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NASA SP-7011 (95)



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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 95)

NOVEMBER 1971

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

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

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NASA SP-7011 (95)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 95)

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



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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 311 reports, articles, and other documents announced during October 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.

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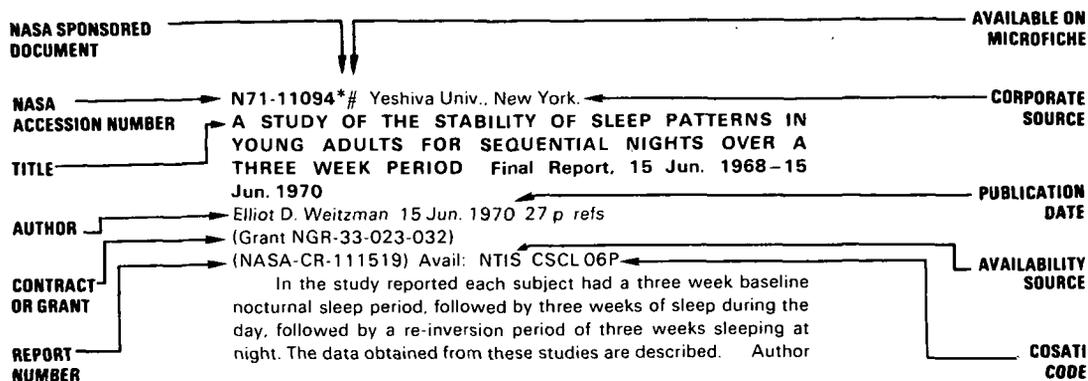
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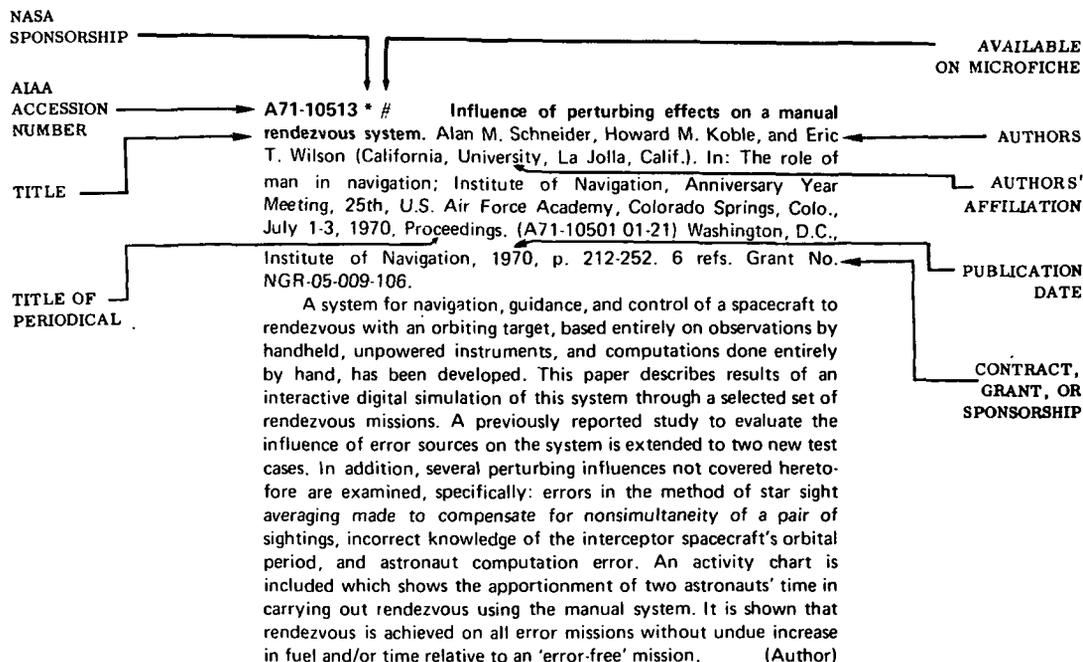
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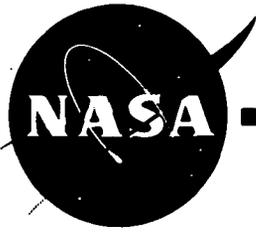
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 95)

NOVEMBER 1971

IAA ENTRIES

A71-37231 **Design and first results of a new phonocardiograph.** Aldo A. Luisada, Donald M. MacCanon, Larry P. Feigen, Paul M. Griffen, and Bernard Darrel (GE Research and Development Center, Schenectady, N.Y.; University of Health Sciences, Chicago, Ill.). *American Journal of Cardiology*, vol. 28, Aug. 1971, p. 134-139. Research supported by the Fannie Rippel Foundation; NIH Grant No. HE-09350.

This paper describes the technical components of a new calibrated phonocardiograph for tracings of displacement, velocity and acceleration. Many possible laboratory and clinical applications of the new apparatus are listed, and representative tracings are presented to show the versatility of the new system. (Author)

A71-37232 **New studies on the first heart sound.** Aldo A. Luisada, Donald M. MacCanon, Bernell Coleman, and Larry P. Feigen (University of Health Sciences, Chicago, Ill.). *American Journal of Cardiology*, vol. 28, Aug. 1971, p. 140-149. 33 refs. Research supported by the Fannie Rippel Foundation; NIH Grant No. HE-09350.

Recent studies demonstrate that the second component of the first heart sound coincides with the opening of the aortic valve, and relate it to the dynamic changes resulting from this event. They show that the vibrations of this second component are larger and have a higher frequency in the outflow tract of the left ventricle in comparison with the main chamber. Other studies have compared the amplitude of the first sound recorded within the left ventricle with that recorded either on the skin or over intermediate layers. The conclusion is that an average loss of 30 dB is present. However, this loss is greater for lf than for hf vibrations. Changes of the first sound are discussed. They occur in experimental or clinical conditions as a result of changes in the power or rapidity of contraction of the left ventricle. Usually a change in frequency is noted on auscultation as a change in intensity. Blood dilatation or wall hypertrophy can also modify the first heart sound. M.M.

A71-37233 **The second heart sound in normal and abnormal conditions.** Aldo A. Luisada (University of Health Sciences, Chicago, Ill.). *American Journal of Cardiology*, vol. 28, Aug. 1971, p. 150-161. 56 refs.

Changes of the second heart sound are caused by shifting in position and changes in magnitude of the aortic or pulmonary component, or both. Differences in the magnitude of each com-

ponent are primarily related to changes in pressure but are also affected by structural changes of the vascular walls. Positional changes are influenced by the time of closure of the respective valve and by the interval between valve closure and vascular vibration at the time of rebound. Normal splitting is present during inspiration and decreases or disappears during expiration. Marked differences related to age are present. Three abnormalities may occur: wide splitting during inspiration that persists during expiration; single second sound; and reverse splitting, either occurring only during, or accentuated by, expiration. M.M.

A71-37234 **A simple method of recording heart sounds and murmurs.** Denis Abelson and David Bernbaum (Pennsylvania, University, Philadelphia, Pa.). *American Journal of Cardiology*, vol. 28, Aug. 1971, p. 191-196. 11 refs.

A new technique (frequency phonocardiography) is described for the graphic registration of heart sounds and murmurs. With use of a zero-crossing detector, an analog voltage is developed proportional to frequency. Advantages of the method include clarity of presentation, ease of measurement of time intervals and suitability for mechanical recorders. (Author)

A71-37250 **Unsymmetrical diffusion along the nerve path as a model of synopsis activity (Unsymmetrische Diffusion längs der Nervenbahn als Modell der Synapsentätigkeit).** Franz Ollendorff (Technion - Israel Institute of Technology, Haifa, Israel). *Archiv für Elektronik und Übertragungstechnik*, vol. 25, July 1971, p. 352-356. 8 refs. In German.

The integral operating mode of a nerve path is represented by a linear diffusion channel in which electrochemically active synapses are implanted at regular intervals. Depending upon their polarity the synapses either promote or inhibit the diffusion of uniformly charged ions. The resultant dual nerve types are described by a pair of complementary, partial differential equations which are derived on the basis of the statistics of unsymmetrical diffusion phenomena. In the case of promoted diffusion the physiological signal triggered at the origin by a Dirac stimulus which is above the threshold level reaches the nearest synopsis with an intensity that is again above threshold level. G.R.

A71-37274 * # **Configuring the orbital centrifuge systems for space shuttle compatibility.** J. E. Stumm (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.) and H. G. Hausch (NASA, Langley Research Center, Hampton, Va.). *American Institute of Aeronautics and Astronautics and Aerospace Medical Association, Weightlessness and Artificial Gravity Meeting, Williamsburg, Va., Aug. 9-11, 1971, AIAA Paper 71-860*. 10 p. Members, \$1.50; nonmembers, \$2.00. Contract No. NAS 1-9904.

Comparative evaluation of various approaches by which the

space-shuttle orbiter may be equipped to provide the necessary experiment environment. These approaches, or experiment performance options (EPOs), were selected from a series of artificial gravity experiment conceptual designs. In defining these EPOs, particular emphasis has been placed on centrifuge applications so as to underscore the relationship of this very versatile system to other methods of experiment implementation. In the final analysis, the orbital centrifuge has proved to be a complementary rather than a competitive device with respect to total vehicle rotation in the study of artificial-g/zero-g phenomena. It is pointed out that no single device or configuration appears capable of providing the complete range of the experiment environment currently considered necessary. Accordingly, the ideal experiment facility may be expected to incorporate a mix of inertial devices in which the orbital centrifuge will be an essential element. M.M.

A71-37275 * # Human psychomotor performance in a rotating environment as measured by the Langley complex coordinator and the decision response time devices. H. G. Hausch, G. V. Maraman (NASA, Langley Research Center, Hampton, Va.), J. L. Peacock, and J. A. Green (North American Rockwell Corp., Space Div., Downey, Calif.). *American Institute of Aeronautics and Astronautics and Aerospace Medical Association, Weightlessness and Artificial Gravity Meeting, Williamsburg, Va., Aug. 9-11, 1971, AIAA Paper 71-887*. 7 p. Members, \$1.50; nonmembers, \$2.00.

Psychomotor performance of four subjects was measured by the Langley Complex Coordinator (LCC) and the Decision Response Time (DRT) devices in a rotating environment on the North American Rockwell Rotational Facility. Twelve tests of single-day exposures to 3, 4, and 5 rpm, and two tests of 3-day and 7-day continuous exposures to rotation at 4 rpm were conducted. The LCC test was performed at a radius of 75 feet with the subjects aligned with the resultant-g vector. The DRT test was performed at test stations at radii of 30 and 78 feet with the subjects' long-body axes aligned with the artificial-g vector. The DRT test was also performed at the nonrotating hub with the subjects seated in the normal vertical position. Analyses of variance were performed on the performance scores. Changes in performance attributable to the rotating environment were minor. Slight degradation in performance due to initial subjects' introduction to rotation and ultimate reestablishment of baseline performance as a result of adaptation to rotation were observable. (Author)

A71-37282 # Impulse blocking by an inhomogeneity in an electrochemical model of a nerve (Blokirovanie impul'sa neodnorodnost'iu v elektrokhimicheskoi modeli nerva). V. G. Levich, N. G. Mazur, and V. S. Markin (Akademiia Nauk SSSR, Institut Elektrokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 198, June 11, 1971, p. 1214-1216. 8 refs. In Russian.

Investigation of the motion of an activation impulse in an inhomogeneous Lillie model of a nerve. The Lillie model consists of an iron wire in a tube containing caustic nitric acid. An attempt is made to ascertain the conditions under which an activation impulse is blocked by an inhomogeneity in a system containing a jump-like inhomogeneity and in a modified system containing an inhomogeneity with an electrochemically inert gap, in which unilateral conductivity is observed. A.B.K.

A71-37283 # Measurement of the time required to react to the appearance and disappearance of short sensory (auditory) stimuli for the purpose of measuring the duration of perception (Izmerenie vremeni reaktivnosti na poivlenie i ischeznoenie kratkikh sensornykh /slukhovykh/ stimulov s tsel'iu izmereniia dlitel'nosti oshchushcheniia). S. N. Gol'dburg and P. O. Makarov (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Akademiia Nauk SSSR*

Doklady, vol. 198, June 11, 1971, p. 1235-1238. 16 refs. In Russian.

Study of the time required for human subjects to respond to the start and cessation of tonal stimuli. It is found that the time required to react to the cessation of a tonal stimulus exceeds the time required to react to the start of such a stimulus by hundreds of milliseconds. It is concluded that the difference between the times required to react to the start and cessation of a sensory stimulus can be used as a measure of the duration of perception. A.B.K.

A71-37299 Cosmic ray flashes in the eye. I. R. McAulay (Trinity College, Dublin, Ireland). *Nature*, vol. 232, Aug. 6, 1971, p. 421, 422.

Demonstration that the light flashes observed in the eye of the Apollo astronauts during lunar flights and which have been interpreted by Fazio et al. (1970) as Čerenkov radiation, can also be interpreted as scintillations produced in the eye lens by the passage of multiply charged cosmic rays. It has been found in experiments that scintillations are produced by alpha particles of 5.3 MeV in eye lenses from freshly killed bullocks. Light from these scintillations is distributed over the whole interior of the eyeball and it is necessary to postulate some focusing mechanism for some of this light to account for the point flashes reported by astronauts. The water-air interface at the front surface of the cornea will act as a partially reflecting concave mirror for light coming from within the eye. When the eyelid is not in optical contact with the cornea, the percentage of light reflected back into the eye is about 2% and scintillations in the lens will be focused to give an image on the retina. M.M.

A71-37308 # Structural arrangement for a biological laboratory in a space station and brief description of a research program on the physiopathology of man in space (Schema di strutturazione di un laboratorio biologico in una stazione orbitale e cenni di un programma di ricerche sulla fisio-patologia dell'uomo nello spazio). Tomaso Lomonaco (Roma, Università, Rome, Italy). In: *Prospects in the next decade for the use of orbiting stations and space shuttles; Technical and Scientific International Space Convention, 11th, Rome, Italy, April 1-3, 1971, Proceedings (Prospettive nel prossimo decennio per la utilizzazione delle stazioni orbitali e delle navette spaziali; Convegno Internazionale Tecnico-Scientifico sullo Spazio, 11th, Rome, Italy, April 1-3, 1971, Atti).*

Convention sponsored by the Ministero degli Affari Esteri and the Associazione Industrie Aerospaziali. Rome, Rassegna Internazionale Elettronica Nucleare e Teleradiocinematografica, 1971, p. 129, 131-139. In Italian.

Suggestion of the various biological and medical activities which are assumed to be needed in a space station. Such a biological laboratory should consist of several departments, some of which might be as follows: (1) department of respiratory physiology and physiopathology; (2) department of physiology and pathology of the cardiovascular tract; (3) hematological department; (4) department for the study of static and dynamic equilibrium; (5) department for the study of neuropsychic conditions; (6) dietetic department; (7) radiobiological department; and (8) hygiene and prophylaxis department. M.M.

A71-37392 # Correlation of the activity of adjacent neurons of the somatosensory zone of the cat cortex (Vzaimootoshenie aktivnosti sosednikh neuronov somatosensornoj zony kory koshki). P. V. Mel'nichuk (Pervyi Moskovskii Meditsinskii Institut, Moscow, USSR) and A. V. Zav'ialov (Kurskii Meditsinskii Institut, Kursk, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 198, June 21, 1971, p. 1471-1473. 15 refs. In Russian.

Analysis of the activity of pairs of adjacent neurons in the brain cortex of cats to determine the role of the background activity level of nerve elements in correlations between them. By studying the distribution of same-direction (cophase) and different-direction

(counterphase) oscillations of background rhythmic, a certain consonance in the work of neighboring neurons is noted. With an increase in the interimpulse interval of a neuron pair the cophasality index decreases and the counterphasality index increases. The counterphase activity oscillations of neighboring neurons may be due to the fact that one element undergoes alleviating effects and the other element inhibiting effects, with the two types of effects being coupled with respect to intensity. A.B.K.

A71-37393 # Dynamics of noradrenaline concentration in the myocardium of rats subjected to high-altitude hypoxia (Dinamika kontsentratsii noradrenalina v miokarde krysi pri vysoknoi gipoksii). M. G. Pshennikova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and B. M. Manukhin (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 198, June 21, 1971, p. 1474-1477. 16 refs. In Russian.

Study of the state of sympathetic regulation of the heart in the presence of hyperfunctioning and hypertrophy caused by high-altitude hypoxia. For this purpose a determination is made of the dynamics of the noradrenaline concentration and content in the myocardium of rats exposed to intermittent high-altitude hypoxia produced by placing the animals in a pressure chamber. It is found that during the action of high-altitude hypoxia with pronounced development of hypertrophy of the myocardium the concentration and content of the sympathetic mediator noradrenaline in the myocardium undergo changes which differ from the changes occurring during hypertrophy caused by heart defects. A.B.K.

A71-37413 The activity of single trochlear nerve fibers during eye movements in the alert monkey. A. F. Fuchs and E. S. Luschei (Washington, University, Seattle, Wash.). *Experimental Brain Research*, vol. 13, no. 1, 1971, p. 78-89. 14 refs. NIH Grant No. RR-00166; PHS Grant No. R 01-NB-08596-01.

The firing frequency of 31 single fibers in the trochlear nerve of alert monkeys was related to eye movement. Monkeys were conditioned to finger press lighted buttons in order to produce a calibrated sequence of eye movements in the horizontal and vertical directions. About 3 msec prior to and during a downward saccade, all units exhibited an intense burst in firing frequency. The average maximum burst frequency was about 400 spikes/sec. Prior to and during an upward saccade, all units exhibited a marked decrease in firing rate. If the downward deviation of the eye exceeded a certain minimum position (threshold), all units exhibited a very regular tonic rate during the fixation pauses between saccades. The activity of simian trochlear fibers is very similar to the activity of neurons in the abducens and oculomotor nuclei. Therefore, one functional type of motoneuron which subserves saccadic, smooth pursuit and fixation eye movements exists in all of the oculomotor nuclei. M.M.

A71-37443 # Functional significance of primary responses in subcortical visual centers (O funktsional'nom znachenii pervichnykh otvetov podkorkovykh zritel'nykh tsentrov). I. A. Shevelev (Akademiia Nauk SSSR, Institut Vysheii Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, May-June 1971, p. 569-576. 19 refs. In Russian.

A parallel study of primary responses (PR) and unit spike activity at two subcortical levels of the visual system (i.e., in the optic tract and the lateral geniculate body) in nonanaesthetized cats shows that the form of tract PR and of lateral geniculate body PR coincides well with the distribution of units at these levels by response latencies. However, total time of initial cell activity considerably exceeds the duration of corresponding response phases. The possible causes of this discrepancy are discussed. The data obtained suggest the possibility that the evoked potentials of the two

investigated levels in the cat's visual system may represent a highly accurate quantitative criterion for the properties and behavior of large neuronal populations during the initial period following photic stimulation of the retina. M.V.E.

A71-37444 # Characteristics of threshold electric phosphene (K voprosu o kharakteristike porogovogo elektricheskogo fosfena). V. I. Shostak. *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, May-June 1971, p. 586-591. 9 refs. In Russian.

Investigation of the dependence of the duration of the threshold electric impulse on the latter's various electric characteristics for different electric stimulation frequencies, and study of the interrelation between threshold intensity and electric stimulation frequency for various impulse durations. The results of the study include the finding that the dependence varies with the way of estimating the threshold value. When the threshold is characterized by voltage and power of the electric impulse, the dependence is of a hyperbolic and parabolic shape for different frequencies, while for threshold values of energy and amount of electricity the dependence is close to a rectilinear shape. M.V.E.

A71-37445 # Changes in human EEG during mental visualization of motions (Izmeneniia EEG cheloveka pri myslennom predstavlenii dvizheniia). M. P. Ivanova and A. V. Artemov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, May-June 1971, p. 624-626. 7 refs. In Russian.

Experiments with human subjects indicate that mental visualization of one's own motions produces EEG changes analogous to those resulting from actual motion performance and activates the motor analyzer. By contrast, when motions of another person are mentally visualized, it is the visual analyzer that is activated the most. M.V.E.

A71-37446 # Methodology of mental work capacity investigation (K metodike issledovaniia umstvennoi rabotosposobnosti). R. M. Baevskii and V. I. Kudriavtseva. *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, May-June 1971, p. 638-640. 8 refs. In Russian.

The merits and drawbacks of several methods for studying mental work capacity are discussed. Among the techniques briefly reviewed are those of Kekchev (1947), Kosilov (1957), Zinchenko et al. (1964), and Pratushevich (1964), as well as one of Kraepelin's (1898) mental tests. M.V.E.

A71-37447 # Investigation of motor reaction parameters (Issledovanie parametrov dvigatel'noi reaktsii). I. D. Kartsev, S. A. Polievskii, and G. A. Polievskii (Ministerstvo Zdravookhraneniia SSSR, Institut Gigieny Detei i Podrostkov, Moscow, USSR). *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, May-June 1971, p. 641-644. 17 refs. In Russian.

Study of some characteristics of higher nervous activity, using a modified version of the logokinetic method of Ivanov-Smolenskii (1933). Conducted in Pavlovian terms, the investigation is aimed at defining the nature of the interrelation of such indices of conditioned motor reactions as the latent period, the reaction intensity, and the reaction duration. The results obtained confirm the findings of other investigators to the effect that reaction duration, reaction intensity, and latent period are not interrelated. This indicates the necessity of viewing them as separate indices characterizing higher nervous activity independently from each other, as well as the need of simultaneously measuring each of them with adequate accuracy. The described method represents one of the techniques applicable to such measurements. M.V.E.

A71-37483 **The application of heat stress indices.** Clark M. Humphreys (U.S. Public Health Service, Bureau of Occupational Safety and Health, Cincinnati, Ohio). (*Southeastern Industrial Health Conference, Gatlinburg, Tenn., Sept. 30-Oct. 2, 1970.*) *Journal of Occupational Medicine*, vol. 13, Aug. 1971, p. 377-379. 7 refs.

Discussion of some of the variables and uncertainties involved in heat stress evaluations. It is suggested that the best way to discourage a literal interpretation of a heat stress index is to consider some of the assumptions and possible errors inherent in the solution, the major unknown probably being the workman himself. It is shown that the performance of a worker under stressful conditions will vary with the degree of acclimatization, the degree of dehydration, clothing, age, physical fitness, general health, individual variability, and sex. F.R.L.

A71-37492 **Man's response to the space environment.** Tony Nicholson (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *New Scientist and Science Journal*, vol. 51, July 29, 1971, p. 248-250.

It is pointed out that prolonged weightlessness and the difficulties of extravehicular work are the major issues of manned space flight. An understanding of these problems is essential not only for the exploration of the solar system beyond the moon but also for the full exploitation of orbiting laboratories. In many ways the capabilities of the Russian and American programs for manned missions have developed along separate lines. Cosmonauts have gathered highly significant data on living and working in the weightless state, while the astronauts have extensive experience of orbital extravehicular and lunar surface activity. G.R.

A71-37543 * **Adaptation to displaced vision - A change in the central control of sensorimotor coordination.** Martha E. Hardt, Richard Held, and Martin J. Steinbach (MIT, Cambridge, Mass.). *Journal of Experimental Psychology*, vol. 89, Aug. 1971, p. 229-239. 24 refs. NIH Grant No. MH-07642; Grant No. NGR-22-009-308.

In characterizing the changes that occur in sensorimotor coordination after viewing the prism-displaced image of the hand, four types of explanation can be advanced: visual, proprioceptive, motor, and sensorimotor. Each one predicts different consequences on different tests of coordination: reaching for visual targets, orienting head to hand, orienting eye to hand, and repositioning the hand in a learned posture. The results of four experiments using these tests are consistent only with the sensorimotor explanation. They imply a change in the control and assessment of coincidence between the direction indicated by the exposed arm and that of either a sensed external object or other body part. M.M.

A71-37544 **Visual-motor control loop - A linear system.** D. Adrian Wilkinson (York University, Toronto, Canada). *Journal of Experimental Psychology*, vol. 89, Aug. 1971, p. 250-257. 18 refs.

A model of prism adaptation is proposed suggesting that the visual-motor control loop is a linear system comprising a number of independent subsystems. Errors in the subsystems sum algebraically to produce the error of the total loop. This hypothesis was tested in two experiments. Exposure to visual-motor discordance produced by wedge prisms caused a change in the judged visual direction (V) of targets. Such exposure also produced a change in setting the hand to the median plane of the head (H). The prism-induced change in target-aiming performance (T) was equal to $(H + V)$. Viewing a visual display through the prisms produced changes in V and H, but the data did not fit the linear model $(H + V = T)$. Changes in pointing at visual targets with the untrained arm are fully accounted for by changes in V. M.M.

A71-37545 **Tracking errors amended without visual feedback.** Ronald W. Angel, Harry Garland (Stanford University, Stanford, Calif.), and Martin Fischler (Lockheed Missiles and Space Co., Palo Alto, Calif.). *Journal of Experimental Psychology*, vol. 89, Aug. 1971, p. 422-424. 5 refs.

Five Ss performed a pursuit tracking test in which the visual feedback was reversed on alternate blocks of target steps. The center of the visual display was screened so that Ss could not see the response marker during the initial part of each response. Numerous false moves were corrected at times when the response marker was invisible. The results confirm previous suggestions that errors can be amended by a central mechanism which does not require sensory feedback. (Author)

A71-37550 **Diastolic heart sounds and filling waves in coronary artery disease.** Peter F. Cohn, Pantel S. Vokonas, Richard A. Williams, Michael V. Herman (Peter Bent Brigham Hospital, Boston, Mass.), and Richard Gorlin (Howard Hughes Medical Institute). *Circulation*, vol. 44, Aug. 1971, p. 196-202. 23 refs. Research supported by the Women's Aid for Heart Research and the Heart Research Foundation; PHS Grants No. PO-1-HE-11306; No. IT 1 HE-5679.

One hundred thirty selected patients with chest pain syndromes were studied by apex- and phonocardiography as well as by cardiac catheterization; selective cine coronary arteriography, and cine left ventriculography. Ninety-three patients had coronary artery disease; 37 did not. Abnormal graphic studies were found in 42 patients with coronary artery disease and three patients with normal coronary arteriograms. These abnormalities correlated well with the presence of elevated left ventricular end-diastolic pressure. Third heart sounds were found less frequently than fourth heart sounds and/or abnormal apexcardiographic a waves, but when present were usually associated with a depressed cardiac index. Diagnostically, over 90% of all patients with chest pain who exhibited graphic abnormalities had significant coronary atherosclerosis. Normal graphic studies did not rule out coronary artery disease, but did indicate adequate left ventricular function since only 5% of patients with normal graphic studies had elevated left ventricular end-diastolic pressure combined with a low cardiac index. (Author)

A71-37569 # **Stop test method for the study of movement control processes (Metodika proby s ostanovkoi v izuchenii protsessov upravleniia dvizheniiami).** G. N. Zhukova, L. A. Tenenbaum, and E. I. Shafranova. *Avtomatika i Telemekhanika*, June 1971, p. 84-91. In Russian.

A stop test method is proposed for studying the role of acceleration in movement control processes in man. Results are presented of experimental studies, based on the proposed method, of periodic and individual elbow joint movements in healthy subjects, as well as of pathologic tremors in subjects afflicted by Parkinson's disease. The investigation possibilities held forth by the proposed method are discussed in the light of these results. M.V.E.

A71-37575 * **An index for describing food utility.** H. B. Chermiside, J. Y. Graudenz, A. Furst, and J. Shapira (San Francisco University, San Francisco; NASA, Ames Research Center, Biotechnology Branch, Moffett Field, Calif.). *Western Pharmacology Society, Proceedings*, vol. 14, 1971, p. 121-124. Grant No. NGR-05-029-005.

Food utility calculations for various formose sugar treatments are presented. The food utility calculation is found to be a valid qualitative measure of the relative effects of dietary materials. Two measures are provided. Food utility is a general, rather than a precise, quantitative notion. Thus the indices of food utility must be used as descriptive, ordinal values, although experience indicates that they are quasi-quantitative. G.R.

A71-37646 * **Relative frequency distribution of D sub 125 C values for spore isolates from the Mariner-Mars 1969 spacecraft.** W. W. Bond, M. S. Favero, N. J. Petersen, and J. H. Marshall (Center for Disease Control, Phoenix, Ariz.). *Applied Microbiology*, vol. 21, May 1971, p. 832-836. 11 refs. NASA-supported research.

Study of bacterial spore crops prepared from 103 randomly selected aerobic mesophilic isolates collected during a spore assay of Mariner-Mars 1969 spacecraft conducted by the Jet Propulsion Laboratory. D sub 125 C values, which were determined by the fractional-replicate-unit-negative-most-probable number assay method using a forced air oven, ranged from less than 5 min to a maximum of 58 min. Subsequent identification of the 103 isolates indicated that there was no relationship between species and dry-heat resistance. A theoretical dry-heat survival curve of the population was nonlinear. The slope of this curve was determined almost exclusively by the more resistant organisms, although they represented only a small portion of the population. (Author)

A71-37648 * **Identification of human operator models by stochastic approximation.** C. B. Neal (Hughes Aircraft Co., Culver City, Calif.) and G. A. Bekey (Southern California, University, Los Angeles, Calif.). *Mathematical Biosciences*, vol. 10, 1971, p. 91-116. 27 refs. Grant No. NGR-05-018-022.

This article discusses the application of stochastic approximation to the estimation of human operator model parameters. Both continuous and sampled-data models are considered. Stochastic approximation was used successfully for parameter estimates in both types of models. In the case of sampled-data models, all parameters, including the sampling interval, have been estimated. (Author)

A71-37763 # **The physiological cost of flight work (O fiziologicheskoi stoimosti letnogo truda).** D. V. Mangina. *Voenna-Meditsinskii Zhurnal*, June 1971, p. 61-64. 13 refs. In Russian.

Survey of the literature on the effects of nervous-emotional stress on the physiology of pilots during flight. The link between nervous-emotional stress and premature fatigue, leading to cardiovascular disorders and psychic disturbances, is noted, as well as the prevalence of coronary atherosclerosis in pilots, which can lead to the sudden development of myocardial infarctions. The effect of long flights on disturbances of the circadian rhythms is also noted. Recommendations are made for counteracting these adverse effects by appropriate training and diet. A.B.K.

A71-37775 # **Typological features of human higher nervous activity and their significance in professional selection (Tipologichni osoblivosti vischoi nervovoi diial'nosti liudini ta ikh znachennia dlia profesiinogo dobori).** V. O. Troshikhin, S. I. Moldavs'ka, and N. V. Kol'chenko. *Akademiia Nauk Ukrain's'koi RSR, Visnik*, vol. 35, June 1971, p. 76-81. In Ukrainian.

Description of laboratory test equipment used to evaluate the agility of the central nervous system and the brain's ability to process information presented in the form of sustained concentrated stimuli. Auditory stimuli consisted of three tones of different frequencies, while visual stimuli involved a display of geometrical patterns and of words belonging to three different subject categories. The subject is required to perform simple manual tasks corresponding to different stimuli, and the latter are presented with increasing frequency. Satisfactory results were obtained with this procedure, used to select optimum radiotelegraphist candidates. T.M.

A71-37777 # **Investigation of a mathematical model of the cardiovascular system (Doslidzhennia matematichnoi modeli sertsevo-sudinnoi sistemi).** V. O. Lishehuk and B. L. Palets' (Akademiia Nauk Ukrain's'koi RSR, Institut Kibernetiki, Kiev, Ukrainian

SSR). *Avtomatika*, vol. 16, May-June 1971, p. 25-32. 17 refs. In Ukrainian.

Study of a mathematical model for the statics of a cardiovascular system. Analytical expressions and experimental data are given for evaluating the influence of different system parameters on important circulatory indices such as minute volume and arterial tension. It is shown that the interaction of biophysical and regulatory mechanisms is organized in such a way that controlled variations of circulatory parameters resulting in higher system productivity are accompanied by increased sensitivity of cardiac minute volume and arterial tension to these changes. In other words, the higher the organism's circulatory requirements, the better they are satisfied by the circulatory system. T.M.

A71-37900 * # **A fraction of the ventricular myocardium that has the specificity of the cardiac beta-adrenergic receptor (norepinephrine binding/displacement).** Robert J. Lefkowitz (Massachusetts General Hospital, Boston, Mass.) and Edgar Haber (Harvard University, Boston, Mass.). *National Academy of Sciences, Proceedings*, vol. 68, Aug. 1971, p. 1773-1777. 18 refs. NASA-supported research.

Description of the characteristics of binding of (H-3)norepinephrine to microsomal particles from the canine ventricular myocardium. The binding was found to be blocked by catecholamines in direct proportion to their beta-adrenergic potency on cardiac action. It is concluded that, on the basis of specificity and affinity of binding, the microsomal particles are likely to contain the beta-adrenergic receptor. Z.W.

A71-37917 * # **Planetary quarantine considerations for outer planet missions.** William Stavro and Charles Gonzalez (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *American Astronautical Society, Annual Meeting, 17th, Seattle, Wash., June 28-30, 1971, Paper AAS 71-122*. 23 p. 6 refs.

The results of an initial investigation of the effect of a planetary quarantine constraint on a typical multiple outer planet mission are presented. The general characteristics of outer planet missions affecting planetary quarantine are presented first. A sample mission is then selected (Jupiter-Saturn-Pluto) and its characteristics given. Navigation error sources are described and a possible midcourse maneuver plan is presented. A branch diagram showing sub-allocations of the planetary quarantine constraint among the various sources is then constructed. An analysis to determine the probability that the spacecraft impacts an encounter planet due to navigation uncertainties is then performed and applied to the selected mission. Conclusions are drawn indicating the implications of planetary quarantine constraints on outer planet missions. (Author)

A71-38016 # **Ergonomics in aviation (Ergonomia w lotnictwie).** Zbigniew Jethon. *Technika Lotnicza i Astronautyczna*, vol. 26, July 1971, p. 15-18. In Polish.

Ergonomic evaluation of the working conditions of aircraft crewmembers is discussed from the viewpoint of static and dynamic adaptation of aircraft system designs to human psychophysical capabilities. Significant criteria for functional evaluation of human-operator and machine elements interfaced in a common system are defined, and an ergonomic approach to system design is outlined in consecutive stages of initial research, prototype development, production, training, utilization, and final modification. T.M.

A71-38048 **Biological effects of radiation.** J. E. Coggle (St. Bartholomew Hospital, London, England). London, Wykeham Publications (London), Ltd. (Wykeham Science Series, No. 14), 1971. 157 p. \$4.80.

A précis of some of the scientific, medical, agricultural,

industrial, and military uses of radiation stresses the need to have an accurate evaluation of the biological risks involved in its use due to the widespread and increasing use of radiation in modern society. The topics include some properties of ionizing radiation, the effect of radiation at the molecular and subcellular levels, cellular effects of radiation, radiation cell survival in vivo, the effect of radiation at the tissue level, the genetic effects of ionizing radiation, some factors which modify the biological effect of radiation, radiation and cancer, radiation lifeshortening, and radiation hazards and the standards for radiation protection. M.M.

A71-38058 Positive and negative deflections in the off response of the electroretinogram in man. Kazuo Kawasaki (Kanazawa University, Kanazawa, Japan), Yutaka Tsuchida, and Jerry H. Jacobson (Cornell University, Medical College, New York, N.Y.). *American Journal of Ophthalmology*, vol. 72, Aug. 1971, p. 367-375. 22 refs. Research supported by the Samuel Bronfman Foundation; PHS Grant No. EY-00264.

When stimuli of relatively low intensity are used, the off response of the human electroretinogram (ERG) consists mostly of a negative-going wave. With intense stimuli, the off response begins with a positive-going wave. The negative-going wave of the off response to dim stimulus is absent in stationary congenital night blindness and present in rod monochromatopsia. The positive-going wave of the off response to intense stimulus is present in stationary congenital night blindness and absent in rod monochromatopsia. M.M.

A71-38059 Effects of image blur and lateral inhibition in the visual system on visual performance. J. C. Trinder (New South Wales, University, Sydney, Australia). *Optica Acta*, vol. 18, June 1971, p. 461-477. 23 refs.

Accuracies obtained for the visual task of pointing or centering a circular black measuring mark on a circular bright target are presented. To understand the complex pattern of pointing accuracies, the shape of the image actually seen by the visual system is computed. This is performed by convolving the luminance profiles of the targets with point spread functions of the visual system, which estimate effects of image blur and lateral inhibition. The resulting luminance profiles are then analyzed and simple visual criteria on which the pointing task is based are derived. (Author)

A71-38061 A psychometric study of the annoyance caused by noise (Eine psychometrische Untersuchung der Lästigkeit von Geräuschen). V. W. Rahlf and A. Schaaf. *Acustica*, vol. 24, June 1971, p. 340-346. 19 refs. In German.

Determination of the annoyance values of laboratory-generated complex sound stimuli by a pure psychological scaling method, and correlation of these values with the corresponding physical parameters by means of a multiple regression technique. The sound stimuli employed consisted of wideband noise with a superimposed narrow-band component, the location and intensity of which were systematically varied. On the basis of these calculations psychophysical relations are obtained which can be expressed by a simple equation. A.B.K.

A71-38062 Middle ear function - A kinematic analysis. V. Marples (Warwick, University, Coventry, England). *Acustica*, vol. 24, June 1971, p. 347-353. 17 refs.

Description of the first stage of an approach to the simulation of the mode of transmission of energy through the middle ear. The middle ear mechanism is subjected to topological analysis and an investigation of the number of its degrees of freedom. These are interpreted in the light of current knowledge of the mode of

operation. On the basis of this analysis a number of alternative suggestions are made regarding details of the modes of motion of the ossicles. The importance of a detailed dimensional geometrical model of the middle ear for further work is emphasized. A.B.K.

A71-38071 The maturation of the circadian rhythm of brain norepinephrine and serotonin in the rat. Yutaka Asano (Hokkaido University, Sapporo, Japan). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 10, Aug. 1, 1971, p. 883-894. 13 refs.

Changes in the daily variations of norepinephrine and serotonin contents in the rat brain were examined for the period ranging from 8-9 to 56-66 postnatal days. Both amines showed a common, presumably inborn pattern of circadian changes up to day 15-17, exhibiting a peak in the dark and a reduction in the light periods. From day 35-37 on, new and mature forms of circadian rhythm were observed; norepinephrine demonstrated a peak in the dark and serotonin a peak in the light phases. It was confirmed also that a circadian rhythm of spontaneous motor activity, and accordingly of the sleep-and-wakefulness pattern is formed gradually about 3 weeks after birth. A hypothesis was suggested that the maturation of circadian rhythm of brain norepinephrine and serotonin contents is closely related with that of spontaneous activity and the sleep-and-wakefulness mechanism. (Author)

A71-38197 # Microelectrode studies of convergence of signals of various sensory modalities on brain neurons (Mikroelektroodnye issledovaniia konvergentsii signalov raznykh sensornykh modal'nostei na neuronakh golovnogo mozga). L. L. Voronin, V. G. Skrebetskii, and I. N. Sharonova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 2, Jan.-Mar. 1971, p. 116-143. 227 refs. In Russian.

Systematization of the reactions to stimuli of various sensory modalities, noting the main types of convergence most characteristic of the major portion of the brain neurons of mammals. Three types of convergence of signals of various sensory modalities are noted as a function of the nature of the impulse reactions of individual brain neurons in mammals. The first type of convergence is most characteristic of 'associative' structures, while the second type is characteristic of primary analyzer systems, and the third type is characteristic of a number of 'nonspecific' structures. However, in almost any formation it is possible to encounter neurons with different types of convergence. The types of convergence may vary as a function of the functional state and previous activity of the brain. A detailed analysis is made of the available data obtained from studies of convergence and the interaction of various signals by means of intracellular recording. A.B.K.

A71-38198 # Correlation analysis of the electrical activity of human respiratory muscles (Korrelatsionnyi analiz elektricheskoi aktivnosti dykhatel'nykh myshts cheloveka). L. E. Sapuntsov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 71, June 1971, p. 9-12. In Russian.

Correlation analysis of interferential electromyograms recorded from external intercostal muscles in healthy young human subjects during (1) regular breathing, (2) breathing of an air mixture with 5 to 6% carbon dioxide, (3) freely intense breathing, and (4) breathing with an inlet restriction. When recordings were made from the sixth and eighth intercostal spaces on one (right) side of the chest, the mean value of the cross-correlation coefficient was 0.46 for normal breathing and 0.54 for the stressed breathing tests. When recordings were taken from the eighth intercostal spaces of both sides of the chest, these values were 0.21 and 0.33, respectively. T.M.

A71-38199 * **Simulation of passive thermal behavior of a cooling biological system - Entry into hibernation.** R. H. Luecke, E. W. Gray, and F. E. South (Missouri, University, Columbia, Mo.). *Pflügers Archiv*, vol. 327, no. 1, 1971, p. 37-52. 21 refs. Grant No. NGR-26-004-025.

A mathematical model is developed which describes the dynamic generation and transfer of heat in the marmot at normothermic to hibernating body temperatures. Since the animal approximates a ball as it enters hibernation, the form of the model was a sphere divided into three concentric layers: central core, muscle, and skin. Each layer was assumed homogeneous in composition, but distributed with respect to temperatures. The nonlinear partial differential equations describing heat exchange between layers were solved numerically on a computer. The temperatures computed from the model were compared with experimental temperatures of marmots entering hibernation. The agreement between model and experimental temperatures was fair. To help improve the model, the principal parameters were varied to determine sensitivities. M.V.E.

A71-38200 **Alveolar-arterial O₂-pressure difference during hyperventilation (Die alveolär-arterielle O₂-Druckdifferenz bei Hyperventilation).** J. P. Pichotka, H. Krekeler, J. Schotte, and K. Muysers (Bonn, Universität, Bonn, West Germany). *Pflügers Archiv*, vol. 327, no. 1, 1971, p. 53-67. 18 refs. In German.

The alveolar-arterial O₂-pressure difference (AaDO₂) was investigated during controlled hyperventilation and during the subsequent posthyperventilatory phase. Alveolar gas pressures were measured by mass spectrometry, and arterial partial oxygen pressures by polarography. The AaDO₂ increased with decreasing alveolar partial CO₂ pressure (PACO₂) during hyperventilation. During the posthyperventilatory period, the AaDO₂ remained elevated, although alveolar and arterial partial O₂ pressures were often distinctly below normal. Plotted against PACO₂, AaDO₂ values obeyed a linear function throughout hyperventilation and the posthyperventilatory phase. It is concluded that, under the given experimental conditions, AaDO₂ is mainly determined by PACO₂. M.V.E.

A71-38222 # **The question of an impairment of hearing due to occupational causes for cockpit crews in civil aviation (Zur Frage der berufsbedingten Hörschädigung der Cockpitbesatzungen in der zivilen Luftfahrt).** Jürgen Kressin and Rolf Karbaum. *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 7, no. 7, 1971, p. 322-325, 340. 16 refs. In German.

An investigation involving 123 members of cockpit crews in the age between 40 and 50 years was conducted in order to determine the effect of the noise in the cockpit of an aircraft on the hearing facilities of persons who are exposed to this noise. The characteristics and the causes of the cockpit noise are discussed. The subjects had undergone an audiometric examination once a year. Three successive audiograms were evaluated for each ear of every person. An impairment of the auditory facilities was found, amounting to 35 dB at a frequency of 6000 Hz for 75% of the subjects, and to values between 35 and 60 dB for 20%. For the remaining 5% the hearing loss was greater than 60 dB. G.R.

A71-38223 # **Applied electroencephalography in aviation medicine as functional diagnosis of central regulations (Angewandte Elektroencephalographie in der Luftfahrtmedizin als Funktionsdiagnostik zentraler Regulationen).** Evelyn Schulte. *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 7, no. 7, 1971, p. 326-330. 5 refs. In German.

The various stresses to which members of the flying personnel are subjected are examined, and the reactions of the organism in response to these stresses are analyzed. The objectives of a diagnosis conducted with the aid of electroencephalography are obtained on

the basis of this analysis. Problems regarding the evaluation of the EEG are discussed. The determination of a number of disturbances of the brain functions with the aid of the EEG requires tests regarding the effect of stresses. The use of the EEG in connection with the problem of fatigue and the allocation of necessary rest periods is also considered. G.R.

A71-38224 # **The growing importance of a psychological basic training for stewardesses (Die wachsende Bedeutung einer psychologischen Grundausbildung im Stewardessenberuf).** Ingo Sedding. *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 7, no. 7, 1971, p. 331-335. In German.

The educational requirements for stewardesses are considered, and the various functions of a stewardess in an aircraft are examined. The importance of a psychological training for the development of the personality of a stewardess is pointed out. A 20-hour course in the field of psychology was introduced into the basic training of stewardesses in the German Democratic Republic in 1967. The course was considerably extended in 1969. The objectives of the course are to call the attention of the stewardess to the problems of her own personality on a psychological basis, and to enable her to establish consciously her relation with the passenger. G.R.

A71-38276 **On modelling neural networks in the retina.** C. Tate and M. M. Woolfson (York, University, York, England). *Vision Research*, vol. 11, July 1971, p. 617-633. 18 refs. Research supported by the Science Research Council and the Wellcome Trust.

Signal propagation in a network of model neurons is formulated in terms of a system of differential equations which combine cable theory with a model for synaptic transmission. Excitatory and inhibitory synapses are formally identical, and their character is specified by giving numerical values to the postsynaptic equilibrium potentials. The retina's five major cell types are represented in a planar model; the equations are integrated by a digital computer program whose input specifies network and stimulus parameters. The connection scheme provides for lateral inhibition, and some calculated ganglion cell responses are similar to recordings from 'on-center' and 'off-center' units in the vertebrate retina. These results are produced by special modes of connection at the level of the model which corresponds to the inner plexiform layer and they may not be realistic. Nevertheless, the calculations performed so far illustrate some of the ways in which the model's parameters govern its behavior. M.M.

A71-38277 **Patterns of spatial integration in the detection of compound visual stimuli.** Frank M. Bagrash, Larry G. Kerr, and James P. Thomas (California, University, Los Angeles, Calif.). *Vision Research*, vol. 11, July 1971, p. 635-645. 12 refs. PHS Grants No. NB-07249; No. EY-00360.

Increment thresholds were measured for foveally viewed square and circular stimuli varying in area from 400 to 1600 sq min of visual angle. They were presented singly or in pairs, one stimulus component superimposed on the other. The single stimuli yielded a traditional areal summation curve. Thresholds for the compound stimuli were lower. The contribution of the small component to the visibility of a compound stimulus depended on the overall area of the compound. These results suggest that more than one pattern of spatial integration is available. The results are discussed in terms of the meaning of the areal summation function and the existence of size-tuned detector mechanisms in the human visual system. M.M.

A71-38278 **Evidence of role of size-tuned mechanisms in increment threshold task.** James P. Thomas and Larry G. Kerr

(California, University, Los Angeles, Calif.). *Vision Research*, vol. 11, July 1971, p. 647-655. 13 refs. PHS Grants No. NB-07249; No. EY-00360.

Detectability of a foveal stimulus against a 248-troland background was measured. The retinal illuminance of the stimulus was not uniform, but was varied systematically from one part of the stimulus to another. Over limited ranges, adding light to part of the stimulus reduces the visibility of the stimulus as a whole. Presenting an adapting stimulus also reduces visibility. The reduction is greatest when the relative distribution of light in the adapting stimulus matches the distribution in the test stimulus. Both observations support the hypothesis that mechanisms which mediate detection are size-tuned. M.M.

A71-38279 **Comparison of human visual cortical potentials evoked by stabilized and unstabilized targets.** Ulker Tulunay Keeseey (Wisconsin, University, Madison, Wis.). *Vision Research*, vol. 11, July 1971, p. 657-670. 15 refs. NIH Grant No. NB-06151.

Visual cortical potentials were evoked by a 2 deg sinusoidally modulated field. Under both the stabilized and unstabilized conditions, the VECF (visual evoked cortical potential) was composed of the fundamental and the harmonics of the stimulus frequency. The total RMS voltage of the potential was a function of flicker frequency and amplitude. When flicker below 20 Hz was used, image stabilization yielded the smaller VECF. There was, however, no subjective disappearance of the stimulus at these low flicker frequencies. Under either viewing condition the VECF amplitude varied randomly as a function of time and did not correlate with changes in either the total EEG level or the alpha frequency of the EEG. M.M.

A71-38280 **The influence of spatial intervals and thickness of lines of stimulus patterns on stabilized images.** B. Cardu, M. Gilbert, and M. Strobel (Montréal, Université, Montreal, Canada). *Vision Research*, vol. 11, July 1971, p. 671-677. 10 refs. National Research Council of Canada Grant No. APA 271.

The influence of lateral inhibition on stabilized images was studied by presenting to three subjects concentric triangles and systematically varying the visual angle subtended, the interval between lines and the thickness of the line. When the images were stabilized on the retina, subjects reported the disappearance of the image in various ways. In particular, the number of times fusion of lines before disappearance was reported was found to be inversely related to the size of the interval and directly related to the thickness of the lines. These findings were consistent with quantitative estimates of lateral inhibition. M.M.

A71-38281 * **Independence of evoked potentials and apparent size.** D. Regan (Keele, University, Keele, Staffs., England) and W. Richards (MIT, Cambridge, Mass.). *Vision Research*, vol. 11, July 1971, p. 679-684. 12 refs. Research supported by the Medical Research Council, the Hartford Foundation, NIH, and NASA.

Experimental investigation of the possibility that visual evoked potential (EP) might also be altered when the subject changed the angle of convergence of his eyes. When the eyes converge, there is a large reduction in the apparent size of an invariant retinal image. If the magnitude of the EP is correlated with apparent, rather than retinal image size, then convergence should also lead to a change in the relation between EP amplitude and the check size of an oscillating checkerboard stimulus. No definitive change in the EP measure was found, suggesting that the neural constraints upon the EP are more peripheral than the site of size scaling. M.M.

A71-38282 **Visually evoked cortical responses to the on- and off-set of patterned light in humans.** M. Russell Harter (North Carolina, University, Greensboro, N.C.). *Vision Research*, vol. 11, July 1971, p. 685-695. 32 refs. NSF Grant No. GB-8053.

Averaged evoked cortical potentials were investigated as a function of the on- and off-set of patterned light and the density and sharpness of contours. Six adult human subjects viewed patterned stimuli which were illuminated every 1.3 sec for 600 msec. Contour density and sharpness were varied by varying the size and distance between polka-dots and induced refractive error. Analyses of variance indicated that dot-size and between-dot-distance significantly influenced the amplitude of early and late components of evoked responses to both the on- and off-set of pattern. In general, response amplitude progressively decreased as a function of decreased distance between elements and increased refractive error. The results are discussed in terms of lateral inhibition and size of receptive field centers of on- and off-center cells in the visual system of animals. M.M.

A71-38283 **Hue shifts produced by intermittent stimulation.** Thomy H. Nilsson and Thomas M. Nelson (Alberta, University, Edmonton, Alberta, Canada). *Vision Research*, vol. 11, July 1971, p. 697-712. 15 refs. National Research Council of Canada Grant No. APA 145.

A matching technique was used to measure the shifts in hue produced in ten narrow-band spectra between 425 and 650 nm by eight rates of intermittency ranging from 0 to 15 Hz. The direction of hue shift did not vary with intermittency rate, but magnitude of hue shift did. The intermittency rate producing maximum shift varied with wavelength. Stimuli at 425, 500 and 574-600 nm were relatively invariant at all rates. Maximal hue shifts were observed with stimuli at 525-550 and 650 nm toward longer wavelengths. Direction of shift of red targets may, however, depend on observer criteria, since strong desaturation effects accompanied the hue shifts. The data indicate that the hue shifts produced by intermittent stimulation differ from those produced by luminance changes. It is suggested that intermittency hue shifts involve an interaction between stimulus intermittency and a temporal coding of color in the visual system. M.M.

A71-38284 **Evaluation of retinal thresholds for C.W. laser radiation.** Irving L. Dunskey and Paul W. Lappin (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Vision Research*, vol. 11, July 1971, p. 733-738. 8 refs.

Rhesus monkeys were exposed to ocular radiation from the yellow line, 568.2 nm emitted by a krypton CW gas laser to determine the minimal ophthalmoscopic visible damage threshold on the retina. The effective-dose 50%-probability points were determined for the extramacular sites having an exposure time range of 16-500 msec. Observations of the fundi were made prior to, during, and after each exposure, using a fundus camera. Damage thresholds for krypton were examined and compared to the reported results of helium-neon, argon, and neodymium. M.M.

A71-38285 **Derivation of wavelength discrimination from colour-naming data.** Damien P. Smith (Melbourne, University, Melbourne, Australia). *Vision Research*, vol. 11, July 1971, p. 739-742. 10 refs.

Description of an experiment of wavelength discrimination from color naming, using the Index of Nameable Color Difference (INCD). Ten young adults with normal visual acuity and color vision acted as subjects. Despite the differences in experimental conditions, the name data compare well with those of Boynton and Gordon (1965), the individual name curves agreeing in spectral location and

distribution. It thus appears, as Jacobs and Gaylord (1967) suggested, that color-naming may be employed to formulate a measure of discrimination that qualitatively parallels the differential threshold curve determined by conventional wavelength discrimination techniques. M.M.

A71-38286 * **Extraretinal correction and memory for target position.** Alexander A. Skavenski (Maryland, University, College Park, Md.). *Vision Research*, vol. 11, July 1971, p. 743-746. PHS Grant No. EY-00325; Grant No. NsG-398.

Description of an experiment showing that error (the distance of the line of regard from the prior target position) stabilizes at about 3.5 deg of arc over very long periods of time. A correlational analysis of prior data shows that many eye movements in the dark tend to be corrective. The findings confirm that there is a good extraretinal source of eye position information and show that such information can be stored in memory and used to control eye position when visible targets are not available. M.M.

A71-38296 **Relations between pressure in pulmonary artery, left atrium, and left ventricle with special reference to events at end diastole.** S. Å. Forsberg (Sahlgren's Hospital, Göteborg, Sweden). *British Heart Journal*, vol. 33, July 1971, p. 494-499. 12 refs.

Results were extracted from 158 patients who underwent diagnostic heart catheterization at rest. Seventeen were considered normal. Simultaneous pressure records from the pulmonary artery and left atrium were always made and often also from the left atrium and ventricle. Some of the main conclusions are as follows: (1) normally at rest there is left atrioventricular diastolic pressure congruence; (2) normally the pulmonary arterial diastolic pressure is approximately identical with the end-diastolic pressure of the left ventricle; (3) at the end of diastole, the flow and pressure gradient across the pulmonary vascular bed seem to be in phase and both are close to zero; and (4) patients with different cardiovascular diseases, the majority with mitral valvular disease, were compared with the normal group. With moderate mitral stenosis without much increased pulmonary vascular resistance, the relation between pulmonary arterial diastolic pressure and end-diastolic pressure in the left atrium is similar to that in normal patients. M.M.

A71-38442 **Why the double standard - A critical review of Russian work on the hazards of microwave radiation.** Leo P. Inglis (North American Rockwell Corp., Atomics International Div., Canoga Park, Calif.). In: The expanding science of EMC; Institute of Electrical and Electronics Engineers, International Symposium on Electromagnetic Compatibility, Anaheim, Calif., July 14-16, 1970, Symposium Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1970, p. 168-172. 8 refs.

Continued interest in the determination of appropriate national levels of exposure to microwave fields has directed attention to Soviet work in this field. The vastly different standards adopted in the two countries have aroused much speculation as to the reasons. In this paper the Russian work is reviewed, and the major individuals identified. An explanation for the different exposure limits is offered, based partly on the difference in national organization. (Author)

A71-38544 # **Isolation and identification of physiologically active substances of indole nature in extracellular metabolites of *Chlorella* (Vydelenie i identifikatsiia fiziologicheskii aktivnykh veshchestv indol'noi prirody vo vnekletochnykh metabolitakh *Khlorelly*).** M. I. Tauts and V. E. Semenenko (Akademiia Nauk

SSSR, Institut Fiziologii Rastenii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 198, June 1, 1971, p. 970-973. 11 refs. In Russian.

Chromatographic analysis of the role of physiologically active substances in stimulating growth and cell division in a *Chlorella* sp. K culture. An attempt is made to isolate the growth-stimulating substances from the culture medium and to test their activity on coleoptiles and on the algae producing these substances, and also to determine by physicochemical methods the group of compounds to which these substances belong. It is shown that indolyl-3-acetic acid is present in extracellular metabolites of a bacterially pure *Chlorella* culture. Moreover, a certain biologically active substance, which is believed to be of indole nature, is also detected in these metabolites. A.B.K.

A71-38545 # **Total content of protein and the quantity of basic proteins in the neurons and neuroglia of the supraoptical and red brain nuclei of rats during natural sleep and when deprived of the paradoxical phase of sleep (Obshchee sodержanie belka i kolichestvo osnovnykh belkov v neironakh i neuroglii supraopticheskogo i krasnogo iader golovnogo mozga krysy pri estestvennom sne i lishenii paradoksal'noi fazy sna).** G. Sh. Voronka, N. N. Demin, and L. Z. Pevzner (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 198, June 1, 1971, p. 974-977. 19 refs. In Russian.

Study of the changes in the protein content in the cytoplasm in certain neurons and glial satellite cells in the supraoptical and red nuclei in the brains of white rats during natural sleep and during periods of deprivation of the paradoxical phase of sleep. It is found that natural sleep leads to an accumulation of total protein and especially of basic proteins in the neuroglial cells of the supraoptical nucleus and to an accumulation of basic proteins in the neurons of this nucleus without changes in their total protein content. In the red nucleus, on the other hand, the total protein content decreases somewhat both in the neuroglia and especially in the neurons, while the quantity of basic proteins slightly increases in the glial cells and remains practically unchanged in the neurons. In the supraoptical nucleus lack of sleep for 24 hours leads to a sharp decrease in the total protein content in the neurons, followed by a certain increase. The total protein content in the neuroglia decreases, but less intensely and more uniformly. The quantity of basic proteins decreases only in the neurons of this nucleus; in the glial cells there is no change. In the red nucleus deprivation of the paradoxical phase of sleep also causes a sharp decrease in the total protein content. However, in the neurons of this nucleus it is less pronounced than in the supraoptical nucleus and is not followed by an increase, while in the glial cells it is more pronounced than in the supraoptical nucleus. In the red cell under these conditions the quantity of basic proteins decreases both in the neurons and in the neuroglia, although somewhat less in the latter. A.B.K.

A71-38551 **Renin, norepinephrine, and epinephrine responses to graded exercise.** Theodore A. Kotchen, Loren H. Hartley, Thomas W. Rice, Edward H. Mougey, LeeRoy G. Jones, and John W. Mason (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.; U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 178-184. 32 refs.

Measurement of plasma renin activity and plasma norepinephrine and epinephrine during graded exercise. Six healthy subjects exercised on a bicycle ergometer at three different 10-min work loads, selected to represent light, heavy, and maximum exercise, and calculated to result in 40, 70, and 100% maximum oxygen consumption, respectively. Renin activity became significantly elevated after exercise at 70% and 100% maximum oxygen consumption but not after 40% maximum oxygen consumption. Ten minutes after exercise at 70% maximum oxygen consumption, renin activity was normal. The renin response to exercise at 100%

maximum oxygen consumption was more sustained, although normal by 30 min after exercise. Significant elevations from resting norepinephrine also occurred after exercise at 70% and 100% maximum oxygen consumption. The changes in epinephrine were comparatively small, and epinephrine was significantly elevated only after maximum exercise. The similar catecholamine and renin responses to graded exercise suggest that acutely elevated renin activity may be related to enhanced sympathetic nervous system activity. (Author)

A71-38552 * Disclosure by dietary modification of an exercise-induced protein catabolism in man. Paul A. Molé and Robert E. Johnson (Illinois, University, Urbana, Ill.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 185-190. 49 refs. Grant No. NGR-14-005-050.

Three men were sequentially fed diets providing their normal caloric requirements (NCR), NCR plus 500, and NCR plus 1,000 kcal, and a constant protein intake of 2 g/kg body weight. Exercise requiring 500 kcal/session was taken on days 6 and 7 of each dietary regimen. The subjects' body weights were constant and they were in positive nitrogen (N) and sulfur (S) balances during the preexercise period on the NCR diet. Exercise produced a 500-kcal deficit but had no effect on urinary N and S excretions during NCR feeding. Surfeit calorie feeding decreased the preexercise urinary N (urea) and S (inorganic sulfate) excretions below the NCR resting levels, thereby making the N and S balances more positive. In contrast to the NCR dietary period, exercise during surfeit feeding significantly increased the urinary N (urea) and S (inorganic sulfate) outputs above their corresponding preexercise levels. These findings indicate that the exercise-induced protein catabolism was not due to a caloric deficit since the catabolic effect of exercise occurred only in the hypercaloric state. (Author)

A71-38553 Determination of maximal oxygen uptake with unsteady-state measurements. J. Howland Auchincloss, Jr., Robert Gilbert, Richard P. Bowman, and Gerhard H. Baule (New York, State University; Syracuse University, Syracuse, N.Y.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 191-197. 12 refs. PHS Grant No. H-2800.

Measurement of maximum oxygen uptake by two techniques in 13 normal subjects, four patients with valvular heart disease, and one with pulmonary disease. A conventional circuit for timed collection of expired air (GCC) was compared with a new circuit (AC) in which inspired ventilation and mixed expired gas concentration were continuously recorded. Treadmill walking speeds were constant during both tests for any individual while grades varied by 2.5% increments. In GCC test collections were made between 1.5 and 2.5 min, while in AC experiments the oxygen uptake was calculated every 0.5 min from onset of the test to its termination at 2.5 min. AC tests could yield the breaking point (BP) oxygen uptake if the subject was forced to stop after 1 min but before 2.5 min. Maximum oxygen uptake for GCC experiments (average of two highest runs) and AC experiments (average of a BP value and the 2-min value of the highest completed test) showed mean values differing by 2.9%, the difference was not statistically significant. Therefore with AC it was possible to determine maximum oxygen uptake in 2-min tests. (Author)

A71-38554 Diet, muscle glycogen, and endurance performance. Jan Karlsson and Bengt Saltin (Gymnastik-och Idrottshögskolan, Stockholm, Sweden). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 203-206. 14 refs. Research supported by the Swedish Medical Research Council and the Swedish Sports Federation.

The influence of high muscle glycogen content on the performance of prolonged heavy exercise was evaluated. Ten subjects

of the same race (30 km) twice, 3 weeks apart. Six subjects performed race I after maintaining a special regimen including a carbohydrate enriched diet. The other four subjects maintained a mixed diet prior to race I. Before race II the subjects reversed the procedure. After the special regimen, mean muscle glycogen content in the lateral portion of the quadriceps muscle was 35 g/kg and after the mixed diet the corresponding value was 17 g/kg wet muscle. The best performance (shortest work time) was attained in all subjects when they had followed the special regimen. However, there was nothing to indicate that a high initial muscle glycogen content made it possible to run faster at the beginning of the race. Mean glycogen usage in the quadriceps muscle was calculated to amount to approximately 0.5 g/(kg wet muscle x km), and an optimal pace could not be maintained with a 3-5 g/kg muscle glycogen content in the thigh. (Author)

A71-38555 * In vivo and in vitro determinations of body fat and body water in the hamster. A. M. Kodama (California, University, Berkeley, Calif.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 218-222. 18 refs. Grant No. NGL-05-003-024.

In vivo measurement of total body water and body density on 34 hamsters (*Mesocricetus auratus*) by the dilution method using super 3 H₂O and an air-displacement technique for estimating body volume. The animals were subsequently sacrificed and body composition determined by direct chemical analyses. When body fat content computed from (1) body density, (2) per cent body water by super 3 H₂O dilution, and (3) body density and per cent body water by super 3 H₂O dilution, was compared with that found by direct analyses, correlation coefficients of 0.94 to 0.97 and standard errors of estimate of 1.0 to 1.7% of body weight were obtained. A predicting equation based on both body density and per cent body water yielded values of per cent body fat which were in somewhat better agreement with the actual fat content, than when body density or per cent body water alone were used. In vitro body composition measurements showed a correlation coefficient of 0.98 between per cent body fat determined by petroleum ether extraction and per cent body water obtained by desiccation. The fraction of water in the fat-free body was remarkably constant, with a mean value of 73.3% and a coefficient of variation of less than 1%. The nitrogen, sodium, potassium, magnesium, and calcium content of the fat-free body were also relatively constant, with coefficients of variation ranging from 3 to 6%. (Author)

A71-38556 Diffusion component of alveolar-arterial oxygen pressure difference in man. Robert Cohen, Edward M. Overfield, and Johannes A. Kylstra (Duke University, Durham, N.C.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 223-226. 8 refs. NIH Grants No. HE-05604-8; No. HE-47222; No. HE-07896; No. HE-5662; Contract No. NR-101-758.

Determination of alveolar-arterial oxygen pressure differences, (A-a)DO₂, in seven healthy men at rest and during exercise at varied P_I sub O₂ and F_I sub O₂. The distribution component of (A-a)DO₂ was virtually eliminated by breathing 100% oxygen, and the shunt component was minimized by lowering the pressure in an altitude chamber in which the subjects were seated. At rest, during breathing of 13 to 14% oxygen, with a mean P_A sub O₂ of 59 mm Hg, the mean (A-a)DO₂ was 9 mm Hg (range 6 to 14 mm Hg). At rest, during breathing of 100% oxygen, with a mean P_A sub O₂ of 56 mm Hg, the mean (A-a)DO₂ was 0 mm Hg (range -4 to 3 mm Hg). During 100-W exercise with breathing of oxygen at a mean P_A sub O₂ of 56 mm Hg, the mean (A-a)DO₂ was 13 mm Hg (range 10 to 15 mm Hg). It is concluded that in healthy men breathing 13 to 14% oxygen there is, on the average, no measurable diffusion component of (A-a)DO₂ at rest; however, the diffusion component is present during exercise. (Author)

A71-38557 Regional cerebral blood flow, O₂, and EEG in exposures to O₂ at high pressure. John W. Bean, James Lignell, and John Coulson (Michigan, University, Ann Arbor, Mich.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 235-242. 41 refs. NIH Grant No. HE-01646.

Study of the interrelationship of regional changes in cerebral blood flow, tissue O₂, EEG, and behavioral reaction in unanesthetized rats breathing air, O₂ at atmospheric and 65 to 80 psig by simultaneous recordings from multiple thermoflow probes, polarographic O₂, and EEG electrodes. These showed synchronous cyclical regional flow changes correlated with tissue O₂ and EEG activity but unrelated to cardiac or respiratory cycles, regional reciprocal flow changes not closely correlated with EEG activity until after prolonged exposure to O₂ at high pressure (OHP), when preconvulsive EEG changes appeared, which developed into massive EEG discharge associated with a shift in regional flow pattern, a pronounced regional flow and tissue O₂ partial pressure increase, and precipitation of overt convulsion. These changes are interpreted as due in part to regional O₂ vascular control involving a primary vasoconstriction and a secondary dilation due to an eventual loss or breakdown of O₂ constrictive control with a resultant sharp increase in regional blood flow and tissue O₂ partial pressure - a sequence of events which would, then, constitute an important aspect of the toxic action of OHP on the central nervous system. (Author)

A71-38558 Ozone tolerance studies utilizing unilateral lung exposure. Stephen M. Alpert and Trent R. Lewis (U.S. Public Health Service, National Air Pollution Control Administration, Cincinnati, Ohio). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 243-246. 18 refs.

An experimental model involving catheterization of one lung of a rabbit with exposure to an initial low dose of ozone followed, after a latent period, by exposure of both the preexposed lung and the unexposed control lung to a high challenge dose of ozone was utilized to study the phenomenon of tolerance. Results showed that tolerance to pulmonary edema was induced by low doses of ozone (1.0 and 0.5 ppm) with only a short latent period (18 hr). It was also found that only the preexposed lung developed tolerance to pulmonary edema, whereas the lung not preexposed developed no protection. (Author)

A71-38559 Effects of exposure to ozone on defensive mechanisms of the lung. Stephen M. Alpert, Donald E. Gardner, Daniel J. Hurst, Trent R. Lewis, and David L. Coffin (U.S. Environmental Protection Agency, Cincinnati, Ohio). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 247-252. 27 refs.

Various components of the endogenous defense mechanism of the lung were studied by means of a unilateral lung exposure technique. Low levels of ozone were found to decrease cellular viability, depress various intracellular hydrolytic enzymes (lysozyme, beta-glucuronidase, and acid phosphatase), and increase the absolute number and percent of polymorphonuclear leukocytes within pulmonary lavage fluid. All these effects were dose-related and were found only in the single lung exposed to ozone and not in the contralateral lung simultaneously breathing ambient air. The responses were found to be the result of a direct toxicity of this pollutant rather than a generalized systemic response. It was concluded that the observed effects could be responsible for the increased mortality of animals given a bacterial challenge following ozone exposure. (Author)

A71-38560 Red blood cell and plasma volumes in the burro, *Equus asinus* - Desert and mountain. M. K. Yousef, D. B. Dill,

and J. D. Morris, Jr. (Desert Research Institute, Boulder City, Nev.; Nevada, University, Las Vegas, Nev.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 253-256. 31 refs. Research supported by the Nevada Heart Association; NIH Grant No. GM-15693-03; NSF Grant No. GB-17126.

Observations were made on red blood cell volume (RBCV) and plasma volume (PV) of two female burros, in the desert, during 3 weeks at the Barcroft Laboratory of the White Mountain Research Station, 3,800 m, barometric pressure 485 mm Hg, and for 40 days postaltitude. During 3 weeks at altitude PV decreased rapidly in both animals and did not return to the control level until after 1 month postaltitude. The decrease in PV was accompanied by increases in hemoglobin concentration and hematocrit. In one animal RBCV did not change, whereas in the other there appeared to be an increase at altitude beginning the 7th day; it was significantly higher throughout the 40 days postaltitude. In the burro the ratio of body hematocrit to venous hematocrit prealtitude was 0.98 contrasted to 0.93 in man. At altitude there was a significant drop in the ratio of 0.92; postaltitude it was 0.99. It appears that in the burro as in man decreased plasma volume and dependent hemoconcentration generally occur during the 1st week at high altitude. Also RBCV eventually increases but in man and burro this does not become significant within 2 weeks and may not occur within 3 weeks.

(Author)

A71-38561 Urinary protein excretion in high-altitude residents. Drummond Rennie, Emilio Marticorena, Carlos Monge, and Luis Sirotzky (Rush-Presbyterian-St. Luke's Medical Center, Chicago, Ill.; Universidad Peruana Cayetano Heredia, Lima, Peru). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 257-259. 21 refs. Grant No. DA-DA-17-68-C-8019.

Two-hour urine collections and venous blood samples were taken from three groups of healthy young adult males of Quechua descent, born in the high Andes and studied in their places of permanent residence. Seventeen lived in Yauricocha (4,640 m) and twenty-six in San Cristobal (4,710 m). Thirty, who had moved down to Lima (160 m) and had lived there for more than 2 years, were studied there. Urinary protein excretion rates were increased in both groups living at high altitude, compared with the Lima group. The cause was unknown. The San Cristobal group showed relatively lower creatinine clearances. The similar hypoxia and dissimilar polycythemia in the two high-altitude groups suggested that the polycythemia rather than the hypoxia was associated with the diminished creatinine clearances in the San Cristobal men. Six other high-altitude dwellers were found to have low serum total protein and raised serum creatinine levels and were therefore not included in group comparisons. (Author)

A71-38562 Alterations in serum and extracellular electrolytes during high-altitude exposure. John P. Hannon, K. S. K. Chinn, and J. L. Shields (U.S. Army, Fitzsimons General Hospital, Denver, Colo.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 266-273. 44 refs.

The concentration and total quantity of electrolytes in serum and extracellular (thiocyanate) space were measured in nine soldiers, initially in San Antonio, Texas (200 m), and subsequently after 1, 3, 7, and 14 days' exposure in Pikes Peak (4,300 m). Altitude exposure caused a total reduction in serum bicarbonate concentration of 7.0 mEq/L. Most of this loss was replaced by an increase in chloride concentration, with minor contributions from protein anion and inorganic phosphate. The serum concentrations of sodium and calcium were unaffected by altitude exposure while the concentrations of potassium and magnesium were slightly elevated. Because of a marked reduction in extracellular space, total extracellular electrolytes, principally sodium, chloride, and bicarbonate, were similarly reduced. Total body water (4-aminoantipyrine space), on the other hand, was slightly elevated, hence calculated intracellular space was

markedly elevated. It was concluded that this high-altitude transfer of water from the extra- to the intracellular space was caused by the osmotic effects associated with a transfer of electrolytes from the extra- to the intracellular compartment. (Author)

A71-38563 **Acclimation response of pigeons to simulated high altitude.** James J. McGrath (Rutgers University, New Brunswick, N.J.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 274-276. 22 refs. Research supported by the Rutgers Research Council.

Adult male pigeons were continuously exposed to a simulated altitude of 20,000 ft (HA) in a barometric chamber for 3 weeks. Control animals were maintained under sea-level conditions. Body weights, hematocrit ratios, and hemoglobin concentrations were determined throughout the exposure period. At the end of 3 weeks, plasma volumes were determined and blood volumes were calculated. The birds were sacrificed and total heart weight (HT), right ventricle weight (RV), and left ventricle plus septal mass weight (LV) determinations were made. The HA birds initially underwent a loss in body weight which returned to normal after 3 weeks. The HA birds had higher hematocrit ratios, hemoglobin concentrations, plasma volumes, and blood volumes. The HA birds developed right ventricular hypertrophy manifest as an increase in the RV/HT and RV/LV ratios. (Author)

A71-38564 * **Regional differences in pleural and esophageal pressures in head-up and head-down positions.** Craig M. Coulam and Earl H. Wood (Mayo Clinic and Mayo Foundation; Minnesota, University, Rochester, Minn.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 277-287. 42 refs. Research supported by the American Heart Association; NIH Grants No. HE-4664; No. FR-7; No. 1 F2-HE-16-769; No. IF3-HE-22-351; No. AF 41(609)-68-0022; Grant No. NsG-327.

Intrapleural pressures were recorded simultaneously via liquid-filled catheters inserted percutaneously with tips positioned at apical and costophrenic surfaces of the lungs of six anesthetized dogs in head-up and head-down positions. Pressures at intermediate sites were recorded by withdrawing these catheters in steps of 1-3 cm. Head-up apical pleural pressures averaged -16.3 plus or minus 1.2 cm water and head-down basal pleural pressures averaged -16.6 plus or minus 0.8, as compared to -2.6 plus or minus 0.5 and -4.6 plus or minus 0.7, respectively, when these sites were dependent in the thorax. Vertical pressure gradients averaged 0.66 plus or minus 0.05 and 0.76 plus or minus 0.06 cm water/cm vertical distance, respectively, but were nonlinear with smaller gradients observed toward the apex in both body positions. Esophageal pressures were less negative than pleural pressures at all sites in the chest. Failure to simulate these results using physical models apparently stems from large differences in characteristics of such models and those of the pleural space, which preclude their use as a basis for assessing the physiologic significance of pleural pressures measured by different techniques. (Author)

A71-38565 **Analysis of test gas washout from lungs with varying tidal volume - Theory.** Peter Scheid and Johannes Piiper (Max Planck Institute of Experimental Medicine, Göttingen, West Germany). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 292-295. 6 refs.

The washout of insoluble test gas from single compartment lung model with tidal volume, VT, varying according to different patterns (progressive, alternating, and scattering) was studied in theory. Variation of VT caused deviations from the true values of the lung volume, VL, and the alveolar tidal volume, VAT, obtained from a regression of the logarithmic decrease of test gas concentration in expired gas on the breath number or on the cumulative tidal volume. The patterns of the deviations were complex, but with alternating

and scattering variance of VT a general trend to underestimate the lung volume, VL, the alveolar tidal volume, VAT, and their ratio, VAT/VL, was observed. On the whole, the errors caused by reasonable variations of VT are so small as to be of minor importance in lung washout analysis. (Author)

A71-38566 **Simultaneous calibration of gas analyzers and meters.** J. M. Brockway, A. W. Boyne, and J. G. Gordon (Rowett Research Institute, Aberdeen, Scotland). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 296, 297.

A method has been devised for the simultaneous calibration of the gas analyzers and gas meter used to monitor the composition of a continuous process gas stream. Pure test gases are added gravimetrically to the carrier gas stream of the system and, from the recorded responses of the measuring instruments, separate calibration factors are derived for each gas analyzer in combination with the gas meter. (Author)

A71-38567 **Wider applicability for Hill's advancing front theory of oxygen uptake.** Howard Kutchai (Oslo, University, Oslo, Norway). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 302-304. 8 refs.

Demonstration that Hill's advancing front equation approximates the kinetics of O₂ uptake by layers of hemoglobin solution in a much wider range of layer thickness and hemoglobin concentration than was hitherto supposed. It applies to O₂ uptake by layers of the same thickness as the human erythrocyte. (Author)

A71-38568 * **Chronic catheterization and handling procedures for marmosets.** Marvin L. Zatzman and Frank E. South (Missouri, University, Columbia, Mo.). *Journal of Applied Physiology*, vol. 31, Aug. 1971, p. 309-312. 12 refs. NSF Grant No. GB-17155; Grant No. NGR-26-004-025.

An autoclavable chronic catheter system and restraining box are described which can be used with marmosets. The catheters are composed of Teflon with Silastic tips and contain a positive seal that permits easy blood sampling and pressure measurement. These catheters were used for 2 years with the majority of the arterial systems remaining patent for 9 months. (Author)

A71-38571 * **Seeing and scintillation.** Andrew T. Young (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Sky and Telescope*, vol. 42, Sept. 1971, p. 139-141, 150.

The irregular motion and distortion of images observed when looking through a telescope is called 'seeing,' while the rapid brightness changes of the stars is usually called 'scintillation.' Seeing and scintillation are caused by very small differences in the refractive index of air from one point to another. These differences correspond to density variations that are due to small temperature fluctuations from place to place. The consequences of these effects for astronomical observations are examined. There is an optimum aperture to use if maximum resolution is wanted. Factors for obtaining good observational conditions are discussed, together with approaches for image restoration and ionospheric scintillations of radio sources. G.R.

A71-38641 # **Automatic regulation of the volumetric blood flow rate during artificial blood circulation (Ob avtomaticheskoy regulirovani ob'emnoi skorosti krovotaka pri iskusstvennom krovoobrashchenii).** V. E. Fridman and V. P. Osipov (Ministerstvo Zdravookhraneniya SSSR, Laboratoriia Iskusstvennogo Kro-

voobrashcheniia Nauchno-Issledovatel'skoi Klinicheskoi i Eksperimental'noi Khirurgii, Moscow, USSR). *Elektromekhanika*, May 1971, p. 541-549. 8 refs. In Russian.

Description of the automated electromechanical system controlling the drive of the arterial pump ('artificial heart') of the cardiopulmonary machine. The selected method governing the regulation of the pump output with respect to venous-blood oxygen content is based on the floating control principle. Presented results of experimental performance tests are discussed. M.V.E.

A71-38677 Visual sensations produced by cosmic ray muons. W. N. Charman and Christina M. Rowlands (Manchester, University, Manchester, England). *Nature*, vol. 232, Aug. 20, 1971, p. 574, 575. 6 refs.

Cosmic ray muons traveling downward within roughly 15 deg of the vertical were selected by a counter telescope. The observers lay with their heads between the scintillators comprising the telescope. Four body positions were used, to allow study of the effects of muons passing in different directions through the eyes and head. It was found that when the muons passed through the eye, visual effects were observed. It is suggested that a direct excitation occurs on the retinal level, probably related to that occurring with X rays and with knock-on protons produced by fast neutrons. Z.W.

A71-38774 # Effects of surround luminance on perceptual latency in the fovea. Halsey H. Matteson (Tulane University, New Orleans, La.). *Optical Society of America, Journal*, vol. 61, Sept. 1971, p. 1169-1172. 18 refs. PHS Grant No. EY-00021.

The effect of surround luminance on relative latency of response to a test stimulus was measured with the perceived-order method in which asynchrony between two lights is varied to make the lights appear subjectively simultaneous. Increasing surround luminance from zero to levels high enough to impair test-stimulus detectability resulted in reduction of test-stimulus latency (facilitation of response speed) by 100 ms both in the rod-free area of the fovea and in the periphery. Since appreciable facilitation of response speed was obtained in the rod-free area of the fovea, suppression of visual noise would seem to be a more plausible explanation of the facilitation effect than inhibition of rod activity. Variation of surround luminance was also found to have a much greater effect than variation of test-stimulus luminance. (Author)

A71-38801 Right heart, pulmonary, and left heart blood volumes determined by analogue computer analysis of radiocardiograms in normal subjects and patients with mitral stenosis. Juhani Peräsalo and Timo Heiskanen (University Central Hospital, Helsinki, Finland). *Cardiovascular Research*, vol. 5, July 1971, p. 260-267. 45 refs. Research supported by the Paavo Nurmi Foundation and the Finnish Heart Foundation.

Analysis of radiocardiograms with an analog computer to determine the right heart, pulmonary, and left heart blood volumes in 15 subjects without cardiopulmonary disease and in 10 patients with mitral stenosis. The right and left heart blood volumes were both greater in the patients with mitral stenosis than in the normal subjects. The pulmonary blood volumes did not differ significantly in the groups studied. In the normal group the right and left heart blood volumes were almost equal. In patients with mitral stenosis the right heart blood volume was significantly greater than the left heart blood volume. The intracardiac blood volumes had a significant positive correlation with the radiographic heart volumes in both groups studied. The right heart blood volume had a positive correlation with the pulmonary blood volume in both groups; with the left heart blood volume this was the case only in the normal group. (Author)

A71-38802 Analogue model for the analysis of radiocardiograms. Timo Heiskanen (University Central Hospital, Helsinki, Finland). *Cardiovascular Research*, vol. 5, July 1971, p. 268-276. 16 refs. Research supported by the Finnish Heart Foundation.

A model for the analysis and the simulation of radiocardiograms is presented. The cardiac and pulmonary blood volumes can be determined by analogue computer analysis of the data measured by external scintillation counting. The application of the method for the detection and quantitation of shunts and valvular regurgitations is discussed. (Author)

A71-38803 Frequency distribution of the heart sounds in normal man. Akira Sakai, Larry P. Feigen, and Aldo A. Luisada (University of Health Sciences, Chicago, Ill.). *Cardiovascular Research*, vol. 5, July 1971, p. 358-363. 9 refs. Research supported by the F. Rippel Foundation and PHS.

The magnitude of the heart sounds at various frequencies was studied in 11 normal young men over three areas of the precordium by using a new calibrated system. The average slope of attenuation for the first heart sound was found to be -6.5 dB per octave at the apex and -7.5 dB per octave at the midprecordium. A slower decline was found for the second heart sound as the average slope of attenuation of the aortic component at the second left interspace was -6 dB per octave up to 80 Hz and no slope existed between 80 and 140 Hz. The pulmonary component of the second sound at the second left interspace had an overall slope of -3.5 dB per octave. A relative 'peaking' was found in all subjects at different frequencies with the first heart sound usually peaking at lower frequency than the second. Marked variability existed in the slope of attenuation and in the relative peaking between the various subjects. These data are discussed in terms of physiological considerations and of practical application to the design of equipment. M.M.

A71-38820 * Phosphoenolpyruvate - A new inhibitor of phosphoribulokinase in *Pseudomonas facilis*. Rodney W. Ballard and Robert D. MacElroy (NASA, Ames Research Center, Moffett Field, Calif.). *Biochemical and Biophysical Research Communications*, vol. 44, no. 3, 1971, p. 614-618. 9 refs.

Use of partially purified preparations of phosphoribulokinase from *Pseudomonas facilis* to characterize a new inhibitor of the enzyme - namely, phosphoenolpyruvate. Phosphoenolpyruvate displays a $K_{sub i}$ of .00055 M and acts as a noncompetitive inhibitor of phosphoribulokinase with respect to ribulose-5-phosphate and ATP, the substrates of the enzyme. It is suggested that phosphoenolpyruvate may function as a general regulator of phosphoribulokinase and thus of ATP-dependent carbon dioxide fixation. (Author)

A71-38824 * # An improved cell volume analyzer. J. T. Merrill, N. Veizades, H. R. Hulett, P. L. Wolf, and L. A. Herzenberg (Stanford University, Stanford, Calif.). *Review of Scientific Instruments*, vol. 42, Aug. 1971, p. 1157-1163. 27 refs. NIH Grants No. GM-17367; No. CA-04681; No. 5-TO1 GM-295-12; Grant No. NGR-05-020-004.

A cell volume sensing instrument has been built which employs the principle used in the Coulter counter in which a cell changes the impedance of a narrow orifice as it passes through the orifice. An improved transducer utilizes a coaxial flow of the cell suspension inside a sheath of cell-free solution through the orifice, thereby avoiding some drawbacks of earlier systems. The instrument is described, and the procedure necessary to achieve acceptable operation is discussed. The output for normal human red blood cells is nearly symmetrical with a narrow peak. Abnormal blood samples show various departures from symmetry and narrowness of peak. The output of this instrument is compared with that from a commercially available instrument, and our data show a more accurate representation of the actual distribution of blood volumes. The resolution of this instrument is such that it could be of significant value in a clinical laboratory. (Author)

A71-38886 Tissue respiration changes in chronic exercise - Comparison with responses to other types of stresses. Gerald D. Tharp (Nebraska, University, Lincoln, Neb.). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 29, no. 3, 1971, p. 195-202. 25 refs.

Investigation of the influence of a daily endurance type of exercise on the resting aerobic metabolism of the key tissues involved in the exercise. The oxygen consumption of tissue slices of heart, skeletal muscle, and liver of trained and nontrained rats was determined using the Warburg technique. The results show that an endurance type of training has little effect on the resting aerobic metabolism of heart or skeletal muscle tissue, regardless of the substrate employed. M.V.E.

A71-38887 Maximal aerobic and anaerobic power and stroke volume of the heart in a subalpine population. Deborah Ann Steplock, Arsenio Veicsteinas, and Massimo Mariani (Milano, Università, Milan, Italy). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 29, no. 3, 1971, p. 203-214. 22 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Maximal aerobic and anaerobic power, fat free body weight, maximal cardiac output, stroke volume of the heart and the O₂ capacity of the blood were measured on 145 subjects in the age range 9-64 selected at random on a population of a subalpine area of Northern Italy. The discussed results include the finding that maximal cardiac output may be a linear function of maximal aerobic power. M.V.E.

A71-38888 Effect of alkalosis on performance and lactate formation in supramaximal exercise. R. Margaria, P. Aghemo, and G. Sassi (Milano, Università, Milan, Italy). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 29, no. 3, 1971, p. 215-223. 13 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Investigation of the effect of an increased base binding power of the blood, induced by alkali administration to subjects performing a supramaximal exercise, on the maximal performance time, or on the total amount of lactic acid in the blood, or on the rate of appearance of lactic acid therein. The results obtained indicate no appreciable effect of this kind. M.V.E.

A71-38889 Evolution of some circulatory, respiratory, and metabolic parameters during physical exercise performed in a noisy environment (Evolution de quelques grandeurs circulatoires, respiratoires et métaboliques au cours de l'effort physique accompli en milieu bruyant). S. Degré, P. Vandermoten, R. Messin, and H. Denolin (Hôpital St. Pierre; Ecole de Santé Publique, Brussels, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 29, no. 3, 1971, p. 234-248. 17 refs. In French. CECA-supported research.

In order to investigate the effects of noise on some major physiological parameters, light, moderate, and heavy physical exercises were performed by 23 normal subjects in a continuously noisy (80-110 dB) environment and in a soundproof room. Heart rate, systolic blood pressure, oxygen intake, ventilation, respiratory equivalent for oxygen, and respiratory quotient were measured at each intensity of effort. Parameters measured in noise and in silence showed no significant differences. M.V.E.

A71-38890 Determinants of marathon running success. David L. Costill, George Branam, Duane Eddy, and Kenneth Sparks (Ball State University, Muncie, Ind.). *Internationale Zeitschrift für*

angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 29, no. 3, 1971, p. 249-254. 15 refs. Research supported by the Ball State University.

Metabolic responses during submaximal and maximal treadmill running were measured for a world champion marathon runner. Oxygen consumption, heart rates, and lactic acid were recorded during a series of 8 submaximal and 2 maximal trials. When compared with other marathon runners, this subject demonstrated little superiority with respect to either aerobic capacity or the energy requirements at various running speeds. The findings of the investigation suggest that marathon running success is dependent upon running economy and the ability to utilize a large fraction of a well developed aerobic capacity. M.V.E.

A71-38891 Analysis of the factors determining the slow variations in heart rate during and after muscle exercise (Analyse des facteurs déterminant les variations lentes de fréquence cardiaque pendant et après l'exercice musculaire). J. J. Vogt, H. Freund, A. Pellier, and G. Marbach (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 29, no. 3, 1971, p. 255-284. 34 refs. In French. Research supported by the Délégation Générale à la Recherche Scientifique et Technique.

Discussion of the results obtained in investigating the heart rate, rectal temperature, mean skin temperature, blood lactate, pyruvate, and glucose in 4 subjects during and after exercise at varying work loads (75 to 135 W) at two thermal levels (neutral and hot). It is shown that one single theoretical equation makes it possible to predict heart rate levels at rest or at work, in a neutral, as well as in a hot environment. M.V.E.

A71-38892 # Distribution of cholesterol and esterified cholesterol in the human skin (Verteilung von Cholesterin und Cholesterinestern in der menschlichen Haut). H. Meffert and E. Schnarrer (Jena, Universität, Jena, East Germany). *Acta Biologica et Medica Germanica*, vol. 26, no. 5, 1971, p. 969-974. 15 refs. In German.

Human surface fat, epidermis, corium, subcutaneous tissue, and serum were analyzed by thin layer chromatographic/colorimetric and by gaschromatographic methods. It was found that the esterified cholesterol of the surface fat are saturated (more than 95%), while in the epidermis esters of unsaturated fatty acids prevail. Esters of saturated fatty acids are predominantly present in the corium, and esters with unsaturated fatty acids containing two double bonds predominate in the serum. The largest relative amount of sterols regarding the total content of lipids was found in the epidermis. G.R.

A71-38893 # Plasma renin activity in essential hypertonic and normotonic persons exposed to exogenous stress (Die Plasmaprenin-Aktivität bei exogener Belastung von essentiellen Hypertonikern und Normotonikern). W. Hartrödt, K. H. Brosowski, Ch. Kreher, Ch. Graff, H. Ziprian, and R. Baumann (Deutsche Akademie der Wissenschaften, Institut für Kortiko-Viszerale Pathologie und Therapie, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 26, no. 5, 1971, p. 1013-1019. 45 refs. In German.

The plasma renin activity (PRA) was measured according to a modified micromethod based on procedures by Boucher et al. (1967) and Arakawa et al. (1968). The PRA was determined in male subjects which were in a recumbent position and had been given arithmetic tests. The results obtained were compared with PRA values measured while the persons were at rest and in orthostasis. It was found that the PRAs showed an increase between rest and arithmetic test or between the arithmetic test and orthostasis. A comparison of mean values between normotonic and hypertonic persons at rest reveals similar values. However, the PRA increments measured in persons under stress were higher for hypertonic patients. G.R.

A71-38894 # An analogous electronic functional model of the external functions of primary biological receptor elements (Zum Tremorin-Oxotremorinstoffwechsel bei Kücken). J. Klinger, B. Zimmermann, W. Oelszner, H.-D. Fischer, and K. Westermann (Medizinische Akademie, Magdeburg, East Germany). *Acta Biologica et Medica Germanica*, vol. 26, no. 5, 1971, p. 1021-1038. 30 refs. In German.

Single receptors and simple receptor fields which are found associated with the great majority of the sense organs of animal species are used as a basis for the design of the model. For stimuli of different characteristics the model can provide the receptor potentials and the afferent pulse trains which are associated with phasic, phasic-tonic, and tonic on-, on-off, and off-elements. The model characteristics include a spatial and temporal summation capacity and a threshold adjustable in its height, spontaneous activity, accommodation, sensibility, and fusion frequency. G.R.

A71-38912 Review of thermoelectric conversion in micro/milliwatt power range for bio-medical applications. Valvo Raag (Resalab, Inc., Northvale, N.J.). In: Society of Automotive Engineers, Intersociety Energy Conversion Engineering Conference, Boston, Mass., August 3-5, 1971, Proceedings. Conference co-sponsored by the American Chemical Society, the American Institute of Aeronautics and Astronautics, the American Society of Mechanical Engineers, the Institute of Electrical and Electronics Engineers, the American Institute of Chemical Engineers, and the American Nuclear Society. New York, Society of Automotive Engineers, Inc., 1971, p. 245-255.

The design considerations of micro- and milliwatt radioisotope thermoelectric generators (RTGs) for biomedical applications are examined, and conclusions are drawn with regard to the advantages and disadvantages of the most common RTG technologies in this field. The conclusions are illustrated by detailed design analyses of a 64.8 milliwatt RTG using silicon-germanium, lead telluride, bismuth telluride, and Cupron-Tophel wires. Silicon-germanium RTGs offer the highest conversion efficiency in the mid to high milliwatt power range. Wire thermocouple RTGs exhibit the lowest conversion efficiency at all power levels, but do enable the attainment of high direct output voltages. Silicon-germanium RTGs provide the highest direct output voltages at all power levels. T.M.

A71-38959 # Some effects of noise on man. Charles W. Nixon (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Society of Automotive Engineers, Intersociety Energy Conversion Engineering Conference, Boston, Mass., August 3-5, 1971, Proceedings. Conference co-sponsored by the American Chemical Society, the American Institute of Aeronautics and Astronautics, the American Society of Mechanical Engineers, the Institute of Electrical and Electronics Engineers, the American Institute of Chemical Engineers, and the American Nuclear Society. New York, Society of Automotive Engineers, Inc., 1971, p. 1024-1033. 22 refs.

Brief review of laboratory experimentation and noise exposure experience over the years, in order to demonstrate that there are many types of acoustic exposure which do affect the physiological and psychological functions of man in different ways. Implications of these effects for general health and well-being are mentioned. It is pointed out that the primary reason for noise abatement is to eliminate deleterious effects on man. Consequently, it is important that personnel who implement noise control measures understand what human responses are to be expected when man experiences various categories of noise exposure. M.M.

A71-38968 * Action of pharmacologic agents in experimental cardiac tamponade. Robert E. Finegan, Marianne Schroll, Sheryllyn Robison, and Donald C. Harrison (Stanford University, Palo

Alto, Calif.). *American Heart Journal*, vol. 81, Feb. 1971, p. 220-226. 8 refs. NIH Grants No. HE-09058; No. HE-5709; No. HE-05866; Grant No. NGL-05-020-305.

Cardiac tamponade was produced in 14 dogs by infusing saline into the pericardial space. The effects of isoproterenol, atrial pacing, ouabain, and methoxamine were studied after the animals resumed spontaneous respiration. Tamponade significantly reduced arterial pressure, stroke volume, and cardiac output, and significant increases in right atrial pressure, heart rate, and systemic vascular resistance were observed. The administration of isoproterenol resulted in an increase in stroke volume, heart rate, and cardiac output and reduced systemic vascular resistance even when right atrial pressure was maintained by further volume infusion. It appears that an ideal pharmacologic agent for reversing the hemodynamic alterations of acute cardiac tamponade should have positive inotropic effects to reduce end-systolic volume and maximize the ejection fraction, and an ideal agent should also increase heart rate and reduce systemic vascular resistance. Isoproterenol combines all of these properties. M.M.

A71-38970 A study of possible biochemical mechanisms involved in hyperbaric oxygen-induced changes in cerebral gamma-aminobutyric acid levels and accompanying seizures. J. D. Wood, M. W. Radomski, and W. J. Watson (Saskatchewan, University, Saskatoon, Saskatchewan; Defence Research Establishment Toronto, Downsview, Ontario, Canada). *Canadian Journal of Biochemistry*, vol. 49, no. 5, 1971, p. 543-547. 16 refs. Research supported by the Defence Research Board and the Medical Research Council of Canada.

A linear correlation was obtained between the relative rate of gamma-aminobutyric acid (GABA) metabolism in chicks of different ages during a period of rapid brain development and the susceptibility of the birds to seizures induced by hyperbaric oxygen (O.H.P.). Since the changes taking place with age in the activities of the two enzymes involved in GABA metabolism (glutamic acid decarboxylase and GABA-alpha-ketoglutarate transaminase) were similar, the enzyme system primarily responsible for the O.H.P.-induced decreases in cerebral GABA levels and accompanying seizures could not be identified. Both enzyme systems may be involved. The possible involvement of an increased transport of GABA through cellular membranes in the production of low cerebral GABA levels could not be demonstrated in the present experiments. (Author)

A71-38976 Radiation exposure in air travel. Hermann J. Schaefer (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.). *Science*, vol. 173, Aug. 27, 1971, p. 780-783. 8 refs.

Comparative evaluation of the environmental radiation levels at conventional jet and SST altitudes. It is pointed out that the level of galactic radiation per mile for the SST is smaller than that for the conventional jet. The SST encounters a higher level of radiation, but it travels so much faster that the integral dose accumulated over the same distance is smaller. However, if population doses are to be assessed and projected into the future, the number of passenger hours at altitude is the relevant quantity. The public health aspects of environmental radiation are considered. M.M.

A71-38979 * L-dopa - Disaggregation of brain polysomes and elevation of brain tryptophan. Bette F. Weiss, Hamish N. Munro, and Richard J. Wurtman (MIT, Cambridge, Mass.). *Science*, vol. 173, Aug. 27, 1971, p. 833-835. 18 refs. Research supported by the Hoffmann-LaRoche Co.; PHS Grant No. AM-14228; Grant No. NGR-22-009-272.

One hour after administration of L-dopa (50 to 300 milligrams per kilogram), there is a marked disaggregation of brain polysomes in immature rats. Adult animals show a similar response, but require larger doses of the amino acid (500 milligrams per kilogram). Single doses of L-dopa significantly elevate amounts of tryptophan in the brain; hence their effect on polysomes does not result from the unavailability of this amino acid. (Author)

A71-38980 **Effects of polycythemia and altitude hypoxia on rat heart and exercise tolerance.** Paul D. Altland (National Institutes of Health, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md.) and Benjamin Highman (U.S. Army, Institute of Pathology, Washington, D.C.). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 388-393. 20 refs.

The effects of 2-6 weeks exposure of rats to 18,000 or 25,000 ft 5 hr daily on tolerance to sea-level walking (12.9 m/min) were determined. At 18,000 ft severe polycythemia developed without affecting sea-level exercise performance. At 25,000 ft additional findings were lipoidosis in liver cells and kidney arteries, apical myocardial lesions, and reduced sea-level exercise performance. Fatigue occurred in 183 min after 4 weeks at altitude and in 124 min after 6 weeks. Controls fatigued after 196 min. Cobalt-induced polycythemia did not alter exercise performance. Repeated bleeding during 6 weeks at 25,000 ft prevented development of polycythemia and changes in sea-level exercise performance and minimized pathological changes. Following exposure to 25,000 ft polycythemia and exercise performance returned to normal within 4 weeks, but myocardial lesions persisted for 6 weeks. Hypoxia was found to be the principal factor responsible for the reduced exercise performance, with associated myocardial lesions and severe polycythemia contributing secondary factors. (Author)

A71-38981 **Tissue temperatures and whole-animal oxygen consumption after exercise.** George A. Brooks, Karl J. Hittelman, John A. Faulkner, and Robert E. Beyer (Michigan, University, Ann Arbor, Mich.). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 427-431. 23 refs. Research supported by the Western Electric Co., the University of Michigan, and the Michigan Heart Association; NIH Grant No. AM-10056-05; NSF Grant No. GB-13496.

Experimental study in which forced treadmill running caused rat muscle and rectal temperatures to increase 8.1 and 5.1 C, respectively. After exercise, muscle temperature fell exponentially but did not reach control values in an hour. Rectal temperature fell rapidly for the first 20 min after exercise, after which only a slow rate of return to resting levels was apparent. An exercise-induced adjustment in the hypothalamic set point was suggested. O₂ consumption was high immediately after exercise, declined rapidly for the first 20 min of recovery, and then plateaued at a level significantly above resting. The hypothesis that a sizable portion of postexercise O₂ consumption is due to increased tissue temperatures is substantiated. The fact that severe exercise results in a large, prolonged elevation in tissue temperature necessitates, as a consequence of the Q_{sub 10} effect, that O₂ consumption be significantly elevated. Since a part of the postexercise O₂ consumption is not associated with recovery from anaerobic metabolism, the classical definition of O₂ debt requires revision. (Author)

A71-38982 **Amino acid levels in plasma, liver, muscle, and kidney during and after exercise in fasted and fed rats.** J. Christophe, J. Winand, R. Kutzner, and M. Hebbelinck (Bruxelles, Université Libre, Brussels, Belgium). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 453-457. 31 refs. Research supported by Fonds de la Recherche Scientifique Médicale.

Young male rats were forced to swim for 15 or 30 min as a single exercise or after a 10-day period of training. When swimming

for 15 min only, these rats were sacrificed immediately or after a 15-min rest. Acute exercise lowered the levels of glutamine in plasma and in the three tissues examined (liver, gastrocnemius, and kidney). The maximum decrease of glutamine was measured in the liver and proved to be 50 per cent of the resting level. These changes were usually accompanied by significant depressions of glutamate. Swimming also induced increases in aspartate and serine in the liver and a decrease of glycine. The data are probably related, among other factors, to increased gluconeogenesis and an enhanced activity of glutaminase consequent to metabolic acidosis. (Author)

A71-38983 **Relationship between phrenic nerve activity and ventilation.** Frederic L. Eldridge. *American Journal of Physiology*, vol. 221, Aug. 1971, p. 535-543. 23 refs. PHS Grant No. HE-03224.

Phrenic nerve discharges were recorded in anesthetized cats simultaneously with a range of tidal volumes. Nerve impulses were processed in a variety of ways. Total impulses per breath and peak impulse frequency correlated poorly with tidal volume. Integrated electrical activity per breath showed an improved, often linear, correlation with tidal volume, but was too dependent upon inspiratory duration to be a satisfactory correlate of volume. Only integrated phrenic activity measured during the 0.1 sec coincident with the peak of inspiration showed a consistently linear relationship with tidal volume under a variety of circumstances, including increasing barbiturate dosage, vagal section, and spinal cord transection below the phrenic roots. Analysis of the relationships between phrenic impulse rate and integrated electrical activity shows that with increased tidal volume there is a progressive increase in size of phrenic action potentials which correlate in turn with the size of the diaphragmatic motor unit. (Author)

A71-38984 * **Water intake and urine output of mice during chronic centrifugation.** Charles C. Wunder, Frederic N. Meyer, Mary E. Clark, and Howard H. Bengel (Iowa, University, Iowa City, Iowa). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 559-563. 18 refs. Grant No. NGR-16-001-031.

Although various animals can survive, grow, and even breed throughout chronic centrifugation, growth and longevity of mice decrease with field intensity. Fields of 2.2, 4, or 7 G caused decreased water intakes, which were most pronounced during the 1st day and which were progressive with field intensity for 190 male, Swiss Webster mice, 5 weeks of age at the onset of exposure. Unlike these progressive decrements of intake, changes of urine flow with increasing field are more complex. In contrast to the increased flow reported by Bengel from this laboratory for 1.7- and 3-G rats under similar conditions, no change was measurable throughout 14 days at 2.2 G while 4-G mice demonstrated decreased flow. Flow increased at 7 G. Although 54, 1-G, pair-fed, control mice exhibited 3 weeks of growth comparable to that of their high-G counterparts, the reduced food intake alone cannot explain the urinary results, as pair feeding resulted in greater flow than with either ad libitum feeding or high-G exposure. (Author)

A71-38985 **Cell contacts in duodenal smooth muscle layers.** Ruth M. Henderson, Gusztav Duchon, and Edwin E. Daniel (Alberta, University, Edmonton, Alberta, Canada). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 564-574. 45 refs. Research supported by the Medical Research Council of Canada.

Two types of cell contacts are described in canine duodenal smooth muscle, perfused in situ with glutaraldehyde fixative. The first is the five-layered junction or nexus. This junction is found only in the circular muscle and therefore cannot participate in electrical coupling in the longitudinal layer. The second type, which occurs largely in the longitudinal layer but also occasionally in the circular,

consists of a region with parallelism of cell membranes, increased cytoplasmic density, an intercellular space of approximately 50 nm (500 Å), and a central denser line. Experiments in which cells were shrunk by perfusion with a hypertonic solution or strongly contracted by acetylcholine or high potassium left both types of contact intact. This indicates that they are resistant to mechanical separation, and also that the observed uncoupling of slow waves in intestinal muscle under these conditions cannot be due simply to gross disruption of nexuses. (Author)

A71-38986 **Role of respiratory chemoreceptors in adrenocortical activation.** C. Lau (Illinois, University, Chicago, Ill.). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 602-606. 21 refs. Contract No. NR-101-580.

Investigation conducted to determine the role played by acid-base alterations on the adrenal cortex. Peripheral chemoreceptor denervation or sham operation was performed on dogs subjected for 1 hr to 10% O₂ + 5% CO₂ 10% O₂ + 10% CO₂ hyperventilation, and 20% O₂ + 10% CO₂. Adrenocortical stimulation in sham intact dogs exposed to the hypoxic gas mixtures was less marked than that noted in a previous study in animals breathing 10% O₂ alone; no change was found during hyperventilation, and a decrease was observed in animals respiring 20% O₂ + 10% CO₂. Peripheral chemoreceptor-denervated dogs manifested no alteration in adrenocortical output when exposed to any of the above gas mixtures, even though the changes in arterial O₂ and CO₂ tensions and pH showed no significant differences from those in sham intact animals. It appears from these studies that stimulation of the adrenal cortex in pentobarbital anesthetized dogs requires the integrity of the buffer nerves, is responsive primarily to oxygen lack, and is secondarily modulated by acid-base variations. (Author)

A71-38987 * **Transmission of small pressure waves in the canine vena cava.** Max Anliker, William G. Yates, and Eric Ogden (NASA, Ames Research Center, Environmental Biology Div., Moffett Field; Stanford University, Stanford, Calif.). *American Journal of Physiology*, vol. 221, Aug. 1971, p. 644-651. 17 refs. Grant No. NGR-05-020-223.

Attempt to acquire quantitative data which will aid in the development of a mathematical model for the mechanical behavior of large veins. Artificially induced sinusoidal pressure waves propagating in the abdominal venae cavae of anesthetized dogs are shown to be only mildly dispersive. For frequencies between 20 and 110 Hz, the speed ranged from 100 to 350 cm/sec, depending on the transmural pressure and the physiological state of the animal. The wave speed increased by 1 to 5 cm/sec per mm H₂O when the pressure was raised by blocking the venous return. The wave amplitudes were attenuated exponentially with distance traveled, and the attenuation per wavelength was independent of frequency. Values of the logarithmic decrement for amplitude decay ranged from 0.6 to 3.3. The results imply that the viscoelasticity of the wall is the dominant damping mechanism in the frequency range considered, and thus the observed attenuation pattern serves as the basic condition to be met by any mathematical model for the viscoelastic behavior of the vessel wall. (Author)

A71-39040 **Occurrence of a deep breath after a period of airway occlusion.** G. Sant'Ambrogio, J. Milic-Emili, and E. Camporesi (Milano, Università, Milan, Italy). *Pflügers Archiv*, vol. 327, no. 2, 1971, p. 95-104. 12 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Experiments with anesthetized rabbits are described which show that after a period of airway occlusion, the tidal volume is greater and longer than the following volumes. The magnitude of these

effects is proportional to the intrapulmonary pressure which develops during the last inspiratory effort before reopening of the airway. These phenomena vanish when the vagal nerves are severed. It is suggested that these effects are related to the stimulation of Mills, Sellick, and Widdicombe's (1970) 'lung irritant receptors' sensitive to changes in lung compliance and to congestion of pulmonary circulation. V.P.

A71-39041 **Continuous recording of human rectal temperature under extreme conditions (Fortlaufende Registrierung der Rectaltemperatur des Menschen unter extremen Bedingungen).** R. Wever (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen, West Germany) and R. A. Zink (München, Universität, Munich, West Germany). *Pflügers Archiv*, vol. 327, no. 2, 1971, p. 186-190. 11 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

Battery-powered thermographs (90 x 70 x 30 mm; 350 g) are described which use small thermistor probes to record continuously the rectal temperature under extreme environmental conditions without inconveniencing the subjects. The precision of temperature measurements is better than 0.1 C. V.P.

A71-39070 * **Effects of long-term shock and associated stimuli on aggressive and manual responses.** R. R. Hutchinson, J. W. Renfrew, and G. A. Young (Western Michigan University, Kalamazoo, Mich.; Fort Custer State Home). *Journal of the Experimental Analysis of Behavior*, vol. 15, Mar. 1971, p. 141-166. 65 refs. Research supported by the Michigan Department of Mental Health and the Illinois Department of Mental Health; NSF Grants No. GB-5980; No. GB-8535; Grant No. NGR-23-010-004; Contract No. N 00014-69-C-0253.

Systematic investigation of the effects of long-term exposure to shock and associated stimuli. Squirrel monkeys were exposed to frequent electric shock over many sessions. Shock was always delivered independently of any feature of the subjects' performance. Biting a rubber hose, depressing a response lever, and pulling a hanging chain were the particular responses studied. F.R.L.

A71-39072 # **Some physical problems of lung scanning.** V. Hušák (University Hospital, Olomouc, Czechoslovakia). *Radio-biologia - Radiotherapia*, vol. 12, no. 1, 1971, p. 87-101. 33 refs.

Investigation of an optimum choice for a suitable detector, an adjustment of electronic equipment, and a radionuclide as well as a labeled compound for lung scanning. A relationship involving almost all parameters encountered in scanning is derived whereby the resolution of the collimator can be determined from an activity administered, a given time allowed for the scan, and other known parameters. Expressions for the contrast over an inactive defect located in the lung tissue and for the minimum detectable size of the defect make it possible to compare various radionuclides from the standpoint of their energy. A comparison is made of radionuclides and labeled compounds according to the photon yield and the absorbed dose in the lungs using a Beck (1966) criterion. It is shown that technetium-99m and iodine-131 are almost equivalent from the viewpoint of the contrast but technetium-99m is much more advantageous when the absorbed dose is considered. The results are useful in clinical practice and explain the physical basis of some empirical findings. M.M.

A71-39073 * **Reliability and correlates of a three-phase code transformation task (3P-COTRAN).** Glynn D. Coates and Earl A. Alluisi (Louisville, University, Louisville, Ky.). *Perceptual and Motor Skills*, vol. 32, June 1971, p. 971-985. 5 refs. Grant No. NGR-18-002-008.

In a further experimental test of a three-phase code transformation task, 84 Ss solved 6 blocks of 3 problems, and later spent 6 hr in responding to paper-and-pencil tests of intelligence and certain personality characteristics. A factor analysis of 75 measures led to the identification of 8 factors, 5 of which represent 3P-COTRAN performances, 1 verbal intelligence, and 2 personality characteristics. Analyses based on 9 selected measures indicated differential practice effects, with the problem-solving third phase of the task being more slowly learned. Reliability of the measures and correlates of the task were computed and discussed. (Author)

A71-39134 # Results of biological studies performed on the Zond 5, Zond 6, and Zond 7 stations (Rezultaty biologicheskikh issledovaniy, vypolnennykh na stantsiyakh 'Zond-5,' 'Zond-6,' i 'Zond-7'). O. G. Gizenko, V. V. Antipov, and G. P. Parfenov. (*International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970.*) *Kosmicheskie Issledovaniia*, vol. 9, July-Aug. 1971, p. 601-609. 20 refs. In Russian.

Analysis of the main results of biological experiments performed in spacecraft on various plants, animals, and bacteria. Flight conditions were found to be the cause of specific alterations in the physiological functions and hereditary structures of a number of the investigated objects. Flight conditions are held to be responsible for stimulation of growth and development in wheat and barley seeds and *Allium cepa* shoots, the induction of chromosome mutations in these objects, and moderate activation of a prophage in lysogenic bacteria. A.B.K.

A71-39205 # Indices of windchill of clothed persons. R. G. Steadman (Manitoba, University, Winnipeg, Manitoba, Canada). *Journal of Applied Meteorology*, vol. 10, Aug. 1971, p. 674-683. 20 refs. Research supported by the University of Manitoba.

The concept of windchill as a measure of the combined effects of low temperature and wind is reviewed. An analysis is presented of the effect of these variables on a person dressed for cold climates and takes account of all important modes of heat loss, including breathing and heat transfer through clothing. This analysis leads to two chief indices of windchill: the windchill equivalent temperature, which is tabulated and compared with existing tables, and the clothing thickness required to maintain a person in thermal equilibrium. The distributions of clothing thickness and of the windchill of exposed skin at 30 C are described. (Author)

A71-39217 # Human efficiency under weightlessness conditions (Rabotospособnost' cheloveka v usloviakh nevesomosti). A. A. Korobova and T. I. Goriunova. *Kosmicheskaia Biologiya i Meditsina*, vol. 5, May-June 1971, p. 3-11. 75 refs. In Russian.

Physicotechnical and biomedical aspects of the weightlessness problem are discussed on the basis of a review of the current status of our knowledge on the coordination of motions as a function of the muscular system and general capacity for work. The principal questions studied are the nature of impairment of coordination, changes in the motor function under subgravity conditions, adaptation to actual and simulated weightlessness conditions, and the role of physical exercises in the adaptation to these conditions. V.P.

A71-39218 # Influence of prolonged hypokinesia on the serotonin metabolism of rats (Vliianie dlitel'noi gipokinezii na obmen serotoninina u krysa). Z. S. Dolgun, S. P. Novikova, and V. S. Shashkov. *Kosmicheskaia Biologiya i Meditsina*, vol. 5, May-June 1971, p. 12-16. 19 refs. In Russian.

An investigation is described, showing that hypokinesia has a substantial influence on the serotonin (5-HT) metabolism. The most

pronounced deviations from the normal 5-HT content in blood and in the duodenal tissues were observed during the first to third day and the thirteenth to fifteenth day of hypokinesia. The same applies to the discharge of 5-hydroxyindole acetic acid (a 5-HT metabolite) with urine. Hypokinesia lasting more than 60 days leads to a substantial increase in 5-HT content in the blood, the content remaining above normal for as long as 45 days after termination of hypokinesia. V.P.

A71-39219 # Interrelation between the indices of general and tissular resistance of rats (in the case of muscular training, adaptation to cold, and administration of dibazol) (Vzaimosviaz' mezhu pokazateliami obshchei i tkanevoi rezistentnosti krysa /pri myshechnoi trenirovke, adaptatsii k kholodu i vvedeniakh dibazola/). V. Ia. Rusin. *Kosmicheskaia Biologiya i Meditsina*, vol. 5, May-June 1971, p. 16-20. 16 refs. In Russian.

It is shown that an increase in the resistance of an intact organism to various adverse effects as a result of muscular training, adaptation to cold, and administration of dibazol is accompanied by increased resistance at the tissular and cellular levels. This indicates that the effectiveness of means and methods of increasing the biological reserves of an organism can be controlled by simple (in the methodological sense) criteria of tissular and cellular resistance. V.P.

A71-39220 # Cultivation of mammalian cells at 'suboptimal' temperatures (Kul'tivirovanie kletok mlekoopitaiushchikh pri 'suboptimal'nykh' temperaturakh). F. V. Sushkov, Z. L. Sorvacheva, and V. V. Portugalov. *Kosmicheskaia Biologiya i Meditsina*, vol. 5, May-June 1971, p. 20-23. 10 refs. In Russian.

Cultures of L, HeLa, and BHK-21 cells, human amnion and kidney A-1, FL, RH cell strains and hamster 237 and 431 substrains were grown at temperatures of 37 C and 28 to 36 C. Cultures of L, A-1, and BHK-21 cells and the hamster cells are found to be capable of mitotic division at 30 and 28 C. Reproduction of L cells could be maintained under these conditions during 19 months, and of the other cells during 20 to 40 days. Substantial cytophysiological changes observed for L cells during the adaptation process indicate that this process is of a purely phenotypical nature. V.P.

A71-39221 # Reflex activity of spinal marrow in intact and labyrinthectomized animals subjected to radial accelerations (Reflektornaia aktivnost' spinnogo mozga u normal'nykh i delabirintirovannykh zhivotnykh pri deistvii radial'nykh uskorenii). G. S. Aizikov, M. D. Emel'ianov, V. G. Ovechkin, and G. V. Tumanov. *Kosmicheskaia Biologiya i Meditsina*, vol. 5, May-June 1971, p. 23-27. 18 refs. In Russian.

The H-reflex evoked in intact and labyrinthectomized rats at head-to-pelvis accelerations ranging from 0.5 to 8 g are studied. It is found that these accelerations produced substantial changes in the H-reflex. At accelerations of 0.5 g, the H-reflex increased in amplitude, and became normal after acceleration was discontinued. At accelerations of 2.4 and 8 g, the H-reflex was inhibited in direct proportion to the acceleration. The restoration time of the H-reflex also increased with increasing acceleration. The functional state and activity of the motor analyzer during acceleration was defined by such factors as reflex changes of the motor neuron activity associated with muscular reception, and vestibular stimulation. V.P.

A71-39222 # Influence of abdomen and head shielding during gamma-irradiation of dogs on the content of protein fractions in the blood serum (Vliianie ekranirovaniia oblasti zhivota ili golovy pri gamma-obluchenii sobak na soderzhanie belkovykh fraktsii

svyrotki krovi). B. I. Davydov, Iu. K. Syzrantsev, and B. L. Razgovorov. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 27-30. 10 refs. In Russian.

Dogs were exposed to a 600-r dose of gamma radiation, with doses of 150 and 300 r behind the shield on the abdomen and a dose of 150 r behind the head shield. Protein fractions in the blood serum were measured by paper electrophoresis. The tests revealed a reduction in the albumin-globulin ratio, regardless of shielding, an increase in the beta-globulin content with normalization after 100 days at a residual dose of 150 r behind the abdomen shield, and an increase in the albumin-globulin ratio, essentially on account of the alpha sub 2 fraction. An increase in the globulins after 40 to 60 days after irradiation correlated with an abrupt increase in glutamate aspartate transferases. Abdomen screening at a dose of 600 r was found to reduce the damaging effect of radiation on the blood protein-fraction synthesis to a greater extent than head shielding.

V.P.

A71-39223 # Role of motor and vestibular analysors and frontal hypothalamus in the compensation for gravitational loads during orthostasis (Znachenie motornogo, vestibuliarnogo analizatorov i perednogo gipotalamusa v kompensatsii gravitatsionnoi nagruzki pri ortostaze). G. S. Belkanii. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 31-36. 11 refs. In Russian.

Experiments with intact cats and cats subjected to curarization, bilateral vestibular deafferentation, and electrocoagulation of the frontal hypothalamus revealed phasic changes in respiration, arterial pressure, and brain bioelectric activity during orthostasis. The rate of development of orthostatic collapse was found to correlate distinctly with the fluctuations in arterial pressure during the second phase of the primary orthostatic reaction. This indicates the prognostic significance of this correlation. Deactivation of the vestibular and motor analysors or the electrocoagulation of the frontal hypothalamus was found to decrease substantially the gravity function during orthostasis.

V.P.

A71-39224 # Establishment of physiological principles of rational heat removal in an individual isolating suit (K obosnovaniuu fiziologicheskikh printsipov ratsional'nogo teplos'ema v individual'nom izoliruiushchem snariazhenii). S. M. Gorodinskii, G. V. Bavro, and G. A. Ivanov. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 36-42. 19 refs. In Russian.

Physiological approaches to the problem of heat removal from a space suit are studied experimentally. Parts of the human body best suited for heat removal owing to their anatomic and physiological features are determined. It is shown that heat removal from areas above the principal muscular systems of the extremities is less effective than from areas above tendons and weakly expressed muscular layers. This type of cooling has also the advantage of avoiding a decrease in muscular performance due to overcooling.

V.P.

A71-39225 # Utilization of color-music during the performance of an operator under conditions of isolation (K voprosu ob ispol'zovanii tsvetomuzyki pri rabote operatora v usloviakh izoliatsii). Iu. A. Petrov and L. N. Mel'nikov. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 42-45. 19 refs. In Russian.

Current concepts of using color effects in combination with music to distract an operator in an isolated environment and to counteract possible impairment of his psychophysiological activity are examined. Results of theoretical and experimental investigations are used as a basis for formulating principles of developing color-music programs.

V.P.

A71-39226 # Human-operator models in the investigation of spacecraft manual control (Modeli cheloveka-operatora pri issledovanii ruchnogo upravleniia kosmicheskim korabl'em). R. V. Komotskii, S. A. Minaev, and A. E. Chebyshev. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 45-50. 14 refs. In Russian.

Means of replacing the human operator by models of various classes of operator performance are discussed. Block and circuit diagrams of models described by a linear transfer function with variable coefficients are examined. Approaches to the construction of a universal model suitable for complex studies of operator performance in its most general form are evaluated.

V.P.

A71-39227 # Cytogenetic studies related to a space flight of man (Tsitogeneticheskie issledovaniia v sviazi s kosmicheskim poletom cheloveka). L. P. Grinio, T. N. Krupina, and N. N. Bobkova. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 51-55. 25 refs. In Russian.

A chromosome analysis was carried out in peripheral blood leukocytes from 4 healthy men after 120 day hypokinesia, and cytogenetic tests on Soviet astronaut Beregovoi prior to and after his space flight. An increase in chromosome aberrations in the subjects or significant changes in the chromosome apparatus of the astronaut could not be established by the study. It is concluded that the Soiuz 3 flight of Beregovoi was safe in terms of cytogenetic radiation damage.

V.Z.

A71-39228 # Changes in human retinal blood circulation under transversely directed acceleration (Izmeneniia v retinal'nom krovoobrashchenii cheloveka pri poperechno napravlennom uskorenii). A. S. Barer and E. A. Sokol. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 55-60. 8 refs. In Russian.

Dark chamber teleophthalmoscopy was applied in a study of blood circulation in the retinas of 19 subjects exposed to transverse accelerations of 4 to 12 g increased by 2-g steps at a speed of about 0.2 g/sec. One per cent homatropine was used to produce mydriasis during observations. Accelerations of 10 and 12 g caused blood stream discontinuities in retinal vessels, accompanied by disturbance of vision, and the blood content in the vessels was decreased when accelerations of 6 and 8 g were applied. Possible mechanisms of these effects are discussed.

V.Z.

A71-39229 # Specific features of reactions of the nasal vascular system during 120-day hypokinesia (Osobennosti reaktsii sosudistoii sistemy nosa v usloviakh 120-sutochnoi gipokinezii). I. Ia. Iakovleva. *Kosmicheskaja Biologija i Meditsina*, vol. 5, May-June 1971, p. 60-64. 12 refs. In Russian.

The function of the nasal vascular system was studied by rhinopneumometry in 10 male subjects during 120 day bed rest in various positions. Some of the subjects were given pituitrin and dioxycorticosterone acetate to support water and mineral metabolism, or nerabol to correct protein metabolism. The blood content in the nasal conchae was generally higher in all subjects on the 3rd through 12th day of hypokinesia, especially in subjects with autonomic and vascular dysfunctions, and the drugs produced no appreciable changes in the nasal blood circulation. The reaction of the nasal vascular system to hypokinesia was generally smaller in subjects given nerabol and was more pronounced in subjects given no drugs.

V.Z.

A71-39230 # Electrical activity of the muscles of the shin during standing after a 120-day bed rest (Elektricheskaja aktivnost' myshts goleni pri stoinii posle 120-sutochnogo postel'nogo rezhima). B. N. Petukhov and Iu. N. Purakhin. *Kosmicheskaja*

A71-39231

Biologiya i Meditsina, vol. 5, May-June 1971, p. 64-69. 17 refs. In Russian.

EMG amplitudes were measured before and after 120-day horizontal hypokinesia in the tibialis and gastrocnemius of a group of 10 healthy subjects who received pituitrin followed by desoxycorticosterone acetate injections. The measurements were made when the subjects were in an upright standing position allowing relaxation or straining of the muscles in alternation. After a one-month recovery period following hypokinesia, the tibialis and gastrocnemius EMG amplitudes increased in most subjects but were still lower than before hypokinesia. V.Z.

A71-39231 # Changes in cardiac ejection caused by 15-day bed rest (Izmenenie serdechnogo vybrosa poa vitaniiem 15-potochnogo postel'nogo rezhima). B. S. Katkovskii and Iu. D. Pometov. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 69-74. 30 refs. In Russian.

Study of the changes in the basic hemodynamic and gaseous metabolism parameters of humans subjected to a strict bed rest regime of moderate duration. A significant increase in cardiac output related mainly to stroke volume was found in five male test subjects during a 15-day bed rest experiment. Oxygen consumption and carbon dioxide production decreased gradually during the observation period. It is suggested that similar changes in cardiac ejection may occur during the early period of weightlessness adaptation in space flight. A.B.K.

A71-39232 # Relation between the elimination of various cations by the kidneys during a disturbance of the salt balance (Sviaz' mezhdru vyvedeniem razlichnykh kationov pochkami v usloviakh narusheniia solevogo balansa). I. S. Balakhovskii, O. A. Virovets, R. K. Kiselev, G. P. Gusev, E. A. Lavrova, and Iu. V. Natochin. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 74-77. 13 refs. In Russian.

Determination of the relation between the elimination of sodium and other ions by the kidneys in humans subjected to a wide range of changes in the state of the water-salt metabolism caused by the prolonged action of high temperature and hypodynamia. It is shown that the nature of the sodium elimination curve depends on the level of input of this element with food intake. In the case of subjects given a diet with a high sodium content, whether subjected to hypodynamia or not, the elimination of sodium in the urine increases severalfold, while the elimination of calcium varies only slightly. In the case of subjects exposed to hypodynamia without excess sodium intake the calcium excretion increased sharply in one subject but remained at a low level in another. It is concluded that the systems of homeostasis regulation of each of the investigated cations differ by high selectivity and reaction specificity. A.B.K.

A71-39233 # Amino silica gels - Regeneratable sorbents for absorbing carbon dioxide, hydrogen sulfide, and water vapor (Aminosilikageli - Regeneriruemye sorbenty dlia pogloshcheniia uglekislogo gaza, serovodoroda i parov vody). I. A. Danilychev, V. V. Strelka, T. N. Burushkina, V. K. Cherkasov, B. L. Avetisants, and V. M. Men'shova. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 77-79. In Russian.

Discussion of some of the sorption characteristics of amino silica gels under static and dynamic conditions. It is shown that the affinity of carbon dioxide for the amino silica gel surface is very high and that the absorption properties of the gel with respect to carbon dioxide remain practically unchanged even after the gel has absorbed a large quantity of water vapor. A high absorption capacity with respect to hydrogen sulfide is also noted, although the affinity of hydrogen sulfide for the amino silica gel surface is less than the affinity of carbon dioxide. The mechanism of interaction between carbon dioxide and amino groups in the surface layer of the gel is explained. A.B.K.

A71-39234 # Nature of the distribution of intraocular pressure in healthy humans from 25 to 40 years old engaged in intellectual work (Kharakter raspredeleniia velichiny vnutriglaznogo davleniia u zdorovykh liudei v vozraste 25-40 let, zanimaiushchikhsia intellektual'nym trudom). T. A. Petrova and M. P. Kuz'min. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 80-82. 18 refs. In Russian.

Analysis of the intraocular pressure distribution curve obtained by daily tonometry for a group of mental workers ranging in age from 25 to 40 years. The distribution curve is found to be fairly symmetrical, with a mode of 21 to 22 mm Hg. An asymmetry in the extreme right-hand portion of the curve is noted (30 mm Hg or more) and is attributed to the presence of an isolated group of subjects whose indices go beyond the limits of the normal distribution. A.B.K.

A71-39235 # Morphological changes in the myocardium under the action of accelerations for several hours (Morfologicheskie izmeneniia miokarda pri mnogochasovom vozdeistvii uskorenii). P. I. Katunian and V. S. Romanov. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 82, 83. In Russian.

Results of histological, histochemical, and electron-microscopic observations of the myocardium reactions in rats subjected to positive 2G accelerations in the z body axis for periods of 8, 16, and 24 hours. Aftereffects were also observed for periods of 24 and 72 hours after stopping the centrifuge. A clearly expressed relationship was observed between the level of dystrophic damage of the myocardium and the duration of acceleration. The structure of the myocardium returned to its normal state by the 72nd hour after termination of acceleration. T.M.

A71-39236 # Optimization of the mineral composition of the nutrient medium for hydrogen bacteria (Optimizatsiia mineral'nogo sostava pitatel'noi sredy dlia vodorodnykh bakterii). V. K. Kovalenkova, L. A. Siletskaia, and V. N. Maksimov. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 84, 85. In Russian.

The method of steepest ascent for mathematical planning of experiments was used to optimize the mineral composition of the nutrient medium for *Hydrogenomonas* bacteria in order to increase the density of the culture and to gain information about the required supplies of mineral salts in spacecraft regeneration systems employing these bacteria. An optimal nutrient medium was chosen by a planned experiment, and its composition is compared in a table with that of the medium proposed by Schlegel et al. (1961). The new medium can yield a density level of the culture equal to that produced by the Schlegel medium with a six times lower overall concentration of salts. T.M.

A71-39237 # Results of the combined action of vibration and gamma irradiation on chlorella (Rezultaty kombinirovannogo vozdeistviia vibratsii i gamma-oblucheniia na khlorellu). I. D. Anikeeva and E. V. Moskvitin. *Kosmicheskaya Biologiya i Meditsina*, vol. 5, May-June 1971, p. 85-87. 11 refs. In Russian.

Experimental study of the effects of both combined and separately acting mechanical vibration (100 Hz at an amplitude of 2 mm) and gamma irradiation (200 r) on the sporulation dynamics, survival rate, and mutability of chlorella. The applied modes of vibration, chronic and acute gamma irradiation, and the combined action of vibration and irradiation do not affect the development and mutability of chlorella cells and do not reduce their survival rate. Acute irradiation somewhat increases the survival rate, but this effect is not present in chronic irradiation. T.M.

A71-39238 # One property of the summary characteristics of vestibular nystagmus (Ob odnom svoistve summarnykh kharak-

teristik vestibularnogo nistagma). A. A. Shipov. *Kosmicheskaia Biologiya i Meditsina*, vol. 5, May-June 1971, p. 87-89. 10 refs. In Russian.

Experiments with guinea pigs show that the number of strokes and the duration and frequency of nystagmus in animals subjected to successively increasing angular accelerations increase with increasing level of acceleration. The nystagmus reaction to each of the accelerations in the series was smaller than the reaction in animals subjected to a single acceleration of corresponding magnitude. A characteristic feature observed is that the number of strokes and the frequency of nystagmus in response to successively increasing accelerations continued to rise to the maximum level of acceleration while the increase in the duration of nystagmus leveled off relatively quickly. T.M.

A71-39252 Applications of cryogenics to biology and medicine. M. Ashwood-Smith (Victoria, University, Victoria, British Columbia, Canada). In: *Advanced cryogenics*. Edited by C. A. Bailey. London and New York, Plenum Press, 1971, p. 439-454. 10 refs.

Discussion of two application areas of cryobiology: long-term, low-temperature storage of living cells and tissues, and cryosurgery. Blood cell and cattle sperm preservation techniques are briefly reviewed, along with some experimental studies on the preservation of microorganisms and various mammalian tissues and organs. The merits of cryosurgical treatment of malignant growths are also discussed. M.V.E.

A71-39262 # On the instantaneous measurement of blood-flow by ultrasonic means. M. G. J. Arts. Eindhoven, Technische Hogeschool, Master of Science Thesis, 1971. 29 p.

A method is described for estimating average instantaneous blood flow rates over the cross section of a blood vessel from signals of a Doppler flowmeter using continuous ultrasound. Basic in this method is the Doppler effect produced when ultrasound signals transmitted by a crystal collide with the moving erythrocytes of the bloodstream. A mathematical model of this process is set up and its accuracy is evaluated. Block diagrams and circuits of the measuring assembly, including an oscillator, a phase shifter, a differentiator and low pass filter sequences, are given. Test results of the method on steady laminar flows are discussed. V.Z.

A71-39378 Unidirectional rate sensitivity component in local control of vascular tone. V. Smieško (Slovak Academy of Sciences, Institute of Normal and Pathological Physiology, Bratislava, Czechoslovakia). *Pflügers Archiv*, vol. 327, no. 4, 1971, p. 324-336. 28 refs.

Study of vascular responses to brief changes in perfusion pressure, and investigation of the mechanism involved. A one second square wave decrease or increase in perfusion pressure induced active vasodilation in the vascular bed of the gracilis muscle. The agreement of all of the response parameters measured indicates that the mechanism of the vasodilation is independent of the polarity of the pressure change. M.V.E.

A71-39379 K(+), osmolality and subcutaneous adipose tissue blood flow. R. Gregory Sachs, Henry G. Hanley, and N. Sheldon Skinner, Jr. (Emory University, Atlanta, Ga.). *Pflügers Archiv*, vol. 327, no. 4, 1971, p. 337-348. 27 refs. PHS Grant No. HE-12566-02.

The effect of local changes in potassium concentrations and levels of osmolality on vascular resistance in subcutaneous adipose

tissue was studied in 22 dogs. It was found that increases in plasma osmolality produced an inconsistent and slight change in fat pad vascular resistance while an increase in potassium concentration within the physiological range produced consistent but only mild vasodilatation. The results obtained indicate that the potassium ion and the level of plasma osmolality can both cause vascular smooth-muscle relaxation in subcutaneous adipose tissue, and that these two nonspecific factors can also interact to produce even greater vasodilatation. M.V.E.

A71-39440 The effect of chronic hypercapnia on oxygen affinity and 2,3-diphosphoglycerate. Arthur A. Messier and Karl E. Schaefer (U.S. Naval Submarine Medical Research Laboratory, Groton, Conn.). *Respiration Physiology*, vol. 12, Aug. 1971, p. 291-296. 19 refs.

Study of the relationship between oxygen affinity and 2,3-diphosphoglycerate (2,3-DPG) in the red cell in chronic hypercapnia induced by prolonged exposure of guinea pigs to 15% CO₂ and 21% O₂ in N₂. Red cell pH fell to a minimum after six hours of exposure and subsequently rose without reaching initial values after seven days of exposure. Both oxygen half-saturation pressure and the level of 2,3-DPG of the red cells followed the time course of the pH changes. However, both parameters required 24 hours to reach a minimum, following which they increased steadily and were not different from control values after seven days of exposure. (Author)

A71-39441 Pulmonary gas transport characterization by a dynamic model. Gerald M. Saidel, Thomas C. Militano, and Edward H. Chester (Case-Western-Reserve University; U.S. Veterans Administration Hospital, Cleveland, Ohio). *Respiration Physiology*, vol. 12, Aug. 1971, p. 305-328. 30 refs. Research supported by the Ohio Thoracic Society and the Tuberculosis and Respiratory Disease Association of Cleveland.

Development of a mathematical model which describes and predicts pulmonary transport of N₂ and CO. The model is structured as a system of five well-mixed compartments, four of which have variable volumes, arranged in parallel and series. For this structure, the unsteady, mass-balance equations are derived and the effect of parameters is investigated. The model may be used to simulate experiments of nitrogen washout and CO uptake with normal subjects and those with chronic obstructive lung disease (COLD). With each subject, these experiments are conducted at several levels of tidal volume and frequency under controlled conditions. When all experiments of a subject are simulated, a set of parameter values is obtained that characterizes the volume and distensibility distributions in airways and alveoli and the CO mass transport across the pulmonary membrane. M.M.

A71-39442 The effect of oxygen administration on gas exchange and cardiopulmonary function in normal subjects. M. S. Karetzky, J. F. Keighley, and J. C. Mithoefer (Dartmouth College; Mary Hitchcock Memorial Hospital, Hanover, N.H.). *Respiration Physiology*, vol. 12, Aug. 1971, p. 361-370. 27 refs. NIH Grants No. HE-12560-01; No. FR-05392.

Measurement of the effects of six different inspired oxygen concentrations on arterial (14 subjects) and mixed venous (8 subjects) pH, CO₂ partial pressure, and O₂ partial pressure. In all 14 subjects, O₂ uptake, CO₂ uptake, minute ventilation, mean arterial blood pressure, and heart rate were measured at each inspired concentration. Inspired O₂ concentrations between 21 and 40% produced a linear increase in arterial oxygen pressure and content and a progressive small rise in mixed venous oxygen content, with only minimal increase in mixed venous O₂ pressure and without change in O₂ uptake, pH, CO₂ partial pressure, ventilation or cardiac

output. With 100% O₂ the further rise in arterial O₂ partial pressure was accompanied by a significant increase in mixed venous oxygen pressure. The ventilation increased slightly; there was no change in cardiac output or acid-base balance. (Author)

A71-39443 **Stagnant asphyxia in the carotid body of the cat.** D. I. McCloskey and A. M. S. Black (Oxford University, Oxford, England). *Respiration Physiology*, vol. 12, Aug. 1971, p. 381-387. 12 refs.

Stagnant asphyxia was allowed to develop in the carotid body when blood pressure was dropped abruptly to zero by simultaneously clamping the common carotid artery and opening a tap in the external carotid artery to the atmosphere. Discharge in single chemoreceptor fibers was observed as it increased in response to the stagnant asphyxia. When discharge was maximal, blood equilibrated with various gas mixtures was allowed to flow through the bifurcation for different periods of time before again dropping the local blood pressure to zero. After such transient interruptions of stagnant asphyxia with normoxic or hyperoxic blood, the return of stagnant asphyxic discharge was delayed in proportion to the degree and duration of preceding hyperoxia - i.e., the organ established an 'oxygen credit.' It is suggested that the carotid body may have a capacity to store oxygen. (Author)

A71-39474 **International Institute for Interdisciplinary Cycle Research, International Interdisciplinary Cycle Research Symposium, 2nd, Noordwijk, Netherlands, June 14-19, 1970, Proceedings. Parts 1 & 2.** Symposium supported by the Foundation for the Study of Cycles. *Journal of Interdisciplinary Cycle Research*, vol. 2, June; Aug. 1971. Pt. 1, 168 p.; pt. 2, 106 p.

The reports are classified, first, in terms of biological cycles in biochemical systems, at the cellular level, in living organisms, and in population groups. Among the subjects treated are cyclic phenomena in biological and biochemical systems, and possible diversity in basic mechanisms of biological oscillations. Under the classification of physiological cycles general, hormonal, and urinary cycles are considered, e.g., circadian rhythms of renal excretion in human subjects at different latitudes. The reports in part 2 belong to the categories of veterinary, medical, and geophysical cycles (meteorological and astronomical), and cycle synchronies and statistics. Attention is given to the biological effects of extremely low frequency electrical phenomena in the atmosphere, the study of the rotation of the earth, and a vectorial representation of time series data.

F.R.L.

A71-39475 **Cyclic phenomena in biological and biochemical systems.** A. Betz and L. von Klitzing (Bonn, Universität, Bonn, West Germany). (*International Institute for Interdisciplinary Cycle Research, International Interdisciplinary Cycle Research Symposium, 2nd, Noordwijk, Netherlands, June 14-19, 1970.*) *Journal of Interdisciplinary Cycle Research*, vol. 2, June 1971, p. 111-120. 15 refs.

Consideration of cyclic phenomena, which are important for processes such as the coordination in development, locomotion of organisms, biological transport, and information exchange. In all these cases a rhythmic process describes and stabilizes a sequence of reactions well ordered with respect to time. In circadian rhythms the organisms are able to develop highly sophisticated timing systems, extremely well stabilized against fluctuations in temperature. As a working hypothesis it is assumed that the physiological basis of biological rhythms is a group of biochemical oscillators - i.e., an oscillatory biochemical feedback system. F.R.L.

A71-39476 **Possible diversity in basic mechanisms of biological oscillations.** Thérèse Vanden Driessche (Bruxelles, Université Libre, Brussels, Belgium). (*International Institute for Interdisciplinary Cycle Research, International Interdisciplinary Cycle Research Symposium, 2nd, Noordwijk, Netherlands, June 14-19, 1970.*) *Journal of Interdisciplinary Cycle Research*, vol. 2, June 1971, p. 133-145. 63 refs.

Study of the molecular nature of the basic mechanism of circadian oscillations. The experimental evidence gained about the basic oscillating system is quite small, and can be summarized by the high probability of implication of nucleic acids in the basic mechanism itself. Four arguments support this assumption: a time-keeping device is part of the genetic characters of the species; the striking effects of UV irradiation on rhythmicity; the effects of actinomycin D on several rhythms indicate a probable role for RNA; and modifications presumably attributable to variations in RNA concentrations bring about parallel modifications in the circadian rhythms. F.R.L.

A71-39477 **Circadian rhythms of renal excretion in human subjects at different latitudes.** Mary C. Lobban (Medical Research Council, National Institute for Medical Research, London, England). (*International Institute for Interdisciplinary Cycle Research, International Interdisciplinary Cycle Research Symposium, 2nd, Noordwijk, Netherlands, June 14-19, 1970.*) *Journal of Interdisciplinary Cycle Research*, vol. 2, June 1971, p. 273-281. 16 refs.

Attempt to detect differences in the physiological circadian rhythms of indigenous human subjects from polar, temperate, and equatorial regions. Some miscellaneous observations on the human circadian rhythms of renal excretions are drawn together which lend support to this idea. Differences were observed between the renal excretions which may be brought about by variations in the daily light day/dark night (L/D) environment. F.R.L.

A71-39478 **Biological effects of extremely low frequency electrical phenomena in the atmosphere.** H. König (München, Technische Hochschule, Munich, West Germany). (*International Institute for Interdisciplinary Cycle Research, International Interdisciplinary Cycle Research Symposium, 2nd, Noordwijk, Netherlands, June 14-19, 1970.*) *Journal of Interdisciplinary Cycle Research*, vol. 2, Aug. 1971, p. 317-323. 8 refs.

Demonstration that electrical fields similar to those which exist in nature can cause medical, zoological, and biological effects. In humans it is shown that the signal type of the alpha and gamma rhythm of the EEG comes very close in frequency and waveshape to the natural e.l.f. field and also to the artificial electric fields used for experiments. Zoological and biological effects have been observed on peach-leaf lice, lactic-acid bacteria, bear yeast, and plant life. F.R.L.

A71-39480 * **The summation-dial, a vectorial representation of time series data.** N. W. Hetherington, C. M. Winget, L. S. Rosenblatt (NASA, Ames Research Center, Physiology Branch, Moffett Field, Calif.), and P. B. Mack (Texas Woman's University, Denton, Tex.). (*International Institute for Interdisciplinary Cycle Research, International Interdisciplinary Cycle Research Symposium, 2nd, Noordwijk, Netherlands, June 14-19, 1970.*) *Journal of Interdisciplinary Cycle Research*, vol. 2, Aug. 1971, p. 365-377.

Development of mathematical methods which would be applicable to data both stationary and nonstationary in time. The basic method suggested has been utilized for many years in the study of geomagnetism, and is here extended to the study of the interrelationships between two rhythms. These methods are described, and examples derived from a study involving 8 male human subjects who had undergone 56 days of bed rest, following a 6-day ambulatory or control period, are cited. F.R.L.

A71-39545 **Automatizing of visual attention.** Charles J. Furst (Langley Porter Neuropsychiatric Institute, San Francisco, Calif.). *Perception and Psychophysics*, vol. 10, Aug. 1971, p. 65-70. 20 refs.

Description of an experiment in which human subjects observed stimulus pictures for several trials, during which records were made of their visual fixations. It was found that fixation rate habituated and that this habituation was accompanied by a reduction in the uncertainty (entropy) of the spatial distributions of fixations. These results were interpreted as evidence for automatizing visual fixation processes. Analysis of eye-movement distances suggested a possible mechanism for the reported loss of vividness of a stimulus which is perceived habitually. M.M.

A71-39548 **Learning of cardiovascular responses - A review and a description of physiological and biochemical consequences.** Leo V. DiCara (Rockefeller University, New York, N.Y.). *New York Academy of Sciences, Transactions, Series 2*, vol. 33, Apr. 1971, p. 411-422. 58 refs. Research supported by the American Heart Association; PHS Grants No. MH-19172; No. MH-13189; No. GM-34110.

Results obtained by various investigators are noted which indicate that instrumental learning of visceral responses can be used for therapeutic purposes. By proving that autonomic responses are subject to instrumental learning and that the learning of visceral responses has significant behavioral, physiological, and biochemical consequences, work in this new area is of significance for learning theory and for the etiology and therapy of psychosomatic symptoms. V.P.

A71-39605 **Effect of conditions of space flight on station 'Zond-5' on seeds, onions, and tradescantia plants.** N. L. Delone, E. M. Morozova, and V. V. Antipov. (*Kosmicheskie Issledovaniia*, vol. 9, Jan.-Feb. 1971, p. 156-159.) *Cosmic Research*, vol. 9, Jan.-Feb. 1971, p. 146-148. Translation.

Effects of Zond 5 circumlunar flight on spiderwort (*Tradescantia paludosa*) plants, onion bulbs, and dry seeds of wheat, barley, peas, carrots, tomatoes, mustard, and pine. The germinating capacity was higher for pea seeds subjected to space flight than for control seeds. Growth stimulation was observed in onion bulbs, and the percentage of chromosome rearrangements increased for barley and pine seeds. Spiderwort roots did not exhibit a statistically reliable increase of chromosome rearrangements. T.M.

A71-39767 * # **Cortical responses of awake cat to narrow-band FM noise stimuli.** Edmund M. Glaser (Maryland, University, Baltimore, Md.). *Acoustical Society of America, Journal*, vol. 50, Aug. 1971, pt. 2, p. 490-501. 23 refs. PHS-NASA-supported research.

Unanesthetized cats with chronically implanted epidural electrodes in the region of primary auditory cortex were stimulated with frequency-modulated (FM) noises of varying bandwidths. The average evoked responses to these stimuli were compared with responses to tone bursts of the same center frequency and intensity. Two different noise stimuli were used: (1) bursts with rise/fall times the same as the tone burst; (2) transitions from tone to noise and back with transition times equal to tone-burst rise time. It was found that: (1) the magnitude of the early response components increases with the bandwidth of the modulating noise, the relationship being fitted well by a power function; (2) there is a smaller power-law type of increase in response amplitude with rms rate, noise bandwidth being held constant; (3) responses to transitions from tone to noise were quite marked, often exceeding burst responses, while responses to transitions from noise to tone were only rarely observed. These results are discussed in terms of the activity of single units in auditory cortex. A simple neuronal model is proposed to explain and

unify the findings. The results are also compared with psychological loudness summation studies. (Author)

A71-39768 * # **Intracochlear potential recorded with micropipets. I - Correlations with micropipet location. II - Responses in the cochlear scalae to tones. III - Relation of cochlear microphonic potential to stapes velocity.** H. S. Sohmer (Massachusetts Eye and Ear Infirmary, Boston, Mass.), W. T. Peake, and T. F. Weiss (MIT, Cambridge; Massachusetts Eye and Ear Infirmary, Boston, Mass.). *Acoustical Society of America, Journal*, vol. 50, Aug. 1971, pt. 2, p. 572-615. 96 refs. Research supported by the Joint Services Electronics Program, PHS, and NASA.

KCl-filled glass micropipets were inserted through the round window of anesthetized cats to determine the dc potential, and the magnitude and phase of responses during the advancement of the micropipet through the cochlea. The fluid in each scala was equipotential in a transverse plane for both ac and dc potentials, and the level and phase of responses to tones changed when large positive dc potentials occurred. No evidence was found for the existence of an extracellular negative dc potential in the organ of Corti. The responses obtained from cochleas with severed auditory nerves were similar to those from intact cochleas. The potentials in the scala media and the scala vestibuli were found to be in phase, but were substantially higher in the scala media than in the scala vestibuli. It was also found that the cochlear potential response was proportional to the stimulus over a broad range of frequencies when the stimulus level was relatively low. V.Z.

A71-39769 # **Estimate of the inherent channel capacity of the ear.** Edith L. R. Corliss (National Bureau of Standards, Institute for Basic Standards, Washington, D.C.). *Acoustical Society of America, Journal*, vol. 50, Aug. 1971, pt. 2, p. 671-677. 22 refs.

The application of Shannon's equations for binary signal transmission (1949) to the computation of an inherent channel capacity of the ear from its circuit parameters is discussed. The properties of a model proposed by Corliss (1967) to derive a unit of hearing response in the form of an effective least count are analyzed. Curves are plotted to compare the intelligibility scores computed from the bit capacity of the ear and the phoneme rate of speech with experimental observations. Curves are also plotted for theoretical functions characterizing the properties of the ear as a communication channel. These functions include effective internal SNR of the ear, the fraction of channel capacity taken up by confusion (equivocation), and the inherent limiting time interval required for the ear to make a binary decision. Aspects of speech as an information source are also discussed. V.Z.

A71-39770 # **Mechanism of absorption of ultrasound in liver tissue.** H. Pauly and H. P. Schwan (Pennsylvania, University, Philadelphia, Pa.). *Acoustical Society of America, Journal*, vol. 50, Aug. 1971, pt. 2, p. 692-699. 19 refs. NIH Grant No. RO1 HE-01253; Contract No. AF 33(616)-2494.

The dominant part of the acoustic absorption of liver tissue and its components results from macromolecular relaxation processes. The absorption has been investigated over the frequency range 1 to 10 MHz and the following results have been obtained: (1) about two-thirds of the total absorption arises at the macromolecular level, with the remainder caused by macroscopic structure, (2) the specific absorption of tissue macromolecules, as expressed in absorption per weight percent, varies considerably from one biopolymer to another, (3) the absorption is related to the structure of the biological macromolecule or its hydration and changes with heat denaturation and pH, and (4) a similar frequency dependence results for all materials investigated. This dependence is to be expected if one assumes that the molecular processes of absorption are characterized by a broad spectrum of relaxational time constants and activation energies extending over a range of at least 1:7. (Author)

STAR ENTRIES

N71-31601*# Minnesota Univ., Minneapolis. Div. of Environmental Health.

ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE Semiannual Progress Report, 1 Jun. 1970 - 30 Nov. 1970

Irving J. Pflug Dec. 1970 59 p refs
(Grant NGL-24-005-160)

(NASA-CR-119638; SAPR-5) Avail: NTIS CSCL 06M

The relationship between environmental microbiology and planetary quarantine is discussed. Subjects presented are: (1) survival of microbial spores under several temperature and humidity conditions, (2) detection of low levels of microbial contamination of surfaces by chemical approaches, (3) dry heat destruction rates of microorganisms on surfaces. P.N.F.

N71-31608*# Welson (B.) and Co., Inc., Hartford, Conn.
DEVELOPMENT OF LUNAR SAMPLE PROCESSING GLOVES FOR THE LUNAR RECEIVING LABORATORY Final Report

24 Jun. 1971 55 p
(Contract NAS9-11626)

(NASA-CR-115112) Avail: NTIS CSCL 06Q

The feasibility was established of developing a pair of all viton gloves for use in the sterile nitrogen atmospheric processing cabinet of the Lunar Receiving Laboratory. All aspects, from material formulation to finished product packaging, are documented together with discussions of in-house experimentation activities. Author

N71-31610# School of Aerospace Medicine, Brooks AFB, Tex. Div. of Physiology.

DETERMINATION OF ALPHA-TOCOPHEROL IN FREEZE DRIED FOODS BY A MODIFIED COLORIMETRIC PROCEDURE Final Report, 1 Oct. 1969 - 30 Apr. 1970

Emmett J. Stork and Ramiro P. Villanueva Sep. 1970 11 p refs

(AD-713829; SAM-TR-70-61) Avail: NTIS CSCL 07C

A reliably precise and reproducible determination of alpha-tocopherol was achieved by an adaptation of the classic colorimetric determination of alpha-tocopherol. The method was preceded by the separation of the various tocopherols either by secondary magnesium phosphate column chromatography or by Florisil column chromatography. The basic method, despite its disadvantages, was considered the most suitable method for use with oils, foods, and feeding stuffs. Samples of precooked, freeze-dried ground beef, chicken cubes, whole eggs, corn, beans, and peas were analyzed and alpha-tocopherol values consistent with those reported in the literature were obtained. Recovery values achieved with the addition of pure alpha-tocopherol ranged from a minimum recovery of 90.2% to a maximum recovery of 99.1%. Author

N71-31612# School of Aerospace Medicine, Brooks AFB, Tex. Biometrics Div.

AUTOMATIC DETECTION AND DISPLAY OF ARRHYTHMIAS ON A DESK-TOP ANALOG COMPUTER Final Report, Oct. 1968 - Oct. 1969

Edward J. Engelken Jun. 1970 8 p refs

(AD-711039; SAM-TR-70-34) Avail: NTIS CSCL 06B

A previously discussed technic for the automatic detection and display of arrhythmias was improved and programmed on an EAI TR-20 desk-top analog computer. A complete program description, diagram, and parts list is provided to enable the duplication of the program with minimum effort. Author

N71-31613# School of Aerospace Medicine, Brooks AFB, Tex. Otolaryngology Branch.

NOISE WITHIN THE BELL UH-1P HELICOPTER DURING FLIGHT Final Report, Apr. - Jun. 1970

Donald C. Gasaway Sep. 1970 11 p refs

(AD-713830; SAM-TR-70-57) Avail: NTIS CSCL 20A

Measurements are reported for acoustic noise encountered within a Bell UH-1P helicopter during a ground-attack mission. Auditory effects of rocket and gun (7.62 mm minigun) firing are described and illustrated. Factors of aeromedical importance are identified and described. Author

N71-31614# School of Aerospace Medicine, Brook AFB, Tex. Biomedical Engineering Branch.

DETERMINING RESPIRATORY RATE AND VOLUME FROM ECG R-WAVE AMPLITUDE MODULATION Final Report, 1970

Bryan L. Steadman Sep. 1970 11 p refs

(AD-713833; SAM-TR-70-65) Avail: NTIS CSCL 06B

Various ECG electrode placements were investigated to determine which location would yield an R-wave amplitude modulation with the highest possible degree of correlation to respiratory volume. Each subject breathed into a spirometer to generate an electrical signal proportional to instantaneous respiratory volume. This signal was simultaneously recorded with the various electrocardiographic signals sensed by the electrodes attached to the subject. This information was then digitized and a plot of R-wave amplitude versus respiratory volume was made and the coefficient of correlation was computed for each set of data. Author

N71-31616# Naval Aerospace Medical Inst., Pensacola, Fla. Bureau of Medicine and Surgery.

LIVING HUMAN DYNAMIC RESPONSE TO - G SUB X IMPACT ACCELERATION. 2: ACCELERATIONS MEASURED ON THE HEAD AND NECK

C. L. Ewing, D. J. Thomas (Harvard School of Public Health), L. M. Patrick (Wayne State Univ.), G. W. Beeler (Mayo Clinic), and M. J. Smith Repr. from 13th Stapp Car Crash Conf., 1969 Oct. 1970 18 p refs Prepared in cooperation with the Army Aeromedical Research Lab., Fort Rucker, Ala.

(AD-717130; NAMRL-1122; USAARL-71-11) Avail: NTIS CSCL 06S

A methodical investigation and measurement of human dynamic response to impact acceleration is presented. Linear accelerations are being measured on the top of the head, at the mouth, and at the base of the neck. Angular velocity is also being measured at the base of the neck and at the mouth. A redundant photographic system is being used for validation. All data are collected in computer compatible format and data processing is by digital computer. Selected data in a stage of interim analysis on

18 representative human runs of the 236 humans runs completed to date are presented. Review of the data indicates that peak accelerations measured at the mouth are higher than previous estimates. The time relationship of the peak resultant mouth accelerations to the peak sled acceleration for this particular accelerator and restraint system is described. The maximum peak resultant mouth acceleration was 47.8 g and the peak mouth angular velocity on another run exceeded 30 rad/sec, on nominal 10 g, 250 g/sec runs. Clinical evaluation of the subjects before and after the runs disclosed no evidence of unconsciousness or neurological deficit attributable to the acceleration. Author

N71-31617# Aberdeen Research and Development Center, Aberdeen Proving Ground, Md. Human Engineering Labs.

MILESTONES: A DIRECTORY OF HUMAN ENGINEERING LABORATORIES PUBLICATIONS, 1953-1970

Jan. 1971 128 p

Avail: NTIS

An updated directory of MILESTONES is presented which provides information on research conducted in Human Engineering Laboratories. Subject categories include aircraft, audition, environment, information processing, vehicles, vision, weapons, and related subjects. E.M.C.

N71-31618*# Naval Aerospace Medical Inst., Pensacola, Fla.
LIGHTING FACTORS AFFECTING THE VISIBILITY OF A MOVING DISPLAY

Richard D. Gilson and Robert H. Elliott 7 Aug. 1970 12 p refs Prepared in cooperation with the Army Aeromedical Res. Lab., Fort Rucker, Ala.

(NASA Order L-43518)

(NASA-CR-119640; AD-715625; NAMRL-1113; USAARL-71-4)

Avail: NTIS CSCL 05E

Compensatory tracking performance was shown to be substantially degraded by oscillation of the visual display at both 1.0 Hz and 2.0 Hz. The severity of this decrement was significantly altered by changes in both the color and the intensity of the display illumination. Performance was significantly better with red light illuminating the display at 0.05 mL than with blue light at the equivalent luminance. This improvement in performance was similar in magnitude to that found for an increase in broadband illumination of the display where luminance was increased from one-half log unit below to one-half log unit above 0.05 mL. Visual mechanisms that may have been responsible for these findings are suggested and practical considerations of instrument lighting are discussed. Author

N71-31620# Naval Aerospace Medical Inst., Pensacola, Fla. Bureau of Medicine and Surgery.

THE APPLICATION OF COLLEGE AND FLIGHT BACKGROUND QUESTIONNAIRES AS SUPPLEMENTARY NONCOGNITIVE MEASURES FOR USE IN THE SELECTION OF STUDENT NAVAL AVIATORS

Ronald M. Bale and Rosalie K. Ambler 6 Oct. 1970 16 p refs

(AD-717941; NAMRL-1120) Avail: NTIS CSCL 05I

A multiple correlation approach was utilized to demonstrate that the inclusion of noncognitive college and flight background information would enhance the sensitivity of selection processes, thus reducing the attrition rate of student naval aviators. The initial results confirmed the hypothesis and the findings were upheld by crossvalidation. Implementation of the suggested technique would

have reduced the attrition rate by 4.5 percentage points for the cross-validation sample. It is recommended that the technique be incorporated as a management tool at the primary selection level.

Author

N71-31621# Naval Aerospace Medical Inst., Pensacola, Fla. Bureau of Medicine and Surgery.

REPLACEMENT AIR GROUP PERFORMANCE AS A CRITERION FOR NAVAL AVIATION TRAINING

Ronald M. Bale, George M. Rickus, Jr. and Rosalie K. Ambler 8 Dec. 1970 11 p refs

(AD-718848; NAMRL-1126) Avail: NTIS CSCL 05I

A multiple correlation analysis was used to examine the possibility of utilizing replacement air group completion as an advanced criterion variable for student naval aviator performance prediction and probability estimation of student completion of flight training. Undergraduate training grades were found to significantly predict replacement air group completion. The findings were crossvalidated on an equivalent sample. Had the proposed weighting system been employed, the attrition rate of the cross-validation sample would have been reduced by 33.8 percent. Author

N71-31622# School of Aerospace Medicine, Brooks AFB, Tex. Biomedical Engineering Branch.

ELECTROCARDIOGRAM R-WAVE AMPLITUDE DETECTOR Technical Report, Oct. 1968-Apr. 1970

Bryan L. Steadman Sep. 1970 11 p

(AD-712668; SAM-TR-70-60) Avail: NTIS CSCL 06 B

A device is described that accepts a raw electrocardiographic signal as an input and generates a steplike output where the height of each step represents the amplitude of each R-wave on a beat-by-beat basis. The instrument is designed to accept an input peak-to-peak signal of 0.5 mV to 5.0 V, enabling it to accept most of the commonly available signal levels. An adjustable dc offset and optional ac coupling circuit are available in the output stage of the device to facilitate the study of the beat-by-beat change in R-wave amplitude. Author

N71-31625# Human Resources Research Organization, Alexandria, Va. Div. No. 5.

AIRCRAFT RECOGNITION PERFORMANCE OF CREW CHIEFS WITH AND WITHOUT FORWARD OBSERVERS

Robert D. Baldwin, Edward W. Frederickson, and Edward C. Hackerson Aug. 1970 43 p refs

(Contract DAHC19-70-C-0012)

(AD-714213; HumRR0-TR-70-12) Avail: NTIS CSCL 05I

A test of aircraft recognition accuracy and decision speed compared the performance of single observers and four man crews. The test used miniaturized simulations of aircraft which were moved at scaled speeds, altitudes, and distances. The validity of the simulation was evaluated, and judged acceptable, by comparing the results of the miniaturized test with results obtained from a previous full-scale test. Comparison of single observers with crews revealed that approximately 50 percent of the observers performed more effectively when alone than when with a crew, in terms of both accuracy and decision speed. The remaining observers performed either equally well, or more effectively when with a crew than when alone. These two groups of effective crew observers tended to be less dependent upon other crewmen judgments than the less effective crew observers. E.M.C.

N71-31660# Southampton Univ. (England). Inst. of Sound and Vibration Research.

PILOT VISUAL ACUITY DURING HELICOPTER FLIGHT

M. J. Griffin Feb. 1971 43 p refs Sponsored by Min. of Defence

(ISVR-TR-44) Avail: NTIS

An experiment to determine pilot visual acuity during helicopter flight is described. The visual task consisted of detecting black wire-shaped objects against uniformly illuminated backgrounds. Experimented results indicate that there is an acuity decrement when viewing the test objects under certain conditions during helicopter flight. Acuity during flight was significantly worse than when standing on the ground for black visual test objects presented against a dark grey background. There was no significant difference between the two scores when the same black test objects were presented against a white background. The implications of these results are discussed and recommendations for further work are presented.

Author (ESRO)

N71-31733# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

SPONTANEOUS CARDIAC ARRHYTHMIAS INDUCED BY BROMOTRIFLUOROMETHANE

Ethard W. Van Stee and Kenneth C. Back Feb. 1971 19 p refs

(AD-723645; AMRL-TR-68-188) Avail: NTIS CSCL 6/5

Cardiac arrhythmias spontaneously appearing in monkeys exposed to CBrF₃ were found to require a minimal blood pressure threshold for their production. The blood pressure threshold varied as an inverse function of the log₁₀ of the CBrF₃ concentration to which monkeys in acid-base balance were exposed. Acidosis decreased the threshold and alkalosis increased the threshold at concentrations of 10 and 20 percent CBrF₃ but were without effect at 30 percent or greater concentrations. Epinephrine was found to decrease the blood pressure threshold required to trigger arrhythmias but was not necessary for their production as it is in the case of cyclopropane. The difference in individual susceptibility to the spontaneous formation of arrhythmias during exposure to CBrF₃ reported by Van Stee and Back (1969) was found to be the result of differences in individual ability to maintain blood pressure during CBrF₃ exposure.

Author (GRA)

N71-31741# Air Force Human Resources Lab., Williams AFB, Ariz. Flying Training Div.

IMPROVED CREW MEMBER TRAINING THROUGH A NEW PHILOSOPHY TOWARD TRAINING

Milton E. Wood Aug. 1970 12 p refs

(AD-723313; AFHRL-TR-70-31) Avail: NTIS CSCL 5/9

New emphasis on the total learning process is bringing about significant changes in both the educational and training communities. The process-oriented, systems approach to training 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 United States 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 multi-media systems. The basic principles inherent in the new-look in training appears to be generally applicable to all phases of crew-member training.

Author (GRA)

N71-31768# Naval Aerospace Medical Inst., Pensacola, Fla. Research Lab.

EVIDENCE FOR A TEST OF DYNAMIC OTOLITH FUNCTION CONSIDERED IN RELATION TO RESPONSES FROM A PATIENT WITH IDIOPATHIC PROGRESSIVE**VESTIBULAR DEGENERATION**

Ashton, Graybiel, Charles W. Stockwell, and Fred E. Guedry, Jr. 1 Oct. 1970 10 p refs

(AD-722318; NAMRL-1119; NAVMED-MR005.01.01.120B-4)

Avail: NTIS CSCL 6/19

A patient is described who possessed residual otolith function, but whose loss of canal function was complete for the horizontal and nearly complete for the vertical canals. A clear (but abnormal) nystagmus response was elicited during rotation about an Earth-horizontal axis, confirming the conclusion, based on animal experiments, that this response depends upon the otolith system. This test appears to measure dynamic otolith function and therefore provides a useful supplement to other vestibular tests.

Author (GRA)

N71-31888# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).

ON THE QUESTION OF PILOT INJURY DURING LOW ALTITUDE FLIGHT [ZU FRAGEN DER PILOTENSCHAEDIGUNG BEIM TIEFFLUG]

P. Schulz /n DGLR Turbulence Model at Low Altitudes and Flight in a Turbulent Atmosphere Dec. 1970 p 99-117 refs In GERMAN

Avail: NTIS; ZLDI Munich: 34 DM

The calculation of pilot injuries during low altitude high speed flight is presented. The pilot acceleration loads due to gusts and low level turbulence are calculated for stochastic disturbances, and the transfer function of the aircraft is taken into account.

ESRO

N71-31942# Naval Aerospace Medical Inst., Pensacola, Fla.

SELECTED BIVARIATE ANTHROPOMETRIC DISTRIBUTIONS DESCRIBING A SAMPLE OF NAVAL AVIATORS, 1964

William F. Moroney 10 Mar. 1971 39 p refs

(AD-723796; NAMRL-1130; NAVMED-MF12.524.002-5013D)

Avail: NTIS CSCL 5/5

Previous anthropometric surveys presented means, standard deviations, ranges, and percentiles as descriptors of the anthropometric features of aviator populations. These reports were limited to a consideration of each variable independently. However, designers also need knowledge of the interaction between variables in order to determine what proportion of the potential operator population their design decisions will eliminate. This report extends data previously collected from 1549 naval aviation personnel by presenting bivariate tables that illustrate the relationship between selected variables. Twenty-one tables were prepared which contained selected interactions between the following variables: bideloid diameter; buttock-knee length; eye height, sitting; functional reach; head height; knee height, sitting; sitting height; shoulder height, sitting; standing height; and thigh circumference. Means, standard deviations, ranges, regression equations, standard error of estimate, and percentile levels were also presented for each variable.

Author (GRA)

N71-32009# Joint Publications Research Service, Washington, D.C.

AUDITORY PATTERN RECOGNITION

N. G. Zagoruyko, ed., et al 15 Jul. 1971 40 p refs Transl. into ENGLISH from the book 'Raspoznavaniye Slukhovyykh Obrazov' Novosibirsk, Nauka Press, 11 Feb. 1969

(JPRS-53606) Avail: NTIS

CONTENTS:

1. STRUCTURE OF THE AUDITORY PATTERN RECOGNITION PROBLEM AND METHODS OF SOLVING IT p 1-16 refs

2. METHODS OF VOICE SIGNAL DESCRIPTION AND RECOGNITION p 17-38 refs

N71-32010# Joint Publications Research Service, Washington, D.C.

STRUCTURE OF THE AUDITORY PATTERN RECOGNITION PROBLEM AND METHODS OF SOLVING IT

In its Auditory Pattern Recognition 15 Jul. 1971 p 1-16 refs

Avail: NTIS

The problems and methods to solve automatic auditory pattern recognition are discussed. An extensive bibliography is included. E.H.W.

N71-32011# Joint Publications Research Service, Washington, D.C.

METHODS OF VOICE SIGNAL DESCRIPTION AND RECOGNITION

In its Auditory Pattern Recognition 15 Jul. 1971 p 17-38 refs

Avail: NTIS

The use of analog to digital converters in voice signal analysis to reduce cost and search operation time is discussed. The requirements imposed on the input devices and the parameters of existing converters are given. An extensive bibliography is included. E.H.W.

N71-32012# Joint Publications Research Service, Washington, D.C.

VISUAL, MEMORY AND BIONIC MODELS' ROLE ANALYZED

21 Jul. 1971 34 p refs Transl. into ENGLISH from Probl. Bioniki, Resp. Mezhdved. Nauchn.-Tekhn. Sb. (Kharkov), no. 2, 1970 p 31-32 and 68-87 (JPRS-53647) Avail: NTIS

CONTENTS:

1. CERTAIN GENERALIZATIONS IN A MATHEMATICAL MODEL OF VISION G. S. Grushko p 1-3 ref

2. REGISTERING STRUCTURE AS A MEMORY MODEL AND ITS ROLE IN PERCEPTION PROCESSES E. V. Uteush p 4-23 refs

3. CONCERNING A PROMISING TREND IN COMPUTER TECHNOLOGY V. P. Belyavskiy et al p 24-32 refs

N71-32013# Joint Publications Research Service, Washington, D.C.

CERTAIN GENERALIZATIONS IN A MATHEMATICAL MODEL OF VISION

G. S. Grushko *In its* Visual, Memory and Bionic Models' Role Analyzed 21 Jul. 1971 p 1-3 ref

Avail: NTIS

Mathematical models are presented to describe the vision process. Numerical relationships of brilliance of the optical pattern, brilliance of visual sensation, coefficient of visual inertia, and coefficient of sighting irradiation are established. P.N.F.

N71-32014# Joint Publications Research Service, Washington, D.C.

REGISTERING STRUCTURE AS A MEMORY MODEL AND ITS ROLE IN PRECEPTION PROCESSES

E. V. Uteush *In its* Visual, Memory and Bionic Models' Role Analyzed 21 Jul. 1971 p 4-23 refs

Avail: NTIS

The problem of the structure of memory is discussed. The processes of information storage in the memory and the control over the recording of information are examined. Hydraulic and electric analogies are established and numerical models of the memory process are presented. P.N.F.

N71-32032# Joint Publications Research Service, Washington, D.C.

NEURON SIMULATION AND SCANNING SYSTEMS OUTLINED

14 Jul. 1971 20 p refs Transl. into ENGLISH from Sovrem. Probl. Kibernetiki. (Moscow), 262-267, 376-382 (JPRS-53597) Avail: NTIS

CONTENTS:

1. MODELLING THE ADAPTATION OF A NEURON AND SPONTANEOUS ACTIVITY OF NEURON NET A. S. Kolokolov et al p 1-8 refs

2. ON A SYNTHESIS OF SEARCH TYPE SCANNING SYSTEMS S. Y. Zdor p 9-18 refs

N71-32033# Joint Publications Research Service, Washington, D.C.

MODELLING THE ADAPTATION OF A NEURON AND SPONTANEOUS ACTIVITY OF NEURON NET

A. S. Kolokolov et al *In its* Neuron Simulation and Scanning Systems Outlined 14 Jul. 1971 p 1-8 refs

Avail: NTIS

Methods of constructing a neuron adaptation model and simulating the spontaneous activity of a neuron network are described. Neuron adaptation involves a reduction in the frequency time of pulses being generated, a concept applicable to a biological neuron which cannot be held in an indefinite excited state due to limited internal energy resources. As an elementary cell of a nerve network, use is made of an analog model containing a blocking generator with controllable frequency. Simulation of the neuron adaptation is then discussed, as well as development of a simple neuron multivibrator. Finally, expansion of this multivibrator into a switching neuron network with a controlled rate of transmitting the excitation is treated. A.C.R.

N71-32034# Joint Publications Research Service, Washington, D.C.

ON A SYNTHESIS OF SEARCH TYPE SCANNING SYSTEMS

S. Ye. Zdor *In its* Neuron Simulation and Scanning Systems Outlined 14 Jul. 1970 p 9-18 refs

Avail: NTIS

Synthesis of search scanning systems is discussed, emphasizing the primary variables that must be considered in formulating optimal distribution of search efforts. It appears that optimal scanning efficiency is directly related to a special filament optical image converter. A mathematical procedure for developing the basic specifications for such a converter is described. A.C.R.

N71-32079# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

ALCOHOL AND DISORIENTATION RELATED RESPONSES. 1: NYSTAGMUS AND VERTIGO DURING CALORIC AND OPTOKINETIC STIMULATION

David J. Schroeder Feb. 1971 30 p refs
(FAA-AM-71-6) Avail: NTIS

The effects of two levels of alcohol on the vertigo and nystagmic responses resulting from caloric irrigations with visual conditions and the alertness of the subjects carefully controlled are reported. Additional information concerning the effects of alcohol on optokinetic nystagmus was also obtained. The data clearly indicate that alcohol suppresses the nystagmic response to calorizations in total darkness. However, under conditions where visual fixation is permitted and where visual fixation would normally inhibit caloric vestibular responses, the ingestion of alcohol results in a high-frequency, low-amplitude nystagmus. This response, however, is not due to increased vestibular sensitivity, but rather to the suppression, by alcohol (directly or indirectly), of the visual fixation system. This visual inhibition was also evident in the suppression of the optokinetic response by alcohol. Vertigo responses to caloric irrigations showed only slight suppression or some enhancement in darkness following alcohol ingestion; however, blurring of vision was prominent when visual fixation was permitted.

Author

N71-32081# Oklahoma Univ., Oklahoma City. Dept. of Physiology and Biophysics.

EFFECT OF A MOVING OPTICAL ENVIRONMENT ON THE SUBJECTIVE MEDIAN

M. Herbert Brecher and Gerhard A. Brecher Apr. 1971 3 p refs

(Contract FA-67-AC-2699-1)
(FAA-AM-71-22) Avail: NTIS

The placement of a point in the median vertical plane under the influence of a moving optical environment was tested in 12 subjects. It was found that the median plane was displaced in the same direction as the movement of the visual environment when the environment was moved at speeds ranging from 9 plus or minus radians/minute to 45 plus or minus 1 radians/minute. It was established that unidirectional movements of the total optical environment always caused a spatial disorientation with respect to external visual reference points.

Author

N71-32082# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

PHYSIOLOGICAL RESPONSES OF LOW TIME PRIVATE PILOTS TO CROSS-COUNTRY FLYING

C. E. Melton and Vincent Fiorica Apr. 1971 8 p refs
(FAA-AM-71-23) Avail: NTIS

Various physiological, biochemical, and psychophysiological measurements were made on low-time private pilots who each flew three cross-country flights. The round-trip flights were 320, 520, and 960 NM in length. Heart rate was recorded continuously throughout the flights. Urine, collected for the 24-hour period surrounding the flights, was differentially analyzed for epinephrine and norepinephrine. None of the measured parameters changed in proportion to the length of the flights; however, the level of stress was high when compared to other types of flying activities. The total stress of such flights must, therefore, be considered to be in direct proportion to the length of the flights.

Author

N71-32083# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

CIVIL AEROMEDICAL STANDARDS FOR GENERAL USE

AEROSPACE TRANSPORTATION VEHICLES: THE SPACE SHUTTLE FOLLOW-ON

Stanley R. Mohler and Siegfried J. Gerathwohl Jul. 1971 7 p refs

(FAA-AM-71-33) Avail: NTIS

Second-generation general-use aerospace transportation vehicles will evolve, and aerospace medical specialists must provide timely medical criteria for (a) occupant selection, (b) vehicle design features, and (c) operational guidelines. Incorporation of this aeromedical data will result in (a) enhanced mission success and mission efficiency, and (b) minimized opportunity for mission failure, accidents, and long-range adverse consequences due to human factors deficiencies. The data include medical standards for the occupants plus standards for oxygen, nitrogen, carbon dioxide and monoxide, humidity, heat, water vapor, internal noise, radiation, and other items.

Author

N71-32088# Joint Publications Research Service, Washington, D.C.

CYBERNETICS AND REGULATION THEORY

6 Jul. 1971 21 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 197, no. 6, 1971 p 1280-1290 (JPRS-53531) Avail: NTIS

CONTENTS:

1. BEHAVIORAL SELECTION EXPERIMENTS CITED
N. I. Glazunov et al p 1-7 refs
2. EFFECTS OF VIBRATION ON HUMANS INVESTIGATED
B. A. Potemkin et al p 8-14 refs
3. STOCHASTIC SYSTEM COMBINATIONS DISCUSSED
V. S. Pugachev p 15-19

N71-32089# Joint Publications Research Service, Washington, D.C.

BEHAVIORAL SELECTION EXPERIMENTS CITED

N. I. Glazunov et al *In its* Cybernetics and Regulation Theory 6 Jul. 1971 p 1-7 refs

Avail: NTIS

A model is constructed to quantitatively examine the performance of automatic machines with normal and disturbed behavior (in the sense of function). In making statistical decisions these characteristics are compared with the behavior of healthy and sick people. The proposed model can be utilized in the diagnostic practice of psychiatric clinics or in engineering psychology.

E.M.C.

N71-32090# Joint Publications Research Service, Washington, D.C.

EFFECTS OF VIBRATION ON HUMANS INVESTIGATED

B. A. Potemkin et al *In its* Cybernetics and Regulation Theory 6 Jul. 1971 p 8-14 refs

Avail: NTIS

Dynamic reactions of an operator with random vibrational stimuli is treated in relation to biomechanical systems. Transmitting functions of the model were determined from fundamental correlation of statistical dynamics of linear systems. Also, mechanical models were formulated to evaluate frequency characteristics of the human body for various postures. An expression was derived for a chain system model with functions corresponding to impedances of parallel branches and to the dynamic mobility of branches that are in sequence.

E.M.C.

N71-32231*# George Washington Univ., Washington, D.C. Medical Center.

SCIENTIFIC PUBLICATIONS AND PRESENTATIONS RELATING TO PLANETARY QUARANTINE. VOLUME 5: THE 1970 SUPPLEMENT

Frank D. Bradley and Margaret F. Werts Aug. 1971 121 p refs

(Contract NSR-09-010-027)

(NASA-CR-121325) Avail: NTIS CSCL 06M

The fourth annual supplement to the original bibliography issued in June, 1967, entitled Scientific Publications of the Biosciences Programs Division, National Aeronautics and Space Administration, Volume V. Planetary Quarantine, is presented. The annual supplements consist of citations of documents relating to planetary quarantine. While they are compiled primarily to bring up to date the survey of the literature in the field, it will be noted that there is also a heavy back gathering of references not previously included. Some of these ante-date the formation of NASA, but are of substantive or historical value to the planetary quarantine program.

Author

N71-32232*# Scientific Translation Service, Santa Barbara, Calif. USING THE METHOD OF SEPARATION AND IDENTIFICATION OF AMINO ACIDS TO DETECT EXTRATERRESTRIAL LIFE [ISPOLZOVANIYE METODA VYDELENIYA I IDENTIFIKATSII AMINOKISLOT DLYA OBNARUZHENIYA ZHIZNI VNE ZEMLI]

G. A. Lavrentyev Washington NASA Aug. 1971 13 p refs Transl. into ENGLISH of Acad. of Sci. (USSR), Moscow. Inst. for Space Res. report Pr-59

(Contract NASw-2035)

(NASA-TT-F-13765) Avail: NTIS CSCL 06F

A method is developed for separating amino acids from soils on the Earth and for analyzing them. The development of an automatic system which would allow amino acids in soil samples from other planets, to be analyzed by automatic space stations, is proposed.

Author

N71-32239# Defense Documentation Center, Alexandria, Va. RADIATION INJURIES AND SICKNESS: A DDC BIBLIOGRAPHY, VOLUME 1, MAY 1957-JULY 1970

May 1971 237 p refs

(AD-722970; DDC-TAS-71-14-1-Vol-1) Avail: NTIS CSCL 6/18

The annotated references were compiled from the Defense Documentation Center's data bank on injuries and sicknesses caused by radiation and radioactive decays. Indexes of corporate author-monitoring agency, subject, and title are provided in this bibliography.

Author (GRA)

N71-32331# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

PERFORMANCE, RECOVERY AND MAN-MACHINE EFFECTIVENESS Semiannual Progress Report, 1 Sep. 1970-28 Feb. 1971

Richard A. Dudek. 15 Mar. 1971 22 p refs

(Contract DAAD05-69-C-0102)

(AD-723430) Avail: NTIS CSCL 5/8

The basic purpose of the program is the generation of basic data concerning human performance and recovery within several work systems settings under conditions of varied environments, task demands, motivational levels, and nutritional

factors, and further, to generate from this basic data the solution to real problems and recommended procedures for mans operation under varying conditions of the work system. Several conclusions regarding human performance and recovery with pertinence to military application have been made and reported. Specifically six new important conclusions with potential military application have been made relative to continuous operations and work/rest schedules.

Author (GRA)

N71-32433# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

ALCOHOL AND DISORIENTATION-RELATED REPONSES. 3: EFFECTS OF ALCOHOL INGESTION ON TRACKING PERFORMANCE DURING ANGULAR ACCELERATION

William E. Collins, Richard D. Gilson (Naval Aerospace Medical Inst.), David J. Schroeder, and Frederick E. Guedry, Jr. (Naval Aerospace Medical Inst.) Apr. 1971 20 p refs

(FAA-AM-71-20) Avail: NTIS

The effects of alcohol ingestion on visual tracking performance (eye-hand coordination) during angular acceleration are considered. Following practice and base-line tests of tracking performance in both static and dynamic conditions, 10 subjects received orange juice which contained 2.0 ml of 100-proof vodka per kg of subject weight; another 10 drank orange juice with a few drops of rum extract added. Tests, conducted 1, 2, 4, 8, and 10 hours after drinking, were in total darkness with the exception of the visual display which was illuminated to recommended levels for cockpit instruments. Static tracking errors for alcohol subjects were significantly higher than those of control subjects only at the 4-hour session. However, alcohol subjects made significantly more dynamic tracking errors than controls during the 1-, 2-, and 4-hour sessions. These data suggest that eye-hand coordination may show little or no impairment following alcohol ingestion in static situations, yet may be seriously degraded during motion.

Author

N71-32434# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

A NON-VERBAL TECHNIQUE FOR THE ASSESSMENT OF GENERAL INTELLECTUAL ABILITY IN SELECTION OF AVIATION PERSONNEL

W. Dean Chiles and Roger C. Smith Jun. 1971 12 p refs

(FAA-AM-71-28) Avail: NTIS

A study was conducted in which performance on a non-verbal problem solving task was correlated with the Otis Quick-Scoring Mental Ability Test and the Raven Progressive Matrices Test. The problem solving task, called code-lock, required the subject to determine the correct sequence in which to push five buttons in order to turn on a light. Measures of how quickly the subject responded and how many errors were made on each problem were taken from 45 college student volunteers. Results indicated substantial correlations (.50 to .60) between time measures on the code-lock task and the Otis but very limited relationships between the Raven and each code-lock measure. The implications of these findings for assessment of intellectual abilities are discussed.

Author

N71-32474*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

A MODEL FOR MEMORY IN THE BRAIN

James S. Albus Washington Aug. 1971 16 p refs

(NASA-TN-D-6456; G-953) Avail: NTIS CSCL 06B

Among the many different types of memory models, the oldest and most persistent hypothesis has been that memory results from modification of synaptic junctions. The proposed model

is a synaptic junction model which differs only slightly from other synaptic junction models, but the difference is critical. This model, like most others, suggests that facilitation of synapses is caused by coincidence of pre- and post-synaptic activity. But, unlike others, this model distinguishes between synapses in nonspecific and specific neural pathways and postulates that facilitatable memory synapses exist primarily at sites where nonspecific fibers terminate on specific pathways. Author

N71-32520* McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Advanced Biotechnology and Power Dept.
COMPOSITION AND CONCENTRATIVE PROPERTIES OF HUMAN URINE

David F. Putnam Washington NASA Jul. 1971 110 p refs
 (Contract NAS1-8954)
 (NASA-CR-1802; DAC-61125-F) Avail: NTIS CSCL 06P

The composition of typical human urine is defined and experimental data is presented on its chemical, physical, engineering and concentrative properties. The effects of chemical and electrolytic pretreatments used in aerospace applications for extraction of potable water are included. The results are presented in tables and plots of unsmoothed data, empirical equations, and tables of nominal values. Sample calculations and examples illustrating the consideration of these data in engineering design applications are included. Author

N71-32547 West Virginia Univ., Morgantown.
MECHANICAL PROPERTIES OF THE HEAD

Richard Lynn Stalnaker (Ph.D. Thesis) 1969 130 p
 Avail: Univ. Microfilms Order No. 70-15266

Research was conducted to provide basic information concerning the mechanical responses of the head. The instrumentation and experimental techniques will be used in a survey of materials to be used in the construction of an artificial head. An electromagnetic shaker and a spectral dynamics analyzer were used to determine the mechanical impedance of the live *Macaca mulatta* monkey head, live monkey head with high blood pressure, dead monkey with low blood pressure, dead monkey head with body removed, the dead monkey skull with the brain, and the dead monkey skull. A microminiature accelerometer and pressure transducers were developed for implantation into the brain. This transducer was implanted in three of the five monkeys tested. The acceleration on the side of the head opposite the point of application of the load for driving point impedance was recorded. Dissert. Abstr.

N71-32566# School of Aerospace Medicine, Brooks AFB, Tex.
INFORMATION MODEL DISPLAYING THE PROCESS INVOLVED IN PILOTING AIRCRAFT [OR INFORMATSIONNOY MODELIDLYA OTBRAZHENIYA PROTSSA PILOTIROVANIYA SAMOLETA LETCHIKOM]

L. I. Vinograi 1971 13 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), v. 13, no. 4, 1967 p 153FF
 (AD-723051; SAM-TT-R-1039-0571) Avail: NTIS CSCL 5/10

An information model is proposed which may be used under laboratory conditions for research or as a display device on the ground as part of the radiotelemetry system used to transmit the parameters of the aircraft to the flight operations command post. The availability to the flight operations officer of information on the behavior curve of the pilot-aircraft system during the actual flight process makes control more effective and visible. He will be able not only to evaluate piloting quality, but also to send corrective commands to the pilot in the event of significant deviations in the

motion parameters from the expected ones, or in the case of an emergency situation. When remote control is used, an additional control and handling team is formed parallel to the pilot-aircraft control team. It consists of the flight operations officer, the radio control and the telemetry equipment. In this case, the flight operations officer becomes an active operator in the complex system of flight control and guidance. Author (GRA)

N71-32572# Stanford Research Inst., Menlo Park, Calif.

A STUDY OF SENSITIVITY TO NOISE Final Report

R. W. Becker, F. Poza, and K. D. Kryter Jun. 1971 64 p refs
 (Contract DOT-FA69WA-2211)
 (EQ-71-4) Avail: NTIS

About 140 subjects were exposed to simulated sonic booms and recorded residential noises in one, two, or three two-hour sessions over a period of six months. Electrophysiological measures of heart rate and electromyographic responses to the stimuli were analyzed. Biographical, demographical, and personality inventories were also obtained for each of the subjects. The purpose of this research was to: (1) determine whether there are different degrees of psychological and physiological sensitivity to noise in a large group of people, (2) to determine whether and how such sensitivity varied in time, and (3) to relate such sensitivity to other psychological and personality variables. Significant differences in psychological sensitivity to noise were found in the subject population. These differences remained stable for the duration of the experiment and were also found to be related to the attitudinal and belief structures of the individuals. Definite physiological responses to the simulated sonic booms were observed. Author

N71-32602# Astro Nautical Research, Inc., Cambridge, Mass.
REPETITIVE EXCURSION DIVES FROM SATURATED DEPTHS ON HELIUM-OXYGEN MIXTURES. PHASE 3: SATURATION DEPTH 300 FEET

James K. Summitt, John M. Alexander, Edward T. Flynn, and J. Wayne Kulig Washington Navy Exptl. Diving Unit 23 Sep. 1970 27 p refs
 (Contract N00024-70-C-5559)

(AD-723172; NEDU-RR-7-70) Avail: NTIS CSCL 6/19

Three 300-foot HeO₂ saturation dives were conducted at the Navy Experimental Diving Unit to verify a no-decompression repetitive excursion format developed by the Deep Submergence Systems Project (PM-11). The table for this series of dives is the same as the one previously tested and found to be satisfactory for repetitive-excursion dives from a saturation depth of 350 feet. Twelve divers completed a total of 216 man-excursion dives from the saturation depth to depths not exceeding 150 feet deeper than their base depth. No symptoms of decompression sickness were reported during the excursion dives, during the bottom time at 300 feet or throughout the decompression on returning to the surface. Author (GRA)

N71-32622# National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.

HUMAN FACTORS ENGINEERING

Leslie Buck *In its* Div. of Mech. Eng. and the Natl. Aeron. Estab. Mar. 1971 p 19-26 refs
 Avail: NTIS

The interaction between a mechanical system and the human user presents various problems for identification and solution. Considered are man machine aspects of: industrial psychology, human relations, human factors engineering, applied experimental psychology, research on attention, perceptual motor skills, engineering psychology, and mathematical modelling. G.G.

N71-32632# Astro Nautical Research, Inc., Cambridge, Mass.
REPETITIVE EXCURSION DIVES FROM SATURATED DEPTHS ON HELIUM-OXYGEN MIXTURES. PHASE 4: SATURATION DEPTH 500 FEET, SATURATION DEPTH 600 FEET

James K. Summitt, John M. Alexander, Edward T. Flynn, and J. Wayne Kulig 23 Sep. 1970 41 p refs
 (Contract N00024-70-C-5559)
 (AD-723173; NEDU-RR-8-70) Avail: NTIS CSCL 6/19

One 500-foot and two 600-foot saturation dives were conducted at the Navy Experimental Diving Unit to verify a no-decompression repetitive-excursion format developed by the Deep Submergence Systems Project (PM-11). This is the same table previously tested and found to be satisfactory for repetitive-excursion dives from saturation depths of 350 feet and 300 feet. Twelve divers completed a total of 206 man-excursion dives from the respective saturation depths to depths not exceeding 150 feet deeper than their base depth. No symptoms of decompression sickness were reported during the bottom time at 500 feet and 600 feet or during the first 200 feet of decompression back to the surface. This criteria is considered to be satisfactory evidence of the safety of the repetitive-excursion format. Three cases of decompression sickness did occur during the latter stages of decompression, and they are briefly discussed. Author (GRA)

N71-32715# Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.
A COLLATION OF ANTHROPOMETRY. VOLUME 2: I-Z AND INDEX

John W. Garrett and Kenneth W. Kennedy Mar. 1971 1081 p refs
 (AD-723630; AMRL-TR-68-1-Vol-2) Avail: NTIS HC (Individually priced)/MF \$0.95 CSCL 6/16

The document is volume 2 of a two-volume collation of adult anthropometry, the sources for which are both domestic and foreign, male and female, military and civilian. GRA

N71-32770# Astro Nautical Research, Inc., Cambridge, Mass.
REPETITIVE EXCURSION DIVES FROM SATURATED DEPTHS ON HELIUM-OXYGEN MIXTURES. PHASE 2: SATURATION DEPTH 200 FEET, SATURATION DEPTH 150 FEET

James K. Summitt, Jerry M. Herron, John M. Alexander, J. Wayne Kulig, and Edward T. Flynn 23 Sep. 1971 53 p refs
 (Contract N00024-70-C-5559)
 (AD-723171; NEDU-RR-6-70) Avail: NTIS CSCL 6/19

Two 200-foot and three 150-foot saturation dives were conducted at the US Navy Experimental Diving Unit to verify a no-decompression repetitive-excursion format developed by the Deep Submergence Systems Project (PM-11). Twenty divers completed a total of 360 man-excursion dives from the saturation depths to depths not exceeding 100 feet deeper than their base depth. No symptoms of decompression sickness were reported during the excursion dives, during the bottom time at 200 and 150 feet or during the first 24 hours of decompression back to the surface. This criteria is considered to be satisfactory evidence of the safety of the repetitive-excursion format. Four cases of decompression sickness occurred during decompression to the surface. One case of decompression sickness occurred 8 hours and 21 minutes after surfacing. All five cases are briefly discussed. Author (GRA)

N71-32825# Picatinny Arsenal, Dover, N.J.
FIELD DEPENDENCE AND VISUAL DETECTION ABILITY

Bruce L. Bucklin May 1971 62 p refs
 (AD-724115; PA-TR-4137) Avail: NTIS CSCL 5/10

The perceptual style known as field independence has been defined by various investigators as the ability to perceptually separate an object from within a complex background. This investigation attempts to test this concept in a literal manner by examining the relationship between several established measures of field independence and performance on a real-life visual detection problem. Only one of the instruments used, the Hidden Figures Test, correlated significantly with performance. An added finding was a correlation between performance and general intelligence. Furthermore, interest correlations showed that the instruments used could be divided into two groups, each measuring what appears to be a separate quality of the field independence concept.

Author (GRA)

N71-32863# Istituto di Fisica dell'Atmosfera, Rome (Italy).
ATMOSPHERIC STABILITY AND AEROSOL POLLUTION. PROPOSAL OF A SIMPLE METHOD FOR EVALUATING THE CONDITIONS OF AIR STABILITY

Luigi Mammarella Jan. 1971 11 p
 (IFA-RDP-36) Avail: NTIS

The interaction of atmospheric temperature, humidity, air motion, and temperature inversions, in connection with the transport of aerosol pollutants, are investigated, and a method is proposed to ascertain atmospheric stability. ESRO

N71-32864# Southampton Univ. (England). Inst. of Sound and Vibration.

SOME EFFECTS OF THE VIBRATION OF READING MATERIAL UPON VISUAL PERFORMANCE

J. G. O'Hanlon and M. J. Griffin May 1971 47 p refs
 Sponsored by Min. of Defence
 (ISVR-TR-49) Avail: NTIS

An investigation has been made of the changes in visual acuity when viewing an object vibrating in the frequency range from 5 to 40 Hz. Reading time, error score, and subjective rating of reading difficulty were used as indicators of performance at a Landolt C acuity task. Three experiments were conducted. The first showed that errors increased with frequency from 5 to 40 Hz and with double amplitude from 0.05 in to 0.20 in. Two further experiments investigated in more detail: (1) varying amplitude at constant frequency, 16 Hz; (2) varying frequency at constant double amplitude, 0.1 in. It was found that error score was proportional to the square root of the amplitude of vibration and that the error score was directly proportional to frequency. A relatively small increase in test object size appreciably reduced errors; a 75% reduction in errors was produced by only a 25% increase in the size of the Landolt C's. The same size increase resulted in up to 20% reduction in the time taken to complete the reading task.

Author (ESRO)

N71-32865# Southampton Univ. (England). Inst. of Sound and Vibration Research.

BEHAVIOURAL AWAKENING IN RESPONSE TO INDOOR SONIC BOOMS

P. A. Morgan and C. G. Rice Dec. 1970 40 p refs
 Sponsored by Min. of Technol.
 (ISVR-TR-41) Avail: NTIS

A behavioral awakening study, involving subjection tests of eight persons (mean age 22.9 years), who were each variously exposed to double event impulse noise simulations of a sonic boom over a period of seven consecutive nights, is reported on.

ESRO

N71-32907# Naval Air Development Center, Johnsville, Pa. Aerospace Crew Equipment Dept.

PHYSIOLOGICAL EVALUATION OF SUBJECTS EXPOSED TO A COLD WATER ENVIRONMENT WHILE WEARING DIFFERENT PROTECTIVE SUIT ASSEMBLIES Interim Report

Louis J. Santa Maria and Meredith H. Radliff 15 Mar. 1971 29 p refs

(AD-724617; NADC-AC-7101) Avail: NTIS CSCL 6/17

The physiological responses of two volunteer subjects exposed to an extreme cold water environment (OC) while wearing the 3/16 inch Chloroprene Wet Suit, 1/8 inch Chloroprene Wet Suit, and the Polyvinyl Chloride Wet Suit were investigated under two conditions of use: constant immersion-flotation (COND I) and immersion-flotation for a two-minute period followed by raft occupancy (COND II). In view of exposure duration ranging from 0.5-1.0 hr and from 2.0-3.0 hr under CONDITIONS I and II, respectively, the results indicate that survival and tissue damage protection is afforded, within expected limits of time under both emergency conditions for search and recovery, by any of the clothing assemblies tested. It is recommended, therefore, that the 1/8 inch Chloroprene Wet Suit be considered as the most acceptable on the basis of such physical characteristics as reduced weight and bulk.

Author (GRA)

N71-32925# Army Natick Labs., Mass. Clothing and Personal Life Support Equipment Lab.

THE BEHAVIOR OF PROTECTIVE UNIFORMS IN LARGE SCALE SIMULATED FIRES

Mar. 1971 51 p

(AD-724648; C/PLSEL-TS-172; USA-NLABS-TR-71-40-CE) Avail: NTIS CSCL 6/17

The report describes a new test facility developed at the U. S. Army Natick Laboratories for exposing clothed manikins to large fuel (JP-4) fires and gives the results of evaluations made of several protective systems developed for hot and cold weather aviators uniforms.

Author (GRA)

N71-32968# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.

PROCEDURE MANUAL FOR THE DEPARTMENT OF ELECTRON MICROSCOPY. 2: PREPARATION OF EMBEDDED BIOLOGICAL SPECIMENS [RICETTARIO AD USO DEL REPARTO DI MICROSCOPIA ELETTRONICA. 2: ALLESTIMENTO DEI PREPARATI INCLUSI]

23 Mar. 1970 77 p refs In ITALIAN; ENGLISH summary (ISS-70/8) Avail: NTIS

Chemical, physical and biological procedures employed in the department of electron microscopy are reported. The isolation procedure of the biological material and the fixation, dehydration and embedding methods are described.

Author

N71-33087# New Mexico State Univ., University Park. Dept of Psychology.

PREDICTING HUMAN PERFORMANCE 2: LAWS OF THE VISUAL REACTION TIME

Warren H. Teichner and Marjorie J. Krebs Apr. 1971 59 p refs

(AD-724001; NMSU-ONR-TR-71-1) Avail: NTIS CSCL 5/10

The literature on the reaction time to a flash of light was reviewed and 14 studies published between 1896 and 1969 were selected as having provided sufficient methodological detail and data appropriate for quantitative analysis of the effects of the

following selected variables: Luminance, duration, size of stimulus, contrast, and background luminance, response to stimulus onset vs. offset of the signal, and monocular vs. binocular viewing. Conclusions were drawn about the effects of each variable and/or the status of the research literature concerning it. Mathematical relationships were developed which can be used to predict binocular RTs over a wide range of luminance, signal duration and signal size. These relationships appear sufficiently reliable to be used for purposes of equipment design. The data were also considered in theoretical terms. It was shown that the product of RT and luminance may be used to represent a response criterion in the sense implied by the theory of signal detection as developed in recent latency models.

Author (GRA)

N71-33088# Defense Documentation Center, Alexandria, Va. **ENVIRONMENTAL POLLUTION: NOISE POLLUTION EAR PROTECTORS, VOLUME 1 Report Bibliography, Nov. 1943-Sep. 1970**

Jun. 1971 68 p refs

(AD-724650; DDC-TAS-71-23-1) Avail: NTIS CSCL 20/1

This is Volume I of a two-volume set on Environmental Pollution: noise Pollution - Ear Protectors in a series of bibliographies on Environmental Pollution. Annotated references concerning ear protective devices, such as earmuffs, earplugs and helmets to be used against airplane noise, gun blasts, industrial plant noise, high-intensity impulse noise, combat noise, and guided missile launchings are included. Corporate Author-Monitoring Agency, Subject, Title, and Report Number indexes are included.

Author (GRA)

N71-33123# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

AVIATION HELMETS Final Report

26 Apr. 1971 21 p refs

(AD-724080; MTP-7-3-085) Avail: NTIS CSCL 6/17

Procedures are provided for determining the functional suitability of aviation helmets. Protective features and compatibility with airborne communication systems are discussed.

Author (GRA)

N71-33125# Navy Experimental Diving Unit, Washington, D.C. **REVISED TABLES OF APPROPRIATE OXYGEN PERCENTAGES FOR SELECTED PARTIAL PRESSURES AT VARIOUS DEPTHS Final Research Report**

Thomas E. Berghage and Gilbert C. Tolhurst 1 Apr. 1971 94 p refs Revised

(AD-724282; NEDU-RR-4-71) Avail: NTIS CSCL 6/11

The report was written to promulgate a revised set of tables to allow rapid and easy conversion of water depth and partial pressure combinations into appropriate oxygen per cent to be used by divers and diving supervisors. The tables were devised for use when making necessary conversions between depth in feet of sea water and pressure in terms of atmospheres absolute.

Author (GRA)

N71-33138# Human Engineering Labs., Aberdeen Proving Ground, Md.

COLOR, DIFFERENTIAL LUMINANCE AND SUBJECTIVE DISTANCE

N71-33148

Claude N. McCain, Jr. and A. Charles Karr Apr. 1971 19 p refs

(AD-724623; HEL-TM-4-71) Avail: NTIS CSCL 5/10

A modified Howard-Dohlman type apparatus was used to quantify the ability of 12 observers to adjust the relative distance of grey, red and blue rods under six relative luminance combinations (left or right rod having equal, one-half, or one-quarter the luminance of its comparison rod). The observers perceived the red rod as nearer than the blue under all conditions, with no significant effect of luminance under any condition. It was concluded that color per se is a cue for depth.

Author (GRA)

N71-33148# Human Resources Research Organization, Alexandria, Va.

PREDICTION OF ARMY AVIATOR PERFORMANCE: DESCRIPTION OF A DEVELOPING SYSTEM

Wiley R. Boyles and James L. Wahlberg Apr. 1971 11 p refs Presented at the Ala. Psychological Assoc. Ann. Meeting, Ala., May 1970 *Its* HumRRO Prof. Paper No. 5-71

(Contract DAHC19-70-C-0012)

(AD-724696) Avail: NTIS CSCL 5/9

The development of a multivariate prediction system aimed at having useful predictors available early in the training of potential Army aviators is discussed. Using this system, supervisors will be able to relate a predictor score to a probability table, this enabling administrators to make early decisions involving further training of Army aviators.

Author (GRA)

N71-33149# Human Resources Research Organization, Alexandria, Va.

PEER RATINGS AS PREDICTORS OF SUCCESS IN MILITARY AVIATION

James L. Wahlberg, Wiley R. Boyles, and H. Alton Boyd Mar. 1971 Presented at Ala. Psychological Assoc. Ann. Meeting, Ala., May 1970 *Its* HumRRO Paper No. 1-71 19 p refs (Contract DAHC19-70-C-0012)

(AD-724695) Avail: NTIS CSCL 5/9

Three experimental peer rating forms were developed for use in research in prediction of the aviation training performance criterion--completion/attrition--from the training program for Aviation Warrant Officer Candidates at the U.S. Army Helicopter School. The paper describes the construction of the ratings, the Potential Aviator Rating forms, and compares the validity of these forms with the Contemporary Evaluation Form (CEF) used by the U.S. Army Helicopter School. The basic comparison involved validity between absolute scale and ranks. The original validity coefficients were sufficiently high to anticipate that the use of peer ratings may increase predictive accuracy in a multivariate system.

Author (GRA)

N71-33187# Louisville Univ., Ky. Performance Research Lab.

EFFECTS OF FIGURAL NOISE, ROTATION, AND OTHER TASK VARIABLES ON THE VISUAL PERCEPTION OF FORM

John B. Thurmond Feb. 1971 53 p refs

(Contract DAHC19-69-C-0009; Proj. Themis)

(AD-723992; ITR-71-18) Avail: NTIS CSCL 5/10

The results of four experimental investigations of the perceptual performance obtained with tasks displaying visual information are reported. Metric figures were used in each experiment--visual forms that are analogs of the amplitude modulated waveforms that characterize the signals of certain sonar and radar presentations.

Among the general conclusions reached regarding ways of optimizing visual displays of complex information were the following: The display should provide increased cues for discrimination by enhancing the visibility of features that distinguish one pattern from another rather than providing finer figural detail. Increasing the signal-to-noise ratio of the displayed information will benefit the observer in situations where rotations of the display relative to the observer are unavoidable. Analogs of amplitude-modulated waveforms used to represent complex information visually may be more easily identified when they take the form of patterns that distribute the visual features radially, rather than horizontally, in each shape. Unless practical considerations dictate otherwise, the visually patterned information should be displayed as solid shapes against a uniform background rather than shapes which are outlined in form.

Author (GRA)

N71-33221*# Exotech, Inc., Washington, D.C.

PLANNING, EVALUATION AND ANALYTICAL STUDIES TO IMPLEMENT PLANETARY QUARANTINE REQUIREMENTS Quarterly Progress Report

Edward J. Bacon Aug. 1971 48 p

(Contract NASw-2062)

(NASA-CR-121423; QPR-5) Avail: NTIS CSCL 06M

Activities are summarized in support of the evaluation of planetary quarantine requirements, the quarantine document system for planetary flights, microbial contamination logs for Venus and Mars, evaluation of flight project quarantine plans, supporting technology transfer, specification of the probability of microbial transfer, estimation of the encapsulated microbial burden, and supporting analysis of planetary quarantine and sterilization parameters. Presentations are appended including an analysis of microbial release probabilities; an estimation of buried microbial burden; and safety margins and implementation of planetary quarantine requirements.

J.M.

N71-33223*# Wisconsin Univ., Madison. Dept. of Radiology.

SKELETAL STATUS AND SOFT TISSUE COMPOSITION OF ASTRONAUTS. DETERMINATION OF BODY COMPOSITION IN VIVO Progress Report, 15 Jun. 1970 - 15 Jun. 1971

John R. Cameron 15 Jun. 1971 177 p refs

(Grant NGR-50-002-051; Contract AT(11-1)-1422)

(NASA-CR-121415) Avail: NTIS CSCL 06P

A summary is presented of research and instrument development in the area of bone mineral content and body composition measurement in vivo.

Author

N71-33232*# California Univ., Berkeley. Space Sciences Lab.

ENZYME ACTIVITY IN TERRESTRIAL SOIL IN RELATION TO EXPLORATION OF THE MARTIAN SURFACE Semiannual Progress Report

A. D. McLaren, W. H. Brams, R. G. Burns, and A. H. Pukite 1 Jul. 1971 39 p refs *Its* Ser. 12, Issue 57

(Grant NGL-05-003-079)

(NASA-CR-121446; SAPR-14) Avail: NTIS CSCL 08M

Enzyme activities in soil are explored including abundance, persistence, and localization of these activities, in an attempt to develop procedures for detection and assay of enzymes in soils suitable for life in planetary soils. A sensitive test for soil urease was made based on hydrolysis of heat-stable C-14 urea and the urease activity of ancient and buried soils is described. A mathematical model was developed, based on enzyme action and microbial growth in soil, for rates of oxidation of nitrogen as

nitrogen compounds are moved downward by water flow. This biogeochemical model is applicable to any percolating system, with suitable modification for special features, such as oxygen concentrations, types of hydrodynamic flow, etc. A suitable extraction procedure for soil enzymes is reported, and measuring activities in one such extract are detailed in order to study how urease is complexed in soil organic matter. Nearly 30 percent of soil enzymes can be isolated as colloidal, clay-free suspensions. Author

N71-33251*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HYPOGRAVIC AND HYPODYNAMIC ENVIRONMENTS

Raymond H. Murray and Michael McCally, eds. Washington 1971 380 p refs Conf. held at French Lick, Ind., 16-18 Jul. 1969; Sponsored in part by Armour Pharm. Co., Lederle Labs., Merck, Sharp, and Dohme, and Sandoz Pharm. (NASA-SP-269; A-3652) Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06P

Papers and discussions are presented dealing with hypodynamic and hypogравic aspects of the space flight environment, particularly inactivity, confinement, and weightlessness.

N71-33252*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

SPACEFLIGHT DECONDITIONING: AN OVERVIEW OF MANNED SPACEFLIGHT RESULTS

Lawrence F. Dietlein *In its* Hypogравic and Hypodyn. Environments 1971 p 1-26 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06P

Physiological changes observed in astronauts during manned space flights are reviewed. Results of studies indicate that major physiological systems undergo consistent and predictable changes as a result of space flight. Changes were observed in the cardiovascular and musculoskeletal systems; composition and quantity of body fluids, including the blood; and in certain hormone and blood cell levels. Results derived from Mercury, Gemini, and Apollo flights through Apollo 10 are summarized. A.L.

N71-33253*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

HEMATOLOGIC IMPLICATIONS OF HYPODYNAMIC STATES

Craig L. Fischer, Carolyn Leach, and Philip C. Johnson (Baylor Coll. of Med.) *In its* Hypogравic and Hypodyn. Environments 1971 p 27-34 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06P

The red cell mass and plasma volume changes noted in the hypodynamic states of bed rest and water immersion are reviewed, and these changes are compared with the hypodynamic and hypogравic state characteristics of earth orbital missions. Author

N71-33254*# Texas Womens Univ. Research Inst., Denton, Tex. **BONE DENSITY CHANGES IN THE ASTRONAUTS DURING SPACEFLIGHT**

Pauline Berry Mack *In* NASA. Ames Res. Center Hypogравic and Hypodyn. Environments 1971 p 35-50 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

The astronaut bone density studies described were designed to determine: (1) the extent of bone density loss experienced during spaceflight; (2) possible means of reducing such losses; and (3) the rate of postflight recovery of any bone mineral loss. Author

N71-33255*# National Institutes of Health, Bethesda, Md. **METABOLIC STUDIES OF THE GEMINI 7 14-DAY ORBITAL SPACEFLIGHT**

G. Donald Whedon and Leo Lutwak (Cornell Univ., Ithaca) *In* NASA. Ames Res. Center Hypogравic and Hypodyn. Environments 1971 p 51-84 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

Described is the effort undertaken to perform complete metabolic balance studies of two astronauts during a 10-day preflight control phase, 14 days of orbital spaceflight (NASA Gemini 7), and a 4-day postflight recovery phase. The studies included measurement of dietary intakes and excretions of calcium, magnesium, phosphate, sulfate, nitrogen, sodium, potassium, and chloride; urinary excretions of 17-hydroxycorticosteroids, aldosterone, and catecholamines were also measured. This study was planned within the rigorous constraints of the technical characteristics of the flight itself. These characteristics included astronaut training, geographic and temporal aspects of the flight plan and schedule, and the limited volume of the space vehicle. In addition, the medical observations, including certain hematologic and cardiovascular measurements, as well as the metabolic study, were but a part of the total effort, including extensive operational and physics-oriented experimental activities required of the astronauts before, during, and after the flight. Author

N71-33256*# Leeds Univ. (England).

ASSESSMENT OF BONE MASS IN RELATION TO INACTIVITY

B. E. Christopher Nordin, A. Horsman, and L. Bulusu *In* NASA. Ames Res. Center Hypogравic and Hypodyn. Environments 1971 p 85-98 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

Existing techniques for the measurement of changes in bone mass due to immobilization are reviewed. The techniques are morphometry, X-ray densitometry, gamma ray densitometry, and neutron activation. Also examined was measurement of calcium loss in urine. Results of the study indicate that no densitometric procedure is likely to be as sensitive in detecting the onset of osteoporosis as the chemical measurement of the loss of bone mineral in the excreta. Although full metabolic balances with turnover studies represent the ideal way of observing the metabolic changes, the measurement of the rate of calcium excretion in the fasting state could be a valuable substitute under space flight conditions. A.L.

N71-33257*# Wisconsin Univ., Madison. Medical Center.

SOME PHYSICAL METHODS OF SKELETAL EVALUATION

John R. Cameron, John M. Jurist, and Richard B. Mazess *In* NASA. Ames Res. Center Hypogравic and Hypodyn. Environments 1971 p 99-110 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

Changes in the musculoskeletal system occur in hypodynamic and hypogравic conditions; these changes, which occur in both bed bound patients and astronauts, may lead to medical problems. Some of the major changes are summarized, and newer physical methods useful in their measurement reviewed. Author

N71-33258*# Mayo Clinic, Rochester, Minn.
BONE AT THE CELLULAR LEVEL: THE EFFECTS OF INACTIVITY

Jenifer Jowsey *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 111-120 refs (Grant AM-8658)

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

Various degrees of inactivity result in loss of bone known as osteopenia, ranging from severe, almost complete immobilization or paralysis, where severe osteopenia is the rule, to more subtle bone loss, reported as a result of lack of gravitational force imposed on astronauts. Several questions are considered that have arisen from the relatively few studies conducted to date. These are: (1) What is the mechanism of bone loss development? (2) Is increased resorption a feature of immobilization? (3) What is the physiologic mechanism of bone loss? (4) What factors will prevent the development of disuse osteopenia? Author

N71-33259*# Harvard Univ., Boston, Mass. School of Medicine.
ESTIMATION OF TOTAL SKELETAL MASS IN MAN BY RADIOISOTOPE DILUTION

Robert M. Zollinger, Jr. (Peter Bent Brigham Hosp.) and Francis D. Moore *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 121-128 refs Sponsored in part by AEC, NIH, Army Med. Res. and Develop. Command and John A. Hartford Found., Inc.

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06P

An attempt to predict skeletal weight using the compositional terms of exchangeable potassium ($K_{sub e}$) and fat free solids (FFS) was made from the observed values in isotope studies and calculated values obtained from regressions based on weight, sex, and age. The predicted values were then combined with data developed by Allen, and an equation devised that related skeletal size to $K_{sub e}$ and the $K_{sub e}$ /FFS ratio. Derivation of the equation and the supporting body composition regressions to predict the compositional values needed are outlined. Additional data, from a patient with antemortem isotope dilution studies and postmortem skeletal dissection with chemical analysis, are presented for both the verification of this technique and for discussion of actual measurements of skeletal size in man. Author

N71-33260*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

DISUSE ATROPHY IN MACACA MULATTA AND ITS IMPLICATIONS FOR EXTENDED SPACE FLIGHT

Leon E. Kazarin and Henning E. von Gierke *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 129-144 refs

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

In order to study the mechanisms operative in producing changes in bone structure, the time constants involved, the reversibility of these effects, and corrective measures to counteract these adverse effects, a program was initiated to investigate the response of the Rhesus monkey to prolonged plaster of paris immobilization. Changes in bone structure as well as quantitative changes of bone strength in situ were observed. As a means of evaluating the practical and operational significance of these changes, some of the primates were exposed after immobilization to impact loads for which injury probability for normal controls was known. The monkeys were restrained in a zoometrically designed seat and exposed to longitudinal transient acceleration in experiments designed to produce vertebral fracture of the type seen in man during longitudinal spinal impact. Some of these immobilized and impacted animals were allowed to recover for 7 months under normal conditions so that delayed manifestations of the impact trauma and recovery could be observed. The basic structural changes of bone and changes in spinal impact tolerance resulting from prolonged immobilization are summarized. Author

N71-33261*# Georgetown Univ. Hospital, Washington, D.C.
NONDESTRUCTIVE MEASUREMENT OF SOME PHYSICAL PROPERTIES OF BONE

W. F. Abendschein and G. W. Hyatt *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 145-170 refs

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06P

Investigations have emphasized the development of nondestructive methods for precise determination of the functional characteristics of bone. These include such physical properties as density, breaking strength, and modulus of elasticity. Tests were performed on normal and pathologic specimens of human tibial cortical bone to develop and document the relationship of destructive and nondestructive testing, and to investigate the correlation, ultrasonic velocity measurements, mass density measurements, and mechanical loading. A.L.

N71-33262*# Texas Univ., Dallas. Southwestern Medical School.
EFFECTS OF BED REST ON THE OXYGEN TRANSPORT SYSTEM

Gunnar Blomquist, Jere H. Mitchell, and Bengt Saltin *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 171-186 refs (Grant HE-06296)

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

Current data on circulatory effects of bed rest are discussed against the background of a recent laboratory study dealing with adaptive changes in oxygen transport and body composition after bed rest and after training. In this investigation, maximal oxygen uptake was used as the index of maximal cardiovascular function. Five 19 to 21 year old college students were selected for the study. The investigation was divided into three phases: (1) a short control period; (2) a 3-week bed rest period; and (3) a 2-month physical training period. Identical sets of studies were performed at the end of each period. Results of the three phases are discussed and presented tabularly and graphically. A.L.

N71-33263*# Public Health Service Hospital, San Francisco, Calif.
HEMODYNAMIC AND BODY FLUID ALTERATIONS INDUCED BY BEDREST

Kenneth H. Hyatt *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 187-210 refs

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

Studies were undertaken to develop an understanding of deadaptation physiology. In these studies, all subjects were healthy male volunteers, aged 21-35. There have been three types of studies: 10-day, 14-day, and 28-day bed rest. In all cases subjects were carefully screened to exclude disease, and were subjected to a noninstrumented 70 deg foot-down passive tilt prior to entry into the study to exclude those with autonomic insufficiency. Statistical analysis was performed by a paired Student's test. Results of the 14-day and 28-day studies are presented. The results of the 10-day bed rest study have been previously reported by NASA. A.L.

N71-33264*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

EFFECTS OF BED REST ON FOREARM VASCULAR RESPONSES TO TYRAMINE AND NOREPINEPHRINE

Philip G. Schmid, Michael McCally, Thomas E. Piemme, and James A. Shaver *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 211-224 refs

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

To test for disturbances in the peripheral adrenergic nerve function, observations were made of forearm vascular responses to brachial artery infusions of tyramine and norepinephrine after two

weeks of bed rest and after control periods of normal vigorous daily activity. The study was subdivided into three periods. An initial control period consisted of 8 days of unrestricted activity. The second period consisted of 12 days of bed rest. The third, or recovery period, consisted of 6 more days of activity and began when the subjects got out of bed. Experiments were conducted on the last day of each period and care was taken to conduct separate sessions under the same conditions. The test periods are discussed and results are presented of the basal values measured before and during infusions of the drugs. Measurements of total catecholamines in the urine are also presented.

A.L.

N71-33265*# School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF TOTAL BODY EXERCISE ON THE METABOLIC, HEMATOLOGIC, AND CARDIOVASCULAR CONSEQUENCES OF PROLONGED BED REST

Malcolm C. Lancaster and John H. Triebwasser *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 225-248 refs

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

The first phase of a study of exercise effects in the prevention of the physiological changes induced by prolonged bed rest has been completed. Because all analyses have not been completed, metabolic and certain special assays, such as renin, renin substrate, and ADH, are not reported. Also, some of the hematologic data have not been evaluated. Eight male subjects participated in the experiment which covered a period of 16 weeks; 5 weeks of control, 5 weeks of bed rest, and 6 weeks of recovery. All exercise was performed on a special total body ergometer that simulates zero gravity while permitting exercise under conditions of normal stress to the fully ambulatory musculoskeletal system. Results are presented of orthostatic stress tests, psychomotor tests, work tolerance, and psychobiologic studies.

A.L.

N71-33266*# Public Health Service Hospital, San Francisco, Calif.
THE EFFECTS OF LONG-TERM BED REST ON MINERAL METABOLISM

Charles L. Donaldson, Donald E. McMillan, Stephen B. Hulley, Robert S. Hattner, and Jon H. Bayers *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 249-260 refs

(NASA Order T-58941; NASA Order T-81070)

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

This study was initiated to determine the effect of long term bed rest on mineral balance and bone density in normal individuals. Three healthy male volunteers were studied during 4 weeks of ambulation, 30 to 36 weeks at rest in bed, and another 4 weeks of ambulation after bed rest. They were maintained on a diet of 2100 calories with 908 mg calcium and 1386 mg phosphorus throughout ambulation and bed rest. Calcium and magnesium in serum, urine, sweat, stool, and diet were determined by atomic absorption spectrophotometry. Standard autoanalyzer methods were used for measuring phosphorus. A second phase of the study, comparing the effectiveness of exercise with that of phosphate in modifying the changes of bed rest, showed that isometric and isotonic exercise has not proved effective in preventing the negative mineral balance induced by bed rest. Results indicated that nine months of horizontal bed rest caused distinct os calcis demineralization in three healthy young men, accompanied by a negative calcium balance that persisted until reambulation. Measure: designed to prevent these changes of calcium balance and bone are under investigation.

A.L.

N71-33267*# Public Health Service Hospital, San Francisco, Calif.
CHANGES IN BONE MINERAL CONTENT OF THE OS

CALCIS INDUCED BY PROLONGED BED REST

John M. Vogel *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 261-270 refs

(NASA Order T-58941; NASA Order T-80173)

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

The effects of prolonged bed rest on bone and calcium metabolism and methods that might effectively alter the mineral loss known to result from bed rest were investigated. Three subjects in their twenties were selected to undergo a 9 month period of bed rest. They were maintained on a rigidly controlled metabolic diet that contained 910 mg calcium per day. Gamma ray densitometry was performed at regular intervals from months 3 to 9 of bed rest and for 5, 7, and 8 months after reambulation. This study demonstrated that there is a significant loss of mineral content of the os calcis during 9 months of bed rest. There is a rapid regain after ambulation, which does not reach prebed rest values until 4 to 6 months have elapsed. It was concluded that prolonged periods of bed rest, and therefore zero gravity conditions, can materially reduce the mineral content of the os calcis and place this bone at risk when ambulation or gravity conditions are reinstated.

A.L.

N71-33268*# Case Western Reserve Univ., Cleveland, Ohio.
THE RELATIONSHIP BETWEEN THE DIURNAL AND MEAL-DRIVEN RHYTHMS OF KIDNEY FUNCTIONS IN SUBJECTS AT REST

Olgard Lindan *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 271-280 refs

(Grant HED-RD-1144-M)

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

In order to study the relationship between diurnal and meal driven excretory patterns in the human kidney, and the possible effect on the kidney of the removal of the diurnal clock, study subjects with normal controls and patients paralyzed with high spinal cord injury were studied while confined to bed. The test schedules lasted from 14 to 21 days and the total average food intake was identical for each subject. The drinking was given either with meals or independently at random. In this study, the diurnal kidney cycle was dwarfed with meal cycles by having the subject consume large meals at regular frequencies, uncorrelated with the day/night cycle. It was not surprising that the results indicated that the kidney should be governed tightly in its activities by the intake of food, however, it was puzzling that certain of its homeostatic mechanisms should apparently follow a day/night cycle. The primary triggering mechanism and the purpose of the diurnal cycle for electrolyte excretion is unknown.

A.L.

N71-33269*# Pittsburgh Univ., Pa.
EFFECTS OF TWO WEEKS OF BED REST ON CARBOHYDRATE METABOLISM

Thomas E. Piemme *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 281-288 refs

Avail: NTIS HC\$6.00/MF\$0.95 CSCL 06S

In view of the apparent inefficient handling of glucose during bed rest and inactivity, a carefully controlled study was conducted to investigate the nature of the carbohydrate intolerance observed during bed rest and some of the factors that might produce such intolerance. Seven health subjects were placed under strict dietary control and supervised activity for a period of four weeks. The first and fourth weeks served as control and recovery periods, respectively, and the second and third weeks comprised the period of enforced bed rest. All subjects showed an elevated peak glucose level and an increased area under the 4-hr glucose curve during the bed rest period as compared with the control period. Insulin

responses to glucose administration were markedly augmented during the bed rest cycle. Insulin response to each of three different stimuli was augmented during bed rest in all subjects. Results appear to indicate that there is a relative ineffectiveness of insulin in lowering blood glucose levels during recumbency. A.L.

N71-33270*# School of Aerospace Medicine, Brooks AFB, Tex.
**THE EFFECT OF BED REST ON GLUCOSE REGULATION
 IN MAN: STUDIES IN PROGRESS**

Frank R. Lecocq *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 289-298 refs

Avail: NTIS HD \$6.00/MF \$0.95 CSCL 06S

Data are presented from two bed rest studies in which isolated parameters of glucose balance during bed rest were investigated. In one study, forearm glucose uptake during glucose loading was measured; in the other study, the effect of an intracellular hypoglycemic agent (2 deoxy-D-glucose) on glucoregulatory hormones was examined. The forearm glucose uptake study was designed to determine the quantitative significance of peripheral glucose uptake in subjects maintained at bed rest for 14 days. Infusion of 2 deoxy-D-glucose before, during, and after 14 days of bed rest was designed to confirm and amplify previous observations that the hypodynamic condition imposed by bed rest decreases pituitary growth hormone responsiveness. Test results showed that significant alterations in both peripheral glucose utilization during glucose loading and glucoregulatory hormone response to intercellular glucopenia are induced by simple absolute bed rest. Whether these changes represent a homeostatic adaptation to bed rest or have pathophysiological significance could not be concluded from these data. However, these findings have significance for both clinical medicine and for the assessment of human response to the effects of prolonged space flight. A.L.

N71-33271*# School of Aerospace Medicine, Brooks AFB, Tex.
HEMATOLOGIC ASPECTS OF BED REST

Malcolm C. Lancaster *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 299-322 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

Results are presented of studies in which the red cell mass (RCM) loss that occurs with bed rest was documented by means of direct red cell label. Twenty-one healthy males participated in the experiment which consisted of a 20-day adjustment phase, 35 days of continuous absolute bed rest, and a 20-day recovery phase. Eight additional males were used to control such variables as age, blood lettings, seasonal changes, and stability of red cell and plasma volumes. The RCM decreased during bed rest in 18 of the 21 subjects with an average loss of 140 ml representing approximately 8 percent of the RCM. Plasma volumes determined by indirect estimation of RCM and corrected microhematocrit decreased some 400 ml during bed rest, and plasma volumes determined at the end of the recovery by a direct method showed values well above those obtained prior to bed rest. Stool tests for occult blood were consistently negative. The results reported agree with the previously described plasma volume changes that occurred during bed rest, where plasma volume was determined by either T-1824 or radiiodinated serum albumin, and the RCM was determined indirectly. A.L.

N71-33272*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
**IMMERSION TECHNIQUES AND THE EVALUATION OF
 SPACEFLIGHT DECONDITIONING COUNTERMEASURES**

Michael McCally and Charles C. Wunder (Iowa State Univ. of Sci. and Technol., Ames) *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 323-344 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

The physiological effects of water immersion in simulating weightlessness are reviewed. Discussed are: (1) cardiovascular effects; (2) body fluid volumes; (3) renal effects; (4) lung volumes; (5) intrapulmonary pressure and pressure-volume relationships; (6) role of transpharyngeal pressure gradient; (7) temperature effects; and (8) space crew performance. Also presented are the results of a study designed to test the relative effectiveness of six different countermeasures for deconditioning: venous occlusive cuffs; an elastic gradient counterpressure garment or leotard; exposure to lower body negative pressure; ADH administration; positive pressure breathing at 15 mm Hg; and mild cold exposure. A.L.

N71-33273*# Frie Univ., Berlin (West Germany).

BODY FLUID REGULATION DURING IMMERSION

Otto H. Gauer *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 345-356 refs

(Contract F61052-68-C-0069)

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

The effects of posture on body fluid circulation; blood volume control and weightlessness; and the effects of water immersion on renal function, plasma volume, distribution of extracellular fluid volume, venous tone, and physical working capacity are discussed. A.L.

N71-33274*# Webb Associates, Yellow Springs, Ohio.
**DECONDITIONING AND ITS PREVENTION BY
 SIMULATING THE HYDROSTATIC GRADIENT**

Paul Webb *In* NASA. Ames Res. Center Hypogravic and Hypodyn. Environments 1971 p 357-372 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06S

Methods of detecting cardiovascular deconditioning and ways of preventing it by simulation of the hydrostatic gradient are described. Briefly discussed are the techniques of continuous and prolonged water immersion, and the use of a special antideconditioning garment that simulates hydrostatic gradient by use of external bladders arranged on the limbs and trunk. A.L.

N71-33275*# National Aeronautics and Space Administration.
 Ames Research Center, Moffett Field, Calif.

RESEARCH DIRECTIONS: DISCUSSION

In its Hypogravic and Hypodyn. Environments 1971 p 373-390 refs

Avail: NTIS HC \$6.00/MF \$0.95 CSCL 06P

A general discussion is presented of what further studies should be done, particularly those studies that would have practical importance for determining whether man is, or will be, qualified for the very long space flights in the future. Some of the problems to be considered are: the magnitude of mineral loss; the meaning of the apparent depression in 17-hydroxycorticosteroids; factors besides weightlessness that make up the space flight environment; changes in metabolic systems induced by use of countermeasures suits; weightlessness simulation; and deconditioning. A.L.

N71-33276# Defense Documentation Center, Alexandria, Va.
RADIATION EFFECTS, VOLUME 1 Report Bibliography, Jan. 1965-Dec. 1970

Jun. 1971 383 p refs
(AD-724600; DDC-TAS-71-24-1-Vol-1) Avail: NTIS HC \$6.00/MF \$0.95 CSCL 6/18

The bibliography contains references on effects of gamma rays, fission fragments, and neutrons, on organisms, food, tissues, the nervous system, etc. The bibliography also includes Corporate Author-Monitoring Agency, Subject, Title, and Personal Author Indexes. Author (GRA)

N71-33329# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

ENCODING FUNCTION OF SYNCODERS Final Report, Mar. 1967 - Mar. 1968

Marvin C. Ziskin and J. Ryland Mundie Mar. 1971 56 p refs
(AD-724072; AMRL-TR-70-119) Avail: NTIS CSCL 6/4

The syncoder is an electronic information processing device based on neurophysiological principles. Its performance can be separated into a summing function and an encoding function. This report discusses the encoding function. Encoding consists of comparing the output voltage of the summing function with an internally generated time varying threshold voltage. When the voltages are equal, an output pulse is generated and the threshold is reset to its initial value. The entire process is then recycled. The response of the encoding function to time variant and to time invariant signals is presented. Also illustrated are the effects of variations in the syncoder parameters. Author (GRA)

N71-33380*# Boeing Co., Seattle, Wash. Aerospace Group.
EFFECTS OF AEOLIAN EROSION ON MICROBIAL RELEASE FROM SOLIDS

E. A. Gustan, R. L. Olson, D. M. Taylor, and R. H. Green Jun. 1971 7 p refs Prepared for JPL
(Contract NAS7-100)
(NASA-CR-121422) Avail: NTIS CSCL 06M

Studies have shown that microorganisms can become encapsulated in selected spacecraft solid materials and under specific conditions survive to arrive on planetary surfaces. This investigation was initiated to determine the percentage of spores that would be expected to be released from the interior of the solid materials by aeolian erosion on a planetary surface. The information obtained can be used in calculations to determine the probability of microbial release in the total planetary quarantine probability equation. Methyl methacrylate and Eccobond discs were fabricated so that each disc contained approximately 40,000 *Bacillus subtilis* var. *niger* spores. The discs were placed in a specially designed sandblasting device and eroded. Exposure periods of 0.5, 2 and 24 hours were investigated using filtered air to accelerate the sand. A series of tests was also conducted for a 0.5 hour period using carbon dioxide. Examination of the erosion products showed that less than one percent of the spores originally contained in the solids was released by aeolian erosion. Author

N71-33400*# Hamilton Standard, Windsor Locks, Conn.
DESIGN AND FABRICATION OF A FLIGHT CONCEPT PROTOTYPE VAPOR DIFFUSION WATER RECLAMATION SYSTEM

Henry J. Kolnsberg and Donald R. McCann Aug. 1971 169 p refs
(Contract NAS1-8943)
(NASA-CR-111932; SVHSER-5903) Avail: NTIS CSCL 13B

The design, fabrication and test of an experimental vapor diffusion urine water reclamation system are reported. It utilized a

polyvinyl chloride membrane and achieved better than 95% recovery efficiency during a 90 day continuous test. The system also incorporated features that exercised microbiological control over the product water. Author

N71-33401*# Yale Univ., New Haven, Conn. School of Medicine.
A MATHEMATICAL MODEL OF PHYSIOLOGICAL TEMPERATURE REGULATION IN MAN

J. A. J. Stolwijk Washington NASA Aug. 1971 81 p refs
(Contract NAS9-9531)
(NASA-CR-1855) Avail: NTIS CSCL 06P

A dynamic mathematical model is presented of physiological regulation of body temperature in man. A total of 25 nodes is used to represent the thermal characteristics of the body, with four nodes each representing the head, trunk, arms, hands, legs and feet. The twenty-fifth node represents the central blood. Each node has the appropriate metabolic heat production, convective heat exchange with the central blood compartments, and conductive heat exchange with adjacent compartments. The outer nodes represent the skin and exchange heat with the environment via radiation, convection and evaporation. In the model the thermoregulatory system receives temperature signals from all compartments and after integration and processing the system causes appropriate commands to be sent to all appropriate compartments changing metabolic heat production, blood flow or the rate of sweat secretion. The model is presented in the form of a documented FORTRAN program. Simulations of experimental exposures to step changes in environmental temperature at rest and of 30 minute exercise bouts at 25, 50 and 75 percent of maximum aerobic capacity at different ambient temperatures are compared with actual results. Author

N71-33437*# Baylor Univ., Houston, Tex. College of Medicine.
PERIODICITY OF HIGH-ORDER FUNCTIONS IN THE CNS Final Progress Report, Year Ending 30 Jun. 1971

Peter Kellaway, Robert P. Borda, Alfred C. Coats, and James D. Frost, Jr. 30 Jun. 1971 35 p refs Prepared in cooperation with the Methodist Hospital, Houston, Tex.
(Grant NGR-44-003-001)
(NASA-CR-121409) Avail: NTIS CSCL 06P

The origin and physiological significance of cerebral slow potentials are investigated. The elucidation of the origin of the contingent negative variation, a slow potential which appears to be related specifically to the mechanisms underlying attention and alertness in humans, was emphasized. The investigations were carried out using monkeys as subjects. E.H.W.

N71-33451# Joint Publications Research Service, Washington, D.C.

SPACE BIOLOGY AND MEDICINE, VOLUME 5, NO. 3, 1971
12 Aug. 1971 150 p refs Transl. into ENGLISH of the publ. 'Kosmicheskaya Biologiya i Meditsina' Moscow, Med. Publishing House, 1971 p 1-92
(JPRS-53801) Avail: NTIS

Research papers on aerospace medical and biological problems of prolonged manned space flights are presented. Topics center on long term physiological effects on the human body caused by confinement in a space capsule and the evaluation of ecological life support system components.

N71-33452# Joint Publications Research Service, Washington, D.C.

MAN'S PERFORMANCE DURING WEIGHTLESSNESS
A. A. Korobova et al *In its* Space Biol. and Med., Vol. 5, No. 3,

1971 12 Aug. 1971 p 1-14 refs

Avail: NTIS

Reviewed are studies on the coordination of movements as functions of the osteomuscular system and overall performance during the weightless state. Considered is the nature of impairments in coordination of bodily movements, change in the motor function under lunar gravitational conditions, adaptation to simulated and natural weightlessness conditions, and the role of physical exercises in adaptation to weightlessness. It is concluded that data in the literature on studies of the human motor functions in model experiments and during natural weightlessness of different durations indicate a change in performance and a definite pattern of timing and strength in the execution of movements. G.G.

N71-33453# Joint Publications Research Service, Washington, D.C.

EFFECT OF PROLONGED HYPOKINESIA ON SEROTONIN METABOLISM IN RATS

Z. S. Dolgun et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 15-21 refs

Avail: NTIS

A study was made on the effect of prolonged hypokinesia on serotonin (5-HT) metabolism in rats. It was found that motor activity restriction causes substantial 5-HT metabolism shifts. The most marked deviations from normalcy in the 5-HT content in the duodenal blood and tissues, and also in the excretion of the metabolite of 5-HT 5-hydroxyindolylacetic acid (5-HIAA) in the urine, were observed on the first-third and thirteenth-fifteenth days of hypokinesia. Prolonged (more than 60 days) hypokinesia leads to a considerable increase in the blood 5-HT content; on the 30th and 45th days after emergence from hypokinesia the blood 5-HT content remains high. Author

N71-33454# Joint Publications Research Service, Washington, D.C.

CORRELATION AMONG THE INDICES OF GENERAL AND TISSUE RESISTANCE IN RATS (DURING MUSCLE TRAINING, ADAPTATION TO THE COLD AND DIBASOL INJECTIONS)

V. Ya. Rusin *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 22-27 refs

Avail: NTIS

It was established in experiments on 225 adult white rats that an increase in resistivity of the intact organism to different unfavorable factors under the influence of muscular training, adaptation to the cold, and dibasol injections has a reliable correlation with the increase in resistance at the tissue and cell levels. It therefore follows that by applying methodologically extremely simple tissue and cell resistance criteria one can check the means and methods for increasing body biological reserves. Author

N71-33455# Joint Publications Research Service, Washington, D.C.

CULTIVATION OF MAMMAL CELLS AT 'SUBOPTIMUM' TEMPERATURES

F. V. Sushkov et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 28-32 refs

Avail: NTIS

Cultures of L. HeLa, and VNK-21 cells, A-1, FL, RH human amnion and kidney cells, and Chinese hamster cells of sublines 237 and 431 were cultivated at temperatures of 37 and 36-28 C with an interval of 2 + or - 0.5 C. L. A-1, BHK-21 cells and Chinese hamster cells were found to be capable of mitotic division

at 30 and 28 C. Proliferation of L cells was maintained for 19 months (42 subinoculations); other cell lines tolerated two or three subinoculations (20-30 days) under these conditions. The adaptation of L cells involved substantial cytophysiological changes which reflected the adaptation process, which is obviously phenotypical.

Author

N71-33456# Joint Publications Research Service, Washington, D.C.

SPINAL CORD REFLEX ACTIVITY IN NORMAL AND LABYRINTHECTOMIZED ANIMALS UNDER THE INFLUENCE OF RADIAL ACCELERATIONS

G. S. Ayzikov et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 33-39 refs

Avail: NTIS

A study was made of spinal cord induced potentials (H-reflex) in intact and labyrinthectomized rats at accelerations of 0.5-8 g in a head-pelvis direction. The combined effect of accelerations in the range from 0.5 to 8 g considerably changed spinal cord reflex activity. At 0.5 g the H-reflex increased in amplitude and returned to the background values after rotation ceased. At 2, 4 and 8 g the reflex was suppressed in direct proportion to the acceleration. The time for reflex restoration also increased with an increase in acceleration. During accelerations the functional state and activity of the motor analyzer were determined by a combination of factors. In labyrinthectomized animals the depression of spinal activity manifested a muscle dependence of the exposure. Author

N71-33457# Joint Publications Research Service, Washington, D.C.

EFFECT OF ABDOMINAL OR HEAD REGION SHIELDING DURING GAMMA IRRADIATION OF DOGS ON THE CONTENT OF BLOOD SERUM PROTEIN FRACTIONS

B. I. Davydov et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 40-45 refs

Avail: NTIS

Dogs were exposed to gamma-irradiation in a dose of 600 R with shielding of the abdominal (dose behind shield 150 and 300 R) or head (dose behind shield 150 R) regions. Protein fractions in the blood serum were determined by the paper electrophoresis method. A decrease in the albumin-globulin coefficient was noted regardless of shield localization; there was an increase in the content of beta-globulins with normalization by the 100th day in the case of abdominal shielding and a residual dose behind the shield of 150 R and an increase in the albumin-globulin coefficient, for the most part due to the alpha sub 2 fraction. The increase in globulins correlates with an increase in glutamate-aspartate transferases. Author

N71-33458# Joint Publications Research Service, Washington, D.C.

IMPORTANCE OF THE MOTOR AND VESTIBULAR ANALYZERS AND FRONTAL HYPOTHALAMUS IN COMPENSATING A GRAVITATIONAL LOAD DURING ORTHOSTASIS

G. S. Belkaniya *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 46-53 refs

Avail: NTIS

In experiments on intact cats and also against a background of curarization, bilateral vestibular deafferentation and electrocoagulation of the frontal hypothalamus, it was possible to determine the phase nature of changes in respiration, arterial pressure and cerebral bioelectric activity during orthostasis. There is a distinct dependence between the rate of development of orthostatic collapse and the nature of the primary vascular reaction;

this determines its prognostic importance. Elimination of the vestibular motor analyzer and electric coagulation of the frontal hypothalamus sharply reduce the gravitational function during orthostasis. Orthostatic tolerance is regarded as a special manifestation of the general mechanism of body spatial orientation.

Author

N71-33459# Joint Publications Research Service, Washington, D.C.

FORMULATION OF PHYSIOLOGICAL PRINCIPLES FOR RATIONAL HEAT TRANSFER IN INDIVIDUAL INSULATING GEAR

S. M. Gorodinskiy *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 54-62 refs

Avail: NTIS

Experimental data are given on validating the physiological principles for approach to heat transfer in an individual insulating suit. The body regions from which the most effective heat transfer can be ensured because of their anatomical-physiological characteristics were determined. The undesirability of heat transfer primarily from body regions situated over the main muscle groups of the extremities is noted; this is true because the conditions for heat removal from them are less favorable than from the sectors situated over tendons and poorly expressed muscle layers; the possibility of local overcooling of the muscles can lead to a decrease in their performance.

Author

N71-33460# Joint Publications Research Service, Washington, D.C.

USE OF COLOR-MUSIC IN AN OPERATOR'S WORK DURING ISOLATION

Yu. A. Petrov et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 63-68 refs

Avail: NTIS

In order to prevent possible impairments in the psychophysiological sphere of an operator during prolonged isolation provisions must be made for a special organization of the interior. Color-musical compositions are an element of this interior. The timeliness of the use of color and music for this purpose is considered and the principles for selecting color and musical programs are defined.

Author

N71-33461# Joint Publications Research Service, Washington, D.C.

MODELS OF A MAN-OPERATOR IN INVESTIGATING SPACESHIP MANUAL CONTROL

R. V. Komotskiy et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 69-76 refs

Avail: NTIS

The possibility and feasibility of replacing a man-operator with an appropriate model is discussed and current models in accordance with the main classes of operator's activity are considered. Mathematical descriptions of models and instructions on how to use models in studying manual operation of a spacecraft are provided.

Author

N71-33462# Joint Publications Research Service, Washington, D.C.

CYTOGENETIC INVESTIGATIONS IN RELATION TO MANNED SPACE FLIGHT

L. P. Grinio et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 77-83 refs

Avail: NTIS

No increase in chromosomal aberrations was found in the blood of test subjects during a 120 day bed rest experiment. No significant changes in the chromosomal apparatus were detected in cytogenetic examinations of a cosmonaut. These findings indicate that manned space flights made along the trajectories and in radiation environments involved up to this time are genetically safe.

Author

N71-33463# Joint Publications Research Service, Washington, D.C.

CHANGES IN HUMAN RETINAL CIRCULATION DURING TRANSVERSE ACCELERATION

A. S. Barar et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 84-90 refs

Avail: NTIS

Data obtained using a teleophthalmoscopic system give evidence that the blood filling of retinal vessels decreases in response to accelerations of 6 and 8 g. Exposure to 10 and 12 g disturbs blood flow continuity in retinal vessels, giving rise to optical disturbances. These phenomena may be accounted for by changes in systemic and regional circulation. Their level is correlated with the values of the acceleration components coinciding with the direction of the vascular bed. In the pathogenesis of the described vascular disturbances an increase in hydrostatic pressure in the region of the eye back pole is of a certain significance.

Author

N71-33464# Joint Publications Research Service, Washington, D.C.

CHARACTERISTICS OF THE NASAL VASCULAR SYSTEM REACTION DURING 120-DAY HYPOKINESIA

I. Ya. Yakovleva *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 91-97 refs

Avail: NTIS

During a 120 day bedrest experiment the dynamics of intranasal circulation was investigated by the rhinopneumometric technique. Each test subject exhibited changes in nasal circulation from the third to the twelfth day of hypokinesia. The responses varied from subject to subject but for the most part were similar, involving an increase in the blood filling of the nasal conchae and vasomotor innervation liability. The changes were more pronounced in cases of autonomic and vascular dysfunction. Drugs produced no distinct effect on nasal circulation responses. Hemodynamic disturbances of the nasal mucosa were due to changes in hydrostatic blood pressure, followed by neuroendocrinal shifts.

Author

N71-33465# Joint Publications Research Service, Washington, D.C.

ELECTRIC ACTIVITY OF LEG MUSCLES DURING STANDING AFTER A 120-DAY BEDREST CONFINEMENT

B. N. Petukhov et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 98-104 refs

Avail: NTIS

Changes in the electromyograms (EMG) of 10 healthy subjects were studied following a 120 day bedrest experiment. The test subjects were classified into three groups: the first, a control group, included four persons; the second and third groups included three men each. The second group of test subjects received pituitrin and DOCA to prevent changes in water and mineral metabolism. The test subjects in the third group were given Nerabol to prevent deviations in protein metabolism. After the hypokinesia the EMG

amplitude exhibited a distinct decrease in the test subjects of the first and third groups and a less marked decrease in the second group of test subjects. Author

N71-33466# Joint Publications Research Service, Washington, D.C.

CHANGE IN CARDIAC EJECTION UNDER THE INFLUENCE OF 15-DAY BED CONFINEMENT

B. S. Katkovskiy et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 105-113 refs

Avail: NTIS

A significant increase in cardiac output related mainly to stroke volume was observed in five male test subjects during a 15 day bedrest experiment. Oxygen consumption and carbon dioxide production decreased gradually during the observation period. It is suggested that similar changes in cardiac output occur in an early period of adaptation to weightlessness during spaceflight. Author

N71-33467# Joint Publications Research Service, Washington, D.C.

CORRELATION BETWEEN RENAL EXCRETION OF DIFFERENT CATIONS UNDER CONDITIONS OF AN IMPAIRED MINERAL BALANCE

I. S. Balakhovskiy et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 114-118 refs

Avail: NTIS

Human subjects were investigated to clarify the interrelationship between renal elimination of sodium and calcium in order to make a more thorough analysis of changes in electrolyte balance during space flight. A broad range of changes in the state of water-mineral metabolism was attributed to prolonged exposure at high temperature and restricted mobility. Author

N71-33468# Joint Publications Research Service, Washington, D.C.

AMINOSILICAGELS: REGENERABLE SORBENTS FOR ABSORBING CARBON HYDROGEN SULFIDE AND WATER VAPOR

I. A. Danilychev et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 119-122 refs

Avail: NTIS

Amino silica gels were synthesized and tested for their absorption effectiveness in spacecraft atmospheric purification systems. Sorption characteristics with carbon dioxide, hydrogen sulfide, and other substances of acid nature provided optimal regeneration capacities for atmospheres in pressurized cabins and also in a number of industrial branches. G.G.

N71-33469# Joint Publications Research Service, Washington, D.C.

NATURE AND DISTRIBUTION OF INTRAOCULAR PRESSURE IN HEALTHY PERSONS AGES 25-40 ENGAGED IN MENTAL WORK

T. A. Petrov et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 123-126 refs

Avail: NTIS

The detection of latent pathology in humans by intraocular pressure measurements was investigated. Tonometric measurements on 25 to 40 year old subjects engaged in mental work showed that intraocular pressure in itself can be evidence of the degree of probability of disease but is not an absolute criterion of normalcy or a pathological condition. Analysis of obtained intraocular pressure distribution curves established an isolated group of individuals whose indices exceeded a normal distribution range. Author

N71-33470# Joint Publications Research Service, Washington, D.C.

MORPHOLOGICAL CHANGES IN MYOCARDIUM DURING MULTIHOUR ACCELERATIONS

P. I. Katunyan et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 127-129 refs

Avail: NTIS

The results of a study on a series of histological, histochemical and electron microscope manifestations of myocardial reactions under the influence of + 2G sub Z accelerations are reported. Observed are the hearts of 36 male rats weighing 200-250 g which were exposed to + 2G sub Z accelerations for periods of 8, 16, and 24 hours on a centrifuge with a 70 cm arm and also studied are the aftereffects 24 and 72 hours after the centrifuge was stopped. A well expressed dependence of dystrophic myocardial damage on acceleration duration is established. Structural changes in cardiac muscle cells and increased capillary permeability observed after continuous acceleration exposure for 24 hrs are indications of dystrophic damage to the myocardium resulting from impaired hemodynamics. Author

N71-33471# Joint Publications Research Service, Washington, D.C.

OPTIMIZATION OF THE MINERAL COMPOSITION OF A NUTRIENT MEDIUM FOR HYDROGENOMONAS

V. K. Kovalenkova et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 130-132 refs

Avail: NTIS

The efficiency of autotrophic cultivation of *Hydrogenomonas* in a modified Schlegel nutrient was studied by comparing increment biomass weight with that obtained for pure Schlegel cultivations. Culture density levels in media where NH₄Cl was replaced by urea increased markedly when nutrient salt concentration was reduced sixfold. G.G.

N71-33472# Joint Publications Research Service, Washington, D.C.

RESULTS OF COMBINED EXPOSURE OF CHLORELLA TO VIBRATION AND GAMMA IRRADIATION

I. D. Anikeyeva et al *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 133-136 refs

Avail: NTIS

An attempt was made to evaluate the possible effects exerted by mechanical vibration and vibration in combination with gamma irradiation on the unicellular green alga *Chlorella vulgaris*, a proposed component of closed ecological systems. Experiments show that there are no appreciable differences in the rate of cell development and the nature of sporulation detectable either in the case of acute or chronic irradiation. Vibration in itself exerted no significant effect, nor did it in combination with irradiation. Author

N71-33473# Joint Publications Research Service, Washington, D.C.

ONE PROPERTY OF THE OVERALL CHARACTERISTICS OF VESTIBULAR NYSTAGMUS

A. A. Shipov *In its Space Biol. and Med.*, Vol. 5, No. 3, 1971 12 Aug. 1971 p 137-140 refs

Avail: NTIS

Experiment on male guinea pigs were performed to determine nystagmic reactions to angular accelerations of increased intensity and lengths. It was demonstrated that the number of beats, duration and frequency of nystagmus in animals exposed to angular accelerations successively increasing in intensity increased with an increase in acceleration intensity. The nystagmic reaction to each of the used accelerations was less than for animals subjected to a single investigation during rotation with acceleration of a particular intensity. Author

N71-33486# Battelle-Northwest, Richland, Wash.

VARIOUS HOLOGRAPHIC SCANNING CONFIGURATIONS FOR UNDER SODIUM VIEWING

H. Dale Collins Mar. 1971 45 p refs

(Contract AT(45-1)-1830)

(BNWL-1558) Avail: NTIS

Various holographic scanning configurations were investigated that could be used for acoustic imaging in liquid sodium. Different scanning configurations were analyzed and experiments were performed to verify the unique properties of each configuration. A general analysis is presented of acoustical scanned holography with phase-shifting the electronic reference beam, and various scanning configurations are composed for viewing in liquid sodium. The optimum holographic imaging configuration in liquid sodium consists of scanning either a focused or point source and receiver transducer and phase shifting the electronic reference. The optimum frequency used for illumination is determined by the required resolution and range of the imaging system. Author

N71-33501# Joint Publications Research Service, Washington, D.C.

BIOGEOCENOLOGY TODAY AND TOMORROW

3 Aug. 1971 34 p refs Transl. into ENGLISH of various articles from *Priroda* (Moscow), no. 6, 1971 p 4-13 (JPRS-53743) Avail: NTIS

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7. BIOGEOCENOLOGY AND WATER TREATMENT M. M. Kamshilov p 19

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N71-33502# Joint Publications Research Service, Washington, D.C.

CURRENT TASKS OF BIOGEOCENOLOGY

Ye. M. Lavrenko *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 2-6 refs

Avail: NTIS

Russian activities in the field of biogeocenoses are discussed. The study of the structure of biogeocenoses, the trophic (food) relations among their living components, and metabolic processes in biogeocenoses, including biological productivity, is the specific nature of biogeocenological research. The physical structure of biogeocenoses and the interrelations among their components are discussed. Author

N71-33503# Joint Publications Research Service, Washington, D.C.

POPULATION STRUCTURE OF BIOGEOCENOSES

S. S. Svarts *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 7-10

Avail: NTIS

Approaches to biogeocenotic research are discussed. Two approaches are proposed. The first is to study a specific cenosis in all aspects of its internal dynamic organization and external ties. The second is to investigate the most important biogeocenotic processes and phenomena, whose aggregate ultimately determines the laws of life of the biosphere. Author

N71-33504# Joint Publications Research Service, Washington, D.C.

STATION INVESTIGATIONS OF TUNDRA BIOGEOCENOSES

B. A. Tikhomirov *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 11-12

Avail: NTIS

Station investigations of tundra biogeocenoses are discussed. Expansion of station research and the setting up of a number of experiments in the tundra are prerequisites for successful management of the tundra, for rational use of resources, and for increasing productivity. Author

N71-33505# Joint Publications Research Service, Washington, D.C.

FROM DOKUCHAYEV'S NATURAL ZONES TO SPACE ECOSYSTEMS

O. G. Gizenko et al *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 13-14

Avail: NTIS

Applications of the theory of natural zones and space ecosystems are presented. Biogeocenology originated with the Russian study of soil science and creation of the scientific disciplines of geographic and genetic soil science. Author

N71-33506# Joint Publications Research Service, Washington, D.C.

EXPERIMENTAL BIOGEOCENOLOGY

A. N. Tyuryukanov *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 15-16

Avail: NTIS

The use of radioisotopes for observing changes in the structure or turnover of substances in biogeocenoses is discussed. Tracer atoms have made it possible to obtain results such as: (1) determination of the nature of chemical and biochemical ties in biogeocenoses, (2) the study of the effect of radioisotopes on organisms, and (3) determination of the coefficients of accumulation by organisms of various elements. Author

N71-33507# Joint Publications Research Service, Washington, D.C.

MICROBIC CENOSSES AND FERTILITY

Ye. N. Mishustin *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 17-18

Avail: NTIS

The role of microbes in biogeocenoses is discussed. The effects of microbes on the fertility of the soil are examined. Various aspects of soil science which will produce increased fertility are described. Author

N71-33508# Joint Publications Research Service, Washington, D.C.

BIOGEOCENOLOGY AND WATER TREATMENT

M. M. Kamshilov *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 19

Avail: NTIS

The application of biogeocenology to the problem of water pollution is discussed. The self-cleaning capability of the Volga river is described and the influences of various chemicals and organisms on water cleanliness are reported. Author

N71-33509# Joint Publications Research Service, Washington, D.C.

THE STRUCTURE AND FUNCTION OF BIOGEOCENOSSES

N. V. Dylis *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 20-22

Avail: NTIS

The structure and function of biogeocenoses are presented. The role of individual components of a biogeocenosis in the organization of its structure and functions is not uniform and is specific. Changes in the autotrophic link of a system and the resulting effects are described. Author

N71-33510# Joint Publications Research Service, Washington, D.C.

PHOTOSYNTHESIS AND THE PRODUCTIVITY OF CENOSSES

A. A. Nichiporovich *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 23-25

Avail: NTIS

The process of photosynthesis and its relation to the production of cenoses is discussed. The process of the formation of the primary organic product is the initial stage in the life activity of any biogeocenosis. This stage is subject to complex special laws that require special study and special regulatory steps. Author

N71-33511# Joint Publications Research Service, Washington, D.C.

BIOGEOCENOLOGY OF THE WATER ENVIRONMENT

G. G. Vinberg *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 26-27

Avail: NTIS

The biogeocenology of the water environment is discussed. Water systems are distinguished from terricolous systems by the fact that there are dozens and hundreds of times more animals in the water environment than on land. Determination of the primary product is the first task of water biogeocenology. Author

N71-33512# Joint Publications Research Service, Washington, D.C.

ENERGY BALANCE OF A BIOGEOCENOSIS

A. A. Molchanov *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 28-30

Avail: NTIS

The effect of solar radiation and its utilization on the potential biological productivity of various terricolous biogeocenoses is discussed. The flow of solar energy with short wave and long wave radiation is reflected from a biogeocenosis, absorbed or transmitted, converted, and finally returned to space. Author

N71-33513# Joint Publications Research Service, Washington, D.C.

IMPORTANCE OF BIOGEOCENOLOGY IN LAND RECLAMATION

N. I. Pyavchenko *In its Biogeocenology Today and Tomorrow* 3 Aug. 1971 p 31-32

Avail: NTIS

The application of biogeocenology principles to land reclamation operations is discussed. Marsh biogeocenoses belong to a special type of the biosphere's accumulating systems. They are very important accumulators of and storehouses for the tremendous reserves of connected bodies of water. Author

N71-33577# South Dakota Univ., Vermillion. Dept. of Biochemistry.

EFFECTS OF ULTRAVIOLET RADIATION ON ALGAE: MECHANISMS OF INACTIVATION AND REPAIR Annual Progress Report, 1 May 1970-30 Apr. 1971

Gary D. Small 1971 4 p refs

(Contract AT(11-1)-1793)

(COO-793-5) Avail: NTIS

A photoreactivating enzyme was detected in *Chlamydomonas reinhardi* and *Euglena gracilis* using the *Hemophilus influenzae* transformation assay. Photoreactivating enzyme activity was found in extracts of chloroplasts isolated from *Euglena*. Studies on detection of ultraviolet-induced photoproducts in DNA of algae included development of a method for isolating pyrimidine dimers from enzymic digests of irradiated P-32 labeled DNA. A DNase with a high specificity toward single-stranded DNA was purified for studies on enzymes that may have a role in repair and replication of DNA. NSA

N71-33718*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

COLD SEA SURVIVAL

James H. Veghte Oct. 1970 26 p refs

(NASA Order MIPR-T-80489)

(NASA-CR-121449; AD-716389; AMRL-TR-70-72) Avail: NTIS CSCL 06K

Two three-man prototype liferafts were evaluated in Arctic waters off Kodiak Island, Alaska. Surface and core temperatures of each subject were monitored continuously during the 22 hour exposure in the TUL raft and 6 hour exposure in the P-B raft. Each subject wore a different clothing assembly: a NASA full pressure suit, the NASA flight clothing, and the Air Force anti-exposure suit. None of the clothing assemblies was considered adequate to maintain a person in comfort. No significant biochemical shifts in the blood or urine were found. General tolerance times for a variety of cold water-raft exposure are depicted graphically. Author

N71-33722# Institute for Sensory Physiology RVO-TNO, Soesterberg (Netherlands).
PSYCHOPHYSICAL MEASURES OF SENSORY SENSITIVITY [PSYCHOFYSISCHE MATEN VOOR SENSORISCHE GEVOELIGHEID]

W. H. Janssen 1971 26 p refs In DUTCH; ENGLISH summary (IZF-1971-13; TDCK-58082) Avail: NTIS

It is shown that measures and procedures based on the threshold idea are not satisfactory. Newer measures have not been elaborated sufficiently to be able to use them with confidence. Determining signal detection theory parameters by means of confidence ratings is the preferable procedure, since a reliable technique of estimation has been developed for estimating parameters from data of this type. Yes-no and forced choice procedures of measurement are inadequate. Author

N71-33725# Institute for Sensory Physiology RVO-TNO, Soesterberg (Netherlands).

VISUAL TROUBLES, DUST PROOF AND ACOUSTIC QUALITIES AS THEY ARE MET WITH PERFORATED WALL COVERING [VISUELE HINDER, STOFWERING EN ACOESTISCHE EIGENSCHAPPEN BIJ HET GEBRUIK VAN GEPEFOREERDE WANDEBEEKLEDING]

H. J. Leebeek and H. J. M. Steeneken 1971 9 p In DUTCH; ENGLISH summary (IZF-1971-12; TDCK-57972) Avail: NTIS

A work situation in a test-cell is described, in which wall covering with a certain acoustic quality is required. The great number of deep holes in the perforated covering causes visual problems for the workers. An explanation of the phenomenon is given as well as means of improvement. A very dark paint would cause less trouble but best solution is the use of thin metal sheet instead of 10 mm plaster material. Author

N71-33775# General Electric Co., Philadelphia, Pa. Space Div.
RESEARCH ON AVALANCHE TYPE SEMICONDUCTOR RADIATION DETECTORS Semiannual Report, Jul. - Dec. 1970
 Philip J. Moldofsky and Peter V. Hewka Jan. 1971 86 p refs (Contract AT(30-1)-3246)
 (NYO-3246-TA-8) Avail: NTIS

Two arrays of three detectors each have been constructed. Each three-detector probe has a detector frontal area of 3 sq cm. In addition, with the detectors arranged as a triangular prism, overall efficiency is increased due to a greater total active detector thickness. Angular dependence of sensitivity is also greatly reduced with this array, making possible a more accurate interpretation of measured count rates in terms of actual interpretation of measured count rates in terms of actual activity of isotope present in an unknown source-detector geometry. Preliminary results show that noise reductions of a factor of 30 are attainable with special voltage sensitive amplifiers, using pulse clipping techniques. Author (NSA)

N71-33823# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

SPECTRAL SENSITIVITY OF MACAQUE CONES DETERMINED WITH AN ERG METHOD

D. van Norren and P. Padmos 1971 16 p refs (IZF-1971-10; TDCK-57935) Avail: NTIS

The spectral sensitivity of macaque monkeys was determined by flicker-electroretinography. Strong colored backgrounds were applied to bleach away one or two of the three fundamental cone systems. With a strong yellow background a blue sensitive system could be isolated. This system is more sensitive to longer wavelengths compared to the human blue system. A deep red background suppresses the red system. Thus the spectral sensitivity of the green sensitive system could be derived. Strong blue backgrounds were less selective in suppressing the blue and green system so that no definite conclusions about the shape of the red system could be drawn. Some theoretical considerations on the method of selective adaptation are given. Author

N71-33859# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

PSYCHOPHYSICAL EVIDENCE FOR LATERAL INHIBITION IN HEARING

T. Houtgast 1971 35 p refs (IZF-1971-8; TDCK-57803) Avail: NTIS

Although there are some indications of the possible role of lateral inhibition in hearing, there has been no clear demonstration of it in psychophysical experiments. Either the phenomenon plays only a minor role, or it has escaped psychophysical verification. Accepting for a moment the second possibility it is argued that the threshold of a test-tone presented simultaneously with a masker affects both the test tone and the masker. Two different methods, in which the test tone and the masker were presented successively, give clear psychophysical evidence of lateral inhibition in hearing. First, the threshold curve of short test tone bursts presented in the gaps between repeated masker bursts (noise with a steep negative or positive gradient at a particular frequency) show marked edge effects. Secondly, the results of psychophysical measurements on two tone suppression indicate that the nervous activity due to one frequency component may be suppressed by another component. The effect at the edges of the frequency spectrum are comparable with visual Mach bands, and the interaction of two tones is suggestive of the two tone inhibition found in auditory nerve fibers. Author

N71-33934# Institute for Cancer Research, Philadelphia, Pa.
STUDIES OF THE EFFECTS OF ULTRAVIOLET RADIATION ON CELL STRUCTURE AND BEHAVIOR Comprehensive Report, 1967 - 1970

Jerome J. Freed 25 Jan. 1971 11 p refs

(Contract AT(30-1)-2356)
 (NYO-2356-43) Avail: NTIS

Radiation studies were continued on cell behavior in relation to underlying cytoplasmic structure and differential activity of genes. For studies on microtubules as determinants of cell behavior, phase contrast time lapse and electron microscopy were used and a flying spot microscope was developed. Studies on the effects of colchicine on saltatory movement in cells showed that these movements were associated with an aster-like array of cytoplasmic microtubules. Other studies were conducted on amino acid deprivation as a source of chromosome aberrations. Haploid cells of frogs were used for transfer of nuclei from monolayer cultured cells to enucleated eggs to determine effects of variant nuclei in embryonic development. NSA

N71-33970

N71-33970# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Meckenheim (West Germany).

ANTHROPOTECHNOLOGY [ANTHROPOTECHNIK]

H. Dupuis, S. Fichtbauer, G. W. Radl, and H. L. Vogt Apr. 1970
101 p refs In GERMAN; ENGLISH summary Presented at 8th
Session of the WGLR Comm. for Anthropotechnol., Munich, 28
Nov. 1969

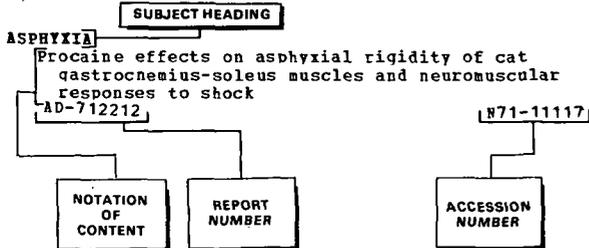
(DLR-Mitt-70-11) Avail: NTIS; ZLDI Munich: 21,20 DM

Four papers dealing with the measurement of human psychic and physical stress are reported as the results of an extensive experimental program to determine the influence of vibrations on the human body. A survey on the role of parallel tasks in determining psychic stress which includes a list of convenient references is given. Some basic experimental problems and different methods e.g. task-analysis-techniques, applications of control theories, psycho-physiological data recording, perceptual psychology-methods and the use of rating scales are outlined together with the use of electrophysiological methods in these fields. Author

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AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 95)* NOVEMBER 1971

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Stop test method to study acceleration in movement control processes in man, considering elbow joint movements in normal and pathological tremors in Parkinson disease afflicted subjects

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Interdisciplinary cycle research - Conference, Noordwijk, Netherlands, June 1970

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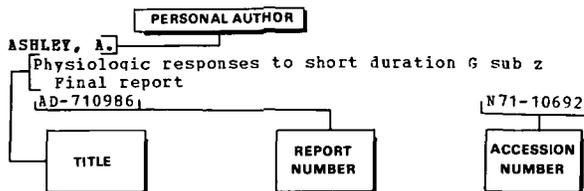
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