenosine triphosphate production forestalled its disappearance from the brain and delayed the development of seizure activity. Author (TAB)

N71-11123# Indiana Univ., Indianapolis. Dept. of Biochemistry.
HYPOXIA AND PARA-AMINOPROPIOPHENE AS RADIOPROTECTIVE AGENTS Final Report
John F. Bonner, Jr. 25 May 1970 9 p refs
(Contract AT(11-1)-1223)
(COO-1223-15) Avail: NTIS

Reaction mechanisms involved in the radioprotective effects of hypoxia and p-aminopropiophenone (PAPP) were investigated in mice. High pressure oxygen was found to increase the sensitivity of mice to x-rays. Methemoglobin producing drugs, antioxidants, and sulfhydryl compounds did not increase the survival of mice exposed to five atmospheres of oxygen. High partial pressures of CO2 provide a measurable radioprotective effect in mice. N-hydroxy-p-aminopropiophenone appeared to be the metabolite of PAPP responsible for the production of methemoglobinemia in experimental animals. The metabolism of PAPP was found to be complex; seven compounds were identified and at least two remain to be identified in mouse urine. Benzhydrazide prevented the production of methemoglobin by PAPP both in vivo and in vitro, presumably by blocking the N-hydroxylating enzymatic pathway. Author (NSA)

N71-11124# Oak Ridge Associated Universities, Tenn. Medical Div.
THEORY OF QUANTITATIVE RADIATION-RESPONSE TIME-DATA
Per-Erik E. Bergner Oct. 1969 25 p refs
(ORAU-109) Avail: NTIS

Preliminary results are given of an attempt to interpret partly unique clinical data obtained from patients with chronic lymphocytic leukemia. The data consist of white cell counts and platelet counts recorded for 42 days following a single, whole-body, therapeutic dose of gamma radiation. A definition of response mechanism is given in terms of effect and repair functions, and the possibility of significant differences of practical value is shown by analyses. The influence of dose level on both the magnitude and the kinetics of the response mechanism is analyzed quantitatively, and the value of conceptual, as opposed to statistical, analysis of biomedical data is discussed. NSA

N71-11175# Massachusetts Inst. of Tech., Cambridge. Dept of Mathematics.
COMPUTER RECOGNITION OF PRISMATIC SOLIDS
Arnold Koons Griffith (Ph.D. Thesis) Aug. 1970 182 p refs
(Contract N00014-20-A-0362-0002; Proj. Mac)
(AD-712069; MAC-TR-73) Avail: NTIS CSCL 6/4

An investigation is made into the problem of constructing a model of the appearance to an optical input device of scenes consisting of plane-faced geometric solids. The goal is to study algorithms which find the real straight edges in the scenes, taking into account smooth variations in intensity over faces of the solids, blurring of edges and noise. A general mathematical analysis is made of optimal methods for identifying the edge lines in figures, given a raster of intensities covering the entire field of view. There is given in addition a suboptimal statistical decision procedure, based on the model, for the identification of a line within a narrow band on the field of view given an array of intensities from within the band. A computer program has been written and extensively tested which implements this procedure and extracts lines from real scenes. Other programs were written which judge the completeness of extracted sets of lines, and propose and test for additional lines which had escaped initial detection. The performance of these programs is discussed in relation to the theory derived from the model, and with regard to their use of global information in detecting and proposing lines. Author (TAB)

N71-11176# Human Resources Research Organization, Alexandria, Va.
HUMRRO RESEARCH IN TRAINING TECHNOLOGY
Jun. 1970 42 p refs Conf. held at Fort Monroe, Va. *Its* Profess. Paper No. 21-70
(Contract DAHC-19-70-C-0012)
(AD-712285) Avail: NTIS CSCL 5/9

The paper records four presentations on research and development in educational technology. The presentations describe research activities on individual training, with low apitude personnel and research in aviation training and aviation training devices. Author

N71-11177*# AiResearch Mfg. Co., Los Angeles, Calif.
ADVANCED EXTRAVEHICULAR SPACE (AES) SUIT Final Report
17 Aug. 1970 360 p
(Contract NAS9-7555)
(NASA-CR-108666; Rept-70-6613) Avail: NTIS CSCL 06K

A summary of achievements of the AEC program is presented along with conclusions and recommendations. Separate sections deal with: (1) program management and control; (2) system engineering; (3) system effectiveness; and (4) design and development. D.L.G.

N71-11178# Human Factors Research, Inc., Goleta, Calif.
HUMAN MONITORING PERFORMANCE Final Report, 1963 -1970
C. H. Baker, James F. O'Hanlon, Jr., William K. Earl, Donald N. Buckner, and Charles Abrams Aug. 1970 38 p refs
(Contract Nonr-4120(00))
(AD-711350; Rept-750-F) Avail: NTIS CSCL 6/16

The two general purposes of the research were: to increase knowledge of the relations of psychological and physiological variables to human monitoring performance, with the aim that such an increase would have practical implications for the many situations in Naval operations that require operators to remain alert over extended vigils; and to investigate display design variables and concepts that might enhance human monitoring performance. Author (TAB)

N71-11180# IIT Research Inst., Chicago, Ill.
DESIGN, DEVELOPMENT AND FABRICATION OF A PERSONNEL ARMOR LOAD PROFILE ANALYZER Final Report
F. Scribano, M. Burns, and E. R. Barron (Army Natick Labs., Mass.) Natick, Mass. Clothing and Org. Mater. Labs. Apr. 1970 121 p refs *Its* C and PLSEL No. 75
(Contract DAAG17-69-C-0008)
(AD-711876; USA-NLABS-TR-70-65-CE) Avail: NTIS CSCL 19/4

The purpose of the program was to design, develop, and fabricate an instrument which could locate and sense loads induced on the body of a person wearing protective armor, and to compare suspensions and suggest improvements which could be incorporated in current or future load-carrying systems. The development of a 'Personnel Armor Load Profile Analyzer' saw the attainment of a method of sensing loads, the integration and positioning of sensors in a suitable garment, a method of displaying information, and the correlation of output data to torso sensitivity. It was found that armor suspension systems could effectively be evaluated using this instrument. Static and dynamic load patterns were displayed and

the shift in these patterns with articulation could be observed. The data obtained from the display could provide guidelines for improving suspension system design by determining whether a particular suspension was effective in distributing loads on the optimum load-bearing areas of the torso. The progressive electrical contact sensor approach provided a direct reading system with maximum reliability, ruggedness, and versatility. In addition, the system did not require special signal conditioning equipment. The variable inductance sensor approach produced an analog sensor output converted to a digital display. Author (TAB)

N71-11181# National Bureau of Standards, Washington, D.C. Technical Analysis Div.

MAN, HIS JOB, AND THE ENVIRONMENT: A REVIEW AND ANNOTATED BIBLIOGRAPHY OF SELECTED RECENT RESEARCH ON HUMAN PERFORMANCE

William G. Mather, III, Boris V. Kit, Gail A. Bloch, and Martha F. Herman Oct. 1970 108 p refs Prepared for Post Office Dept. Human Factors Group

(NBS-Spec-Publ-319) Avail: SOD $1.00 Catalog No. C-13.10:319

Recent scientific literature was searched to review procedures currently being used to study human reactions to work and environmental stress. An ecological context is followed, considering task variables, environmental conditions, individual variations in subjects, and physiological, psycho-physical, psychological, and sociological responses. The different types of research reviewed included analyses of the job performance, simulations of real life situations, laboratory experiments with human and nonhuman subjects, and clinical studies. A methodological program is suggested for measuring the expenditure of effort in work situations. In addition to an extensive bibliography, detailed abstracts of 190 research reports are presented. Author

N71-11182# Royal Aircraft Establishment, Farnborough (England).

THE MAXIMUM DETECTION RANGE AND DISCOVERY OF LAND VEHICLES, FIRST SUPPLEMENT [DIE MAXIMALE AUFFASSREICHWEITE UND DIE AUFFINDBARKEIT VON LANDFAHRZEUGEN, 1 FORTSETZUNG]

H.-E. Hoffmann Jun. 1970 28 p refs Transl. into ENGLISH of German report DFVLR-0597- Supplement to DFL-0475

(RAE-Lib-Trans-1485; DFVLR-0597; DFL-0475) Avail: NTIS

A previous DFL-Bericht, No. 0475, dealt with the maximum detection range of and the search for land vehicles. In 1968 some of the tests involved were repeated with different observers, and in particular with a larger number of observers. The new tests, which were intended to explore how the maximum detection range depends on horizontal standard visibility, yielded to considerably smaller ranges than those of the previous year. The reason for these differences probably lies in the inexperience of the 1968 observers. They were unfamiliar with the changes in the appearance of an object with increasing distance. Where comparisons were possible, all the other investigations showed results similar to those found the year before. Author

N71-11183# National Bureau of Standards, Washington, D.C.

INVESTIGATION OF COLOR VISION OF DICHROMATS. SIGNIFICANCE OF THE INVESTIGATION OF VISION OF DICHROMATS AND THE METHODS OF INVESTIGATION

N. D. Nuberg et al 1969 175 p refs Transl. into ENGLISH from Russian report

(PB-190416T) Avail: NTIS CSCL 06P

The special characteristics of the vision of dichromats have always served and continue to serve as one of the most important criteria for assessing various theories of color vision. Therefore, in works on dichromatism various experimental facts are often stated from the point of view of a specific physiological theory. This sometimes leads to a mixture of results, not directly received from experiment, with conclusions based on specific hypothetical premises. In the beginning of our experimental research a number of facts were fixed. These facts are the following: (1) The additivity of colors is the same for normal trichromats as for dichromats. (2) Tri-dimensionality of color functions of trichromats and bi-dimensionality of dichromats. (3) The acceptance by dichromats of normal color equalities. Author (USGRDR)

N71-11184# Naval Training Device Center, Orlando, Fla. Human Factors Lab.

AN INTEGRATED APPROACH TO THE STUDY OF LEARNING, RETENTION, AND TRANSFER. A KEY ISSUE IN TRAINING DEVICE RESEARCH AND DEVELOPMENT

Arthur S. Blaiwes and James J. Regan Aug. 1970 36 p refs

(AD-712096; NAVTRADEVCEN-IH-178) Avail: NTIS CSCL 5/9

The report summarizes the approach, rationale, and some of the results of an effort being made to acquire information on learning, retention, and transfer which can be applied toward the solution of military training problems. A review of some relevant psychological theories and an analysis of some of the relevant research literature are included. Author (TAB)

N71-11185*# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.

ON FEATURE REDUCTION WITH APPLICATION TO ELECTROENCEPHALOGRAMS

Karkal Pulkeri Sheshagiri Prabhu Sep. 1970 159 p refs

(Grant NGL-22-007-143; Contract N00014-67-A-0298-0006)

(NASA-CR-111385; TR-615) Avail: NTIS CSCL 06B

The discrimination between two kinds of electroencephalogram (EEG) signals recorded from a human subject, spontaneous EEG and EEG driven by photic stimuli at the alpha frequency are reported. The feature reduction methods available are examined critically. A nonparametric feature reduction method based on a distance measure is developed, using the sampled values of the EEG. The computations involved in feature reduction also yield the best separating hyperplane at each stage. The error rate is less than five percent when the decisions are based on twenty periods of the alpha frequency. A random process model is developed for the two kinds of EEG signals based on the fact that the EEG driven at the alpha frequency has more phase coherence than the spontaneous EEG. The model is then employed for feature reduction and pattern classification. Author

N71-11186*# Texas Univ., Houston. Dental Science Inst.

STUDY TO DEFINE AND VERIFY THE PERSONAL ORAL HYGIENE REQUIREMENTS FOR EXTENDED MANNED SPACE FLIGHT Annual Report, 1 Aug. 1969 – 30 Aug. 1970

Lee R. Brown, Merrill G. Wheatcroft, and Sandra Allen 30 Aug. 1970 56 p refs

(Contract NAS9-8200)

(NASA-CR-108695; AR-2) Avail: NTIS CSCL 06I

Oral hygiene requirements for extended manned spacecraft flights were studied with small primates housed in a hyperbaric chamber simulating spacecraft environments. The primary objectives were to obtain a marmoset oral census before, during, and after isolation in the simulated environment, and to test sampling techniques that would be applicable to man. The results show: (1) Diarrhea and weight loss was a persistent problem associated with chamber isolation. (2) Significant increments of total anaerobes, bacteroides, neisseria, and streptococci occurred. (3) The greatest numerical change in the oral microflora of isolated animals was an increase in staphylococci. (4) The mouth may act as a reservoir for potentially pathogenic organisms. F.O.S.

N71-11187# Department of Labor, Washington, D.C. Manpower Administration.
PILOTS AND MECHANICS IN CIVIL AVIATION, 1967–1977. A STUDY OF MANPOWER REQUIREMENTS. PART 1: CURRENT SITUATION AND THE SHORT-RANGE OUTLOOK (MANPOWER ADMINISTRATION). PART 2: LONG-RANGE MANPOWER REQUIREMENTS (BUREAU OF LABOR STATISTICS)
1970 105 p refs
Avail: SOD $1.00

A study designed to evaluate current and future requirements and resources for pilots and mechanics in civil aviation in the United States over a ten-year period is presented. The first part of the study provides an analysis of current and short-range requirements and resources in each of the principle sectors of civil aviation, both in the airlines and general aviation categories. The second part presents projections of long-range manpower requirements, also by principle sectors of civil aviation, and the methods used to derive the projections. The data were derived from airlines, firms in general aviation, aviation schools, aircraft manufacturers, trade associations, trade unions, and government agencies. Author

N71-11188# Uniroyal, Inc., Wayne, N.J. Research Center.
RESEARCH AND DEVELOPMENT ON A PASSIVELY PRESSURIZED FLIGHT UNIFORM Final Report, Jul. 1966–Oct. 1968
Robert A. Fowkes and Mark W. Olson Wright-Patterson AFB, Ohio AFML Dec. 1969 35 p
(Contract AF 33(615)-5261)
(AD-702537; AMRL-TR-69-56) Avail: NTIS CSCL 6/17

A high altitude protection suit of the partial pressure type was developed that utilizes 40 sealed cells, each containing a small air charge which expands according to Boyle's law when the atmospheric pressure is reduced. The independently acting, expandable, tubular cells are restrained within a stretch resistant but porous coverall in a manner to allow them to pressurize the body of the wearer. When the coverall is worn with pressure gloves, boots and a pressure helmet, it is possible to pressurize the entire body sufficiently for altitude exposure up to 100,000 feet for at least several minutes. The suit is fabricated of NOMEX material, with pleated cells of polyurethane, and an inner comfort liner. The experimental suits were evaluated through actual wear in altitude chambers and the results confirm the potential of this approach for providing aircrew protection. Further refinement is needed to obtain a design more suitable for use in the field and to assure balanced respiratory pressures. Author (USGRDR)

N71-11189* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
BIOMEDICAL ELECTRODE ARRANGEMENT Patent
James A. Roman, inventor (to NASA) Issued 20 Oct. 1970 (Filed 24 Mar. 1967) 12 p Int. Cl. A61b5/04
(NASA-Case-XFR-10856; US-Patent-3,534,727;
US-Patent-Appl-SN-626376) Avail: US Patent Office CSCL 06B

An electromedical device is described for applying vectorcardiograph-type electrodes to a patient's body so that data may be gathered while the patient is physically active. The electrodes provide signals with a high signal-to-noise ratio. An elastic garment, tailored to tightly fit a selected naked portion of a human torso, supports a plurality of electrodes. The electrodes are flexible with an elastic layer of conductive cloth. The conductive layer of each electrode is electrically connected by a separate conductive wire to an output connector which may be connected to a standard vectorcardiogram recording device. J.M.

N71-11190* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
HELMET ASSEMBLY AND LATCH MEANS THEREFOR Patent
Robert L. Jones, inventor (to NASA) Issued 24 Mar. 1970 (Filed 3 Jan. 1966) 12 p Cl. 128-142.5; Int. Cl. A62b7/00; Intl. Cl. A42b3/00
(NASA-Case-XMS-04935; US-Patent-3,502,074;
US-Patent-Appl-SN-518487) Avail: US Patent Office CSCL 06K

A single unit construction, transparent-polycarbonate resin shell helmet assembly is described. The shell is shaped to allow complete freedom of normal head movement. An air distributing and shock absorbing pad secured in the rear of the shell cooperates with an air valve in the suit for supplying breathing, cooling, and defogging air. An automatic latch secures the shell to a pressurized flight suit with a push button release. Impact protection for severe impact is provided by a removable internal bump cap and an external pad. The communications are carried on a skull cap which can be worn with or without the shell and an extravehicular, snap-on visor assembly is provided to protect the wearer against glare and radiation. Various views of the shell helmet are included. J.M.

N71-11191# Joint Publications Research Service, Washington, D.C.
LIFE SUPPORT PROBLEMS IN SPACE
6 Nov. 1970 26 p refs Transl. into ENGLISH of eight Russian pamphlets
(JPRS-51736) Avail: NTIS

An artificial earth satellite for studying solar X-rays and ultraviolet radiation was developed based on the Cosmos series; it is permanently oriented toward the sun. The launching and landing dates, weight (kg), perigee, apogee, orbital period, orbital inclination, flight data, and cosmonauts of Vostoch and Voskod spacecraft are given. Various medical investigations on Soviet satellites are briefly mentioned, emphasizing the Cosmos 110 experiment. A state-of-the-art review is presented for bioengineering of life support systems. J.A.M.

N71-11192# Becton, Dickinson and Co., Raleigh, N.C. Research Center.
THE TYPES OF BIOLOGICAL INDICATORS USED IN MONITORING STERLIZATION PROCESSES
William S. Miller 23 Nov. 1970 12 p refs Presented at the Ann. Conv. of the Parenteral Drug Assoc., New York, 11-13 Nov. 1970
(TR-34) Avail: NTIS

Several types of biological indicators were reviewed. The preliminary work which preceded their selection and the bases on which a particular indicator was evaluated are given. Information is provided on the importance of preparation method in order to obtain consistent indicator performance. Studies of a number of factors influencing organism resistance indicate that method of preparation can result in resistance differences greater than those normally seen between common indicator species. The critical points for the valid use of biological indicators include correlation of resistance with that of the most resistant organism found on the materials before sterilization, certified and adequately controlled sterilization cycles, uniformity in indicator production and comprehensive sterility test programs for both indicators and products. Author

N71-11193* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ELECTRODE CONSTRUCTION Patent
Richard M. Westbrook and Joseph J. Zuccaro, inventors (to NASA) Issued 28 Apr. 1970 (Filed 16 Oct. 1967) 5 p Cl. 128-2.1; Int. Cl. A61b5/04
(NASA-Case-ARC-10043-1; US-Patent-3,508,541;
US-Patent-Appl-SN-676012) Avail: US Patent Office CSCL 06B

An electrode construction comprising a cap of insulating

material attached to the helmet of the subject for detecting low level signals from the skin of living creatures is described. The electrode member is positioned adjacent a layer of permeable material such as compressed AgCl, which maintains its position by a rigid disc of fritted glass fixedly mounted in the cap. A resilient permeable material e.g. sponge is carried by the cap and engages the fritted glass disc. This device which has a low source impedance and is substantially free of motion artifacts, is particularly adapted for use in obtaining EEG and other data. The size of the helmet and liner, as well as the length of the electrodes may be adapted to fit the subject. E.M.C.

N71-11194* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

SPACE SUIT PRESSURE STABILIZER Patent

Donald E. Barthlome, inventor (to NASA) Issued 20 Oct. 1970 (Filed 6 Sep. 1968) 9 p Cl. 2-2.1; Int. Cl. A62b17/00; Int. Cl. F16l55/04

(NASA-Case-XLA-05332; US-Patent-3,534,407; US-Patent-Appl-SN-757861) Avail: US Patent Office CSCL 06K

A space suit having a compensator system designed to maintain the pressurizing gas inside the inflatable space suit at a constant pressure and volume is described. In operation the compensator receives the excess inflation volume forced out of the bent joint and returns this excess volume to the joint when the limb is again straightened without a corresponding change in suit pressure at the bent joint. This eliminates the necessity for constant volume joints in the space suit. Accordingly, the pressure stabilizer minimizes the energy required by an astronaut to bend his limbs during extravehicular activity and at other times. The pressure stabilizer in a backpack arrangement is connected to, and in fluid communication with the interior of the space suit. Detailed descriptions are included with drawings of the space suit. E.M.C.

N71-11195* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

EQUIPOTENTIAL SPACE SUIT Patent

Donald E. Barthlome, inventor (to NASA) Issued 20 Oct. 1970 (Filed 24 Oct. 1968) 9 p Cl. 2-2.1; Int. Cl. B63c11/04

(NASA-Case-LAR-10007-1; US-Patent-3,534,406; US-Patent-Appl-SN-770203) Avail: US Patent Office CSCL 06K

The equipotential space suit aims at utilizing simple spring type mechanical aids, termed joint assists, which minimize the energy requirements imposed upon the astronaut to bend his limbs while wearing the space suit. It also contains joints which possess reliable construction features permitting pressurization well within the region associated with a two gas system. The basic suit is assumed to be inflatable and has separable sections joined together; the joint assist mechanisms, disposed exterior of the suit at each movable joint, keep the bent joint in a state of near-neutral equilibrium. Consequently, the astronaut need only supply energy associated with inertia and friction. A detailed description and drawings are included. An additional mechanism for assisting in movement of the hip joint includes an inverted V-shaped housing with a pair of movable pistons, each under the influence of a coil spring. E.M.C.

N71-11196# Battelle-Northwest Richland, Wash. Pacific Northwest Lab.

USE OF SOLID STATE DETECTORS FOR ORGAN COUNTING

D. McConnon Jul. 1970 13 p refs

(Contract AT(45-1)-1830)

(BNWL-1178) Avail: NTIS

Results of in vivo measurement of a complex mixture of gamma emitters with conventional whole body or organ counting systems are often unsatisfactory because of the poor resolution of the counting system. The possibility of eliminating this problem by the use of a counting system employing a high resolution solid state detector prompted study of such a system to determine its suitability in measuring amounts of radionuclides in individual organs. The response of a dual crystal Ge(Li) detector to gamma emitters contained in various organ compartments of an anthropomorphic phantom was measured. The study indicated that even though its sensitivity is poor relative to that of conventional organ counting systems, use of a solid state system may yield useful supplemental information for assessment of internal depositions, provided the amount deposited in the organ is sufficiently large, and that the background and counting geometry are controlled. Author (NSA)

N71-11197# Argonne Cancer Research Hospital, Chicago, Ill.

HIGH RESOLUTION OF RECTILINEAR BRAIN SCANNING: IS IT WORTH THE EFFORT?

Alexander Gottschalk 23 Jan. 1970 16 p Presented at the 2d Ann. Meeting of the Nucl. Med. Seminar, Miami Beach, Fla., 19–23 Jan. 1970

(ACRH-1000-190; CONF-700110-2) Avail: NTIS

The brain scanner at Argonne Cancer Research Hospital, consisting of four detectors and high-resolution collimators, is briefly described and compared to the conventional three inch scanner and Anger camera. NSA

N71-11198 Naval Personnel and Training Research Lab., San Diego, Calif.

TASK ANALYSIS REDUCTION TECHNIQUE (TART) FOR THE QUANTIFICATION OF HUMAN PERFORMANCE

Robert H. Ellis Sep. 1970 37 p refs

(AD-711807; SRM-71-7) Avail: NTIS CSCL 5/9

A Task Analysis Reduction Technique (TART) for collecting human factors information was developed and applied to the anti-submarine warfare tactical data system. TART is a specific procedure for analyzing the man/machine interface which allows the researcher to analyze sequential properties of the man/machine interaction. The technique is based on an analysis of the interface at a task level and uses closed circuit television and video tape recording apparatus. A trial application was performed using four air detector/trackers who were presented a one-hour air scenario in the anti-submarine warfare tactical data system. The results section presents various breakdowns of the TART data and indicate that TART can provide valuable insight into man/machine design and training effectiveness decisions. Author (TAB)

N71-11199* Martin-Marietta Corp., Baltimore, Md.

EMERGENCY ESCAPE SYSTEM Patent

Wolfgang G. Offik, inventor (to NASA) Issued 26 Jul. 1966 (Filed 29 Oct. 1964) 6 p Cl. 182-191 Sponsored by NASA

(NASA-Case-XKS-02342; US-Patent-3,262,518; US-Patent-Appl-SN-407603) Avail: US Patent Office CSCL 06G

An escape system for evacuating personnel from tall buildings where there is a possibility of explosions, such as launch towers, is described. A rescue cabin is guided through a domed roof into an underground shelter. The bottom of the cabin is conical and penetrates a bed of granular material, providing the deceleration. When the cabin is at rest the personnel depart and proceed through an underground tunnel. The shelter roof prevents liquid propellants from entering the shelter before the cabin crashes through it, and only a comparably small opening is made by the cabin. The roof is easily replaced to allow for training. N.E.N.

N71-11200# Mine Safety Appliances Co., Pittsburgh, Pa.

DEVELOPMENT AND FABRICATION OF A POLYCARBONATE EYESHIELD FOR THE US ARMY FLYER'S HELMET Final Report

Abraham L. Lastnik (Army Natick Labs., Mass.), Bruce T. Cleavly, and John B. Brown Natick, Mass. Natick Labs. Jun. 1970 29 p refs *Its* C and PLSEL No. 76
(Contract DA-19-129-AMC-332)
(AD-712313; USA-NLABS-TR-71-3-CE) Avail: NTIS CSCL 6/17

The need to provide U.S. Army aircrewmen with increased eye protection saw a production technique developed to make optically acceptable, shatter- and impact-resistant eyeshields from polycarbonate resin. It was found that production quantities of optically transparent polycarbonate lenses can be manufactured with a great deal of reliability by injection-molding processes. Injection-molding of polycarbonate lenses employs standard equipment and techniques. These, however, must be adjusted to account for the idiosyncrasies of the resin, e.g., hygroscopic and flow characteristics. In this fabrication project, the mold used was end-gated and highly polished. Of three available grades of resin, the material with the lowest molecular viscosity provided the best results. The development molds produced about 75,000 acceptable eyeshields which were made available to U.S. Army and Air Force airmen for immediate tactical use. The polycarbonate resin characteristics and molding techniques that influenced the design of the eyeshield, and the development of the fabrication technique are discussed. Also discussed are factors that governed the selection of material type, mold design, and quality assurance considerations. Author (TAB)

N71-11201# Washington Univ., Seattle. Dept. of Psychology.
COMBINATORIAL PROPERTIES OF PERSONAL PROBABILITIES
Scott Barclay and Lee Roy Beach 7 Sep. 1970 17 p refs
(Contract N00014-67-A-0103-0011)
(AD-712119; Rept-70-01-09) Avail: NTIS CSCL 5/10

An experiment in decision making examined the degree to which personal probabilities, subjective probabilities which need not have objective counterparts, conform to probability theory. Subjects gave subjective probability estimates from complex and elementary events. The degree of conformity to probability theory is evaluated by the degree to which probabilities for complex events could be predicted from the proper combination of the probabilities for elementary events. Author

N71-11202* North American Aviation, Inc., Los Angeles, Calif.
METHOD AND SYSTEM FOR RESPIRATION ANALYSIS Patent
Gordon W. Campbell and Robert K. Breeze, inventors (to NASA) Issued 21 Apr. 1970 (Filed 9 Feb. 1968) 6 p Cl. 73-23; Int. Cl. G01n7/02 Sponsored by NASA
(NASA-Case-XFR-08403; US-Patent-3,507,146;
US-Patent-Appl-SN-704420) Avail: US Patent Office CSCL 06B

A respiration analyzing method and apparatus are described for determining an individual's oxygen consumption in space environments. The apparatus consists of a mouthpiece connected with separate inlet and outlet lines, a breathing valve, and a flow meter on the inlet line. The volumes of inhaled and exhaled oxygen are determined by alternately sampling small amounts of inlet and outlet streams from the mouthpiece. The stream samples are directed to oxygen and carbon dioxide partial pressure sensors and a total gas pressure sensor. An explanation of the required calculations is included with diagrams of the apparatus. J.M.

N71-11203* Garrett Corp., Los Angeles, Calif.
PORTABLE ENVIRONMENTAL CONTROL SYSTEM Patent
William J. O'Reilly, Donald A. Myers, and Paul D. Peterson, inventors (to NASA) Issued 17 Mar. 1970 (Filed 16 Jan. 1969) 9 p Cl. 128-142.5; Int. Cl. A62b7/02; Int. Cl. A61m15/00; Int. Cl. F24f7/06 Sponsored by NASA
(NASA-Case-XMS-09632-1; US-Patent-3,500,827;
US-Patent-Appl-SN-791693) Avail: US Patent Office CSCL 06K

A portable environmental control system is described which is uniquely adapted for use by a crewman in extravehicular activity as well as within a spacecraft during a space flight mission. The system includes a breathable fluid circuit for pressurizing and supplying oxygen to a crewman's protective garment, and a liquid circuit for circulating and supplying a cooling liquid such as water to the protective garment. The breathable fluid and liquid circuits are heat exchange and pressure interrelated and circulation of both systems is mechanically induced by a single power system. As a result, volume and power requirements are greatly reduced and metabolic load capabilities are substantially increased. Descriptive drawings of the device are included. E.M.C.

N71-11204*# TRW, Inc., Cleveland, Ohio.
AIRCREW OXYGEN SYSTEM DEVELOPMENT CARBON DIOXIDE CONCENTRATOR SUBSYSTEM REPORT
R. G. Huebscher and A. D. Babinsky Jul. 1970 185 p refs
(Contract NAS2-4444)
(NASA-CR-73397; TRW-ER-7256-24) Avail: NTIS CSCL 06K

The results are presented of a program to develop a closed loop aircrew oxygen system which generates oxygen on-board the aircraft as required. A water electrolysis module is used as the oxygen generator, and the amount of oxygen required is decreased significantly through the use of a closed loop rebreather system. The rebreather loop functions to condition the exhaled gas such that it can be reused in the breathing cycle. The rebreather must remove exhaled carbon dioxide, nitrogen, water vapor, and heat. Removal of carbon dioxide is accomplished by an electrochemical carbon dioxide concentrating module. The module consists of cells in which two porous electrodes are separated by an asbestos capillary matrix containing an aqueous solution of an alkali metal carbonate. Cell plates adjacent to the electrodes provide passageways for distributing the gaseous reactants over the surface of the electrodes. Author

N71-11205# Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.
A MANUAL FOR ADAPTIVE TECHNIQUES: DESIGN, MEASUREMENT, RESEARCH AND TRAINING, APPLICATIONS OF THE DUNLAP ADAPTIVE TECHNIQUE Final Report
Charles R. Kelley and Erica J. Kelly 15 Aug. 1970 133 p refs
(Contract Nonr-4986(00))
(AD-711985; NR-196-050) Avail: NTIS CSCL 5/9

Adaptation in human tasks and man-machine systems occurs when a response is employed to modify the task, problem or stimulus. The method of adaptation developed and employed in the Dunlap and Associates, Inc. laboratories uses adjustment of an adaptive variable to keep a performance measurement constant. The adaptive variable can then be used as a new index of performance. The nature, history and usefulness of the Dunlap type of adaptive task or system are discussed. Guidelines for applying the technique in continuous and discrete tasks are developed, including four primary adaptive equations, and applications are described for the four forms of adaptive logic represented by these equations. Research studies directly relevant to the Dunlap adaptive technique are abstracted, and 66 references are listed. Author (TAB)

N71-11206*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO OPERATIONS HANDBOOK, EXTRAVEHICULAR MOBILITY UNIT. VOLUME 1: SYSTEM DESCRIPTION, CSD-A-789-(1), APOLLO 14
Jun. 1970 110 p refs Revised

(NASA-TM-X-66478; MSC-01372-1-Vol-1-Rev-4; CSD-A-789-(1)-Vol-1-Rev-4) Avail: NTIS CSCL 06K

The extravehicular mobility unit is designed to protect the crewman in a low pressure environment and provide comfort, mobility, dexterity, and a specified unobstructed range of vision during pressurized and unpressurized modes of operation. There are two basic configurations which support an Apollo mission; an intravehicular configuration which affords pressure and fire protection, and an extravehicular configuration which provides pressure, fire, thermal, and micrometeoroid protection. Connectors permit both configurations to interface with spacecraft systems for pressurization, ventilation, communications, cooling, and waste management purposes. The EV configuration incorporates the portable life support system (PLSS) for pressurization, ventilation, communications, and temperature control when used for EV phases of the mission. Waste management systems are self-contained in both configurations. Author

N71-11207* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

RECOVERY OF POTABLE WATER FROM HUMAN WASTES IN BELOW-G CONDITIONS Patent

Dan C. Popma and Vernon G. Collins, inventors (to NASA) Issued 13 May 1969 (Filed 8 May 1967) 9 p Cl. 202-182; Int. Cl. C02c1/00, 3/00; Int. Cl. B01d3/00

(NASA-Case-XLA-03213; US-Patent-3,444,051; US-Patent-Appl-SN-621715) Avail: US Patent Office CSCL 06K

A water reclamation system consisting of evaporator, condenser, and residue removal units is described. The system uses waste heat to obtain positive separation of clean vapors from the waste liquids. Solid waste salts are precipitated out of waste fluid by a combination of crystallization by cooling and filtration. The remaining waste fluid is recycled for further evaporation and separation from clean vapors. N.E.N.

N71-11476# Joint Publications Research Service, Washington, D.C.

SPACE BIOLOGY AND MEDICINE, VOLUME 4, NO. 4, 1970

26 Oct. 1970 137 p refs Transl. into ENGLISH of the periodical 'Kosmicheskaya Biologiya i Meditsina Moscow, Med. Publishing House, 1970 p 1-89

(JPRS-51641) Avail: NTIS

The articles presented pertain to human factors engineering, life support systems, biotechnology, physiological and radiation effects, and medical science. For individual titles, see N71-11477 through N71-11497.

N71-11477# Joint Publications Research Service, Washington, D.C.

ANALYSIS OF BLOOD PRESSURE CHANGES IN HEART CAVITIES AND LARGE VESSELS IN DOGS DURING ACCELERATIONS IN DIFFERENT DIRECTIONS

A. S. Barer et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 1-8 refs (See N71-11476 02-04)

Avail: NTIS

Dogs were exposed to accelerations of 2, 4, 6 and 10 g in a pelvis-to-head direction (at an angle of 0 deg), 4, 6, 10 and 12 g in a back-to-chest direction (at an angle of 90 deg), and 4, 6 and 10 g in a head-to-pelvis direction (at an angle of 180 deg). Miniature sensors were implanted in the right auricle and ventricle, the pulmonary artery, the thoracic and abdominal aortas for measuring blood pressure. The ECG, pneumogram and rectal pressure were also registered. During transverse accelerations the systolic and diastolic pressures increased in all the tested organs; this seems to be caused by increased resistance in systemic and pulmonary circulation. Author

N71-11478# Joint Publications Research Service, Washington, D.C.

ANALYSIS OF STABILITY OF EXTERNAL MASS EXCHANGE IN CLOSED LIFE SUPPORT SYSTEMS

V. M. Volynets et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 9-16 refs (See N71-11476 02-04)

Avail: NTIS

A mathematical model for mass exchange in closed life support systems is presented. A method for solving systems of equations and an evaluation of mass exchange stability are described. Author

N71-11479# Joint Publications Research Service, Washington, D.C.

SANITARY AND CHEMICAL STUDIES OF SOME POLYMERS

S. M. Gorodinskiy et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 17-26 refs (See N71-11476 02-04)

Avail: NTIS

A comparative evaluation of the sanitary and chemical properties of polymers is described. It takes into account such specific operating conditions as isolation of a chamber and its pressurization, high saturation of the chamber atmosphere by the material and low operating temperature. The sanitary and chemical studies of polymers were made in a vacuum, reduced oxygen pressure (0.2-0.4 atm), and also at atmospheric pressure. The temperature range studied was from room temperature to 200 F. More than 25 materials were studied, including those based on polyvinyl chloride, caprolactam, polycarbonate, polyurethanes, natural and synthetic fibers, rubbers, sealings, glass plastics and plexiglass. It is shown that the hygienic properties of polymers can be improved by vacuum processing, addition of stabilizers, heating, and washing with water. Author

N71-11480# Joint Publications Research Service, Washington, D.C.

COMPARATIVE EXPERIMENTAL STUDY OF THE CONTINUOUS AND INTERMITTENT EFFECT OF CARBON TETRACHLORIDE ON THE MICROSTRUCTURE OF ANIMAL ORGANS

G. P. Tikhonov et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 27-33 refs (See N71-11476 02-04)

Avail: NTIS

The pattern and level of pathomorphological and histochemical processes that developed in the liver of test animals continuously and intermittently breathing carbon tetrachloride in a concentration of 0.5 mg/liter are discussed. Structural and metabolic disturbances developed in the liver three to four times sooner during a continuous exposure than during an intermittent exposure (six hours) of the same total duration. Author

N71-11481# Joint Publications Research Service, Washington, D.C.

EFFECT OF HYPOKINESIA ON THE PROTEIN COMPOSITION OF SKELETAL MUSCLES

M. S. Gayevskaya et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 34-39 refs (See N71-11476 02-04)

Avail: NTIS

Experiments conducted on rats revealed that the animals did not develop hypokinesia immediately after their enclosure but only after extinction of the freedom reflex. During the period of muscular activity preceding hypokinesia the content of sarcoplasmic proteins decreased in the hind limb muscles whereas the quantity of myofibrillar proteins increased. The period of hypokinesia which followed considerably reduced the content of myofibrillar proteins

in skeletal muscles but caused no changes in the concentration and composition of sarcoplasmic proteins. Author

N71-11482# Joint Publications Research Service, Washington, D.C.

MORPHOLOGICAL AND SOME HISTOCHEMICAL CHANGES IN THE LIVER AND KIDNEYS OF RATS DURING PROLONGED HYPOTHERMIA

V. I. Starostin et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 40-45 refs (See N71-11476 02-04)
Avail: NTIS

A histologic and histochemical study was made of the liver and kidneys of rats exposed to 20 and 24 hour hypothermia. The animals killed during deep hypothermia exhibited the greatest changes. These included a decrease in phosphorylase activity and glycogen depletion (liver) and turbid swelling. These changes were accompanied by blood vessel congestion. Later most of the animals exhibited granulation tissue modules in the liver and some animals had structural damage of some kidney glomerules. After a long period of time most of the animals exhibited complete repair of liver and kidney structures. Author

N71-11483# Joint Publications Research Service, Washington, D.C.

CHOICE OF A CRITERION FOR EVALUATING RADIATION DAMAGE FOR DIFFERENT DOSE DEPTH DISTRIBUTIONS

Yu. G. Grigoryev et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 46-54 refs (See N71-11476 02-04)
Avail: NTIS

The influence of a nonuniform dose depth distribution on the radiobiological effect was investigated on dogs. The tissue dose along the midline of the body was 20 percent of the surface dose. A comparison of the biological effect for similar mean tissue doses revealed significant differences in the clinical picture and severity of radiation sickness. Author

N71-11484# Joint Publications Research Service, Washington, D.C.

MEDICAL SUPPORT FOR PROLONGED SPACE FLIGHTS

T. N. Krupina et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 55-60 refs (See N71-11476 02-04)
Avail: NTIS

Various problems involved in medical support of prolonged manned space missions are discussed. The authors stress the importance of experimental studies which may facilitate a reliable prediction and better understanding of the mechanisms of functional disturbances and diseases during prolonged flights. This is a necessary prerequisite for proper planning and timely rendering of in-flight medical assistance. It is also important to investigate the effect of various drugs on the human body, whose reactivity may change due to spaceflight factors, and to develop proper drugs and ascertain the correct dose. Some aspects of rendering specialized in-flight medical aid are described. It is emphasized that these problems can be solved only through the combined efforts of experts in different scientific fields. Author

N71-11485# Joint Publications Research Service, Washington, D.C.

HUMAN HEAT EXCHANGE STRUCTURE AND THE OVERHEATING MECHANISM AT HIGH AMBIENT TEMPERATURES

Ye. Ya. Shepelev *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 61-66 refs (See N71-11476 02-04)
Avail: NTIS

Experimental data on structure of the human heat balance at high ambient temperatures under ground conditions and at reduced atmospheric pressure are presented. The collected data are used in discussing the most probable primary mechanism for increase in body temperature. It is shown that at high temperatures and with maintenance of a physiological humidity deficit in the surrounding air the increase in body temperature is related to a retention of the heat produced by the body and not to its entry from the surrounding air. The term external heat stress is redefined and made more precise. Author

N71-11486# Joint Publications Research Service, Washington, D.C.

SOME INDICES CHARACTERIZING THE HUMAN HEAT STRESS TOLERANCE LIMIT

R. F. Afanasyeva et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 67-72 refs (See N71-11476 02-04)
Avail: NTIS

Some indices of the thermal state of human subjects exposed to heat stresses at rest and during physical exercises of different intensity are analyzed. The tolerance limit coincides with the following subjective sensations: marked deterioration of general feeling of well-being, nausea, impaired respiration, headache, fatigue, weakness, heart throbbing, and the following objective symptoms: irritability, blueness of skin and facial puffiness. An average body temperature of 38.5 to 38.8 C and a corresponding heat accumulation of 160-200 Cal can be used as an objective criterion for the human heat stress tolerance limit. Such characteristics of the human thermal state as rectal temperature, skin temperature, frequency of cardiac contractions and water losses are dependent on ambient temperature and humidity and the amount of work performed. Author

N71-11487# Joint Publications Research Service, Washington, D.C.

SOME CHARACTERISTICS OF EXTERNAL RESPIRATION AND ENERGY EXPENDITURES DURING ORTHOSTATIC TESTS BEFORE AND AFTER EIGHTEEN-HOUR IMMERSION

V. I. Sokolkov *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 73-82 refs (See N71-11476 02-04)
Avail: NTIS

External respiration, metabolism and energy expenditures were studied during orthostatic tests before and after an 18-hour immersion experiment. Tilt tests at an angle of 90 deg were performed for 15 minutes. The subjects were classified into two groups on the basis of orthostatic tolerance. The first group included individuals with a high tolerance and the second included those with a reduced tolerance (regularly developing orthostatic collapses). During tilt tests the subjects in the second group exhibited statistically significant increases in pulmonary ventilation, oxygen consumption, release of carbon dioxide, and energy expenditures in comparison with subjects in the first group. Author

N71-11488# Joint Publications Research Service, Washington, D.C.

MODELING OF A NEURON NETWORK GENERATING STABLE RHYTHMIC IMPULSATION

B. G. Sushkov *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 83-88 refs (See N71-11476 02-04)
Avail: NTIS

A system capable of generating a stable rhythmic impulsation is constructed from elements whose behavior is similar to that of nerve cells. The relationship between system performance and its

parameters is discussed. This study may help in controlling similar neuron networks in living organisms, particularly in interpreting the genesis of vestibular nystagmus. Author

N71-11489# Joint Publications Research Service, Washington, D.C.

FUNCTIONAL STATE OF THE RIGHT HEART

N. P. Mironenko *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 89–93 refs (See N71-11476 02-04)
Avail: NTIS

Experiments were made on 61 male test subjects in the age range from 20 to 40 years. Forty-seven were healthy, eight suffered from vascular dysfunction of the hypertension type and six were patients with hypertension disease in the first stage. The activity of the right heart was registered with an electrokymograph. The test subjects performed the Valsalva maneuver. It was found that during the provocative test the right ventricle with a normally short ejection period at rest is capable of increasing its contractive force to a greater extent than the ventricle with a shorter ejection period. Author

N71-11490# Joint Publications Research Service, Washington, D.C.

ELECTRONYSTAGMOGRAPHIC CHARACTERISTICS OF ADAPTATION PROCESSES IN THE VESTIBULAR SYSTEM

A. A. Shipov *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 94–100 refs (See N71-11476 02-04)
Avail: NTIS

Experiments were performed on intact and unilaterally labyrinthectomized guinea pigs for determining extinction of number of nystagmic beats, duration and frequency of nystagmus during repeated exposures to angular accelerations of different intensity and similar duration. It was found that the extinction curves for each of the nystagmic reaction parameters can be approximated by exponential functions. The number of beats extinguished most rapidly (with the smallest rotation constant) whereas nystagmic frequency extinguished most slowly. The higher rates of nystagmic reaction corresponded to higher accelerations. Slower nystagmic extinction was observed in unilaterally labyrinthectomized guinea pigs than in intact animals. Author

N71-11491# Joint Publications Research Service, Washington, D.C.

SOME CLINICAL-BIOCHEMICAL INDICES OF HUMAN TOLERANCE TO IMPACT ACCELERATIONS

L. A. Rubashkina *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 101–107 refs (See N71-11476 02-04)
Avail: NTIS

The degree of increase in aspartic aminotransferase activity with some indices indicating a high level of human tolerance to impact accelerations are compared. Accelerations imparted to the short and long axes of the body were investigated. With an increase from 25 to 35-40 g and the rate of transverse accelerations from 2,000 to 4,000 g/sec the appearance of limiting symptoms (shock, hematuria, proteinuria, bradycardia, ECG changes) was also accompanied by an increase in aspartic aminotransferase activity in the blood serum. The enzyme activity reached a maximum of 200-240 percent of the initial level during exposures to both transverse and longitudinal accelerations. Author

N71-11492# Joint Publications Research Service, Washington, D.C.

SOME RESULTS OF OPERATION OF THE SELF-CONTAINED LIFE SUPPORT SYSTEM DURING FLIGHT OF THE 'SOYUZ 4' AND 'SOYUZ 5' SPACESHIPS

I. P. Abramov *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 108–112 refs (See N71-11476 02-04)
Avail: NTIS

The characteristics and operation of self-contained life support systems used in Soyuz spacecraft are presented. The system is designed to operate for several hours and was operated for one hour in space during transfer of cosmonauts from one spacecraft to another. In the event of malfunction, a warning signal sounds and the backpack duplication system begins to operate. The system contains instrumentation for medical monitoring of the cosmonaut's condition and for checking the operation of the individual system assemblies. P.N.F.

N71-11493# Joint Publications Research Service, Washington, D.C.

METHOD FOR INVESTIGATING HUMAN METABOLISM IN A RARIFIED ATMOSPHERE BY GAS CHROMATOGRAPHY

V. I. Chadov et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 113–118 refs (See N71-11476 02-04)
Avail: NTIS

A method for determining human metabolism in a rarefied atmosphere using a special apparatus for sampling the exhaled gas mixture with subsequent analysis by the gas chromatography method is described. The use of gas chromatography for these purposes makes it possible to increase accuracy and sharply reduce the time required for analyzing the gas mixture. Author

N71-11494# Joint Publications Research Service, Washington, D.C.

ROLE OF PROPRIOCEPTION IN SENSING BODY POSITION DURING FLIGHT IN A KEPLERIAN TRAJECTORY

I. F. Chekirda et al *In its* Space Biol. and Med. Vol. 4, No. 4, 1970 26 Oct. 1970 p 119–121 refs (See N71-11476 02-04)
Avail: NTIS

An investigation of the peculiarities in perception of the relative position of arm segments during reproduction of a stipulated joint angle under weightlessness conditions and accelerations is discussed. The tests showed that transition to a greater sensation of weight leads to overestimate of the angle of extension. Transition to a lesser sensation of weight or to weightlessness results in underestimation of the reproduced angle. Author

N71-11495# Joint Publications Research Service, Washington, D.C.

STUDY OF DRUG STABILITY UNDER UNUSUAL ENVIRONMENTAL CONDITIONS

I. P. Neumyvakin et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 122–123 (See N71-11476 02-04)
Avail: NTIS

In some cases drugs can be exposed to a combination of such factors as increased temperature and humidity, a modified atmosphere, increased oxygen content, radiation, vacuum, vibration, and accelerations. A study of the tolerance to these factors for tablets of amobarbital sodium, caffeine, madribon, codeine phosphate with soda, and etaperazine is discussed. The drugs were arranged in trays and then exposed to different agents: increased temperature (+50 deg), high relative humidity (98 percent), vacuum (.0001 mm), radiation (30,000 rad), modified atmosphere, increased oxygen content (97 percent), vibration, and accelerations. The exposure levels were exaggerated in comparison with those expected so as to ensure preservation of the qualities of the investigated drugs. The trays were withdrawn for inspection at different stages in the research as the number of influencing factors was increased. Author

N71-11496# Joint Publications Research Service, Washington, D.C.

EFFECT OF A RATION WITH UNICELLULAR ALGAE ON THE CONDITION OF INTERNAL ORGANS IN RATS

A. V. Novokova et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 124–126 refs (See N71-11476 02-04)

Avail: NTIS

The quality of the food components of the biomass of algae, particularly protein, are discussed. The effect of a ration with algae on the condition of the internal organs of animals after protein starvation is reported. The experiment demonstrated that the protein of a unicellular algae favored the recovery of the animals from a state of protein starvation almost the same as a casein diet. In contrast, in animals receiving soya protein the restoration of the internal organ structure and metabolism after protein starvation transpired far more slowly. The data confirm that the proteins of unicellular algae have a high biological value exceeding the value of soya protein. Author

N71-11497# Joint Publications Research Service, Washington, D.C.

EFFECT OF CHRONIC GAMMA IRRADIATION ON CELL DIVISION PROCESSES AND THE CHROMOSOMAL APPARATUS IN THE BONE MARROW OF DOGS

T. P. Tsessarskaya et al *In its* Space Biol. and Med., Vol. 4, No. 4, 1970 26 Oct. 1970 p 127–129 refs (See N71-11476 02-04)

Avail: NTIS

An experiment with the chronic irradiation of dogs is described. Cytogenetic data and the results of a study of different indices for the physiological regeneration of bone marrow in dogs exposed for a year to chronic irradiation and against this background, to single irradiations simulating solar flares are reported. Exposure to Co60 gamma rays was by means of special apparatus for 22 hours a day. Thermoluminescent dosimeters were attached to the collar of each animal for determining the dose. Bone marrow punctates were used in the investigation. Proliferative activity (total mitotic index and the mitotic indices for the principal bone marrow components); relative frequency of individual mitosis phases; intensity of DNA synthesis by bone marrow cells (autoradiography with thymidine H3 in experiments in vitro); frequency and nature of chromosomal aberrations visible in the anaphase and metaphse of mitosis are discussed. Author

N71-11711*# National Aeronautics and Space Administration, Washington, D.C.

THE INTERACTION OF LIVING SYSTEMS WITH THE SPACE ENVIRONMENT

Joseph F. Saunders *In its* Space Process. and Manufacturing 21 Oct. 1969 p 195–215 (See N71-11701 02-15)

Avail: NTIS CSCL 06C

Thirteen experiments flown in Biosatellite 2 were concerned with the role of gravity in living systems. Six experiments sought to determine the effects of weightlessness alone. Seven investigated the combined effects of radiation and weightlessness. It was found that weightlessness altered the orientation as well as the growth of plants. Bacteria, insects and plants exposed to gamma radiation while weightless confirmed that neutralization of gravity does change the effects of radiation on the cellular elements that control heredity. The primate in Biosatellite 3 showed physiologic deterioration attributed mainly to weightlessness. Author

N71-11713*# Martin Marietta Corp., Denver, Colo.

INDUSTRIAL MICROBIOLOGICAL APPLICATIONS IN ZERO GRAVITY: A VACCINE SATELLITE PROGRAM (VACSAT)

Russell T. Jordan *In* NASA Marshall Space Flight Center Space Process. and Manufacturing 21 Oct. 1969 p 238–251 refs (See N71-11701 02-15)

Avail: NTIS CSCL 06M

Discussed are some potential applications for manufacturing pharmaceuticals in an orbital workshop and presents a preliminary design for a zero G Fermenter with a proposed method for the unprecedented utilization of weightlessness in industrial fermentation. Author

N71-11801# Advisory Group for Aerospace Research and Development, Paris (France).

MEDICO-LEGAL ASPECTS OF AVIATION. RECENT ADVANCES IN AEROSPACE MEDICINE: LIFE SUPPORT AND PHYSIOLOGY

Sep. 1970 326 p refs Presented at 26th Aerospace Med. Panel Meeting, Florence, 21–24 Oct. 1969

(AGARD-CP-61-70) Avail: NTIS

The topics discussed pertain to the medico-legal aspects of aviation, clinical aviation medicine, aerospace medicine, and space medicine. For individual titles, see N71-11802 through N71-11830.

N71-11802# Army Board for Aviation Accident Research, Fort Rucker, Ala.

OPERATIONAL CHARACTERISTICS AND PILOT EXPERIENCE IN ALCOHOL-CAUSED US GENERAL AVIATION ACCIDENTS

William H. Berner *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 6 p refs (See N71-11801 02-04)

Avail: NTIS

Examination of certain variables in aircraft accidents over a three year period involving aviators impaired by ingestion of alcohol revealed that there was very little difference between these accidents and US Civil General Aviation accidents as a whole with respect to pilot age, experience and Federal certification. The likelihood of alcohol playing a part in the accident cause is far greater for pleasure flying than for any other type. The low incidence of involvement in instructional flying, agricultural aerial application and air taxi operations indicates that a greater degree of professionalism and responsibility are exercised when the flight is for financial gain rather than for personal enjoyment. The very high incidence of operator errors such as stalls, spins, wire strikes, tree strikes, undershoots, etc., testifies to the degradation of pilot skill, coordination and perception caused by alcohol. The large number of cases of buzzing, acrobatics, and lack of respect for adverse weather indicates the effects of alcohol on critical judgment, caution, and mature behavior. This study has shown that prevention efforts to educate the aviator population in the dangers of alcohol and flying must be directed to all pilots, regardless of age or experience. Author

N71-11803# Canadian Armed Forces Inst. of Environmental Medicine, Toronto (Ontario).

THE VALUE OF POST-MORTEM LACTATE ANALYSES IN AIRCRAFT ACCIDENT INVESTIGATION

W. R. Franks and I. H. Anderson *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 9 p refs (See N71-11801 02-04)

Avail: NTIS

Post-mortem lactic acid concentrations are used to determine the possible adrenergetic response to a dangerous flight situation; tissue lactate profiles are obtained by an increase in the ratio of kidney to liver lactate values. Comparison of lactate findings with the accident history indicates whether the pilot was aware of a severe problem more than 15 seconds prior to impact and thus establishes whether or not technical malfunction caused or precipitated the accident. G.G.

N71-11804# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

TOXICOLOGY OF CARBON MONOXIDE IN ARTIFICIAL CABIN ATMOSPHERES

Anthony A. Thomas *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 4 p (See N71-11801 02-04)
(AMRL-TR-69-19) Avail: NTIS

The most likely problem contaminant in sealed cabins during long mission durations is carbon monoxide (CO). Sources for CO generation include gas-off from cabin construction materials, system and subsystem malfunctions, and the metabolic activity of the crew. Recent continuous exposure studies in 5 psia pure oxygen and mixed gas atmospheres with subhuman primates performing continuous and discrete avoidance tests on audio and visual cues during exposure to 55, 110, 220, and 440 mg of CO per cubic meter have indicated an unexpectedly high tolerance and perhaps the presence of some adaptive mechanisms. 125 ppm of CO had no demonstrable effect on higher mental integrating and coordinated neuromuscular function in human volunteer subjects for three-hour single exposure periods. There were no demonstrable physiological changes or clinical abnormalities. Author

N71-11805# Royal Air Force Inst. of Pathology and Tropical Medicine, Aylesbury (England).

MEDICO-LEGAL RESPONSIBILITIES OF THE AVIATION PATHOLOGIST

J. K. Mason *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 9 p refs (See N71-11801 02-04)
Avail: NTIS

Attention is focused on the dual responsibilities of the pathologist investigating a fatal aircraft accident - to the Board of Inquiry and to the local jurisdiction. The responsibilities to the Board of Inquiry mainly involve attempts to establish the cause of the accident and the sequence of events. Less well appreciated are the strictly medico-legal duties of the pathologist. In addition to establishing who died, where, and by what means, the pathologist must be prepared to answer questions relating to factors such as aircraft control at the time of the accident, whether natural disease played any part in the death, whether there was negligence on the part of either the pilot or the manufacturers, and, finally, whether there was any evidence as to survivorship when close relatives were killed in the same accident. Author

N71-11806# Belgian Air Force, Brussels.

MEDICAL SECRET AND APTITUDE OF FLYING [SECRET MEDICAL ET APTITUDE AU VOL]

E. Evrard *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 4 p In FRENCH (See N71-11801 02-04)
Avail: NTIS

Because medical facts between a private physician and his patient are privileged information, medical authorities of the military have grave difficulties in acquiring medical information to assess the aptitude of service pilots in the Belgian Air Force. An intern recommends changes and suggests that secret information be given military doctors upon request from military authorities. The information request would be precise requiring only that information necessary to evaluate the quality of the patient as pilot.
Transl. by E.H.W.

N71-11807# Centro di Studi e Richerche di Medicina Aeronautica e Spaziale, Rome (Italy).

REPEATED DECELERATIONS OF MODERATE INTENSITY AND THEIR HISTOPATHOLOGICAL AND BIOCHEMICAL EFFECTS

Gualtiero Paolucci *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 12 p refs (See N71-11801 02-04)
Avail: NTIS

Studies on deceleration show that: (1) injuries' gravity is a function of G intensity; (2) longitudinal positions are the most harmful; (3) tissue damage happens not only in organs placed along deceleration axes, but even out of their range; and (4) liver is the organ most frequently damaged. By two different experimental modalities, it was noted that single but abrupt decelerations over 300 G produce serious and acute organic damages and high serum enzyme activity, while repeated but medium decelerations don't produce acute organic damage and enzyme activity increase, but fibrosis and cellular reaction in liver, fibrosis in spleen and hypetrophy in suprarenal cortex, corresponding with a rise of gamma globulins, a trend to blood hypercoagulation, and a positivity of precipitin reactions. Author

N71-11808# Institut de Medecine Legale de l'Aviation Militaire, Rome (Italy).

CHARACTERISTICS OF ACOUSTIC DAMAGE FOUND IN TECHNICAL MILITARY PERSONNEL [LE DOMMAGE ACOUSTIQUE CHEZ LE PERSONNEL TECHNIQUE DE L'AVIATION MILITAIRE ET SES CARACTERISTIQUES]

Giorgio Mazza *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 10 p refs In FRENCH; ENGLISH summary (See N71-11801 02-04)
Avail: NTIS

An audiological survey was conducted concerning technical personnel in service in three IAF Bases, with different types of aircraft: supersonic jets, conventional, and helicopters. The research was carried on a group of 340 subjects (aged 22-45). Their behavior was studied in regard to auditive acuity, by comparing the acoustic damage, evidenced under its different forms, to the most impostant parameters, requested for this study, in particular to the physical characteristics of noise. Author

N71-11809# Italian Air Force Medical Service of the 2d Air Region, Rome.

A STATISTICAL STUDY OF ACCIDENTIAL TRAUMATISMS IN THE ITALIAN AIR FORCE

Aristide Scano and Roberto Santini *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 5 p (See N71-11801 02-04)
Avail: NTIS

On the basis of medical reports of all injuries through accidents suffered by military personnel, a statistical survey on type and localization of injuries and their causes, and possible connections with injured's position in the Italian Air Force, rank, age, time when the accident occurred etc., is made. The survey covers a period of 25 months and, on the basis of a statistically sound number of military personnel, shows an average percentage of injuries suffered within one month of about 0.3% of the personnel under consideration. Author

N71-11810# Advisory Group for Aerospace Research and Development, Paris (France).

DIFFICULTIES OF CIRCUMSCRIBING THE DANGER ZONES FOR THE OTHER PERSONNEL OF AERIAL RADAR [DIFFICULTES A CIRCONSCRIRE LES ZONES DANGEREUSES POUR LE PERSONNEL AUTOUR DES AERIENS RADAR]

L. Miro, G. Deltour, A. Pfister, and R. Kaiser *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 4 p In FRENCH (See N71-11801 02-04)
Avail: NTIS

Pathological manifestations due to hyperfrequency waves are very rare in the Western world. By contrast, it is of sufficient importance in Russia to justify the existence of a genuine professional disorder from which the different syndromes are described. This verification has brought about changes in preventive

measures. These changes along with difficulties in applying security limits in current practice are discussed. An idea for simplifying the existing norms is also given. Transl. by E.H.W.

N71-11811# Royal Naval Air Medical School, Hillhead (England).
SPINAL INJURY RESULTING FROM EJECTION FROM ROYAL NAVAL AIRCRAFT, 1960–1968
F. St. C. Golden *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 9 p refs (See N71-11801 02-04)
Avail: NTIS

A survey of ejections from aircraft covering the period 1st January 1960 to 31st December 1968 has been carried out. There were 104 successful ejections, 42 of the ejectees were discovered subsequently to have fractures of one or more vertebrae. This represents an incidence of 40.4% which compares unfavorably with the published injury rate of the majority of users of Martin Baker seats who have an incidence of approximately 20%. The overall figures show a marked increase in spinal injury since 1966. Examined are the possible causes for this high incidence. One of the major contributing causes found was an increase in the included angle produced by a new method of parachute packing. The level at which the majority of fractures were found also differed from that described in previously published reports and this was found to be mainly a result of a large lumbar support cushion used in one aircraft type. Author

N71-11812# Flugmedizinisches Institut der Luftwaffe, Fuerstenfeldbruck (West Germany).
THE INCIDENCE OF BAROTRAUMA IN RELATION TO SINUS X-RAY AND NASAL PATHOLOGY
G. Froehlich *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 3 p (See N71-11801 02-04)
Avail: NTIS

One day after clinical examination and X-ray of sinuses, 476 healthy cadets were submitted to a low pressure chamber ride from 25000 ft to sea level with a rate of decend of 4000 ft/min. 16% of the cadets were found to have radiographic evidence of maxillary or frontal sinus disease, 32% had nasal pathology mostly some forms of rhinitis. During descent 56 (12%) of the total had a barotitis, only 13 (3%) of the subjects had had a significantly higher percentage of all forms of rhinitis, X-ray pathology in combination with nasal pathology or mucosal thickening of sinuses. There was no higher incidence of polypi or cysts, sinus opacity without nasal pathology, marked septal deviations or other nasal obstructions. In subjects having a barosinusitis there was a higher incidence of sinus opacity, all forms of rhinitis and X-ray pathology in combination with nasal pathology. No significant difference was found in sinus mucosal thickening, polypi or cysts, marked septal deviations and other nasal obstructions. The significance of these results in terms of medical standards and qualification for flying duties is being discussed. Author

N71-11813# Naval Medical Research Inst., Bethesda, Md.
EFFECT OF SIMULATED ALTITUDE ON EXPERIMENTAL INFECTIONS
Francis B. Gordon and James D. Gillmore *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 14 p refs (See N71-11801 02-04)
(NASA Order A-3061A)
Avail: NTIS CSCL 06S

The effect of abnormal atmospheric pressures and O2 tensions on experimental infections in the mouse were examined in an attempt to detect altered reactions between host and microorganism, and to identify potential problems relating to human infection in space vehicles or in undersea shelters. Mice infected by aerosols of influenza virus had a more severe pneumonia and sustained greater mortalities when exposed to increased O2 tensions in comparison to controls kept in ambient air. In confirmation of earlier reports, the hypoxia of a simulated altitude of 18,000 ft had the opposite effect--the severity of the influenzal infection was reduced. When another pneumonia-producing agent (Chlamydia trachomatis, mouse pneumonitis strain) was used, hyperoxia exerted a protective effect and hypoxia enhanced the infection. The same was true when a similar agent (C. psittaci, psittacosis strain) was employed to induce a generalized infection. Mortality rates from both pneumonia-producing agents were increased when the mice were exposed to 100% O2 at 3.2 psia. Increased O2 tension had no apparent effect on Coxsackie B virus infection in adult mice, but hypoxia greatly increased the severity of the disease. Some of the described modifications of the disease process are correlated directly with changes in the amount of disease agent demonstrable in the tissues, but in others the mechanism of the observed alteration is obscure. Because of different effects of the same abnormal environment on different model infections it is probable that multiple factors are responsible for the observed changes. Author

N71-11814# Army Aeromedical Research Lab., Fort Rucker, Ala.
PILOT PERFORMANCE AND REFRACTIVE ERROR
John K. Crosley *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 6 p (See N71-11801 02-04)
Avail: NTIS

Conducted is a comparative evaluation of the performance of 113 students with refractive error as they progressed through primary rotary wing or primary fixed wing training. The achievement of students requiring corrective lenses was compared with that of a classmate who did not require lenses. The two broad areas of comparison were academic (classroom) achievement, and in-flight performance as rated by an instructor pilot. The results of this study show that there was no significant (alpha = .05) difference in the performance of these two groups of students throughout the first sixteen weeks of their flight training. Author

N71-11815# Institut de Medecine Legale de l'Aviation Militaire, Rome (Italy).
PSYCHIATRIC SYNDROMES FOUND IN MILITARY PILOT TRAINEES: CLINICAL ASPECTS AND MEDICO-LEGAL [SYNDROMES PSYCHIQUES CHEZ LES ELEVES PILOTES MILITAIRES: ASPECTS CLINIQUES ET MEDICO-LEGAUX]
Luigi Longo *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 9 p In FRENCH; ENGLISH summary (See N71-11801 02-04)
Avail: NTIS

The results of a statistical study on psychiatric syndromes, found in trainees of the Flight School of the Italian Air Force in 1961-1966 are reported. The study surveys these results, in respect to level attained by the trainees, and to technical and cooperative characteristics of the School. The Author discusses also a nosographic table of different syndromes, after the better known trends of psychopathologic nomenclature (neurasthenic reactions: 46%; neurotic syndromes: 21%; neurovegetative disorder: 18%; after emotion psychogenic reactions: 12%, dysthimic psychosis: 3%). In conclusion, medico-legal aspects are analyzed, and considerations are discussed on prognosis and possible recovery of these subjects. Author

N71-11816# Flugmedizinisches Institut der Luftwaffe, Fuerstenfeldbruck (West Germany).
STRESS ON THE PILOT'S SPINE AND ITS PROGNOSTIC APPRAISAL
J. B. Boeger *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 8 p refs (See N71-11801 02-04)
Avail: NTIS

It is demonstrated that apparently healthy young men may have - more frequently than generally known - alterations of the spine which may reduce spinal tolerance to mechanical stress caused by military flying duty. Therefore it is necessary to include

a prognostic assessment of the spine in the medical selection. The methods for spinal examination employed at the Institute of Aviation Medicine of the German Air Force are described; type and frequency of the most important findings and the criteria of judgment are outlined. Follow-up checks offering vast statistical material are to supplement the current investigations. Because approximately 5% of young men formerly judged totally fit for military service have to be withdrawn from pilot training later on, careful orthopedically-oriented prognostic assessment, generally including X-ray control, is mandatory. Author

N71-11817# Flugmedizinisches Institut der Luftwaffe, Fuerstenfeldbruck (West Germany).
DOES A CHRONIC GLAUCOMA NECESSITATE RELIEF FROM FLYING STATUS?
Dietrich Kuerschner In AGARD Med.-Legal Aspects of Aviation Sep. 1970 6 p refs (See N71-11801 02-04)
Avail: NTIS

From 1959 to 1969, 30,561 examinations for aircrew selection and survey have been conducted. 6,100 examinees were aged above 40. In seven cases glaucoma was detected. Glaucoma, therefore, does not constitute a problem as to its frequency but is of interest to the flight surgeon as far as the individual aviator is concerned. Whether a pilot with glaucoma should remain on flying status depends on his visual performance, the variety of glaucoma present (tonometric open-angle glaucoma), and on the practicability of short-interval follow-up checks. A glaucoma calling for treatment will exclude flying activities in any case. Finally certain legal aspects must be observed. Author

N71-11818# *Italian Air Force Psycho-Physiological Institute,* Naples.
VALIDITY OF SOME CARDIO-RESPIRATORY FUNCTIONAL TESTS (MAXIMUM VOLUNTARY EXERCISE, TILTING TABLE, HYPOXIA CORRESPONDING TO 5500 METRES ALTITUDE) ADMINISTERD DURING 9 YEARS IN THE IAF PSYCHO-PHYSIOLOGICAL INSTITUTE AT NAPLES, FOR MILITARY PILOTS SELECTION
Cesare Vacca and Alfonso Aurucci *In* AGARD Med.-Legal Aspects of Aviation Se. 1970 5 p refs (See N71-11801 02-04)
Avail: NTIS

In 9 years from 1960 to 1968 the Psycho-Physiological Institute of Naples has submitted at medical examination 7245 candidates to become pilot officer cadets in regular service. Subjects eliminated at the functional cardio-respiratory tests were only 0.70% against a total media of 62.30% for all the other medical examinations and tests. The cardio-respiratory tests were: (1) a maximum voluntary exercise performed with a bicycle-ergometer and an increasing load to the exhaustion of the subject; (2) a tilting table lasting 5 minutes at + or − 65 deg respectively. Blood pressure, pulmonary ventilation, heart frequency, and EKG record are controlled in each position; and (3) hypoxia, in which the *subject breathes* 02 *in* N2 *at* 9% *for* 15 *minutes, measuring* the same physiological parameters as in the tilting table test. Author

N71-11819# Army Aeromedical Research Lab., Fort Rucker, Ala.
RECENT ADVANCES IN PROVIDING EAR PROTECTION IN AVIATION CRASH PROTECTIVE HELMETS
Robert T. Camp, Jr. *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 6 p (See N71-11801 02-04)
Avail: NTIS

Summarized are sound attenuation characteristics of a large sample of ear protective devices. These data show not only the present state-of-the-art, but also establish a basis for the evaluation of ear protectors such as the U.S. Army APH-5 and the Navy SPH-3 helmets. Differences between attenuation values of the inefficient APH-5 and the superior Navy SPH-3 (Modified) demonstrate the recent advances in providing aviators with acoustically efficient helmets. Author

N71-11820# National Aeronautics and Space Administration, Washington, D.C.
NASA'S 1969 ADVANCED RESEARCH AND DEVELOPMENT IN AVIATION MEDICINE
Walton J. Jones *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 15 p (See N71-11801 02-04)
Avail: NTIS CSCL 05E

The Human Factors Systems Program of the National Aeronautics and Space Administration's Office of Advanced Research and Technology is pursuing an aggressive plan of research concerning the support and utilization of man in future aeronautical systems. It emphasizes the two most critical problems underlying the development of civil aviation, safety in air operations and noise control. It covers many items of interest to military aviation as well. Current research in these areas should have significant payoff within the next three to five years. New equipment under study will greatly increase the probability of survival in aircraft accidents. Investigations of pilot workload during all weather landing operations should reduce those accidents frequently attributed to pilot error. In the noise domain, we are studying both the physical characteristics of the noise environment and the psychoacoustic effects of exposure, all with an aim toward the development of improved noise control techniques. Author

N71-11821# National Aeronautics and Space Administration, Washington, D.C.
BIOASTRONAUTIC ASPECTS OF APOLLO BIOMEDICAL OPERATIONS
Walton L. Jones *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 10 p (See N71-11801 02-04)
Avail: NTIS CSCL 06S

The absence of solar flare eliminated the radiation problem for Apollo, but for prolonged manned *spaceflight the problem* has not been solved. Crews have adapted generally to weightlessness and used it to advantage. Weight loss is still noted and it is only partly due to fluid loss. Sleep appears to be impaired and the relationship of work/rest cycles to task requirements needs further consideration. The preventive medicine program has been difficult to conduct but in the later flights it effectively reduced the pre-, in-, and postflight incidence of upper respiratory and gastrointestinal infection. Motion sickness has been noted in varying degrees but all astronauts have adapted well within a few days. A significant decrement in postflight work capacity has been noted to last 24 *to 36 hours. The loss of red blood cell mass of Gemini was found* only in Apollo 9, which was the only Apollo flight where the astronauts were exposed to pure oxygen at 5 psia for prolonged periods. The microbiological studies indicate an increase of intercrew transfer and growth of opportunist organisms, which could become a hazard in future spaceflight. Author

N71-11822# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
PHYSIOLOGICAL CONSIDERATIONS IN THE PREVENTION OF INSTABILITY IN OXYGEN BREATHING SYSTEMS
G. R. Sharp *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 12 p refs (See N71-11801 02-04)
Avail: NTIS

During the recent development of a pneumatic controlled miniature man-mounted oxygen breathing system, *it was found* that some preproduction regulators exhibited marked oscillation of delivery pressure instability. In order to eliminate this problem in final production regulators it has been necessary to modify test procedures to include a dynamic assessment of oxygen breathing system stability. Investigations were carried out in order to examine

some of the physiological factors affecting the oscillatory behavior of these miniature systems. Human subjects breathed on a number of test miniature oxygen regulators which exhibited varying degrees of instability and it was found that the incidence and magnitude of oscillation of regulator delivery pressure depended mainly on the subject's level of pulmonary ventilation, the presence of speech and the proportion of breaths taken by nose. Analysis of inspiratory flow patterns using an analogue computer were carried out with subjects at rest, during light exercise and with speech during both activities. The results of this study suggested that the greater degree of instability which is found during light exercise and with speech, (at rest and during exercise) is related to the marked increase in inspiratory peak flow and rate of change of flow which was observed in these conditions. A second series of experiments were undertaken to measure respiratory impedance when sinusoidal oscillations of various frequencies were applied directly to the respiratory system with subjects carrying out pure nose and mouth breathing, at rest and during light exercise. It was shown that with applied oscillations, within the frequency range exhibited by unstable regulators, respiratory impedance is considerably higher with nasal breathing than with oral breathing. Author

N71-11823# Ministry of Defence, London (England).
AIRSICKNESS DURING FLYING TRAINING
T. G. Dobie *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 4 p (See N71-11801 02-04)
Avail: NTIS

The purpose of this review is to examine the various aspects of airsickness which concern student aircrews. That is: the incidence of airsickness during flying training, possible methods of preselection to reduce the incidence, methods of prevention during training and treatment of the condition during this period based on data gathered over the last ten years. Author

N71-11824# Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).
ON THE PERCEPTION AND IDENTIFICATION OF IMAGES IN DIFFERENT ACCELERATIVE FIELDS, NOTE 2
G. Meineri and V. Sorano *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 10 p (See N71-11801 02-04)
Avail: NTIS

A complex apparatus for the presentation of luminous symbols (square, circle, triangle) against a background of complete darkness and lights was perfected. With this, the capacity of subjects, submitted to −1.4 and −2Gy in a centrifuge, to recognize symbols or perceive luminous stimuli was tested. Under acceleration there was a reduction of the field of vision and a diminution of the average number of symbols recognized according to a horizontal meridian. On the contrary, according to the vertical meridian and particularly in the case of the square, there was an increase in the number of symbols recognized. There resulted a shifting of the field of recognition of the symbol in a temporal direction. It is suggested that this depends on the mechanical shifting of the anteroposterior axis of the eye or an unconscious rotation of the eyeball. Author

N71-11825# Ulm Univ. (West Germany). Dept. of Neurology and Neurophysiology.
CHARACTERISTICS OF VOLUNTARY SACCADIC EYE-MOVEMENTS AND THEIR IMPORTANCE FOR PILOT PERFORMANCE
J. C. Aschoff *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 9 p refs (See N71-11801 02-04)
Avail: NTIS

Voluntary eye movements between fixed points (between instruments or instrument panel and horizon) are called saccades. Under normal conditions the following characteristics are observed: the speed of saccadic eye movements cannot be changed at will, contrary to skeleton muscle movements. The speed is determined by the amplitude of the saccade, influenced by the diurnal rhythm and slowed down significantly by prolonged wakefulness and by tranquilizers as well as by alcohol, which manifests the potential danger of Valium, librium or similar drugs. Stimulants cannot improve eye movement velocity or accuracy. For the layout of instrument panels it seems important that saccades towards the center are faster and more accurate than saccades towards the periphery, and that saccadic eye movements of more than 20 degrees amplitude are almost all biphasic with latencies up to 1/4 sec for corrective saccades. For emergency training one should be aware of men's capability to store eye tracking patterns and to perform this pattern (quick checking of several instruments) after some trials even after long intervals in reduced time. Author

N71-11826# Advisory Group for Aerospace Research and Development, Paris (France).
HISTOLOGICAL ASPECTS AND ULTRASTRUCTURE OF INTOXICATION IN RATS BY MEANS OF PURE OXYGEN AT LOW PRESSURE [ASPECTS HISTOLOGIQUES ET ULTRASTRUCTURAUX DE L'INTOXICATION DU RAT PAR DE L'OXYGENE PUR A FAIBLES PRESSIONS]
A. M. Pfister, S. Despres, C. Nogues, Y. Le Charpentier and J. J. Curgy *In its* Med.-Legal Aspects of Aviation Sep. 1970 29 p refs In FRENCH; ENGLISH summary (See N71-11801 02-04)
Avail: NTIS

Several batches of Wistar rats were exposed to rates of pure oxygen at pressures ranging from 600 to 450 mm Mercury, in a double low pressure chamber, for periods of 1 to 17 days. All the viscera were submitted to histological analyses. The modifications of the alveolar coating were studied by means of electronic microscopes. Blood modifications were investigated by means of hemograms and myelograms. The results of these studies are described and discussed. Author

N71-11827# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
CIRCADIAN RYHTHMS OF PILOT'S PERFORMANCE IN A FLIGHT SIMULATOR AND EFFECTS OF TIME SHIFTS
K. E. Klein, H. Bruener, H. Holtmann, H. Rehme, J. Stolze et al *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 13 p refs (See N71-11801 02-04)
Avail: NTIS

If a standard instrument flight in a supersonic simulator was repeated in intervals of 2 hours the average performance of 12 pilots revealed a sinusoid circadian rhythm curve with the temporal position of peak and trough between 2 and 3 p.m. and 4 and 5 a.m., respectively. The amplitude of the diurnal oscillation came to an average of + or − 25 (12 - 49) % of the 24 hours total average as against + or − 12% found on average in the same subjects for the simple reaction time. After rapid transportation from Europe to the U.S. and back with a sojourn of 17 days (time shift: 8 h), the duration of resynchronization was about 5 days on average for both directions with a rate of phase adjustment of approximately 1.5 (1 - 2) h/day. The change in the performance level following transit, independent of the coincidence of old and new clock time, was unequal during the course of the day, but in general the level was significantly decreased (up to 40%) at day time and increased during the late night hours. A performance decrement seen for the 24 hours total average, in comparison to the preflight control, was significant only after the eastward (−8.5%) but not after the westward (−3.3%) flight. The reason for this difference is mainly seen in a greater fatigue due to an unfavorable flight schedule and the more severe sleep loss connected with eastward traveling. Author

N71-11828# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

BIOCHEMICAL REGULATION OF THE SLEEP-WAKE AND TEMPERATURE CYCLES

G. Vernon Pegram and Thomas J. Crowley *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 10 p refs (See N71-11801 02-04)

Avail: NTIS

Both norepinephrine and serotonin occur naturally in the central nervous system and may act as central regulators of circadian temperature rhythms and sleep patterns. In this study specific changes in the sleep patterns and brain cortical temperature following depletion of norepinephrine and serotonin were studied in the primate. Monkeys treated with alpha-methylparatyrosine (AMPT), a specific norepinephrine depletor, showed a slight decrease in paradoxical (REM) sleep and were somewhat lethargic. Monkeys treated with parachloraphenenylalanine (PCPA), a specific serotonin depletor, showed a significant decrease in slow wave sleep (deep sleep) and a shift in the peak temperature rhythm. The serotonin depletion results suggest that artificial (biochemical) regulation of circadian rhythms may be possible. Author

N71-11829# Milan Univ. (Italy) Dept. of Human Physiology.

THE ORIBITING FROG OTOLITH EXPERIMENT

Torquato Gualtierotti *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 17 p refs (See N71-11801 02-04)

Avail: NTIS

The objective of the OFO (Orbiting Frog Otolith) experiment, a part of the vestibular program of the Office for Advanced Research and Technology of NASA, is to investigate directly the output of the vestibule during three days of orbital flight. The spike train data are recorded from the primary neurons of four vestibular statoreceptors of two paralyzed bullfrogs. A special biopackage has been designed, containing also a small centrifuge to provide 0.5 g of artificial gravity as a stimulus to the statoreceptors. The experiment will be launched by means of a Scout rocket in an especially built satellite capable of assuring 1,000 g of linear acceleration in all directions for the entire flight. Vestibular alteration due to weightlessness and possible adaptive trend will be studied. Author

N71-11830# Direction des Recherches et Moyens d'Essais, Paris (France).

UTILIZATION OF POTASSIUM SUPEROXIDE IN THE REGENERATION OF EXPIRED GAS [UTILISATION DU SUPEROXIDE DE POTASSIUM DANS LA REGENERATION DES GAZ EXPIRES]

P. Ganas *In* AGARD Med.-Legal Aspects of Aviation Sep. 1970 15 p refs In FRENCH (See N71-11801 02-04)

Avail: NTIS

The results of work in using KO2 as a means of regenerating expired gas in artificial atmospheres are given. Different phases of the work are given. The important phases include fabrication of KO2 in laboratories, fabrication of pellets in KO2 powder, physical and chemical analysis of the pellets, and a description of the operation. Simulators are used to determine the performance characteristics of the KO2. Transl. by E.H.W.

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AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 86)* FEBRUARY 1971

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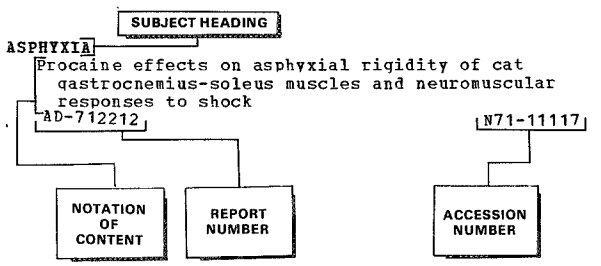

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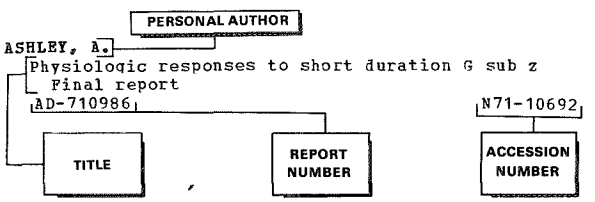

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