NASA SP-7011 (102)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 102)

MAY 1972

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (102)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 102)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1972 in

- *Scientific and technical Aerospace Reports (STAR)*
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 456 reports, articles, and other documents announced during April 1972 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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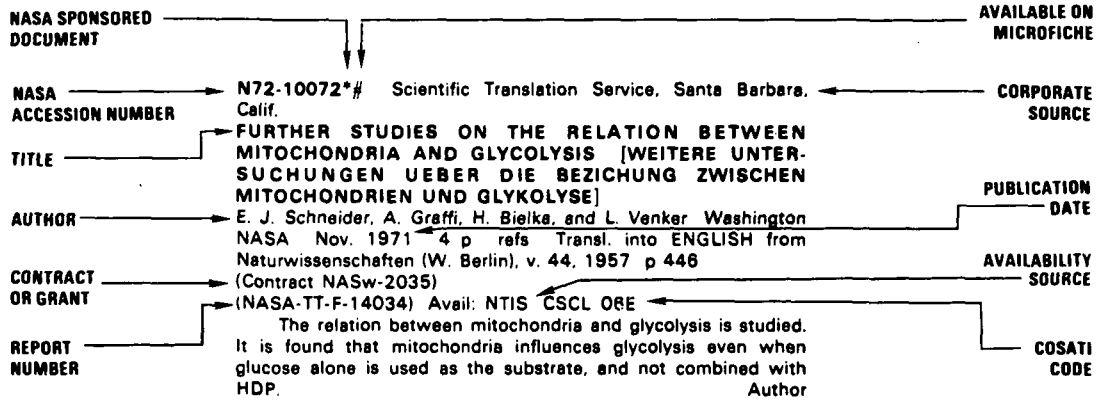

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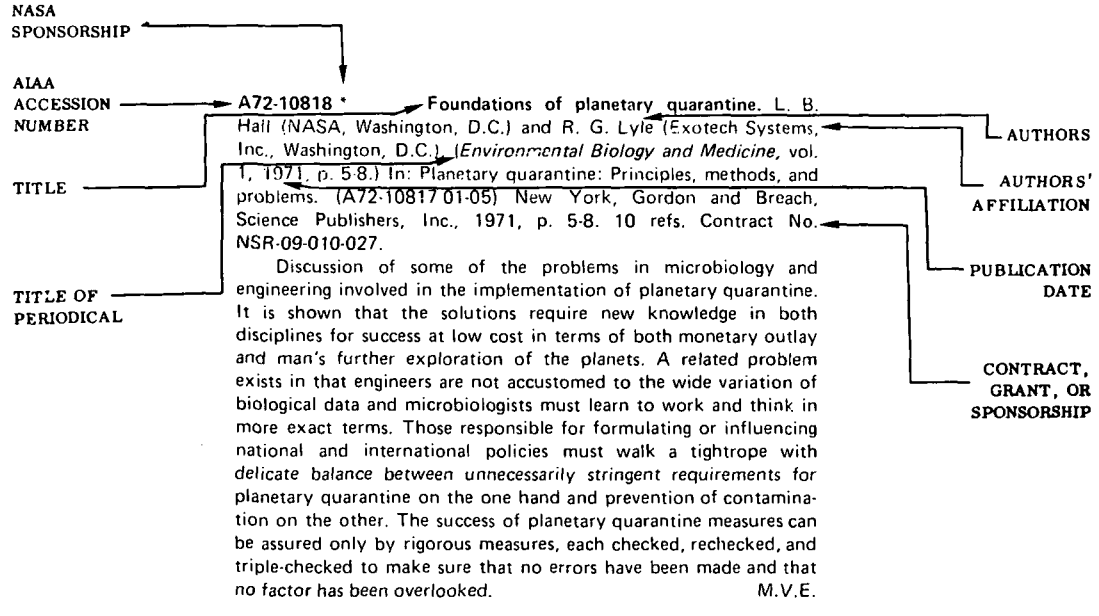

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 102) MAY 1972

IAA ENTRIES

A72-18763 # **A forecasting technique for accumulated particulate contamination on spacecraft assemblies.** R. P. Reul, C. E. Hilbers, and E. Goller (TRW Systems Group, Redondo Beach, Calif.). In: National Conference on Environmental Effects on Aircraft and Propulsion Systems, 10th, Trenton, N.J., May 18-20, 1971, Proceedings. Trenton, N.J., U.S. Naval Air Propulsion Test Center, 1971, p. 14-1 to 14-46.

A basic analytical technique is presented for the prediction of accumulated particulate contamination on space hardware, which is assembled and tested in controlled areas. Selective laboratory testing was performed to provide empirical data on parameters of high significance to contamination behavior. Limited verification of the prediction technique was obtained in several representative facilities, and the data obtained were used to refine the forecasting procedure. (Author)

A72-18775 **Central nervous analysis and processing of visual sensory stimuli (Zentralnervöse Analyse und Verarbeitung visueller Sinnesreize).** J. P. Ewert (Darmstadt, Technische Hochschule, Darmstadt, West Germany). *Naturwissenschaftliche Rundschau,* vol. 25, Jan. 1972, p. 1-11. 45 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft and the Foundation's Fund for Research in Psychiatry.

Study of the recognition of optical signals and the processing of visual stimuli in the toad (Bufo bufo L.). An analysis is made of the effect of object size on the ability of the toad to distinguish between prey and enemies, considering the entire organism of the toad as a black box. An attempt is made to determine the extent to which the neuron system of the toad retina serves as an information filter and to determine which parts of the brain respond to retinal information and the extent to which they contribute to an interpretation of visual environmental stimuli. It is concluded that the tectum opticum alone on the basis of retinal inputs provides the toad with essential information concerning the location, size, and speed of a moving object, and that Rostral brain structures (the caudal thalamus and the praetectum) then assess the significance of the signal and determine the toad's behavior. A.B.K.

A72-18801 **The facilitating effects of mental rehearsal in the acquisition of rotary pursuit tracking.** E. I. Rawlings (Iowa, University, Iowa City, Iowa), I. L. Rawlings, S. S. Chen, and M. D. Yilk (Fort Hays Kansas State College, Hays, Kan.). *Psychonomic Science,* vol. 26, Jan. 25, 1972, p. 71-73. 9 refs.

Two experiments were performed to test the hypothesis that mental rehearsal facilitates learning of rotary pursuit tracking. In Experiment 1, improvement in rotary pursuit tracking was compared for a physical practice group, a mental rehearsal group, and a no-practice control group. After 10 days of practice, the physical practice and mental rehearsal groups were equally proficient and both groups were superior to the no-practice control group. In Experiment 2, the rate of learning was faster for a group which mentally rehearsed during rest periods following physical practice than a group which performed a controlled task during the rest periods. The group engaging in combined mental and physical practice reached asymptote 2 days earlier than did the physical-practice-only group. (Author)

A72-18803 # **Conformal electron interactions in biological systems (Elektronno-konformatsionnye vzaimodeistviia v biologicheskikh sistemakh).** M. V. Vol'kenshtein (Akademiia Nauk SSSR, Institut Molekuliarnoi Biologii, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1971, p. 805-818. 47 refs. In Russian.

The current state of the theory of conformal electron interactions in biopolymer and hypermolecular biological systems is reviewed. The specific physical properties of macromolecules which are important in the information theory and nonequilibrium thermodynamics are discussed. Also considered are the physical aspects of enzyme catalysis, the thermodynamic relation between chemical and conformal transformations in macromolecules, the cofactors as regulators of enzyme activity, and the fundamentals of the molecular theory of muscle contractions. It is shown that the effect of calcium ions on the informative properties of the system is instrumental in the generation of an action potential in a biological membrane. V.Z.

A72-18832 # **What the pilot sees during instrument approach in low-visibility conditions.** J. J. Carroll (National Transportation Safety Board, Bureau of Aviation Safety, Washington, D.C.). In: Annual International Air Safety Seminar, 24th, Mexico City, Mexico, October 18-21, 1971, Technical Summary. Arlington, Va., Flight Safety Foundation, Inc., 1971, p. 63-65.

As the available cues for the pilot during approach and landing are reduced by fog, haze, rain, glare, snow, sleet, or smog, the need for cue enhancement and automated control and guidance increase. In all cases, stabilization of the approach is desirable, but in the low visibility condition, the need can become very critical. During any transition from actual instrument conditions to visual guidance, the pilot subconsciously, as well as consciously, analyzes dynamic but subtle cues that cause him to accept or reject the situation. G.R.

A72-18836 # **Handling disturbed passengers.** R. C. Smith (FAA, Aviation Psychology Laboratory, Oklahoma City, Okla.). In:

Annual International Air Safety Seminar, 24th, Mexico City, Mexico, October 18-21, 1971, Technical Summary.
Arlington, Va., Flight Safety Foundation, Inc., 1971, p. 121-126.

The sometimes serious consequences of incidents with emotionally disturbed passengers suggest that crew members need more than intuition to guide them in dealing with such people. It is suggested that crew members should be trained in the recognition of the behavioral signs indicating the presence of possible significant disorders. Crew members should also be made aware of the emotional and personality factors underlying 'people' emergencies and of the methods suitable to deal with these emergencies. Crew members should be able to assess the effectiveness of their actions while in such situations. G.R.

A72-18839 # **Simulation - The only safe way.** W. P. Moran (American Airlines, Inc., New York, N.Y.). In: Annual International Air Safety Seminar, 24th, Mexico City, Mexico, October 18-21, 1971, Technical Summary. Arlington, Va., Flight Safety Foundation, Inc., 1971, p. 167-170.

Review of the contributions made to aircraft safety by recent innovations in training methods and equipment. An attempt is made to explain how material and technique improvements have produced better trained crew members while drastically reducing the accident rate of the most accident-prone flying - i.e., aircraft flight training. The use of modern digital computer simulators with visual and motions systems is discussed, and the B-747 training program is described. The improved fidelity of simulator and visual systems is pointed out, evidence of learning transfer from the simulator to the actual aircraft is presented, and training on the simulator for emergency procedures is discussed. The flight simulator is now believed to be an appropriate device for total training of experienced flight crew members. F.R.L.

A72-18864 # **Responses to stretching in human antagonist muscles (O reaktsii myshts-antagonistov cheloveka na rastiazhenie).** E. M. El'ner (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) and G. V. Mamasakhlisov (Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 64, Oct. 1971, p. 169-172. 13 refs. In Russian.

The reactions of antagonist musculus gastrocnemius, musculus soleus, and musculus tibialis anterior were studied in 20 healthy subjects when one of the muscles was strained by percussion at the Achilles tendon or when a jerk of the whole body was produced by a sudden motion of the test stand. Electromyograms were used as the basis for the interpretation of the reactions. Theories are proposed for the mechanisms of the observed reactions. V.Z.

A72-18865 # **Projection of the periphery in the colliculus anterior of the cat (O proektsii periferii v perednikh bugrakh chetverokholmiia koshki).** Z. S. Khanaeva (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 64, Oct. 1971, p. 173-176. 9 refs. In Russian.

Experiments on anesthetized cats were conducted to determine the location of sensor systems terminals in the colliculus anterior. Responses to light signals at the grey and optical layer levels and responses to acoustic signals in the upper and middle portions of the colliculus anterior were recorded. V.Z.

A72-18866 # **Origin of a cortical aftereffect in response to peripheral stimulation (K proiskhozdeniiu korkovogo posledstviia na perifericheskie razdrazheniia).** S. P. Narikashvili, D. V. Kadzhaia, and A. S. Timchenko (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 64, Oct. 1971, p. 177-180. 7 refs. In Russian.

Optimal conditions for cortical aftereffects caused by peripheral stimuli were studied in anesthetized cats with an electroencephalograph used for recording. It was found that the aftereffects were not related to the circulation of stimuli in the thalamocortical circuits but represented spontaneous spindles evoked by stimulation. V.Z.

A72-18867 # **Enteral mechanisms of blood self-purification (Ob enteral'nykh mekhanizmakh samoochishcheniia krovi).** E. I. Dolidze (Tbilisskii Institut Sanitarii i Gigieny, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 64, Oct. 1971, p. 229-231. In Russian.

Leucocyte populations were determined in six male dogs on an empty stomach, one hour after feeding, and several days later, after intravenous interferon injections. Appreciable changes in leucocyte populations were not observed after interferon injections and after feeding following injections. V.Z.

A72-18868 # **A computer program for polycardiographic data processing (Programma dlia obrabotki polikardiograficheskikh dannykh na EVM).** N. N. Kikvadze, G. Sh. Vasadze, L. A. Pochiani, and K. Sh. Nadareishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii and Vychislitel'nyi Tsentr, Tiflis; Ministerstvo Zdravookhranenia Gruzinskoi SSR, Institut Eksperimental'noi i Klinicheskoi Khirurgii, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 64, Oct. 1971, p. 233-236. 5 refs. In Russian.

Cardiac-cycle, systolic, expulsion, and diastolic characteristics were determined in rabbits as a basis for a computer polycardiac data processing program covering a total of 10 cardiac characteristics. Thirteen further cardiac and respiratory characteristics can be determined when this program is used. The program takes 619 storage cells for execution on an M-220 computer. V.Z.

A72-18891 **Polarcardiographic responses to maximal exercise in healthy young adults.** R. A. Bruce, K. Early, R. Early (Washington, University, Seattle, Wash.), and J. M. Detry. *American Heart Journal,* vol. 83, Feb. 1972, p. 206-218. 7 refs. PHS Grant No. HS-00092.

Polarcardiographic responses were recorded before and after maximal upright exercise in 72 healthy young adults. Significant quantitative changes in the spatial magnitude as well as directional changes of the corresponding vectors of P, R, ST, and T forces were defined. A higher prevalence of 'false positive' polarcardiographic criteria associated with myocardial infarction was noted at rest in the upright position than in the supine position. In the supine position, utilizing the same electrode placement originally recommended by Dower (1966), a comparably low prevalence of false positive criteria was revealed. More than a fourfold increase in transient occurrence of these criteria after maximal exercise in healthy subjects suggests changes in ventricular conduction or depolarization. G.R.

A72-18965 **The training stimulus - The effects of intensity, duration and frequency of effort on maximum aerobic power output.** C. T. M. Davies (London School of Hygiene and Tropical Medicine, London, England) and A. V. Knibbs (Carnegie College of Education, Leeds, England). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 4, 1971, p. 299-305. 11 refs.

The effects of various regimes of bicycle ergometer exercise (varying in intensity, duration, and frequency of effort) on directly measured maximum aerobic power have been studied on 28 healthy male subjects aged 18-38 years. Analysis of the results showed that the two most important factors in training the maximum oxygen consumption were intensity and duration, these parameters being interdependent. No subject who trained at or below 50 per cent of maximum oxygen consumption showed an improvement in his maximum aerobic power output. Even at the highest intensities and longest durations of effort, the improvement in maximum oxygen consumption was quite small (1-9 ml/kg/min). It would seem that in

order to effect an improvement in maximum oxygen consumption an individual must be prepared to work at or close to his maximum for prolonged periods of time; even then the improvement may be disappointingly small. (Author)

A72-18966 The prediction of maximal oxygen intake in acute moderate hypoxia. R. Flandrois (Lyon, Université, Lyons, France) and J. R. Lacour (Saint-Etienne, Université, Saint-Etienne, Loire, France). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 4, 1971, p. 306-313. 16 refs. Translation.

The relation of heart rate to oxygen intake was checked in 20 healthy male students performing exercises of different intensities at sea level and in acute moderate hypoxia. This hypoxia was induced by breathing a wet oxygen-nitrogen mixture at the ambient pressure. Hypoxia did not alter the mechanical efficiency during the exercises. However, the average maximal oxygen intake was reduced by 13 per cent. During submaximal exercises, heart rate was a linear function of oxygen intake in both acute hypoxia and normoxia; however, the standard deviation was greater in hypoxia. These results indicate that it is possible to predict the maximal oxygen intake, in acute moderate hypoxia, by using the indirect techniques. (Author)

A72-18975 * Basis of behavioral influence of chlorpromazine. G. S. Emley and R. R. Hutchinson. *Life Sciences, Part I - Physiology and Pharmacology,* vol. 11, Jan. 1, 1972, p. 43-47. 12 refs. Research supported by the Western Michigan University; NSF Grants No. GB-18413; No. GB-8535; Grant No. NGR-23-014-001; Contract No. N00014-70-A-0183-0001.

Squirrel monkeys, studied during response-independent, periodic presentation of electric shock, engaged in biting attack behavior after shock and anticipatory manual and locomotor behavior prior to shock. For all subjects, administration of chlorpromazine caused a dose-dependent decrease in biting attack reactions and a simultaneous increase in anticipatory manual responses. Administration of d-Amphetamine increased while morphine decreased both responses. The results suggest that the tranquilizer, chlorpromazine, produces a shift in an organism's response tendency from post-event aggressivity toward pre-event anticipatory responding. (Author)

A72-19024 Human ERG in response to double flashes of light during the course of dark adaptation - A Fourier analysis of the oscillatory potentials. P. Algvere (Karolinska Hospital, Stockholm, Sweden) and S. Westbech (Kungl. Tekniska Högskolan, Stockholm, Sweden). *Vision Research,* vol. 12, Feb. 1972, p. 195-214. 48 refs.

After adaptation to light of 1500 photopic candelas per sq m, the recovery in the dark of the adaptometric visual threshold and electroretinograms (ERG) were studied in response to strong double light flashes of short duration. A combined impulse response and Fourier analysis was performed, showing the energy and dominant frequency of the oscillatory potentials. The oscillatory potentials differed in behavior from the a-wave and b-wave of ERG. It is suggested that strong light flashes of short duration facilitate the regeneration of oscillatory potentials, probably by inducing transient neural activity in the inner retinal layers. O.H.

A72-19025 Suppression of visual evoked responses to flashes and pattern shifts during voluntary saccades. R. Chase and R. E. Kalil (MIT, Cambridge, Mass.). *Vision Research,* vol. 12, Feb. 1972, p. 215-220. 12 refs.

Experimental results show that the visual evoked response was completely suppressed when either low intensity flashes of light or shifting patterns of narrow black and white stripes were presented at the onset of eye movements. Suppression did not occur when more intense flashes or wider stripes were employed. The similarity of effects suggests that the suppression mechanism operates independently of the type of stimuli which excite the retina. O.H.

A72-19026 * Inflow as a source of extraretinal eye position information. A. A. Skavenski (Maryland, University, College Park, Md.). *Vision Research,* vol. 12, Feb. 1972, p. 221-229. 20 refs. NIH Grant No. EY-00325; Grant No. NsG-398.

Experiments were performed which show that subjects can reliably report when, and in which direction, loads were applied to their eyes in total darkness, which indicates that they were aware of inflow eye position information. Awareness of the inflow signal was not disrupted when the eyelids and conjunctiva were anesthetized and the eyelids were retracted from all possible contact with the scleral contact lens. Furthermore, the subjects maintained eye position when loads were applied to the eye in total darkness, showing that this inflow information can be used for extraretinal oculomotor control. O.H.

A72-19027 Optical modulation by the isolated retina and retinal receptors. H. Ohzu, J. M. Enoch, and J. C. O'Hair (Washington, University, St. Louis, Mo.). *Vision Research,* vol. 12, Feb. 1972, p. 231-244. 15 refs. NIH Grants No. EY-00204; No. EY-00233.

Optical image transfer characteristics of flat preparations of rod and cone retinas were studied and image modulation, similar to that of an optical fiber bundle, was observed. It was found that the quality of photoreceptor orientation is of importance in the measurement of the retinal modulation transfer function, and that this function and total light transmittance of retina change in time after clamping the optic nerve. The interaction between the grating image and the mosaic structure of the retinal receptors is discussed. O.H.

A72-19028 Dynamic properties of vision. I, II. J. A. J. Roufs (Eindhoven, Technische Hogeschool, Eindhoven, Netherlands). *Vision Research,* vol. 12, Feb. 1972, p. 261-292. 68 refs.

Flicker thresholds of harmonically modulated light with variable frequency and flash thresholds of square flashes of variable duration are compared quantitatively. Sensitivity for flicker and sensitivity for flashes are found to have a constant ratio over the entire background intensity range. The product of the cutoff frequency with flicker and the critical duration with flashes is also found to be constant. Finally, theoretical relationships, based on some general system properties, are established between parameters which characterize the sensitivity and inertia of the visual system in flicker and flash experiments. The results are found to be in good agreement with the relationships obtained experimentally. O.H.

A72-19029 Resolution thresholds for moving targets at the fovea and in the peripheral retina. B. Brown (Melbourne, University, Melbourne, Australia). *Vision Research,* vol. 12, Feb. 1972, p. 293-304. 20 refs. Research supported by the Australian Road Research Board. ARRB Project 95230.

Resolution thresholds for Landolt ring target images moving on the retina have been determined for retinal target image angular velocities from 0 to 50 deg/sec, and eccentricities from 0 to 10 deg. At the fovea, the relation between threshold (min of arc) and target image angular velocity (deg/sec) is found to be linear. In the parafovea, the relation is complex and resolution of slowly moving targets is better than for static targets at the same eccentricity. Evidence is presented which suggests that two mechanisms may mediate the perception of moving targets in the parafovea. O.H.

A72-19030 Dynamic visual acuity, eye movements and peripheral acuity for moving targets. B. Brown (Melbourne, University, Melbourne, Australia). *Vision Research,* vol. 12, Feb. 1972, p. 305-321. 14 refs. Research supported by the Australian Road Research Board. ARRB Project 05230.

An experiment is described in which dynamic visual acuity (DVA) was measured and in which eye movements were simultaneously recorded. Retinal target image position and velocity errors

during ocular pursuit were derived from the eye movement data and were used in conjunction with data describing peripheral acuity for moving targets to derive DVA as a function of target angular velocity. A good correspondence was found between the measured and the derived values of DVA, indicating that position and velocity errors are the main determinants of DVA. O.H.

A72-19031 **The size-distance relation and intrinsic geometry of visual space - Implications for processing.** J. M. Foley (California, University, Santa Barbara, Calif.). *Vision Research,* vol. 12, Feb. 1972, p. 323-332. 28 refs. PHS Grant No. MH-08878; Contract No. F 44620-69-C-0108.

Experiments have been conducted which demonstrate that when a perceived frontal size is matched to a perceived egocentric distance with only primary cues available, the corresponding physical size-distance ratio is about 0.5. Perceived visual angle exceeds physical angle by much less. It follows that under these conditions the visual space is not Euclidean. This phenomenon is shown to be inconsistent with the assumption of homogeneity of the Luneburg-Blank theory. When additional cues to distance are introduced, the physical ratio is set much closer to the perceived ratio with no corresponding change in the perceived magnitude of visual angles. The results are interpreted as disconfirming the hypothesis that perceived size is inferred from visual angle and perceived distance. Rather they suggest two independent modes of spatial information processing. O.H.

A72-19032 **A stimulus apparatus for the presentation of moving visual stimuli.** B. E. Stein, N. Dodich, and L. Kruger (California, University, Los Angeles, Calif.). *Vision Research,* vol. 12, Feb. 1972, p. 333-336. 15 refs. PHS Grant No. EY-571.

A simple, inexpensive device for the presentation of moving visual stimuli with which one can exercise precise, independent control over size, shape, background intensity, orientation, and velocity of movement over a large traverse, is described. The apparatus has been employed in studies of the superior colliculus of the cat in order to determine neuronal sensitivity to direction and velocity of moving visual stimuli, as well as responsiveness to repeated identical stimulus presentations. O.H.

A72-19033 **A lateral light adaptation effect in human vision.** G. J. Burton and K. H. Ruddock (Imperial College of Science and Technology, London, England). *Vision Research,* vol. 12, Feb. 1972, p. 347-352. 16 refs. Research supported by the Science Research Council.

An experimental investigation has been carried out of the effects of light adaptation on dichromatic color matches established for a bipartite, centrally fixated circular matching field. Results show that the adaptation light which changes the small-field dichromatic color matches is not absorbed in the receptors lying within the matching field, and that more than two spectral classes of receptor contribute to these matches. O.H.

A72-19034 * **Impaired motion detection preceding smooth eye movements.** W. Richards and M. J. Steinbach (MIT, Cambridge, Mass.). *Vision Research,* vol. 12, Feb. 1972, p. 353-356. 15 refs. NIH-NASA-supported research; Contract No. F44620-69-C-0108.

Experiments have been carried out that suggest that the observed psychophysical impairment of motion detection in man may not occur equally over the entire visual field. Instead, if impaired motion detection is a consequence of redirection of 'attention' to another portion of the visual field, then movement detection may be impaired the most in the fovea and the least in the region of the subsequent target. O.H.

A72-19040 **Alpha rhythm and uniform visual field in man.** J. B. Lehtonen (University Central Hospital, Turku, Finland) and I. Lehtinen (Turku, University, Turku, Finland). *Electroencephalography and Clinical Neurophysiology,* vol. 32, Feb. 1972, p. 139-147. 31 refs. Research supported by the National Research Council for Medical Sciences of Finland.

The influence of a uniform visual field on the electroencephalographic alpha rhythm has been experimentally examined. In particular, the following problems were studied: the quantity, frequency, and reactivity of the alpha rhythm provoked by the uniform visual field; the possible role of a change in vigilance in connection with the appearance of the rhythm; the effects of ocular fixation and visual attention on the rhythm; and the behavior of the rhythmic alpha-like afteractivity of visual evoked potentials with respect to the rhythm. O.H.

A72-19041 **Rhythmic after-activity to flashes in relation to the background alpha which precedes and follows the photic stimuli.** R. W. Lansing (Massachusetts General Hospital; Harvard University, Boston; MIT, Cambridge, Mass.; Arizona, University, Tucson, Ariz.) and J. S. Barlow (Massachusetts General Hospital; Harvard University, Boston; MIT, Cambridge, Mass.). *Electroencephalography and Clinical Neurophysiology,* vol. 32, Feb. 1972, p. 149-160. 26 refs. PHS Grant No. NS-03752.

Occipital EEG responses to slowly repeated, aperiodic light flashes were studied in normal subjects. Particular attention was given to the following two problems: the dependence of the amplitude of afteractivity on the amplitude of the alpha waves at the time of stimulation, and the comparative time courses of the amplitude changes of background alpha and afteractivity following the light flash. O.H.

A72-19109 # **Phase relations between alpha-waves and automated rhythmic motoric activity (Phasenbeziehungen zwischen Alpha-Wellen und automatisierter rhythmischer motorischer Tätigkeit).** N. Roth and F. Klingberg (Leipzig, Universität, Leipzig, East Germany). *Acta Biologica et Medica Germanica,* vol. 27, no. 4, 1971, p. 715-721. 36 refs. In German.

The interactions between rhythmic motoric activity, alpha-rhythm in the electroencephalograms, respiration, and heart rate were investigated in healthy subjects. It was found that with increasing automation of the rhythmic motoric activity, the electric muscular activity is coupled with the positive phase of the alpha-waves. It is suggested that automation of the rhythmic motoric activity occurs at a certain state of behavioral activity. The role of thalamic pacemaker zones in this process is discussed. O.H.

A72-19128 **On man-computer dialogue.** D. Ambrózy (Magyar Tudományos Akadémia, Automatizálási Kutató Intézet, Budapest, Hungary). *International Journal of Man-Machine Studies,* vol. 3, Oct. 1971, p. 375-383.

Discussion of certain aspects of that part of the man-computer interaction that represents the man-computer dialogue. A formulation of the dialogue is offered, and the dialogue-course influencing basic human factor (i.e., the specific fatigue associated with the information processing work of the human nervous system) is examined. M.V.E.

A72-19137 # **NCLT - A complete approach.** J. R. McDaniel (U.S. Navy, Lemoore, Calif.). *Approach,* vol. 17, Feb. 1972, p. 16-22.

Modern technology has produced a new tool, the Night Carrier Landing Trainer (NCLT), which promises to eliminate many of the unknowns from night carrier landing practice for pilots of at least one series of aircraft - the A-7. The NCLT is expected to provide a

precise simulation of the night carrier landing environment and a means whereby supervisors can more thoroughly evaluate pilot abilities, tendencies and habit patterns. G.R.

A72-19185 **The origin of life by natural causes.** M. G. Rutten. Amsterdam, Elsevier Publishing Co., 1971. 433 p. 442 refs. $29.50.

This book deals with the modern ideas regarding the possibility that life on earth, and elsewhere in the universe, may have originated by a gradual transition from a lifeless environment. Fundamental methods of physical geology as a foundation for the other studies are discussed together with the biological approach, the astronomer's view, some experimental investigations, stages in biopoesis, stages in the early and later evolution of life, the orogenetic cycle, fossils, and contemporary environment. It is found that a natural origin of life is only possible under a primeval anoxygenic atmosphere of reducing character. Such an atmosphere has existed on earth until 1.8 billion years ago. An objective evaluation of the facts points to the probability of an extraterrestrial biogenic origin of organic compounds found on meteorites. In conclusion, it is pointed out that the origin of life through natural causes, although not proved, has become highly probable. G.R.

A72-19241 **Preliminary dosimetric results of cosmic radiation on board the Concorde prototype (Premiers résultats dosimétriques des rayonnements cosmiques à bord du prototype Concorde).** R. Kaiser, R. P. Delahaye, A. Pfister, and S. Depres (CNRS, Laboratoire de Physique Corpusculaire, Strasbourg-Cronenbourg, France). *Revue de Médicine Aéronautique et Spatiale,* vol. 10, 3rd Quarter, 1971, p. 119-121. In French.

Results of measurements of the radiation doses detected in the cabin of the Concorde prototype, using nuclear emulsions to record all charged particles and photographic dosimeters to determine the dose due to neutrons. On the basis of a laboratory analysis of the two types of measurements, it is concluded that during the time considered (a period of minimum solar activity) and at latitudes ranging from 43 to 53 N there is no radiobiological danger for the crews. A.B.K.

A72-19242 **Hemodynamic reactions of man subjected to a gradually increasing stress measured by an external technique useful for the selection and supervision of personnel in aeronautics (Réactions hémodynamiques de l'homme soumis à un effort progressif mesuré par une technique externe utilisable pour la sélection et la surveillance du personnel de l'aéronautique).** B. Vettes, J. Demange, and A. Auzas (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 0, 3rd Quarter, 1971, p. 122-128. In French.

Results of a study of the circulatory reactions of a group of men without any particular physical training who were required to perform running exercises on a treadmill at periodically increasing speeds. An attempt is made to determine the possibility of measuring the variations of the systolic ejection (and thus the heart rate), to verify the variations of this wave at the start of the stress, and to determine the power level at which an increase in the cardiac frequency may first be noted. The use of electrical plethysmography is found to confirm that the evolution of the average cardiac frequency of a group of subjects can make it possible to follow the evolution of the cardiac flow rate, but only starting from an arbitrary value corresponding approximately to a stress identical to that produced by running at a rate of 3 km/hr. A.B.K.

A72-19243 **The difficulties of the psychiatrist in a civil aeronautics environment - Reflections concerning 3000 consultations (Les difficultés du psychiatre en milieu aéronautique civil - Réflexions à propos de 3000 consultations).** C. Blanc, P. Moroni, and E. Lafontaine. *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 3rd Quarter, 1971, p. 131, 132. In French.

Discussion of certain problems peculiar to the work of psychiatrists or medical psychologists treating air navigation personnel. Some of the obstacles encountered by the psychiatrist in an aeronautical environment are cited, including problems of correct administering of chemotherapeutic and psychotherapeutic treatments and problems in relations with general practitioners. Noting that psychiatric morbidity rates are very difficult to evaluate in an aeronautical environment, it is recommended that the psychiatrist or medical psychologist be brought into the picture starting from the moment of hiring of personnel. A.B.K.

A72-19244 **Variations with age of normal acuity and refraction in flight deck personnel (Variations avec l'age de l'acuité normale et de la réfraction chez le personnel navigant technique).** J. P. Boissin (Compagnie Nationale Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 3rd Quarter, 1971, p. 133, 134. In French.

Attempt to correlate variations in visual acuity in normal subjects in different age groups with variations in refraction. It is shown that the maximum visual acuity variation noted, starting from age 40, and even the relatively insignificant progressive decrease noted between age 25 and 30 cannot be attributed to modifications of refraction, but are more likely attributable to a diminution of the functional value of the eye with age. A.B.K.

A72-19245 **Calcium metabolism in astronautics (Métabolisme du calcium en cosmonautique).** R. Grandpierre. *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 3rd Quarter, 1971, p. 135-141. 21 refs. In French.

Review of the literature on perturbations of calcium metabolism noted in astronauts experiencing weightlessness during space flights and in immobilized subjects in laboratory tests. A brief description is given of the renewal cycle of bone tissue, and certain factors which can intervene to modify the different phases of this cycle are noted. According to Whedon (1968), a significant increase in calciuria was noted in both of the Gemini 7 astronauts. Even greater calcium losses were noted by Berry-Mack et al. (1966) in the Gemini 4 and 5 astronauts. A study by Geiser and Trueta (1958) concerning the effect of muscular pressures and tensions on bone calcification is described, as well as a study by Krotov (1970) of disturbances of calcium metabolism in immobilized rabbits, studies by Dietrick et al. (1948) concerning calciuria variations in immobilized human subjects, a study by Vrabiescu and Domilescu (1964) concerning the effect of an increase in gravitational forces on human beings, studies by Graveline and Balke (1961) and Graybiel and Clark (1961) concerning human subjects subjected to immersion, and still other studies. A.B.K.

A72-19246 **Comparative study of visual acuity measured with the Beyne optometer and the Mercier optometric scale (Etude comparative de l'acuité visuelle mesurée avec l'optometre de Beyne et l'échelle optométrique de R. Mercier).** J. Chevaleraud (Ministère des Armées, Service de Santé des Armées, Paris, France) and B. Sevel (Hôpitaux des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 3rd Quarter, 1971, p. 142-146. In French.

Comparison of angular visual acuity measured with the Beyne optometer and morphoscopic acuity measured with the Mercier optometric scale. The results of studies of uncorrected and corrected monocular and binocular acuity using the Beyne optometer and the Mercier optometric scale are presented. It is concluded that, in spite of its apparent severity, the Mercier scale, which uses letters, is too easy, thus explaining the difference habitually noted between angular acuity and morphoscopic acuity. The use of the Beyne optometer is therefore to be preferred over the use of the Mercier scale. A.B.K.

A72-19269 # **Design for acceptable aircraft vibration.** A. G. Woods. *(British Acoustical Society, Spring Meeting on Transport Noise and Vibration, University of Birmingham, Birmingham, England, Apr. 5-7, 1971.) British Acoustical Society*, vol. 1, Autumn 1971. 4 p.

A number of vibration problems with various types of aircraft are discussed, taking into account flight vibrations and runway response. A literature survey and experimental investigations showed that the levels of vibration experienced during taxiing could be caused by running over quite small discontinuities. The forcing was proportional to the effective tire stiffness. Only from 10 to 25% of the structural vibration was produced by forcing through the nosewheel. The need for the measurement and analysis of acceptable vibration levels on aircraft in service is pointed out. G.R.

A72-19277 **Some human factors considerations in the design of instructor's stations for automated flight training systems.** J. N. Fox (Texas, University, Arlington, Tex.) and A. S. Blaiwes (U.S. Navy, Naval Training Devices Center, Orlando, Fla.). In: Hawaii International Conference on System Sciences, 5th, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co., 1972, p. 73-75. 5 refs.

Attempt to ascertain the informational requirements of the instructor's station in automated flight training systems. The functions of the instructor in such a system are reviewed, noting the effect of automated and adaptive training in increasing flexibility of the instructor functions. The informational requirements of the instructor are discussed from the standpoint of procedural information and flight path information. The application of computer generated displays to training device instructor stations is considered. A.B.K.

A72-19306 **Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement.** Conference sponsored by the University of Hawaii, the Regional Medical Program of Hawaii, the U.S. Navy, the U.S. Army, the Digital Equipment Corp., and the National Science Foundation. Edited by A. Lew. North Hollywood, Calif., Western Periodicals Co., 1972. 280 p. Price, $25.; Proceedings and Supplement, $50.

Advances in the use of computers for processing biomedical data are described in research reports dealing with patient monitoring, diagnosis, treatment control, health appraisal, and simulation of complex biological processes. Topics examined include electroencephalography, pattern recognition, ventricular dynamics, neuronal models, ocular functions, motor control, evoked potentials, and cancer chemotherapy. Software and hardware aspects of various computerized monitoring systems are described, including details of data acquisition, parameter identification, statistical analysis, storage, decision making, and interfacing. T.M.

A72-19307 * **Acquisition of electroencephalographic data in a large regional hospital - Bringing the brain waves to the computer.** M. D. Low, M. Baker, R. Ferguson (British Columbia, University; Vancouver General Hospital, Vancouver, Canada), and J. D. Frost, Jr. (Baylor University; Methodist Hospital, Houston, Tex.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 9-11. Research supported by the R. A. Woodward's Foundation, the British Columbia Hospital Insurance Service, and NASA.

This paper describes a complete electroencephalographic acquisition and transmission system, designed to meet the needs of a large hospital with multiple critical care patient monitoring units. The system provides rapid and prolonged access to a centralized recording and computing area from remote locations within the hospital complex, and from locations in other hospitals and other cities. The system includes quick-on electrode caps, amplifier units and cable transmission for access from within the hospital, and EEG digitization and telephone transmission for access from other hospitals or cities. (Author)

A72-19308 * **The use of computer graphic techniques for the determination of ventricular function.** H. Sandler and D. Rasmussen (NASA, Ames Research Center, Moffett Field, Calif.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 63-65.

Description of computer techniques employed to increase the speed, accuracy, reliability, and scope of angiocardiographic analyses determining human heart dimensions. Chamber margins are traced with a Calma 303 digitizer from projections of the angiographic films. The digitized margins of the ventricular images are filed in a computer for subsequent analysis. The margins can be displayed on the television screen of a graphics unit for individual study or they can be viewed in real time (or at any selected speed) to study dynamic changes in the chamber outline. The construction of three dimensional images of the ventricle is described. T.M.

A72-19309 **Optimal control behavior of human eye movements.** M. R. Clark and L. Stark (California, University, Berkeley, Calif.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 88-91.

An interactive computer graphics system was used to simulate the Cook-Stark model of saccadic eye movements. Recent findings concerning the characteristics of human eye muscles were incorporated in the model. Investigation of actual eye movement records along with the corresponding responses of the model indicates that the eye is much closer to being time optimal than previously thought. (Author)

A72-19310 **Modelling pupillary motor behavior in response to light, accommodation and fusional inputs.** J. L. Semmlow (Illinois, University, Chicago, Ill.), D. Hansman, and L. Stark (California, University, Berkeley, Calif.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 92-95. 12 refs.

Simulation results from a model of the human iris motor mechanism based on muscular properties suggest a continuously varying output range nonlinearity that modifies plant gain as a function of mean pupil size. Experiments on human subjects were designed to isolate the motor properties from the variety of input features seen in iris behavior; results confirmed this nonlinearity and permitted close definition of the nonlinear function. A redefined model based on this more precise information is currently being simulated. T.M.

A72-19311 **An on-line computer system for electrocardiogram interpretation.** D. O. Randall (Control Data Corp., La Jolla,

Calif.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 102-104.

Until recently, most computer systems for electrocardiogram interpretation were off-line, and analysis was performed in a batch mode. The present work discusses a system which combines the ability to acquire a multitude of electrocardiograms from numerous remote locations over a switched telephone network, with concurrent interpretation and report generation. System hardware and software are described, together with the sequence of events taking place during on-line acquisition and interpretation of the electrocardiogram. T.M.

A72-19312 Digital image processing of the diagnostic echocardiogram. S. Wixson (Alabama, University, Birmingham, Ala.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 105-107. NIH Grant No. PH 43-67-1441.

Description of an ultrahigh-speed analog-to-digital converter that interfaces a pulsed ultrasound diagnostic machine to a general purpose digital computer. The diagnostic ultrasound is utilized to determine left ventricular dimensions and wall thickness. Several digital image processing techniques are discussed. T.M.

A72-19313 A computer model for the genesis of the electrocardiogram. R. M. Rosenberg, C. H. Chao, and J. Abbott (California, University, Berkeley and San Francisco, Calif.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 126-128. 14 refs.

A computer model of electrical cardiac activity is constructed, including a biophysically faithful model of the electrical conduction system and a model of a twelve-lead electrocardiograph. The electrical activity is simulated by a finite number of dipoles having a varying dipole moment and both known and fixed location and direction. The conduction system is described by special coupling between the oscillators, and formulas are obtained for unipolar and bipolar electrocardiograph lead potentials. T.M.

A72-19314 Some aspects of fusional information processing by the human visual system. A. E. Kertesz (California Institute of Technology, Pasadena, Calif.). In: Computers in biomedicine; Proceedings of the Fifth Hawaii International Conference on System Sciences, University of Hawaii, Honolulu, Hawaii, January 11-13, 1972. Supplement. North Hollywood, Calif., Western Periodicals Co., 1972, p. 214-216. NIH Grants No. EY-00687; No. NS-0627.

Fusional information processing of the human visual system is examined. The role of compensatory eye movements in overcoming retinal image disparity is evaluated. It is found that increasing stimulus complexity results in an increased cyclofusional range. The maximum fused disparity introduced by the stimulus is accounted for in terms of the disparity threshold for diplopia. (Author)

A72-19328 Decreased pulmonary oxygen toxicity by pretreatment with hypoxia. R. E. Brashear and R. E. DeAtley (Indiana University, Indianapolis, Ind.). *Archives of Environmental Health,* vol. 24, Feb. 1972, p. 77-81. 37 refs. Research supported by the Marion County Heart Association; PHS Grants No. HE-13453-01; No. He-06308.

Study of the effect of 10 or 12% oxygen pretreatment on subsequent mortality of rats as a result of breathing 100% oxygen. Rats exposed to 100% oxygen without prior treatment died after 66 plus or minus 7 hours. Those pretreated with compressed air for 120 hours died after 61 plus or minus 10 hours of exposure to 100% oxygen. Those pretreated with 10% oxygen for 120 hours survived exposure to 100% oxygen for 336 hours (P less than .01). Six out of 16 rats pretreated with 120 hours of 12% oxygen died after 134 plus or minus 104 hours of exposure to 100% oxygen, while ten survived 336 hours of exposure to 100% oxygen. Pretreatment of rats with 10 or 12% oxygen for 120 hours has a significant effect on subsequent survival in an environment of 100% oxygen. A.B.K.

A72-19351 Individual differences in attention and the prediction of flight criteria. D. Gopher (Tel Aviv University, Tel Aviv, Israel) and D. Kahneman (Hebrew University, Jerusalem, Israel). *Perceptual and Motor Skills,* vol. 33, Dec. 1971, pt. 2, p. 1335-1342. 8 refs.

A dichotic listening test was constructed which requires S to monitor a relevant message and to ignore a concurrent message presented to the other ear. The test has promising validity for predicting different criteria of proficiency in flying high-performance aircraft. An analysis of the most valid type of errors suggests that a change in an existing orientation is accompanied by a transient instability of selective attention. Most errors in continuous attention are omissions, which indicate a failure of the listening set. Intrusions, which indicate a failure of selectivity, are rare and their frequency is not correlated to flight criteria. (Author)

A72-19437 Effect of local heating and arterial occlusion on sweat electrolyte content. R. S. Elizondo, M. Banerjee, and R. W. Bullard (Indiana University, Bloomington, Ind.). *Journal of Applied Physiology,* vol. 32, Jan. 1972, p. 1-6. 23 refs. Army-supported research; Contract No. F44620-68-C-0014.

Use of three different procedures (general body thermal stress, local heating, and arterial occlusion) to alter the rate of sweat production while corresponding changes in the concentration and rate of electrolyte excretion were examined. The volar surface of the forearm was thoroughly washed and the sweating activity of an 8-sq-cm area was continuously recorded for 10 to 15 min by resistance hygrometry and integrated by a Linc 8 computer. The area under the sweat capsule was then washed with a measured volume of distilled water, and the eluent was analyzed for total osmolarity, Na(+), K(+), and Cl(-). The K(+) and osmolar concentration was found to be inversely related to the sweating rate. A direct relationship, however, was found between the sweating rate (0.05 to 0.65 mg/sq-cm-min) and the sweat Na(+) concentration, while no consistent relationship was observed between the sweating rate and the Cl(-) concentration. A significant positive correlation was consistently observed between the sweating rate and the rate of Na(+), Cl(-), K(+), and osmolar excretion. Local heating and 10 to 15 min of arterial occlusion were found to significantly alter the sweating rate but did not significantly change any of the relationships between sweat production and electrolyte excretion. (Author)

A72-19438 Effect of carbon monoxide on reflex vasoconstriction in man. D. D. Heistad and R. C. Wheeler (U.S. Army, Physiology Laboratory, Natick, Mass.). *Journal of Applied Physiology,* vol. 32, Jan. 1972, p. 7-11. 15 refs.

Observation of the effects of inhalation of carbon monoxide on blood flow to the forearm and hand and on reflex vascular responsiveness in healthy men. This study was performed to determine whether the hypoxia induced by carbon monoxide causes an inhibition of reflex vasoconstrictor responses or whether the

presence of a normal arterial oxygen tension allows preservation of vascular responses. Blood flow to the forearm and hand were measured with plethysmographs, and arterial pressure was obtained by auscultation. Resting values and responses to lower body negative pressure and to application of ice to the forehead were compared at three levels of carboxyhemoglobin: 4% (control), 19%, and 25%. There was no evidence of stimulation of the sympathoadrenal system by carbon monoxide: heart rate was unchanged and there was no vasoconstriction in the hand. Carbon monoxide caused dilatation of vessels of the forearm and reduced the vasoconstrictor responses to lower body negative pressure and to the application of ice to the forehead. It appears that the hypoxia induced by carbon monoxide causes an inhibition of reflex vasoconstrictor responses despite the presence of normal arterial oxygen tension. (Author)

A72-19439 # **Carotid sinus counterpressure as a baroreceptor stimulus in the intact dog.** S. J. Shubrooks, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 32, Jan. 1972, p. 12-19. 26 refs.

Description of a noninvasive technique in which application of external counterpressure to the neck is used to stimulate the carotid sinus baroreceptors by altering transmural pressure (Ptm) across the wall of the sinus, allowing the description of the systemic arterial pressure (Psa) response in an intact animal. A plaster chamber was sealed around the neck of 12 dogs anesthetized with chloralose so that chamber pressure (Pc) could be changed up to 100 mm Hg above and below atmospheric pressure, resulting in decreases and increases, respectively, in carotid sinus Ptm. A sigmoid arterial pressure response curve was obtained which showed the maximum carotid sinus responsiveness in the range of the animal's base-line Psa. Closed-loop gains (delta mean Psa/delta Pc) of the intact system in this range of maximum responsiveness ranged from 0.43 to 0.90, with a mean of 0.66. Gain calculated as delta mean Psa/delta Ptm from base-line control to steady state after application of counterpressure, numerically equivalent to an open-loop gain, ranged from 0.75 to 9.50, with a mean of 2.78. In comparison with studies using the isolated sinus, gains determined in the present study were higher. Changes in heart rate, after an initial transient response, were generally small and variable. (Author)

A72-19440 **Plasma erythropoietin in men and mice during acclimatization to different altitudes.** P. H. Abbrecht and J. K. Littell (Michigan, University, Ann Arbor, Mich.). *Journal of Applied Physiology*, vol. 32, Jan. 1972, p. 54-58. 26 refs. PHS Grants No. AM-10395; No. RR-05383; NSF Grant No. GB-5874.

Results of repeated measurements of plasma erythropoietin concentration made in five men before and during ten days' stay at 14,300 ft. Serial determinations of plasma erythropoietin concentration over a ten-day period were also made in mice during exposure to air pressures of 510, 440, or 360 mm Hg, equivalent to altitudes of 10,500; 14,500; and 19,000 ft, respectively. Calibration curves using a standard erythropoietin preparation were done with all assays, so that erythropoietin concentration could be expressed in standard units per milliliter. In human beings, erythropoietin concentration reached maximum values after from 19- to 39-hr hypoxia, and then decreased rapidly without a significant change in hematocrit or blood hemoglobin concentration. Maximum erythropoietin values in mice were measured at 12- to 18-hr hypoxic exposure, with the earlier peak occurring at the highest altitude. In all cases, erythropoietin concentration had decreased to values not significantly different from prehypoxic control values by the tenth day at altitude. There was good correlation between maximum erythropoietin concentration and estimated oxygen partial pressure in mice. (Author)

A72-19441 **Acid-base balance after maximal exercise of short duration.** J. B. Osnes and L. Hermansen (Institute of Work Physiology, Oslo, Norway). *Journal of Applied Physiology*, vol. 32, Jan. 1972, p. 59-63. 19 refs.

Measurement of blood lactate concentration (LA), blood pH, plasma bicarbonate concentration (PB), and base excess (BE) in arterialized capillary blood in 14 male subjects before, during, and after maximal exercise of short duration (i.e., continuous or intermittent running or bicycling). LA was found to increase to values as high as 32.1 millimicrons. The consequent changes in the acid-base balance lowered the blood pH to 6.80 (lowest value recorded), CO2 partial pressure to 14 mm Hg, PB to 2.6 mEq/L, and BE to -34 mEq/L. A straight-line relationship was found between LA, on one hand, and blood pH and BE, on the other, in the entire range of observations. However, between LA and PB a straight-line relationship was demonstrated only for LA up to approximately 15 to 20 millimicrons. BE sub Hb 15 (i.e., BE at a hemoglobin of 15 g/100 ml) was found to overestimate the acidosis of the extracellular fluid, whereas BE corrected to a hemoglobin concentration of 5 g/100 ml showed changes equivalent to those of the LA. Thus, BE sub Hb 5 is a reliable index of extracellular acidosis. Maximal work of short duration is a valuable tool for studying metabolic acidosis in healthy subjects, and in these subjects even extreme changes in the acid-base balance seem to be well tolerated. (Author)

A72-19442 **Cardiac acceleration elicited by voluntary muscle contractions of minimal duration.** C. Borst, A. P. Hollander, and L. N. Bouman (Amsterdam, Universiteit, Amsterdam, Netherlands). *Journal of Applied Physiology*, vol. 32, Jan. 1972, p. 70-77. 19 refs. Research supported by the Nederlandse Organisatie voor Zuiver Wetenschappelijk Onderzoek.

Investigation of the R-R interval response to voluntary isometric contractions of minimal duration (less than 1 sec) with an averaging technique in 22 subjects. The results show: (1) a contraction at maximal force of either plantar flexors of the ankle or masticatory muscles elicited a substantial R-R interval decrease (up to 18%); (2) even a contraction at 1/3 MVC (maximal voluntary contraction) elicited an R-R interval decrease; (3) no difference was found between the responses to unilateral and bilateral maximal plantar flexion; (4) a stronger contraction tended to elicit a larger interval decrease but no clear relation could be demonstrated between response magnitude and exerted force in the range of 1/3 to 3/3 MVC; (5) cardiac acceleration was detectable about 0.4 to 0.6 sec after the start of the contraction. The results suggest that the proportional interval decrease is mainly subject-dependent and largely independent of heart rate and mass of muscle involved. It is concluded that the start of any strong voluntary muscle contraction is instantaneously followed by cardiac acceleration due to abrupt inhibition of vagal tone. (Author)

A72-19443 **An examination of regenerating hepatic tissue subjected to radio-frequency irradiation.** B. D. McLees, E. D. Finch, and M. L. Albright (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.). *Journal of Applied Physiology*, vol. 32, Jan. 1972, p. 78-85. 44 refs. Navy-supported research. Navy Task MF12,524,015-0001B.

The effects of both pulsed and continuous-wave irradiation at 13.12 MHz on mitotic activity and chromosomal aberrations in regenerating rat liver have been investigated. A technique permitting measurement of power absorbed by the animal has been developed and the threshold power for elevation of the animal's body temperature has been determined. No evidence for cellular damage at the histologic or ultrastructural level has been found. The relationship of these results to similar studies in the literature and to radiation safety requirements has been discussed. (Author)

A72-19444 **High-frequency pulsatile discharge of human sweat glands - Myoepithelial mechanism.** S. Nicolaidis (Collège de France, Paris, France) and J. Sivadjian (Institut Pasteur, Paris,

France). *Journal of Applied Physiology,* vol. 32, Jan. 1972, p. 86-90. 25 refs.

Description of a new technique for recording with minimal inertia the sweat delivery of individual glands as well as that of the entire population in a limited area. The hygrophotographic recordings thus obtained permitted the demonstration of a high-frequency (12 to 21 cycles/sec) pulsatile expulsion of sweat to the cutaneous surface by each eccrine unit. Parallel to this individual expulsion mechanism there is evidence of synchronous fluctuations or waves of increasing-decreasing overall sweat excretion with a period approximating 11 to 13 sec in most of the glands observed. To explain the pulsatory individual discharge, it is suggested that the transmitter released by the free endings into the periglandular space triggers in a jerky or 'saltatory' manner the contraction of the myoepithelial cells arranged regularly along the length of the chain. The time of propagation between two consecutive elements of the spiral is between 0.1 and 0.05 sec, as is shown by recordings obtained in the form of excretory pulsations. (Author)

A72-19445 Unattenuated ventilatory hypoxic drive in ovine and bovine species native to high altitude. S. Lahiri (Pennsylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology,* vol. 32, Jan. 1972, p. 95-102. 27 refs. World Health Organization Contract No. SOH-008/1968; NIH Grant No. HE-08805.

Attempt to ascertain the mechanism responsible for the blunted ventilatory drive to hypoxia in native human residents at altitude, by studying four young adult yaks, two heifers, one male cow-yak cross, and three sheep native to 3,800 m in the Himalayas at 3,800 m. For comparison, three lowland sheep were studied at sea level. The hypoxic drive was estimated by (1) the time course of ventilatory response to 100% O2 inhalation at 3,800-m altitude; (2) the steady-state response to simultaneous hypoxia and hypercapnia; and (3) the O2 alveolar pressure/CO2 alveolar pressure relationship under ambient conditions. By all of these tests, the high-altitude animals generally differed from the high-altitude human natives but appeared similar to sea-level man and to the adult human sojourner at altitude. Thus, it appears that the loss of hypoxic sensitivity that uniformly characterized human native residents of high altitudes is not a universal phenomenon. If the sensitivity change develops early in postnatal life, this failure of the ovine and bovine species, particularly of yak, to show a uniformly blunted hypoxic response may be related to the possibility that the newborn of these species responds to the ambient hypoxia differently from man. (Author)

A72-19446 Vagal control of ventilation and respiratory muscles during elevated pressures in the cat. B. Bishop and H. Bachofen (New York, State University, Buffalo, N.Y.). *Journal of Applied Physiology,* vol. 32, Jan. 1972, p. 103-112. 30 refs. USAF-supported research; Contract No. N00014-68-A-0216.

Study of the steady-state ventilatory responses of Dial-anesthetized cats to constant positive-pressure breathing (CPPB) and expiratory threshold loading (ETL) before and after vagotomy. Minute ventilation, tidal volume, frequency of breathing, alveolar O2 and CO2 partial pressure, airway pressure, and the activity of diaphragm and abdominal muscle were continuously recorded. Both maneuvers, CPPB and ETL, depressed steady-state ventilation: the depression was more severe during ETL. When applying small to medium loads, vagotomy changed the breathing pattern but not the degree of ventilatory depression. There is evidence that a vagal feedback mechanism influences the division of labor between inspiratory and expiratory muscles to achieve maximal efficiency of the respiratory apparatus. (Author)

A72-19447 # A nondestructive technique to measure wall displacement in the thoracic aorta. R. M. Olson and D. K. Shelton, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology,* vol. 32, Jan. 1972, p. 147-151. 9 refs.

This paper presents a simple, highly precise, nonsurgical technique to follow aortic wall motion and consequently monitor pulsatile changes in thoracic aortic diameter. The diameter contours which result can be used in much the same way as pressure contours, because both contours are practically congruent. Pressure contours have been used to estimate cardiac output, to detect some valvular heart disease, and to detect such abnormalities of the aortic arch as coarctation. The technique utilizes an ultrasonic crystal mounted on an esophageal probe by means of a platform which can be tilted. Ultrasound is passed across the esophageal wall and reflects from the walls of the aortic arch. The reflected signals are processed, like radar, to track the position of the reflecting surface, i.e., the aortic walls. (Author)

A72-19491 * The role of perilymph in the response of the semicircular canals to angular acceleration. M. Anliker and W. Van Buskirk (Stanford University, Stanford, Calif.). *Acta Otolaryngologica,* vol. 72, 1971, p. 93-100. 16 refs. Contract No. N00014-67-A-0112-0007; Grant No. NGL-05-020-223.

A new model for the response of the semicircular canals to angular motion is postulated. This model is based on evidence that the bony canal is not compartmentalized and assumes that the ampulla wall is highly flexible. It is shown that the perilymph induces a cupula displacement far greater than that produced by the endolymph alone. The predicted dynamic behavior of the canals on the basis of this model is found to be consistent with experimental observations. (Author)

A72-19526 * Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Symposium sponsored by the National Academy of Sciences and NASA, Contract No. NSR-09-012-077. Edited by M Menaker (Texas, University, Austin, Tex.). Washington, D.C., National Academy of Sciences, 1971. 663 p. $15.50.

Topics discussed include circadian activity rhythms in birds and man, variation of circadian rhythms in monkeys, resetting of circadian eclosion rhythm in fruitflies, the effectiveness of mathematical models of circadian rhythms, the influence of ac electric fields on circadian rhythms in man, the relation between changes in the metabolic rate and circadian periodicity of the resistance of pocket mice to ionizing radiation, the relation between circadian organization and the photoperiodic time measurement in moths, the circadian rhythm of optic nerve potentials in the isolated eye of the sea hare, phasing of circadian temperature rhythms in the pocket mouse by specific spectral regions, the phase-shifting effect of light on circadian rhymicity in the fruifly, hormonal control of circadian rhythms in the fruitfly, metabolically controlled temperature compensation in the circadian rhythm of algae, and circadian rhythms in the chloroplasts of algae.

A.B.K.

A72-19527 # Interdependent parameters of circadian activity rhythms in birds and man. J. Aschoff, U. Gerecke, A. Kureck, H. Pohl, P. Rieger, U. von Saint Paul, and R. Wever (Max-Planck-Institut für Verhaltnesphysiologie, Seewiesen, West Germany). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 3-27; Discussion, p. 27-29. 16 refs.

Investigation of the relationship between activity time and sleep time in free-running birds and human subjects. The data discussed were obtained from finches caged singly in soundproof boxes under constant conditions and different illumination intensities and from

humans who lived for several weeks in complete isolation in an underground bunker. It is shown that the ratio of activity time to rest time, the degree of negative correlation between activity time and rest time, the standard deviation of the onset and end of the circadian period, and the precision of the circadian period all depend on the circadian period. It is demonstrated that the variability of the circadian period is less than could be expected from the 'summed' variabilities of the activity time and rest time, and that the midpoint of the activity time can be less variable than either onset or end of activity. All these characteristics are not only compatible with, but are demanded by, a model that assumes that the circadian oscillator passes through a threshold twice during each period, that the organism is active as long as oscillation is above the threshold, and that shape, amplitude, and level of oscillation depend on the circadian period. A.B.K.

A72-19528 * # **Individual variation in circadian rhythms of sleep, EEG, temperature, and activity among monkeys - Implications for regulatory mechanisms.** T. J. Crowley (Colorado, University, Denver, Colo.), F. Halberg (Minnesota, University, Minneapolis, Minn.), D. F. Kripke (Yeshiva University, Bronx, N.Y.), and G. V. Pegram (USAF, Holloman AFB, N. Mex.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 30-53; Discussion, p. 53, 54. 45 refs. PHS Grant No. CA-5-K6-GM-13981; Contracts No. F29608-69-0011; No. NAS2-2738; Grant No. NGR-24-005-006. ARL Project 6892.

Investigation of circadian rhythms in a number of variables related to sleep, EEG, temperature, and motor activity in rhesus monkeys on an LD 12:12 schedule. Circadian rhythms were found to appear in each of 15 variables investigated. Statistical procedures assessed the variables for evidence of common regulation in these aspects of their circadian rhythms: acrophase (timing), amplitude (extent of change), and level (24-hr mean value). Patterns appearing in the data suggested that the circadian rhythms of certain variables are regulated in common. The circadian modulation of activity in the beta and sigma frequency bands of the EEG was correlated with statistical significance in acrophase, level, and amplitude. The delta frequency band appeared to be under circadian rhythm regulation distinct from that of the other bands. The circadian rhythm of REM stage sleep was like that of beta activity in level and amplitude. The data indicate that REM stage may share some common regulation of circadian timing with both stage 3-4 sleep and with temperature. Generally, however, the circadian rhythm of temperature appeared to bear little relation to the circadian rhythms of motor activity, EEG, or sleep. A.B.K.

A72-19529 * **Corkscrews and singularities in fruitflies - Resetting behavior of the circadian eclosion rhythm.** A. T. Winfree (Chicago, University, Chicago, Ill.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 81-106; Discussion, p. 107-109. 46 refs. Contracts No. NASr-233; No. Nonr-1858/28/.

Description of experiments undertaken to define the phase-resetting behavior of the circadian rhythm of pupal eclosion in populations of fruitflies. An attempt is made to determine how and why the resetting response depends on the duration of a standard perturbation as well as on the time at which it is given. Plotting a three-dimensional graph of the measured emergence centroids vs the stimulus variables, the data are found to spiral up around a vertical rotation axis. Using a computer, a smooth surface, called the resetting surface, which approximately fits the helicoidal cloud of data points, is obtained and is shown to be best described as a vertical corkscrew linking together tilted planes. This corkscrew feature of the resetting surface is taken to indicate that there is an isolated perturbation following which there is either no circadian rhythm of emergence in the steady state, or one of unpredictable phase. A hypothesis concerning the clock dynamics underlying the eclosion rhythm is briefly sketched which encompasses the main features of known resetting data using single discrete pulses of any perturbing agent. A.B.K.

A72-19530 # **Mathematical models of circadian rhythms - Their usefulness and their limitations.** T. Pavlidis (Princeton University, Princeton, N.J.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 110-116. 26 refs.

Outline of some features to be desired in mathematical models of circadian rhythms, and evaluation of the effectiveness of mathematical models hitherto suggested. The need to develop models which discourage trivial experiments and which provide some insight into the nature of the physical system responsible for circadian rhythms is noted. The tendency to modify models in order to assimilate new evidence is criticized. The disappointing performance of mathematical models hitherto proposed is attributed to the limited amount of information provided by the behavioral experiments on which most of them have been based. The use of a quantitative biochemical model which simulates all the behavioral data of the earlier Princeton models and, in addition, has a specific physical structure is recommended. A.B.K.

A72-19531 # **Influence of electric fields on some parameters of circadian rhythms in man.** R. Wever (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen, West Germany). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 117-132; Discussion, p. 132, 133. 15 refs.

Investigation of the influence of a weak ac electric field, with a frequency of 10 Hz, on human circadian rhythms. In the experiments performed the circadian rhythms of rectal temperature and activity were found to be shorter with the field in operation than without it, the difference being highly significant and confirming the predictions of a special mathematical model (Wever: 1965, 1966). The model was tested and demonstrated to be applicable to changes of rhythm parameters under both constant and periodically changing conditions, and to the properties of a single rhythmic function as well as to interactions among different functions. A.B.K.

A72-19532 * # **Circadian periodicity of resistance to ionizing radiation in the pocket mouse.** R. G. Lindberg, P. Hayden (Northrop Life Sciences Laboratory, Hawthorne, Calif.), and J. J. Gambino (U.S. Veterans Administration Center, Los Angeles, Calif.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 169-184; Discussion, p. 184, 185. 27 refs. Contracts No. NASw-812; No. NAS2-5037.

Investigation of the response of pocket mice to Co 60 irradiation delivered at two times of day - namely, the predicted high and low points of the metabolic rate. The validity of torpor as an assay of the circadian period of body temperature in pocket mice and as a basis for selecting irradiation times is examined. A study is made of the mitotic activity in the pocket mouse intestinal epithelium as an example of a physiological rhythm which might influence radiation sensitivity. The results of tests in which pocket mice were exposed to ionizing radiation at two different times of day are cited. It is found that under the investigated conditions pocket mice irradiated during their metabolically active period (2330 hr) live significantly longer than those irradiated while their metabolic rate is low (0900 hr). A.B.K.

A72-19533 # **The photoperiodic time measurement in Pectinophora gossypiella and its relation to the circadian system in that species.** C. S. Pittendrigh and D. H. Minis (Stanford University, Stanford, Calif.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 212-247; Discussion, p. 247-250. 39 refs.

Investigation of a possible relationship between circadian organization and the photoperiodic time measurement in the moth Pectinophora gossypiella. A summary is presented of the knowledge gained about the circadian system in P. gossypiella and how that knowledge bears on the 'coincidence' model of photoperiodic induction. The results of first-approximation tests of the coincidence model are presented, showing the possibility of entrainment and induction by asymmetric skeleton photoperiods, by concurrent cycles of light and temperature, and by symmetric skeleton photoperiods. More recent experiments on entrainment and induction when the period of the experimental light cycle is close to the circadian period are described which yield evidence against the coincidence model, in any form, for the explanation of time measurement in P. gossypiella. The general features of some recently obtained action spectra for the initiation by light pulses of the circadian rhythm of egg hatching in P. gossypiella are discussed. Some resonance experiments are described which suggest that emphasis on concurrent analyses of induction and entrainment of any arbitrary marker of system phase may be ill-founded and misleading. A.B.K.

A72-19534 * # **A circadian rhythm in optic nerve impulses from an isolated eye in darkness.** J. W. Jacklet (New York, State University, Albany, N.Y.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 351-361; Discussion, p. 361, 362. 17 refs. NIH Grants No. NB-07071-02; No. 1-RO1-NB08443-01; Grant No. NGR-05-002-031.

Study of the circadian rhythm of optic nerve potentials recorded from the isolated eye of the sea hare Aplysia. The optic nerve activity in constant conditions is found to be clearly circadian and to obey the circadian rule for diurnal animals. In addition, the period length depends on the in vitro culturing solution. In seawater it is about 22 hr, but in culture medium it is 27 hr. The rhythm can be completely phase-shifted in one trial if the phase of the LD 12:12 Zeitgeber is advanced or delayed 4 hr. The rhythm in one eye can be phase-shifted in vivo independently of the other eye and in vitro independently of the rest of the animal. Thus, in the animal, the eye oscillators are, at most, only slightly influenced by each other or by other oscillators in the animal. A.B.K.

A72-19535 # **Observations on spectral sensitivities for the phasing of circadian temperature rhythms in Perognathus penicillatus.** S. A. Gordon and G. A. Brown (Argonne National Laboratory, Argonne, Ill.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 363-371. 16 refs. AEC-sponsored research.

Description of experiments undertaken to determine whether circadian temperature rhythms in the pocket mouse can be phased by particular spectral regions. Experiments designed to indicate relative spectral efficiencies for phase-shifting the body temperature rhythm are reviewed. On the basis of limited observations it is suggested that the most effective wavelengths for phase delay and perhaps for entrainment are not in the red spectral region, as had been anticipated, but in the blue-green. A.B.K.

A72-19536 # **Some photophysiological aspects of circadian rhythmicity in Drosophila.** W. F. Zimmerman and D. Ives (Amherst College, Amherst, Mass.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 381-391. 32 refs. NSF Grant No. GB-8303.

Description of experiments designed to elucidate the phase-shifting effect of light on the circadian rhythm of adult emergence in Drosophila and to determine the nature and location of the photopigment involved. It is shown that in Drosophila the response of the circadian system to white light signals is invariant with developmental stage, and that the photoreceptive pigment involved is probably the same in all postpupation stages, is not the same one involved in vision, is not located in the compound eyes or ocelli, and is located in the brain. A.B.K.

A72-19537 # **Hormonal control of circadian rhythms in Drosophila.** L. Rensing (Göttingen, Universität, Göttingen, West Germany). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 527-539; Discussion, p. 539, 540. 47 refs.

Experiments with the hormone ecdysone were conducted in order to explore possible generalizations regarding synchronizing mechanisms and the 'circadian rule.' An approximate temporal sequence of events was derived on the basis of the results obtained. Stimulated by light or following the endogenous circadian rhythm, neurosecretory cells synthesize RNA. Neurohormone is probably synthesized about 4 to 6 hr later. The release of neurohormone induces the release of ecdysone, which in turn induces certain gene activities within 1 hr. G.R.

A72-19538 # **Metabolic control of temperature compensation in the circadian rhythm of Euglena gracilis.** K. Brinkmann (Institut für Molekularbiologie, Stöckheim, West Germany). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 567-588; Discussion, p. 589-593. 25 refs. Research supported by the Deutsche Forschungsgemeinschaft and the Stiftung Volkswagenwerk.

Experiments are carried out in a study of the metabolic mechanism of temperature compensation in a Euglena gracilis strain. A diagram is plotted to show the effect of temperature on the random motility of the strain. It is concluded that the mechanism of temperature compensation in the circadian rhythm of this strain may be controlled by the temperature coefficient of respiration. The conclusion is supported by existence of a correlation between the induction of lactic-acid fermentation and the transformation from frequency sensitivity to phase sensitivity during the temperature compensation of the circadian rhythm. V.Z.

A72-19539 # **Persistent circadian rhythm of cell division in Euglena - Some theoretical considerations and the problem of intercellular communication.** L. N. Edmunds, Jr. (New York, State University, Stony Brook, N.Y.). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 594-611. 46 refs. NSF Grants No. GB-4140; No. GB-6892; No. GB-12474.

Observed entrainment of the cell division rhythm in Euglena by low-frequency light-dark cycles and the results previously obtained with skeleton photoperiods, high-frequency cycles, random lighting regimes, and constant dim light are consistent with the concept of a circadian oscillation that controls the timing of cell division. Since this work dealt with photoautotrophically grown Euglena, it was complicated by the possible interaction of nutritional factors with the clock-phasing machinery. However, additional experiments with

a photosynthetic mutant of Euglena substantiate the previous conclusions. These findings are shown to raise theoretical problems concerning the significance of (1) free-run oscillations under nonconstant conditions, (2) variability in the free-running period, and (3) strongly persistent free-running rhythms with little, if any, decay in a population of Euglena. T.M.

A72-19540 # **Structural and functional rhythms in the chloroplasts of Acetabularia - Molecular aspects of the circadian system.** T. Vanden Driessche (Bruxelles, Université Libre, Brussels, Belgium). In: Biochronometry; Proceeding of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 612-621; Discussion, p. 621, 622. 24 refs.

Chloroplast-related endogenous circadian rhythms of the alga and the molecular basis of the associated overt processes are discussed in the light of available experiments. The possibility that two or more overt processes are different manifestations of the same rhythm is examined. Indications that proteins are involved in the mechanisms of all overt rhythms are assessed positively, suggesting that the state of conformity of all proteins is a significant contributor to the rhythmic process. Experimental evidence is given for the basic rhythmicity mechanism in Acetabularia. The possible involvement of transcription and translation in the rhythmicity of this species is discussed. V.Z.

A72-19541 # **Periodicities in intermediary metabolism.** E. K. Pye (Pennsylvania, University, Philadelphia, Pa.). In: *Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash.,* September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 623-634; Discussion, p. 634-636. 22 refs. NSF Grant No. GB-8270; PHS Grant No. GM-12202.

The properties of glycolytic oscillations in yeast are reviewed, and a mechanism for their generation is proposed which may apply in general terms to other metabolic pathways. It is shown that metabolic systems can generate self-sustained, essentially continuous oscillations in the concentrations of associated metabolites. These biochemical oscillations display many features (specific waveforms, amplitude modulation, damping, initiation, and phase-dependent phase shifts) which are analogous to those of rhythms observed at the behavioral and physiological levels. They do not, however, have the period length or temperature compensation characteristic of circadian rhythms. T.M.

A72-19542 # **Testing the chronon theory of circadian timekeeping.** A. Barnett (Maryland, University, College Park, Md.), C. F. Ehret (Argonne National Laboratory, Argonne, Ill.), and J. J. Wille, Jr. (Cincinnati, University, Cincinnati, Ohio). In: Biochronometry; Proceedings of the Symposium, Friday Harbor, Wash., September 4-6, 1969. Washington, D.C., National Academy of Sciences, 1971, p. 637-650; Discussion, p. 650, 651. 8 refs. AEC-sponsored research.

DNA-RNA molecular hybridization is studied in Tetrahymena *pyriformis and Paramecium multimicronucleatum ciliated protozoa* cells by a technique developed by Gillespie and Spiegelman (1965). A procedure is given for the preparation of timed RNA's. Also discussed are hybridization experiments in testing for the presence of distinct RNA molecules in different time cuts. The properties of the RNA isolated from the cells are described. Diagrams are given to show the kinetics of DNA-RNA hybridization. V.Z.

A72-19649 # **Thermal stability variations in blood serum protein after electrical stimulation of various hypothalamic structures (Zmini teplostiikosti bilkiv plazmi krovi pri elektrichnomu podraznenni riznikh gipotalamichnikh struktur).** O. F. Makarchenko, B. A. Roitrub, R. S. Zlatin, and O. I. Kostiuk (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 33, Dec. 1971, p. 1112-1117. 19 refs. In Ukrainian.

The effect of electrical stimulation of Nucleus mamillaris medialis, Nucleus supramamillaris and area hypothalamica lateralis on UV absorption by the protein of blood serum was investigated in a series of 68 chronic experiments on 9 rabbits. Light absorption measurements were made in serum samples at room temperature and after raising the sample temperature to 56 deg C for 30 min. Some changes in the UV absorption capacity of serum proteins were reliably established in heated samples when Nucleus mamillaris was stimulated. V.Z.

A72-19686 **Experimental reproduction of intravascular erythrocyte aggregation (Reproduction expérimentale de l'agrégation intravasculaire des éléments figurés du sang).** M. Aurousseau, A. Larcan, and M. Stoltz (Reims, Université, Reims; Nancy, Université, Nancy, France). *Journal de Physiologie,* vol. 63, no. 7, 1971, p. 695-704. 13 refs. In French.

A microcirculation study in rats has made it possible to identify a phenomenon characterized by intravascular erythrocyte aggregation (blood sludge). The formation, evolution, and eventual disappearance of this phenomenon have been examined. Morphologically different kinds of sludge are described. O.H.

A72-19827 # **Dark adaptation in the presence of waning background luminances.** L. Spillmann, A. T. Nowlan, and C. D. Bernholz (Massachusetts Eye and Ear Infirmary, Boston, Mass.). *Optical Society of America, Journal,* vol. 62, Feb. 1972, p. 177-181. 23 refs. PHS Grants No. NB-05691; No. NB-01482.

The course of dark adaptation following low-level preexposure was determined against background luminances whose logarithms decreased linearly with time. Luminance was reduced by 7 log units over periods of 3.5, 7, 14, and 21 min. Transient adapting fields of this kind yield curves that remain increasingly behind the time course of normal dark thresholds; the delay varies with the rate of background change. Increment threshold derived from such dark-adaptation curves exceed corresponding thresholds for stationary adapting fields by as much as 1.25 log unit, particularly during the scotopic portion of steep luminance descents. The deficit in contrast sensitivity may be attributed to the additive action of the real background plus the equivalent background resulting from the pre-exposure bleach. (Author)

A72-19828 # **Photochromatic interval during dark adaptation and as a function of background luminance.** L. Spillmann (Massachusetts Eye and Ear Infirmary, Boston, Mass.) and J. E. Conlon (Retina Foundation, Boston, Mass.). *Optical Society of America, Journal,* vol. 62, Feb. 1972, p. 182-185. 25 refs. PHS *Grants No. NB-05691; No. NB-01482.*

Achromatic and chromatic thresholds for a 535-nm stimulus were determined during dark adaptation and against background luminances varying over a range of 20 million. In contrast to light thresholds, which decrease from photopic to scotopic values, curves for color thresholds first fall, then rise until they reach a steady level. The change of trend occurs before or at the transition from cone to rod function. The resulting increase of the photochromatic interval with dark adaptation and decreasing background luminance is described by a sigmoid function. The increment of color thresholds after the initial decline is tentatively attributed to chromatic desaturation caused by rod intrusion. (Author)

A72-19850 * **Apollo 12 lunar material - Effects on lipid levels of tobacco tissue cultures.** J. D. Weete (Lunar Science Institute, Houston, Tex.), C. H. Walkinshaw (U.S. Forest Service; NASA, Manned Spacecraft Center, Lunar Receiving Laboratory, Houston, Tex.), and J. L. Laseter (Louisiana State University, New Orleans, La.). *Science*, vol. 175, Feb. 11, 1972, p. 623, 624. 16 refs. Contracts No. NSR-09-051-001; No. NAS9-11339.

Tobacco tissue cultures grown in contact with lunar material from Apollo 12, for a 12-week period, resulted in fluctuations of both the relative and absolute concentrations of endogenous sterols and fatty acids. The experimental tissues contained higher concentrations of sterols than the controls did. The ratio of campesterol to stigmasterol was greater than 1 in control tissues, but less than 1 in the experimental tissues after 3 weeks. High relative concentrations (17.1 to 22.2 per cent) of an unidentified compound or compounds were found only in control tissues that were 3 to 9 weeks of age.

(Author)

A72-19859 # **Conditioned reflex, evoked on the basis of hypothalamic stimulation, before and after isolation of the neocortex (Uslovnaia reaktsiia, vyrabotannaia na baze razdrazheniia gipotalamusa, do i posle vykliucheniia novoi kory).** A. V. Kvirtskhaliia. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 64, Nov. 1971, p. 441-444. 9 refs. In Georgian, with abstract in Russian.

A conditioned negative fear reaction in response to sound was evoked in cats during stimulation of different regions of the hypothalamus. This reflex persists for two to three weeks in normal cats and is not eliminated by damage of hypothalamic regions whose stimulation conditioned the response. Extirpation of the neocortex does not fully eliminate the reflex which persists in simplified form. The reflex took much more time to be established in deneocorticated cats, and persisted for only several days. It is concluded that in both normal and deneocorticated animals this reflex is established mainly through the archipaleocortex, while the neocortex serves mainly to retain the conditioned response. T.M.

A72-19875 **Fitting the task to the man: An ergonomic approach /2nd revised and enlarged edition/.** E. Grandjean (Eidgenössische Technische Hochschule, Zurich, Switzerland). London, Taylor and Francis, Ltd., 1971. 169 p. 72 refs. Translation. $11.70.

The physiology of the muscular system is discussed, giving attention to muscular performance, static and dynamic muscular work, nervous control of movement, and muscular fatigue. Questions of improving working efficiency are considered, together with man-machine systems, physiological facts concerning heavy work, and aspects of fatigue. The suitable arrangement of daily working time, rest pauses, and factors of food consumption have a definite effect on operator efficiency. Other subjects investigated include the significance of light and color, effects of noise, and the importance of the working environment. G.R.

A72-19910 **Vigilance: The problem of sustained attention.** C. M. Stroh (Ministry of Transport, Ottawa, Canada). Oxford and New York, Pergamon Press (International Series of Monographs in Experimental Psychology. Volume 13), 1971. 111 p. 277 refs. $8.25.

The extensive research that has been conducted so far on vigilance phenomena is critically reviewed and summarized. The factors supposed to influence vigilance performance - i.e., the ability to maintain attention - are examined, and the existing theories of vigilance are surveyed. Discrepancies in earlier research work are elucidated, and findings from other areas of psychology are employed to help explain apparent contradictions. Finally, a new theory of vigilance performance is proposed, and some of the data resulting from the author's recent investigations are presented. O.H.

A72-19911 # **A study of the pressure of the cerebro-spinal fluid by remote monitoring through the skull. I - Biology.** K. L. Allen (Johannesburg Hospital; Witwatersrand, University, Johannesburg, Republic of South Africa) and H. A. Sun (EDAC /Pty./, Ltd., Johannesburg, Republic of South Africa). *South African Council for Scientific and Industrial Research, Symposium on Biotelemetry, Pretoria, Republic of South Africa, Nov. 23-26, 1971, Paper.* 45 p. 13 refs. Research supported by the South African Council for Scientific and Industrial Research, the Medical Research Council, and the Anglo-American Corp.

The ventricular cerebro-spinal fluid pressures within the naturally closed (partially vented) cranio-spinal system in man have been experimentally studied. Telemetric recordings obtained from a miniature passive pressure transducer, called 'radio pressure pill' and implanted intercranially to fully free and conscious patients, have been employed in this study. The variety of information on the intracranial dynamic events that can be obtained in this way, particularly on average mean pressures and pulsatile fluctuations, is discussed and analyzed. The design of the passive pressure transducer employed is described in detail, and its fidelity is examined. Finally, the receiver detector recorder system is dealt with. O.H.

A72-19912 # **Instrumentation for remote observation of physiology and behavior.** H. A. Baldwin (Sensory Systems Laboratory, Tucson, Ariz.). *South African Council for Scientific and Industrial Research, Symposium on Biotelemetry, Pretoria, Republic of South Africa, Nov. 23-26, 1971, Paper.* 38 p.

Several physiological telemetry studies of free-roaming animals in their natural or normal habitats are described. Included are telemetry investigations of the following problems: the heart rate of free-flying sparrow hawks; the role of convective cooling in the African elephant ear; the function of zebra stripes and their relationship to solar radiation; surface body temperature and its correlation with the behavior of the African buffalo; digestive responses indicated by temperature shifts in the abdominal cavity of the Mexican wolf; skin temperature correlation with sensory alerting responses in a trained bird dog; the heat flux in the polar bear under Arctic weather conditions; and the goal finding ability in the marine sea turtles when the earth's magnetic field is modified. Telemetric instrumentation employed in these studies, such as the heart rate transmitter, receiver and tachometer, and temperature transmitter, is also described. O.H.

A72-19913 * # **Satellite monitoring of black bear.** J. J. Craighead (Bureau of Sport Fisheries and Wildlife; Montana, University, Missoula, Mont.), F. C. Craighead, Jr. (New York, State University, Albany, N.Y.; Environmental Research Institute, Moose, Wyo.), J. R. Varney (Montana, University, Missoula, Mont.), and C. E. Cote (NASA, Goddard Space Flight Center, Greenbelt, Md.). *South African Council for Scientific and Industrial Research, Symposium on Biotelemetry, Pretoria, Republic of South Africa, Nov. 23-26, 1971, Paper.* 41 p. 11 refs.

Description of a feasibility experiment recently performed to test the use of a satellite system for telemetering environmental and physiological data from the winter den of a 'hibernating' black bear, Ursus americanus. The instrumentation procedure and evaluations of the equipment performance and sensory data obtained are discussed in detail. M.V.E.

A72-19915 * # **Bio-medical telemetry - Sensing and transmitting biological information from animals and man.** S. Mackay (Boston University, Boston, Mass.). *South African Council for Scientific and Industrial Research, Symposium on Biotelemetry, Pretoria, Republic of South Africa, Nov. 23-26, 1971, Paper.* 23 p. 6 refs. Research supported by the John Hartford Foundation; Grant No. NGR-22-004-024.

Several examples are presented of radio transmitters swallowed, surgically implanted, or carried externally to study animal and human objects with minimum disturbance to normal activity patterns. Particular attention is given to the method of using satellite-borne receivers for determining the position of animals or other objects carrying fixed-frequency transmitters. The design and operation of the instrumentation necessary for this purpose are described. O.H.

A72-19916 # **Advances in and prospects for biotelemetry.** M. Milner (Groote Schuur Hospital, Cape Town, Republic of South Africa). *South African Council for Scientific and Industrial Research, Symposium on Biotelemetry, Pretoria, Republic of South Africa, Nov. 23-26, 1971, Paper.* 24 p. 21 refs.

Review of the scope, problems, advances, and limitations of biotelemetry, and discussion of some of its implementation and application aspects. Medical applications are shown to include studies of exercise physiology and ergonometrics, peristalsis observations, intercranial and bladder pressure measurements, detection of bleeding in the gastrointestinal tract, and foetal monitoring. Animal experiments include the implantation of telemetry systems making possible the capture of electroencephalographic data and the injection of control signals into the brain or nervous system. Physiological aspects of birds in flight have been investigated and temperature variations of incubating eggs studied. Telemetry has enabled animal movements to be tracked under free ranging conditions over several kilometers. Telemetry limitations are allied essentially with materials science and power sources. Some of the critical areas are pointed out. M.V.E.

A72-19917 * # **Biomedical transducers.** J. L. Stuart (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *South African Council for Scientific and Industrial Research, Symposium on Biotelemetry, Pretoria, Republic of South Africa, Nov. 23-26, 1971, Paper.* 20 p. 8 refs.

Examples are given of some of the sensors and attachment techniques that have been developed during the last few years at the NASA centers for use in the space program. A detailed description is first given of the successive development of ECG electrodes, starting from their original simple form, that eventually resulted in the novel technology of spray-on electrodes. Finally, features of a new telemetering system under development, which is suitable for the recovery of ECG, respiration, body core temperature, and surface temperature, are outlined. O.H.

A72-19919 The probability of visual detection of objects as a function of their angular size, contrast and search time. N. I. Pinegin and N. P. Travnikova. *(Optiko-Mekhanicheskaia Promyshlennost',* vol. 38, May 1971.) *Soviet Journal of Optical Technology,* vol. 38, May 1971, p. 257-260. Translation.

The exponential probability distribution of visual detection of objects has been found. A method of selecting and training observers is recommended. The effectiveness of binocular search as compared with monocular is evaluated. Finally, the detection times of objects that are darker or lighter than the background are examined. O.H.

A72-19993 Clinical response to nitroglycerin as a diagnostic test for coronary artery disease. L. D. Horwitz (Texas, University, Dallas, Tex.), M. V. Herman (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.), and R. Gorlin (Howard Hughes Medical Institute, Boston, Mass.). *American Journal of Cardiology,* vol. 29, Feb. 1972, p. 149-153. 10 refs. Research supported by the Women's Aid for Heart Research; PHS Grants No. PO-1-HE-11306; No. IT-1-HE-5679.

The value of the subjective response to nitroglycerin, reported in a standardized interview, is assessed as an aid to diagnosing obstructive coronary artery disease. The response to the drug was correlated with the results of coronary angiography in 70 patients with chest pain of the anginal type. The population comprised 49 patients with coronary artery disease and 21 patients without demonstrable coronary lesions. The results indicate that 90% of patients with recurrent, angina-like chest pain who exhibit a prompt response to nitroglycerin have coronary artery disease; a delayed or absent response paradoxically indicates either absence of coronary artery disease or unusually severe disease and angina. M.V.E.

A72-19994 Pitfalls in prediction of coronary arterial obstruction from patterns of anterior infarction on electrocardiogram and vectorcardiogram. J. Hilsenrath, R. I. Hamby, E. Glassman, and I. Hoffman (Long Island Jewish Medical Center, New Hyde Park, N.Y.). *American Journal of Cardiology,* vol. 29, Feb. 1972, p. 164-170. 23 refs.

Investigation of the predictability of coronary artery disease and severity of vessel involvement from electrocardiographic and vectorcardiographic patterns of anterior wall myocardial infarction. The results obtained suggest that caution is indicated in the prediction of coronary artery disease from electrocardiographic or vectorcardiographic records, especially in patients selected for catheterization procedures. M.V.E.

A72-19995 Clinically suspect ischemic heart disease not corroborated by demonstrable coronary artery disease - Physiologic investigations and clinical course. W. A. Neill, M. P. Judkins, D. S. Dhindsa, J. Metcalfe, D. G. Kassebaum, and F. E. Kloster (Oregon, University; U.S. Veterans Administration Hospital, Portland, Ore.). *American Journal of Cardiology,* vol. 29, Feb. 1972, p. 171-179. 15 refs. Research supported by the Oregon Heart Association; PHS Grants No. HE-10433; No. HE-06042; No. HE-06336.

In 11 patients with angina pectoris and abnormal stress electrocardiograms, no narrowing or obstruction of coronary vessels was visible by selective cut film and coronary cinearteriography. One patient showed chemical evidence of myocardial hypoxia despite normal arteriograms. Similar evidence of impaired myocardial oxygen supply was absent in the remaining 10 patients. We found no abnormality in hemoglobin O2 affinity which might jeopardize myocardial O2 supply. The clinical course of these patients, including that during a 1 to 2 year followup period, has not been complicated by myocardial infarction or cardiac failure. In 5 symptoms have decreased. (Author)

A72-20087 # **The fluid mechanics of pulsatile flow in the microcirculation.** J. F. Gross and J. Aroesty (RAND Corp., Santa Monica, Calif.). In: Symposium on Advanced Problems and Methods in Fluid Mechanics, 10th, Rynia, Poland, September 6-11, 1971, Proceedings. Part 2. Warsaw, Państwowe Wydawnictwo Naukowe, 1972, p. 257-268. 28 refs.

Discussion of some basic aspects of pulsatile fluid mechanics in the microcirculation in the light of the interaction with a non-Newtonian model for blood flow and a preliminary network model for a composite microcirculatory bed. The problem of fluid mechanics in the pulsatile microcirculation is shown to be important to the physiologist and clinician primarily in regard to its role in determining the nature and scale of the transcapillary mass transport processes. Work presently under way is devoted to the study of the rheology of blood in vessels less than 100 microns thick, a careful analysis of the nature of the plasma layer and its relevance to in vitro measurements, and refinement and extension of the network model to include a more accurate representation of the cardiac pressure input and mass transfer at the wall. M.V.E.

A72-20162 **Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings.** *Symposium sponsored by the U.S.* Department of Transportation, Contract No. DOT-OS-AP-036. Edited by J. D. Chalupnik (Washington, University, Seattle, Wash.). Seattle, University of Washington Press, 1970. 366 p. $14.50.

Various scales for evaluating transportation noises are examined in papers dealing with specific types of sources, difficulties caused by qualitative dissimilarities, philosophical aspects of scales and measures, *meaningful interpretation of measurements on a standardized* basis, and community reaction surveys. Frequency spectra, propagation characteristics, and time histories are given for aircraft engine noise components, sonic boom, and surface transportation noises. Mathematical fundamentals, experimental procedures, and typical results are explained for noise rating methods based on psychophysical comparison, psychophysical scaling, hearing damage, speech interference, and other criteria.

T.M.

A72-20165 **Loudness.** I. Pollack (Michigan, University, Ann Arbor, Mich.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 59-68.

Some commonly used methods for assessing the loudness of sounds are critically examined, and studies applying loudness scaling methods to transportation noises are reviewed. Loudness matching procedures are shown to be complicated by qualitative differences between the reference source and the noise subject to assessment. Development of equal loudness contours for tones is discussed, and attention is given to the definition of units of measure that can provide a loudness scale. Stevens magnitude scales are analyzed, together with problems arising in the use of available scales for assessment of typical transportation noises. T.M.

A72-20166 **Annoyance /Perceived noisiness/.** K. D. Kryter (Stanford Research Institute, Menlo Park, Calif.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 69-84. 27 refs.

Development of standard procedures for the evaluation of noise on the basis of physical measurements requires the definition of an attribute of sound to be called annoyance or perceived noisiness. Results of psychological judgment tests of perceived noisiness are reviewed in an attempt to provide a fundamental definition of the concept. Attention is then given to the establishment of primary and secondary standards for estimating (from physical measurements) attributes of perceived noisiness that account for spectra weighting, spectral complexity, integration over time, and onset duration. Tables compare the efficiency of different perceived noise level (PNL) measures in predicting the results of judgments of the relative perceived noisiness of a large variety of aircraft flyover noises. These data serve to indicate the best units for estimating the effective PNL. T.M.

A72-20167 ***Noise rating methods for predicting speech*** **communication effectiveness.** J. C. Webster (U.S. Naval Electronics Laboratory Center, San Diego, Calif.) and R. S. Gales (U.S. Naval Undersea Warfare Center, San Diego, Calif.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 85-102. 35 refs.

The use of AI, SIL-PSIL, NC-NCA, PNL, and A-weighted sound levels as measures of the speech interfering properties of noises is explained in terms of theoretical fundamentals, experimental procedures, and significance of results obtained. Charts and tables summarize the limits which are imposed on speech communication by noise. These data illustrate the communication capability which can be expected under various levels of noise when using various communication techniques and equipment. T.M.

A72-20168 **Psychophysical comparison methods.** D. M. Green (California, University, La Jolla, Calif.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 153-164. 12 refs.

Description of different psychophysical comparison methods used to validate procedures for calculating the noisiness or annoyance value of sounds. It is emphasized that instructions given to the subjects about the attribute to be judged affect the result in a crucial manner; it is desirable to provide independent evidence to indicate which set of instructions is operative in a given experiment. Emphasis is placed on the method of adjustment and on the paired-comparison method for psychophysical comparison of auditory stimuli. The utilization of these two methods for the selection of the best calculation procedure in rating the annoyance of sound is illustrated by means of scattergrams providing a comparison of various sound measures. T.M.

A72-20169 **Hearing damage.** W. D. Ward (Minnesota, University, Minneapolis, Minn.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 174-186. 14 refs. Research supported by the Deafness Research Foundation and PHS.

Survey of problems arising in the scaling of hearing damage as a physiological method of evaluating human response to transportation noise. The extent of hearing loss required for the affected subject to become aware of a hearing difficulty is identified as a critical question requiring further research. Values of hearing level which constitute complete loss of hearing must be more precisely defined, and the relative importance of different audiometric frequencies must be evaluated. Some specific proposals for damage-risk criteria are compared and evaluated in terms of desired meaningful results. T.M.

A72-20170 **Procedure for correcting perceived noise level calculations for the effect of background noise.** D. C. Nagel (California, University, Los Angeles, Calif.), J. E. Parnell (Southern California, University, Los Angeles, Calif.), and H. J. Parry (Lockheed-California Co., Burbank, Calif.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 187-196. FAA-supported research.

Results of cross modality tests were used to develop a method that accounts for the effects of background noise in the perceived noise level calculation. The procedure reduces the sound pressure level of each third octave band of the judged noise by an amount dependent upon the signal-noise to background-noise ratio in that frequency band. Preliminary calculations have shown that for realistic background spectra and signal-noise to background-noise ratios of 40 dB the predicted effect upon the perceived noise level of a judged noise is approximately 3 PNdB. T.M.

A72-20171 Preliminary analysis of some factors that influence equal attribute judgment experiments using acoustic stimuli. H. J. Parry (Lockheed-California Co., Burbank, Calif.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 197-203. 5 refs.

It is shown that additional factors other than differences in subject instruction can account for differences in equal attribute contours as large as those found by Kryter and Pearsons (1963). These additional factors include the experimenter (or facility), the subject age, the type of sound field, and the subject sex. T.M.

A72-20172 Predicting community response to noise from laboratory data. W. J. Galloway (Bolt Beranek and Newman, Inc., Los Angeles, Calif.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 269-291. 18 refs.

It is shown that laboratory experiments can provide a means for comparing one set of noises with another when an arbitrary evaluation of one noise attribute against another is desired. A judgment of what magnitude of noise is termed acceptable to an individual can be attempted by limited field experiments coupled with related laboratory experiments. This method of noise description can be utilized to determine how a measure of noise, plus other attributes, correlates with reactions indicated in complaints or social surveys. T.M.

A72-20173 Criteria for design. J. W. Little (Boeing Co., Renton, Wash.). In: Transportation noises; Symposium on Acceptability Criteria, University of Washington, Seattle, Wash., March 26-28, 1969, Proceedings. Seattle, University of Washington Press, 1970, p. 292-306. 6 refs.

Design criteria aimed at the regulation of transportation system noise are defined in terms of requirements involving limits, scales, standards for judgment, demonstrability, and tolerances. Some types of criteria which are currently available are surveyed, with emphasis on the role of laboratory findings. Criteria based on ambient noise, absolute limit criteria, hearing damage considerations, speech interference scales, and subjective reaction data are examined. An overall philosophy leading to the development of an equitable system for defining criteria limits and scales is outlined. T.M.

A72-20174 Electrocardiogram and vectorcardiogram in myocardial infarction. H. D. Levine, E. Young, and R. A. Williams (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.). *Circulation,* vol. 45, Feb. 1972, p. 457-470. 58 refs. Research supported by the Peter Bent Brigham Hospital; PHS Grants No. PO-1-HE-11306; No. 5-T02-HE-00297.

Specific situations are discussed in which the vectorcardiogram may prove particularly helpful in the diagnosis of myocardial infarction and, specifically, may delineate changes in QRS when the electrocardiogram is normal or shows only nonspecific changes. Attention is focused upon those planes which generally are most useful for a specific diagnosis - i.e., the horizontal plane for anterior or posterobasal infarction, and the frontal plane for inferior infarction. O.H.

A72-20175 Metabolic response during impending myocardial infarction. I - Relevance of studies of glucose and fatty acid metabolism in animals. L. H. Opie (Cape Town, University; Groote Schuur Hospital, Cape Town, Republic of South Africa). *Circulation,* vol. 45, Feb. 1972, p. 483-490. 42 refs. Research supported by the Chris Barnard Fund, the University of Cape Town, and the Medical Research Council of the Republic of South Africa.

The validity of the hypotheses that glucose has a beneficial effect on the ischemic or infarcting myocardium, whereas free fatty acids are toxic, is examined in the light of experimental evidence. It is suggested that free fatty acids are not necessarily toxic, and that there is no evidence for any harmful consequences of glucose administration to patients with acute myocardial infarction. O.H.

A72-20176 # Desynchronization of body temperature and performance circadian rhythm as a result of outgoing and homegoing transmeridian flights. K. E. Klein, H. M. Wegmann, and B. I. Hunt (Wright State University, Dayton, Ohio; Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 119-132. 46 refs. Contract No. F33615-70-C-1598. (AMRL-TR-71-89)

Rectal temperature and performance were studied and urine samples taken in a group of eight United States residents before and after flights between the U.S.A. and Germany. It was found that it took 14-15 days following the eastbound and 11-12 days after the westbound flight for the phase of the temperature rhythm to readjust completely. For the more complex (psychomotor) performance task, the corresponding figures were 12 and 10 days; for the simpler ones, including visual reaction time, they were nine and six days, respectively. Phase shift, amplitude reduction and decrease of the 24-hour mean together resulted in a depression of temperature significant on both 1st postflight days. This depression occurred mainly at 1200 and 1500 hours after eastbound travel and at 2100 and 2400 hours after westbound travel. At the same time postflight temperature was significantly elevated for five days between 2400 and 0600 hours after eastbound travel and for three days between 0600 and 0900 hours after westbound travel. Performance revealed depressions and elevations of 6-10% at similar clock hours of the day. The more pronounced and longer lasting effect of eastbound travel is in concordance with the earlier results obtained from studies done with German residents. (Author)

A72-20177 Cardiovascular and respiratory responses to intra-arterial injection of K/+/ and Na/+/. C. T. Liu, R. A. Huggins, and H. E. Hoff (Baylor University, Houston, Tex.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 133-137. 12 refs. NIH Grant No. HE-05435.

Within three seconds following an injection of hypertonic or isosmotic KCl into a dog femoral artery at doses of 3, 10, and 30 mg/kg, significant increases in mean blood pressure, heart rate, cardiac contractile force, respiratory rate, and minute volume occurred. The augmented responses were dose dependent and lasted for 2-4 min. After the injection of isosmotic solution containing both NaCl and KCl, the magnitude of increased cardiovascular and respiratory responses was reduced. Isotonic NaCl produced no change, but hypertonic saline (3.5 M) evoked some degree of responses. Upon section of femoral, hamstring, and sciatic nerves of the injected leg, the K(+)-induced responses were abolished at the lowest dose level (3 mg/kg), and markedly diminished at high dose levels (10-50 mg/kg). The K(+)-induced cardiopulmonary responses persisted after the removal of the leg skin, indicating that the postulated peripheral receptors are located in the muscle. (Author)

A72-20178 Duty hours and sleep patterns in aircrew operating world-wide routes. A. N. Nicholson (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *(Aerospace Medical Association, Annual Scientific Meeting, 42nd, Houston,*

Tex., Apr. 26-29, 1971.) Aerospace Medicine, vol. 43, Feb. 1972, p. 138-141.

Sleep patterns of an airline pilot operating world-wide, east-west routes have been related to duty hours. It is suggested that duty hours compatible with an acceptable sleep pattern may be related in a logarithmic manner with the number of days of the schedule. It would appear that the most critical consideration in preserving a control sleep pattern may involve the relation between total duty hours and duration of schedule. (Author)

A72-20179 * **Effect of a 30-day isolation stress on calcium, phosphorus and other excretory products in an unrestrained chimpanzee.** I. M. Sabbot, J. J. McNew, T. Hoshizaki, C. J. Sedgwick, and W. R. Adey (California, University, Los Angeles, Calif.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 142-148. 30 refs. Contracts No. NSR-05-007-158; No. F44620-70-C-0017.

An unrestrained chimpanzee was studied in an isolation chamber and in his home cage environment. The study consisted of 49 urine collection days (14 days pre-, 5 days post- and 30 days of isolation), and then of 10 days in the home cage. Dietary intake, urine and fecal data were obtained. The effect of isolation on various excretory parameters was studied. Urine samples were analyzed for volume, osmolarity, creatinine, creatine, urea-N, 17-hydroxy corticosteroids, VMA, calcium and inorganic phosphorus. One way analyses of variance performed on the urinary excretion parameters showed all except creatinine excretion to vary significantly during periods of the study. The changes observed in calcium and phosphorus were highly significant. The data suggests that the calcium to phosphorus excretion ratio might serve as a physiological stress indicator of Selye's adaptation syndrome (period of resistance). (Author)

A72-20180 * **Micturition patterns of an unrestrained chimpanzee under entrained and free running conditions.** T. Hoshizaki, J. J. McNew, I. Sabbot, and W. R. Adey (California, University, Los Angeles, Calif.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 149-154. 22 refs. Contracts No. NSR-05-007-158; No. F44620-70-C-0017.

A young male chimpanzee was subjected to 30 days of isolation. Urine volumes and voiding times were recorded every hour beginning 14 days prior to isolation, ending 6 days after isolation, and approximately 2 months later for 10 days as a control. Observed during most periods of the experiment were (1) clear circadian micturition rhythms with the voiding peak occurring immediately after the subject awoke and (2) urine flow rhythms with the maximum volume voided in the morning hours. A 24-hour rhythm was seen when the subject was entrained to 12L:12D treatments and 24.8-hour rhythm when he was exposed to continuous light. A possible underlying 24-hour micturition rhythm was also seen during the continuous light period. Distorted rhythm curves indicating possible stress were obtained for the pre-isolation adaptation period and the initial period of isolation. As time passed, the curves were more like the controls, perhaps indicating a decrease in stress. (Author)

A72-20181 * **Sleep-wake cycle of an unrestrained isolated chimpanzee under entrained and free running conditions.** J. J. McNew, R. C. Burson, T. Hoshizaki, and W. R. Adey (California, University, Los Angeles, Calif.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 155-161. 22 refs. Contracts No. NSR-05-007-158; No. F44620-70-C-0017.

Biorhythmic patterns of EEG activity - the sleep-wake cycle and the sleep cycle - were investigated in an unrestrained chimpanzee subjected to 30 days of isolation in a 4-ft cubical cage placed in a high performance sound isolation chamber. The animal received 10 days of 12 hours of light and 12 hours of dark, then 10 days of continuous light, followed by 10 more days of 12 hours of light and 12 hours of dark. The circadian sleep-wake rhythm and the wake and sleep phases of this rhythm during entrained and free running conditions were analyzed in terms of duration. The awake and nonREM sleep and REM sleep stages were also analyzed. In addition, the mean duration of the sleep cycle of the sleep phase was computed. (Author)

A72-20182 **Response of the cardiovascular system in oxygen toxicity.** C. D. Wood, G. F. Perkins, A. G. Smith (Louisiana State University, Shreveport, La.), and J. M. Reaux. *Aerospace Medicine,* vol. 43, Feb. 1972, p. 162-167. 22 refs. U.S. Veterans Administration Grant No. RC-515-4.

The pulmonary edema resulting from exposure to hyperbaric oxygen was found to be secondary to a systemic hypertension which produced left ventricular failure. Elevated pulmonary venous pressures resulted which caused edema fluid to pass into the alveoli along with some intact red blood cells. Microscopic and gross changes in the lungs with pulmonary edema resulting from exposure to hyperbaric oxygen were identical to lungs with pulmonary edema resulting from preoptic hypothalamic injections of aconitine. These changes also were similar to those seen in clinical cases of pulmonary edema resulting from hypertensive heart failure. Our results indicate that much of the major pulmonary pathology seen in oxygen toxicity could be accounted for by cardiovascular effects. (Author)

A72-20183 **Leg pain and gas bubbles in the rat following decompression from pressure - Monitoring by ultrasound.** M. R. Powell (Ocean Systems, Inc., Tarrytown, N.Y.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 168-172. 21 refs. Contract No. N00014-69-C-0346.

Through-transmission mode ultrasound, at a frequency of 5.7 MHz, has been employed to study gas-liquid phase separation in rats resulting from decompression. The time course for this separation was compared to the time course for development of decompression sickness signs in rats exercising on a treadmill. The parameters of ultrasound signal attenuation, i.e., time to attain an effect, rate of change of effect and magnitude of effect, parallel the manifestations of corresponding signs of decompression sickness. The results are discussed in terms of a working hypothesis which considers bubbles to be the necessary and sufficient mechanism for the several pathophysiological manifestations of decompression sickness and death. Three bubble 'types' differing in anatomic location and size are postulated. (Author)

A72-20184 # **Urea nitrogen-uric acid ratios as a means of identifying avian tissue.** E. J. Stork (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 172-175. 24 refs.

Description of studies conducted with the aim of devising a quick and simple chemical test for identifying avian tissue in aircraft accidents suspected to have been caused by a midair collision with birds or bird ingestion by a jet engine. The test proposed as a result of these studies is based on the ratio of urea nitrogen to uric acid that is distinctly different in tissues of mammals, birds, and insects. M.V.E.

A72-20185 **Response from arousal and thermal sweat areas during motion sickness.** J. A. McClure, A. R. Fregly, E. Molina, and A. Graybiel (U.S. Naval Aerospace Medical Institute, Pensacola, Fla.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 176-179. 9 refs. Navy-sponsored research; Defence Research Board of Canada Grant No. 9310-112.

The sweat response from the palm (an arousal sweat area) is compared with that from the dorsal hand and arm (a thermal sweat

area) during the elicitation of motion sickness by vestibular stimulation. Both palmar and dorsal sweating were detected by using galvanic skin response techniques. In addition, the dorsal sweat response was monitored by an electrochemical sweat sensor. The palmar sweat response is maximum during the first few head movements while a subject is rotating at constant velocity and quickly declines with continuation of the stimulus. This is typical of the arousal sweat response seen on the palm of the hand in response to any unusual sensory input. On the other hand, dorsal sweating has a definite latency, followed by a gradual increase in magnitude of the response. This is characteristic of most motion sickness symptomatology. (Author)

A72-20186 # **Effect of hypoxia on aircraft pilot performance.** R. E. Gold and L. L. Kulak (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 180-183. 13 refs. (AMRL-TR-71-97)

Seven FAA instrument rated pilots were exposed to three gas mixtures simulating ground level and altitudes of 12,300 feet and 15,000 feet. Performance was objectively measured while flying ILS instrument approaches in an aircraft simulator. Significant decrements in performance were found at the .05 and .01 confidence level at 12,300 feet simulated altitude and at the .005 level at 15,000 feet simulated altitude. It is concluded that supplemental oxygen is needed at or above 12,000 feet for any crew member involved in a complex task. (Author)

A72-20187 # **Study of the feasibility of using perforated and split ear protectors in aircraft during flight.** V. C. Bragg and R. Danford, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 193-196. 7 refs.

To determine the possibility of providing additional protection from noise for aircraft crewmembers without risk of excessive pressure on the tympanic membrane, two modifications to standard USAF earplugs were tested. The first involved insertion of a small (.023 in ID) polyethylene tube through the longitudinal dimension of the V-51R plug. This procedure provided sufficient ventilation to prevent any buildup of pressure within the external canal, but some sacrifice in low frequency attenuation was noted. By slitting across the septum of the plug a valve was formed which opened during climb and descent but remained closed at all other times with only negligible changes in the noise attenuation characteristics of the plug. (Author)

A72-20188 **Aviator performance and the use of hypnotic drugs.** C. R. Harper and G. J. Kidera (United Air Lines, Inc., Denver, Colo.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 197-199. 5 refs.

The use of hypnotic drugs for sleep inducement has in general been avoided in the practice of aviation medicine. The caution has been based on the possible next day effects of the drug on flight safety and performance. The double-blind study design was to evaluate objectively and subjectively any performance decrement in a flight task after two nights of hypnotic drug induced sleep. The 'aircraft' utilized was a twin turbo-jet flight simulator. Thirty pilots performed 300 ILS instrument approaches. A Sanborn 8-channel recorder was used as a measure of the flight parameters. Two drugs and a placebo were used. The drugs were glutethimide and flurazepam. The objective flight recorder data indicate no significant decrement in flight performance greater than the placebo effect itself. Subjectively, flurazepam was superior to glutethimide, particularly in the hangover effect. (Author)

A72-20189 **Idiopathic subvalvular aortic stenosis - A case report in a pilot.** H. S. Turner, V. K. Philips, and R. F. Leighton (Ohio State University; Columbus Medical Center, Columbus, Ohio). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 200-203. 7 refs.

Idiopathic subvalvular aortic stenosis has been recognized as a clinical entity for only slightly more than a decade, although isolated reports appeared prior to 1960. The disorder is characterized by stenosis in the infundibulum of the left ventricle either by muscle or membrane. In patients with hypertrophic muscular stenosis, left ventricular hypertrophy is noted involving particularly the interventricular septum and the left ventricular outflow tract. The outflow tract obstruction is aggravated during systole by contraction of the hypertrophied muscle. Marked enlargement of papillary musculature and of the trabeculae are typical findings as are deformation of the mitral valve and thickening of the anterior mitral valve leaflet. In other patients, a true subaortic muscular hypertrophy may not be present; rather, a subvalvular membrane, diaphragm or ridge may produce the obstruction. A case report is presented. (Author)

A72-20190 # **Drusen of the optic disc with visual field defect and Marcus Gunn pupillary phenomenon /Aeromedical Consultation Service case report/.** W. E. Barry and T. J. Tredici (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 203-206. 17 refs.

Optic disc drusen (colloid or hyaline bodies) are an important clinical finding in flight personnel. This paper presents a highly experienced, 41-year-old pilot who was found to have quadrantic uniocular visual field defect secondary to extensive optic disc drusen of the right eye. The Marcus Gunn pupillary phenomenon was a concomitant finding. Pitfalls of diagnosis, progression of visual field defects, calibrated perimetry, and the need for binocular field testing are stressed. (Author)

A72-20191 **Influence of exposure to compulsive locomotion and of hyperbaric oxygenation to gamma-aminobutyric acid levels in mice.** G. Schaefer and J. C. Delhaze (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institute für Flugmedizin, Bad Godesberg, West Germany). *Aerospace Medicine,* vol. 43, Feb. 1972, p. 209, 210. 13 refs.

The gamma-aminobutyric acid (GABA) level in the brain extracts of mice after 72-hr REM-sleep deprivation shows an increase by about 20% in comparison with the level in the control group. Additional hyperoxia leads to an increase of 26%, whereas hyperoxia without REM-sleep deprivation causes an increase of about 12% in the GABA concentration. M.V.E.

A72-20237 * **3-phosphoglycerate kinase from Hydrogenomonas facilis.** B. A. McFadden and E. Schuster (Washington State University, Pullman, Wash.). *Journal of Bacteriology,* vol. 109, Feb. 1972, p. 751-756. 30 refs. NIH Grant No. AM-14400; Grant No. NGR-48-001-004.

Description of studies of the kinetics of heat inactivation of phosphoglycerate kinase in the soluble fraction from Hydrogenomonas facilis, its extensive purification, and inhibition by adenosine monophosphate (AMP). No evidence was found for an enzyme which catalyzes adenosine-triphosphate-dependent conversion of 3-phosphoglycerate to 1,3-diphosphoglycerate, AMP, and phosphate. M.V.E.

A72-20238 * **Ultrastructure of Pseudomonas saccharophila at early and late log phase of growth.** H. L. Young, F.-C. Chao, C. Turnbill, and D. E. Philpott (NASA, Ames Research Center, Moffett Field; Stanford Research Institute, Menlo Park, Calif.). *Journal of Bacteriology,* vol. 109, Feb. 1972, p. 862-868. 22 refs.

Description of the fine structure of Pseudomonas saccarophila at the early log phase and the late log phase of growth, such as shown by electron microscopy with the aid of various techniques of preparation. The observations reported suggested that, under the experimental conditions applied, P. saccharophila multiplies by the method of constrictive division. M.V.E.

A72-20251 # **Oxygen intake and cardiac output during maximal treadmill and bicycle exercise.** M. Miyamura and Y. Honda (Kanazawa University, Kanazawa, Japan). *Physiological Society of Japan, Journal,* vol. 33, no. 6, 1971, p. 364, 365. 9 refs.

The maximum oxygen intake measured by means of maximal treadmill exercise is compared with that measured by bicycle ergometer exercise. The difference between these two measurements of the maximum oxygen intake is analyzed in terms of circulatory dynamic factors and of oxygen transport capacity in the circulating blood. M.V.E.

A72-20267 **Contamination by carbon monoxide (Contaminação pelo monóxido de carbono).** C. Faggiano. *ITA-Engenharia,* vol. 2, Sept. 1971, p. 34-37. In Portuguese.

Discussion of the dangers of high CO concentrations, and how to avoid, control, and analyze them. The study deals chiefly with the hazard to pilots if the gas enters the cabin. The danger is greatest during the winter and at altitude because windows and ventilating apertures are likely to be closed, and heating devices using engine exhaust gas are in operation. The symptoms of CO-poisoning are outlined; they range from mild headache to loss of muscular capability, vomiting, convulsions, and coma. Concentrations of CO in excess of 50 ppm are dangerous. Examples of accidents attributed to CO poisoning are cited, and various types of detection apparatus are described. F.R.L.

A72-20274 * **Idea of a new anatomy of the thalamus.** W. R. Mehler (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Psychiatric Research,* vol. 8, 1971, p. 203-217. 62 refs.

Review of some of the advances in knowledge about the thalamus and various aspects of thalamic function and organization accomplished during the last 15 years with the aid of improved neurophysiological research methods. Special attention is given to cytoarchitectural differentiations which, heretofore of little more than descriptive interest, have gradually begun to be clarified in terms of their functional significance. M.V.E.

A72-20275 * **Exercise temperature regulation in man in the upright and supine positions.** J. E. Greenleaf, D. H. Card, M. Rapport (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif.), A. L. van Kessel, and W. Ruff (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field; Stanford University, Stanford, Calif.). *Medicine and Science in Sports,* vol. 3, no. 4, 1971, p. 175-182. 31 refs.

Rectal, auditory canal, and mean skin temperatures and various metabolic measurements were taken on subjects during 70-min exercise periods, in the upright and supine positions, on a bicycle ergometer. The results indicate nonlinear relationships between sweating and core skin temperatures and suggest the action of undefined thermal and/or nonthermal inputs in the control of exercise temperature regulation. O.H.

A72-20300 # **Space research and world health - Special tasks and activities of WHO today and tomorrow (Weltraumforschung und Weltgesundheit - Spezialaufgaben und Aktivitäten der WHO heute und morgen).** H. Fellhauer. *Astronomie und Raumfahrt,* no. 6, 1971, p. 183-186. In German.

Some aspects of the collaboration of the World Health Organization (a special organization of UNO) with the International Academy of Astronautics (IAA), the International Astronautical Federation (IAF), and other organizations concerned with the relationship between man and his environment are reviewed. Particular attention is given to the application of space technology to contagious diseases, cardiovascular disorders, nutrition, as well as in the fields of environmental health, communication science, occupational health, radiation health, and health education. V.P.

A72-20329 **Real time simulation of the Apollo manned mission for NASA flight controller training.** W. M. Taylor (IBM Corp., Federal Systems Div., Houston, Tex.). In: Summer Computer Simulation Conference, Boston, Mass., July 19-21, 1971, Proceedings. Volume 1. Denver, Colo., Board of Simulation Conferences; Montvale, N.J., American Federation of Information Processing Societies, 1971, p. 135-139.

The primary training system for the flight controllers is the Ground Support Simulation Computer. The primary systems for the flight crew are the Command Module Simulator and the Lunar Module Simulator. Integrated training using both systems is the final phase of training which duplicates the entire environment. Extensive training of flight controllers is necessary to maximize flight crew safety. The real-world environment required is discussed together with mathematical models for initial proficiency training, the acquirement of malfunction capability, and system design concepts. G.R.

A72-20333 **Analysis of bioelectric data using hybrid computer techniques.** M. H. Kuo and G. A. Perdikaris (Wisconsin, University, Kenosha, Wis.). In: Summer Computer Simulation Conference, Boston, Mass., July 19-21, 1971, Proceedings. Volume 1. Denver, Colo., Board of Simulation Conferences; Montvale, N.J., American Federation of Information Processing Societies, 1971, p. 186-191. 7 refs.

This paper describes a method for analyzing bioelectric data using hybrid computer techniques. The autocorrelation function of the given data is first evaluated and stored in the digital portion of the hybrid computer. An optimum set of parameters is then determined whose corresponding model configuration has an impulse response that resembles the autocorrelation function of the original signal. (Author)

A72-20356 **Development in vivo simulation, and medical utility of a control system model for the mechanics of the human left ventricle.** K. M. Patil, D. N. Ghista, K. B. Woo, and C. Oliver (Washington University, St. Louis, Mo.). In: Summer Computer Simulation Conference, Boston, Mass., July 17-21, 1971, Proceedings. Volume 2. Denver, Colo., Board of Simulation Conferences; Montvale, N.J., American Federation of Information Processing Societies, 1971, p. 881-889. 7 refs.

The paper presents a control system model integrating the mechanics of the left ventricle, the circulatory system and their regulation by the central nervous system. The model is parametrically simulated for three subjects, whose diagnoses are made on the basis of the values of the diagnostic parameters and responses of their model systems to arterial pressure perturbations. (Author)

A72-20357 **A computer simulation of the human arterial system.** J. K. Raines, M. Y. Jaffrin, and A. H. Shapiro (MIT, Cambridge, Mass.). In: Summer Computer Simulation Conference,

Boston, Mass., July 17-21, 1971, Proceedings. Volume 2. Denver, Colo., Board of Simulation Conferences; Montvale, N.J., American Federation of Information Processing Societies, 1971, p. 890-900. 10 refs.

This paper describes a convenient and economical calculational procedure for nonlinear models of the human arterial system than can accommodate any prescribed physiologic data. Pressure and flow are calculated in time and space using a finite difference technique. Preliminary results illustrate the effects of convective acceleration, viscosity, and arterial compliance on the propagation of the pressure and flow pulses. (Author)

A72-20358 * **A predictive model of human performance.** R. F. Walters and L. D. Carlson (California, University, Davis, Calif.). In: Summer Computer Simulation Conference, Boston, Mass., July 19-21, 1971, Proceedings. Volume 2. Denver, Colo., Board of Simulation Conferences; Montvale, N.J., American Federation of Information Processing Societies, 1971, p. 911-918. 7 refs. Grants No. AF-AFOSR-69-1569; No. NGL-05-004-031.

An attempt is made to develop a model describing the overall responses of humans to exercise and environmental stresses for prediction of exhaustion vs an individual's physical characteristics. The principal components of the model are a steady state description of circulation and a dynamic description of thermal regulation. The circulatory portion of the system accepts changes in work load and oxygen pressure, while the thermal portion is influenced by external factors of ambient temperature, humidity and air movement, affecting skin blood flow. The operation of the model is discussed and its structural details are given. V.Z.

A72-20374 # **The significance of functional diagnostics in stomatological aviation medicine (Die Bedeutung der Funktionsdiagnostik in der stomatologischen Luftfahrtmedizin).** T. Kressin (Medizinischer Dienst des Verkehrswesen, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 7, no. 12, 1971, p. 578-581. 9 refs. In German.

It is pointed out that the condition of the teeth is an important factor in an evaluation of the state of health of a pilot. Local factors which affect the masticatory organ include susceptibility to caries, paradentosis, and aspects of oral hygiene. Caries and its subsequent effects can produce aerodontalgia. Suitable dental repair work for members of the flying personnel is discussed. G.R.

A72-20375 # **Methods for the evaluation of the piloting qualities of a crew (Methoden zur Bewertung der fliegerischen Fähigkeiten einer Besatzung).** W. Denisow, D. Glutschenko, and P. Klimenko. (*Grazhdanskaia Aviatsiia,* no. 8, 1971.) *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 7, no. 12, 1971, p. 582-584. 10 refs. In German. (Translation).

An attempt has been made to combine methods for the evaluation of the professional competence of the pilot with the approaches of the physiological analysis. The effect of type and extent of the operational information on the degree of nervous and emotional tension was considered. A simulator was equipped with a device for recording various factors including the EKG, the magnitude of the arterial pressure, and the breathing frequency. It was found that the nervous and emotional state of the pilot is greatly affected by the type of stress he is subjected to. G.R.

A72-20383 # **Theoretical and practical problems of wake-sleep alternation (Problèmes théoriques et pratiques de l'alternance veille-sommeil).** J. Nouaille-Degorce and M. Riotte. *Revue des Corps de Santé des Armées,* vol. 12, Dec. 1971, p. 655-672. 18 refs. In French.

Discussion of the importance of the waking-sleeping cycle in military service, where command requirements are to utilize personnel whose qualities and duration of vigilance can be modified. The problem is considered in two aspects: that of the perturbation of the nyctohemeral rhythms of sleep and its consequences, and that of the possibility of making a subject sleep or stay physiologically awake for an appropriate time. The concept of the circadian rhythm and the physiology of sleep are reviewed, as well as present knowledge of the structures responsible for vigilance. The effects of various drugs on wakefulness are outlined, and methods for studying vigilance are considered. F.R.L.

A72-20384 # **Hyperventilation: Its relations with spasmophilia - Approach of a test of induced hyperventilation (L'hyperventilation: Ses relations avec la spasmophilie - Approche d'une épreuve d'hyperventilation provoquée).** R. Pannier (Ministère des Armées, Service de Santé des Armées, Paris, France), G. Leguay (Hôpitaux des Armées, Paris, France), and J. Freteur. *Revue des Corps de Santé des Armées,* vol. 12, Dec. 1971, p. 683-702. 69 refs. In French.

Discussion of induced hyperventilation, defined as excessive ventilation exceeding that necessary for elimination of carbon dioxide from the organism. It involves gaseous alkalosis. Experimentally, voluntary hyperventilation involves perturbations at the level of numerous metabolisms and functions. Augmentation of the neuromuscular excitability is the essential fact. Clinically, spontaneous hyperventilation is the usual clue to spasmophilia. It releases various troubles on this particular state, among which are distal manifestations. Demonstration of the spasmophilic region rests on various examinations, both clinical and biological, but especially electromyographic. A more objective test of induced hyperventilation, of more extensive interest than that generally proposed, is studied. The causes of spontaneous hyperventilation are numerous, the most important being of psychoemotional origin. F.R.L.

A72-20394 **Biology from the standpoint of physics (Biologie aus dem Gesichtswinkel der Physik).** P. Jordan. *VDI-Z,* vol. 114, Feb. 1972, p. 89-93. In German.

Comparative study of the different approaches to obtaining knowledge in physics (understood to include chemistry) and biology. It is noted that physics and biology must pursue different paths in the attainment of knowledge, owing to the fact that physics deals with the multiple repetition of identical or similar phenomena which make it possible to establish a pattern, while biology of necessity deals much more with the unique. Thus in the realm of macrophysics physics can establish generally valid natural laws which are at all times reproducible, while in biology only statistical laws are valid and mechanistic theories are irrelevant. In contrast to inorganic natural structures, living organisms can change their way of functioning in the macroregion as a result of microphysical phenomena. Even recent cybernetic research offers no proof against the indeterminateness of organic beings. A.B.K.

A72-20426 **Radial and longitudinal distensibility of arterial microvessels in the mesentery and their dependence on extravascular structures.** P. A. L. Gaehtgens (Köln, Universität, Cologne, West Germany). *Pflügers Archiv,* vol. 330, no. 4, 1971, p. 277-289. 22 refs.

Changes of microvascular diameter as well as length upon alteration of intravascular pressure was studied in dogs, with particular attention to the contribution of extravascular structures to the distensibility characteristics of arterial microvessels. Pressure-diameter relations were found to be concave to the pressure axis with a plateau of unchanging diameter seen in approximately 50% of the

vessels at pressures above 70 mm Hg. The total change of diameter averaged approximately 15% over the pressure range between 0 and 170 mm Hg. A correlation was found between the changes in length and the changes in diameter, indicating that both are influenced by the mechanical properties and the tension in the extravascular structures. It is suggested that the peripheral microvessels exhibit a greater stiffness than larger arteries and in part derive their mechanical properties from those of the surrounding tissues. O.H.

A72-20427 Stretch activation and myogenic oscillation of isolated contractile structures of heart muscle. G. J. Steiger (Ruhr-Universität, Bochum, West Germany). *Pflügers Archiv,* vol. 330, no. 4, 1971, p. 347-361. 25 refs. Deutsche Forschungsgemeinschaft Grant No. RU 154/3.

Glycerinated or freeze-dried fiber bundles of heart muscles show in ATP-salt solution an active tension increment after quick or sinusoidal stretching. This increment is delayed with respect to the length change. The delayed activation of the contractile bonds at stretch, and the delayed deactivation at shortening, induce the heart muscle to produce power output. The frequency range corresponds to the heart beat frequency of the living muscles. O.H.

A72-20445 # Rhythmostasis - A fundamental life characteristic: Aerospace medical aspect. H. Strughold. *Rivista di Medicina Aeronautica e Spaziale,* vol. 34, July-Sept. 1971, p. 168-175. 19 refs.

Discussion of a concept which might be useful for the characterization of certain types of biorhythms and their behavior under various cycloecological conditions. A brief review of the whole spectrum of cycles or rhythms found in the universe is presented. A concept of rhythmostasis is then proposed and is applied to a study of human circadian rhythms and cycle desynchrony during air travel. A.B.K.

A72-20446 # Development of the inner ear in albino rat embryos subjected to transverse accelerations of plus or minus 3 Gy (Sviluppo dell'orecchio interno in embrioni di ratti albini sottoposti ad accelerazioni trasversali di plus or minus 3 Gy). C. Vacca, C. Koch, G. P. Pizzuti, P. Castagliuolo, and G. V. Pelagalli (Napoli, Università, Naples; Aeronautica Militare, Servizio di Sanità, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 34, July-Sept. 1971, p. 176-186. In Italian.

Study of the effect of transverse accelerations of pregnant albino rats on gestating embryos as a whole and on the development of the embryonic inner ear. It is found that embryos taken from rats subjected to such accelerations are significantly smaller than the embryos of control rats in the same stage of pregnancy. A study of transverse and longitudinal histological sections of the head, carried out to reveal the inner ear, showed that this organ, unlike the skeleton and the physical soma, is more advanced in its evolution in embryos subjected to accelerations. The reason for this contrasting development of the embryo as a whole and of the inner ear in particular is thought to be that the stimulus presented by the accelerations is so highly specific and selective as regards the inner ear as to overcome even a state of intermittent chronic embryonal hypoxia due to deterioration of the materno-fetal circulation. A.B.K.

A72-20447 # Statistical study of the clinical, physical, and psychic causes of temporary and permanent unfitness for flight service in air crews of the Italian Air Force (Studio statistico sulle cause cliniche, fisiche e psichiche, di inabilità temporanea e permanente al servizio aeronavigante degli equipaggi di volo dell'Aeronautica Militare Italiana). G. Rotondo (Aeronautica Militare, Istituto Medico Legale, Milan, Italy), A. Aurucci (Aeronautica Militare, Istituto Medico Legale, Naples, Italy), and L. Longo (Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *(NATO-AGARD, Symposium on Clinical Causes for Grounding of Aircrew, Oporto, Portugal, June 1971.) Rivista di Medicina Aeronautica e Spaziale,* vol. 34, July-Sept. 1971, p. 187-238. 26 refs. In Italian.

Results of an extensive statistical survey of all flight personnel who had received medical examinations during a six-year period in order to shed light on the clinical causes of temporary and permanent unfitness for flight service. A study was made of the incidence, among flight personnel, of morbidity, or rather, that part of morbidity that is the cause of unfitness. This morbidity was then broken down into classes of illnesses according to the accepted international analytical classification, and thus it was possible to indicate the diseases of the various organs that recur most frequently in determining both temporary and permanent unfitness for flight service. A study was also made of the morbidity manifested among pilots and among specialists belonging to air crews, on the one hand, and the relationships between general morbidity observed in flight personnel in the aforementioned two categories and general morbidity observed in a category of nonflying personnel. A.B.K.

A72-20448 # Studies of biochemical processes in cerebral vasculopathies carried out in aviation medicine (Alcune ricerche sul biochimismo delle vasculopatie cerebrali effettuate nell'ambito medico aeronautico). L. Longo (Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *(Simposio sulle Vasculopatie Cerebrali, Rome, Italy, Mar. 27, 28, 1971.) Rivista di Medicina Aeronautica e Spaziale,* vol. 34, July-Sept. 1971, p. 239-248. 14 refs. In Italian.

Review of the literature concerning biochemical processes figuring in cerebral vascular disorders. The works discussed concern, among other things, the relation between coronary arteriosclerotic lesions and retinal vascular changes, the effects of repeated exposures to anoxia and of frequent flight stresses on the serum lipid and cholesterol concentration, and the effect of alcohol on the esterified cholesterol behavior. Criteria concerning the lipid and cholesterol content compatible with the duties of a pilot are presented. A.B.K.

A72-20460 Brain structure and behavioral motivation (Gehirnstruktur und Verhaltensmotivation). J. Schurz (Darmstadt, Technische Hochschule, Darmstadt, West Germany). *Naturwissenschaftliche Rundschau,* vol. 25, Feb. 1972, p. 45-52. In German.

Development of a brain model which associates specific regions of the brain with specific types of behavior. An attempt is made to sketch the evolution of the human nervous system, and a hypothesis is suggested concerning the key role of the limbic system in the phylogenetic evolution of the brain. A comparative study is made of innate and learned behavioral patterns, analyzing them from the standpoint of their three components - namely, the trigger, the program, and the drive. A nine-component functional model of the brain is developed which constitutes a higher approximation than Freud's model, and an attempt is made to identify the various functional units of this model with actual brain regions. Certain conjectures are made concerning the possible capacity of the human brain. The mechanism of information transmission via the channels of the nerve paths is discussed, as well as the laws governing the information entropy. The proposed nine-part brain model is formalized by reducing it to a two-component system, consisting of a conscious part governing voluntary behavior and an unconscious part governing instinctual behavior. The conscious mind is roughly equated with the cerebral cortex, while the unconscious is equated with the medulla. A.B.K.

A72-20501 Synaptic organization of the vestibulotrochlear pathway. W. Precht (Max-Planck-Institut für Hirnforschung,

Frankfurt am Main, West Germany) and R. Baker (Iowa, University, Iowa City, Iowa). *Experimental Brain Research,* vol. 14, no. 2, 1972, p. 158-184. 44 refs. Research supported by the Institute of Biomedical Research; PHS Grant No. NS-09916.

Field and intracellular potentials evoked in the trochlear nucleus (TN) of the cat following stimulation of the ipsi- and contralateral vestibular nerves and the vestibular nuclei (VN) were recorded with microelectrodes. Single shock stimulation of either the ipsilateral or the contralateral vestibular nerves evokes in the TN the presynaptic potentials, which are generated by the action currents of repetitively firing axons of vestibular neurons reaching the TN via the medial longitudinal fascicle. It has been directly demonstrated that the VN are the mediating links for both the short latency excitatory and inhibitory vestibulo-ocular reflexes. G.R.

A72-20537 An in vivo study of aortic flow disturbances. R. M. Nerem and W. A. Seed (Imperial College of Science and Technology, London, England). *Cardiovascular Research,* vol. 6, Jan. 1972, p. 1-14. Research supported by the Science Research Council, the Medical Research Council, the Wates Foundation, and the Nuffield Foundation.

The general nature of flow-disturbances and turbulence in fluid flows, and the special features which may govern their appearance in unsteady flows, are considered. A hot-film anemometer system, modified for use within arteries, has been used to examine flow disturbances in the aorta. Results suggested that the extent of flow-disturbances may be influenced by both peak flow velocity and pulse-rate, expressed in terms of the relevant fluid dynamic parameters. Possible underlying mechanisms are discussed, and power spectra for laminar and highly disturbed aortic velocity waveforms presented. (Author)

A72-20553 Cardiac catheterization. G. Miller (Brompton Hospital, London, England). *British Heart Journal,* vol. 34, Feb. 1972, p. 117-120. 10 refs.

Review of the applications of cardiac catheterization in cardiology. The risks of catheterization in neonates, infants and adult cardiac patients are evaluated. The complexity of laboratory equipment for catheterization and the high level of training and skill required from the performing surgeons are noted. The ethical aspects of catheterization are considered. V.Z.

A72-20574 Abnormal electrocardiograms in healthy man (Electrocardiogrammes anormaux chez l'homme en bonne santé). M. Holzmann. *(Journées Internationales de Cardiologie, Paris, France, May 1971.) Annales de Cardiologie et d'Angéiologie,* vol. 20, Nov.-Dec. 1971, p. 679-690. 40 refs. In French.

Consideration of abnormal electrocardiograms of persons in good health, which may be due to sequelae of a former disease, precursors of a subclinical disease, congenital anomalies, isolated manifestations within the framework of a hereditary disease, or pure functional aberrations. Emphasis is placed on the difficulties of evaluating the latter ones. The means of recognition are control in the fasting state, exercise, forced inspiration, Valsalva's maneuver, hyperventilation, sympathicolysis by hydergine or ergotamine, beta blocking agents, vagolysis by atropine and Pro-Banthine, and overloading with potassium. F.R.L.

A72-20575 Sportsmen's electrocardiograms (L'électrocardiogramme des sportifs). R. Plas (Unité d'Enseignement et de Recherches en Education Physique et Sportive, Paris, France). *(Journées Internationales de Cardiologie, Paris, France, May 1971.) Annales de Cardiologie et d'Angéiologie,* vol. 20, Nov.-Dec. 1971, p. 729-731. In French.

Study of the often atypical electrocardiograms of sportsmen, where minor disorders in repolarization may very often be due only to the effect of fatigue. The way in which they appear is explained by modifications in the ECG during static and dynamic effort. Major disorders in repolarization may be classified into four micrological types. These are signs of ischemia and lesion, but they probably result from a metabolic disorder. Disorders of the excitability and conduction type are not so serious as usually thought. They should be studied within the context of the onset of bradycardia in sportsmen. In general they result from hypervagotony. F.R.L.

A72-20607 A new interpretation of mechanograms - The apexo-carotid diagram (Une nouvelle interprétation des mécanogrammes - Le diagramme apexo-carotidien). R.-A. Soulier and G. Heuillet (Clinique Cardiologique et Cardiologie Expérimentale, Marseille, France). *Annales de Cardiologie et d'Angéiologie,* vol. 20, Sept.-Oct. 1971, p. 591-599. In French.

Combination of two curves (carotidogram and apexogram) in one diagram. The initial concept consisted of comparing the heart with a pumping motor with which it is possible to lay out a functional diagram. A study of graphs obtained experimentally in various cardiographies made it possible to define the main families of graphs characteristic of each cardiopathy or of various association. It is considered that the findings make it likely that there are connections with other methods of investigating cardiac revolution, hence the apexo-carotid diagram may deserve a place in the rapid bloodless investigation of cardiopathies. F.R.L.

A72-20608 The oesocardiogram: Techniques - General considerations (L'oesocardiogramme: Techniques - Considérations générales). R. Tricot and G. Weber (Hôpital Bichat, Paris, France). *Annales de Cardiologie et d'Angéiologie,* vol. 20, Sept.-Oct. 1971, p. 609-615. 8 refs. In French.

Discussion of the oesocardiogram, a computer which explores the mechanical activity of the left auricle. The curves are similar to those obtained by direct catherization of the left auricle. The examination can be carried out with the equipment generally found in any cardiology unit. The technique is simple, is always well tolerated, may be repeated as often as wished, and hence enables diseases of the mitral apparatus to be observed by computer. Interpretation of the graphs should be critical in the light of clinical findings and the findings of other computers. F.R.L.

A72-20617 # New data on the stimulation transmission mechanism in sympathetic ganglia (Novi dani pro mekhanizm peredachi zbudzhennia v simpatichnomu ganglii). V. I. Skok. *Akademiia Nauk Ukrains'koi RSR, Visnik,* vol. 35, Dec. 1971, p. 30-36. 24 refs. In Ukrainian.

Review of recent studies of transmission tracts, synaptic transmission mechanisms and tonic activity of sympathetic ganglia. A model of transmission tracts of the solar ganglion, and circuits of a neuron membrane and transmission tracts in the cervic ganglion of the cat are discussed. The studies are summarized as leading to the conclusions that the vegetative ganglia perform a synaptic transmission of central stimulation as well as stimulus multiplication and integration, and make the activity of individual organs autonomous from the central nervous system. V.Z.

A72-20619 # Determination of the motoneuron pool fraction providing the monosynaptic reflex in man (K opredeleniiu u cheloveka fraktsii motoneironnogo pula, obespechivaiushchei monosinapticheskii refleks). M. Kh. Starobinets (Petrozavodskii Gosudar-

stvennyi Universitet, Petrozavodsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 72, Nov. 1971, p. 5-8. 7 refs. In Russian.

The motoneuron pool fraction participating in the monosynaptic reaction was quantitatively determined in healthy subjects and in neurological patients with depressed supraspinal impulsion and with reduced excitability of the spinal motoneurons. The goal of the study was to compare the results obtained by using two different methods of determining the motoneuron pool fraction. One method was based on the percentage ratio of maximum amplitudes of reflex (H) and motor (M) responses of the skeletal muscle. The other method employed paired stimuli to determine the amount of motor units participating in H discharges. Both methods gave equal motoneuron pool fractions participating in the monosynaptic reaction, and they have equal diagnostic value in the normal case and in pathology. T.M.

A72-20620 # **Functional state of the thyroid gland under conditions of acute hypoxic hypoxia (Funktsional'noe sostoianie shchitovidnoi zhelezy v usloviiakh ostroi gipoksicheskoi gipoksii).** N. G. Triniak (Chernovitskii Meditsinskii Institut, Chernovitsy, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 72, Nov. 1971, p. 17-19. 14 refs. In Russian.

Increased concentrations of iodine combined with blood proteins and morphological changes in the thyroid gland (indicating an activation of the thyroid function) were observed in rats with acute hypoxic hypoxia induced by a 30-min exposure to 360 mm Hg. Similar results were observed in tests on rats with ammonium-induced pulmonary edema and in experiments on dogs where pulmonary edema was provoked by chloramine. T.M.

A72-20621 # **Increased noradrenalin 'turnover' rate in the hypothalamus after demedullation of the adrenal glands /Strengthening of the disulfiram effect depleting noradrenalin reserves/ (Uvelichenie skorosti 'krugooborota' noradrenalina v gipotalamuse posle demedulliatsii nadpochechnikov /Usilenie istoshchaiushchego noradrenalinovye resursy effekta disul'firama/).** A. M. Baru, M. S. Rasin, and I. Ia. Braude (Khar'kovskii Nauchno-Issledovatel'skii Institut Nevrologii i Psikhiatrii; Khar'kovskii Meditsinskii Institut, Kharkov, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 72, Nov. 1971, p. 23, 24. In Russian.

The administration of a dopamine-beta-oxidase inhibitor (disulfiram) produced a sharper decline of the noradrenalin level in the hypothalamus of rats subjected to demedullation of the adrenal glands as compared to rats with intact adrenal glands. The surgical operation had no effect on the noradrenalin content of the heart and cerebral hemispheres when disulfiram was administered. T.M.

A72-20622 # **Content of catecholamines in a myocardium hyperfunctioning on the background of a changed balance of thyroid hormones (Soderzhanie katekholaminov v serdechnoi myshtse pri ee giperfunktsii na fone izmenennogo balansa tireoidnykh gormonov).** A. A. Zhilinskaia (Vitebskii Meditsinskii Institut, Vitebsk, Belorussian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 72, Nov. 1971, p. 40-42. 10 refs. In Russian.

Hyperfunction of the heart (caused by aortic coarctation in the peritoneal section) substantially reduces catecholamine levels in the myocardium during administration of moderate doses of thyroidin (20 mg per 100 g body weight per day). Small doses of thyroidin (1.5 mg per 100 g body weight) prevent the drop in the noradrenalin level of the hyperfunctioning myocardium for a period of 4 to 45 days. T.M.

A72-20623 # **Diurnal rhythms of mitotic activity and the duration of mitosis in the esophageal epithelium during normality and under the action of thyroxin (Sutochnye ritmy mitoticheskoi aktivnosti i dlitel'nosti mitoza v epitelii pishchevoda v norme i pri vozdeistvii tiroksinom).** Iu. A. Romanov and V. P. Rybakov (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 72, Nov. 1971, p. 93-97. 9 refs. In Russian.

The diurnal rhythm of mitosis in the esophageal epithelium of rats which were given thyroxin for seven days is not synchronous with the corresponding rhythm in control animals. The duration of mitosis in the diurnal rhythm is minimal during the highest mitotic activity for both the test and control groups. The enhancement of mitotic activity in the rhythm of both groups of animals is associated not with a prolongation of the duration of mitosis but with an increased number of cells participating in mitosis per unit of time. T.M.

A72-20624 # **Method for experimental detection of paired interaction in neuronal systems (Metod eksperimental'nogo obnaruzheniia poparnogo vzaimodeistviia v neironnykh sistemakh).** V. D. Baron (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 72, Nov. 1971, p. 119-121. In Russian.

Description of an experimental method for investigating short-latency interactions in neuronal systems. The probability distribution curve for the first-order cross-interval of simultaneously recorded sequences of the action potentials of two neurons is estimated from a histogram obtained by a simple count of the number of points appearing in the corresponding vertical band of the point oscillogram. T.M.

A72-20658 # **High-energy phosphates, glucose, lactate, and pyruvate in rat's brain under varying pO2 of the inhaled air (Energiereiche Phosphate, Glukose, Laktat und Pyruvat im Hirn der Ratte unter Änderung des pO2 der Inspirationsluft).** H. G. Lippmann. *Acta Biologica et Medica Germanica,* vol. 27, no. 5-6, 1971, p. 805-820. 50 refs. In German. Research supported by the Ministerium für Gesundheitswesen of East Germany.

The influence of varying pO2 of the inhaled air upon stationary concentrations of ATP, ADP, AMP, CP, Cr, Lac, Pyr and Glc was studied in the perchloric extract of brain homogenate from rats. The results were as follows: keeping the animals at pO2 79.8 plus or minus 3.7 torr for 120 min reduced the ATP/ADP and CP/Cr quotients, accompanied by an increase in Lac/Pyr quotient and in brain Glc; the 'anoxic limit value' of the inhaled air proved to be in positive correlation with age; after a 30 min sleeping period, stationary ATP and CP concentrations increased by 12 to 16%; and, increasing pO2 of the inhaled air caused an increase in ATP/ADP and CP/Cr quotients. O.H.

A72-20659 # **A model for the development of hypertonic blood pressure irregularities through improperly controlled learning (Ein Modell für die Entwicklung hyperton ausgelenkter Blutdruckdysregulationen durch fehlgesteuertes lernen).** K. Hecht, K. Treptow, M. Poppei, and T. Hecht (Deutsche Akademie der Wissenschaften, Institut für kortiko-viszerale Pathologie und Therapie, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 27, no. 506, 1971, p. 869-883. 38 refs. In German.

An investigation has been carried out in rats concerning the problem of whether the negative emotional reactions, that accompany a stressing conditional-reflex learning process and cause transitory blood pressure rise, can be stored in the 'emotional memory' and cause chronic hypertonic irregularities of the arterial blood pressure. The effects of this learning stress method were studied from the capacity of memory, the course of different conditional-reflex functional parameters, the dynamics of blood

pressure-time curves, and morphological and psychological organ tests. An attempt is made to find the links existing between improperly controlled learning processes and the pathogenesis of hypertonia. O.H.

A72-20660 # **Sex-specific differences in the formation and development of different experimental neurotic forms of hypertonia (Geschlechtsspezifische Unterschiede bei der Entstehung und Entwicklung verschiedener experimenteller neurotischer Hypertonieformen).** M. Poppei, K. Hecht, S. Choinowski, T. Hecht, and K. Treptow (Deutsche Akademie der Wissenschaften, Institut für kortiko-viszerale Pathologie und Therapie, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 27, no. 5-6, 1971, p. 885-897. 28 refs. In German.

The chronical influence of environmental stress upon blood pressure and information processing was investigated in male and female rats. The chronical stress proved to cause a steady neurotic hypertonic blood pressure irregularity which is more significant in males than in females. The results also show that male animals react on the same quantity and quality of a chronical stress with more strongly pathological deviations than females. It is supposed that these sex-specific reactions are determined by the whole neuro-humoral regulatory system. O.H.

A72-20661 # **Entropy-dependent responses in two-dimensional conditional-reflex decision situations and possibilities of their modeling (Entropieabhängige Reaktionsweisen in Zweidimensionalen bedingt-reflektorischen Entscheidungssituationen und Möglichkeiten ihrer Modellierung).** K. Treptow, K. Hecht, and M. Peschel (Deutsche Akademie der Wissenschaften, Institut für kortiko-viszerale Pathologie und Therapie, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 27, no. 5-6, 1971, p. 911-924. 9 refs. In German.

The influence of entropy, as a measure of indefiniteness in two-dimensional conditional-reflex decision processes, upon central nervous analysis-synthesis processes, was investigated in rats. Tests were carried out to determine how stimulation patterns with fixed rates and with varying relative frequencies of conditional and differential stimuli act upon the execution of conditional locomotor avoidance reactions. The linear dependence of the animals' reaction upon the relative rate of stimuli suggests that during analysis and synthesis in the central nervous system and the accompanying reactions, the principle of entropy becomes effective when environmental stimuli are converted to adaptive behavioral acts. O.H.

A72-20662 # **Correlations between operational algorithms of central-nervous processes in conditional-reflex two-dimensional decision situations (Wechselbeziehungen von Arbeitsalgorithmen zentralnervaler Prozesse in bedingt-reflektorischen zweidimensionalen Entscheidungssituationen).** K. Hecht, K. Treptow, and M. Peschel (Deutsche Akademie der Wissenschaften, Institut für kortiko-viszerale Pathologie und Therapie, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 27, no. 5-6, 1971, p. 925-931. 5 refs. In German.

Correlations between central-nervous plasticity and stereotypy were explored in rats, using a conditional-reflex motoric avoidance method. The results show that continuous training of a defined, constant stimulation pattern causes, on the one hand, a generalized central-nervous performance increase in flexible processes, and a stereotype orientation of cerebral processes on the other hand. An immediate changeover from a stereotypically operating algorithm to flexible operation of the central nervous system is possible. O.H.

A72-20686 # **Lung changes after beryllium inhalation - Ultrastructural and morphometric study.** C. Conradi, P. H. Burri, Y. Kapanci, E. R. Weibel (Bern, Universität, Berne, Switzerland), and F. R. Robinson (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Archives of Environmental Health,* vol. 23, Nov. 1971, p. 348-358. 18 refs. Contract No. F61052-68-C-0030.

Monkeys and dogs were exposed to an environment contaminated with beryllium oxide calcinated at 1,400 C. Two years after exposure the lung tissue was investigated by electron microscopy, using morphometric methods. In both experimental animals and controls, unidentified particles were found inside lysosomes occurring in histiocytes, endothelium, and macrophages. No neoplastic or granulomatous pulmonary lesions were observed in any of the beryllium-exposed animals. The mean thickness of the air-blood barrier was not changed in the test animals. Vacuolated interstitial cells, interpreted as degranulated mast cells, were frequently found in both control and test dogs. The beryllium compound investigated did not cause pathological alterations in lung tissue two years after exposure, although it was still deposited in the lung, as demonstrated by spectrographic analysis. (Author)

A72-20688 **Effects of autonomic blockade on the baroreflex in man at rest and during exercise.** T. G. Pickering, D. J. C. Cunningham, P. Sleight (Oxford University; Radcliffe Infirmary, Oxford, England), B. Gribbin, and E. S. Petersen. *Circulation Research,* vol. 30, Feb. 1972, p. 177-185. 19 refs. Research supported by the Danish Medical Research Council.

The reflex bradycardia produced by a transient phenylephrine-induced rise of arterial pressure was investigated in man during rest and supine exercise, before and after autonomic blockade of the heart. It was concluded that reflex heart rate changes following sudden changes of arterial pressure are predominantly parasympathetic and diminish during exercise in parallel with the decrease of parasympathetic tone. The reflex response is determined partly by the interaction of parasympathetic and sympathetic impulses at the sinoatrial node, shown by the effects of peripheral sympathetic stimulation and blockade at rest. Central depression of the reflex may also occur during exercise. T.M.

A72-20787 * **Effects of continuous exposure to high gravity on gravity preference in rats.** D. F. McCoy and J. P. Jankovich (Kentucky, University, Lexington, Ky.). *Journal of Comparative and Physiological Psychology,* vol. 78, Feb. 1972, p. 305-310. 18 refs. Grants No. NGR-18-001-003; No. NGR-18-001-046.

Rats were chronically centrifuged in excess of 2.0 g for 6 or 12 mo. They were given four 24-hr gravity-preference tests in a spiral centrifuge in which they could adjust the gravity level imposed by locomoting inward or outward radially along a track. Chronically centrifuged rats (Group CC) spent as much time at 2.0 g as at 1.0 g while normally raised controls (Group NC) selected only 1.0 g. Group CC initially selected 2.0 g and a preference for 1.0 g developed over the four test sessions. These results suggest that hypergravity is not necessarily an aversive stimulus and that gravity preference may depend initially upon the reference level involved. The ultimate selection of 1.0 g by chronically centrifuged animals suggests that a preference for a familiar gravity environment is replaced by a preference for low-gravity stimuli. (Author)

A72-20882 **Production of gaseous nitrogen in human steady-state conditions.** J. H. Cissik, R. E. Johnson, and D. K. Rokosch (Illinois, University, Urbana, Ill.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 155-159. 11 refs.

Under fasting conditions at rest, the minute volume of gaseous nitrogen expired by nine volunteer subjects was less than the minute volume of gaseous nitrogen inspired. After consumption of meals containing between 23-67% protein (22-61 g protein, respectively), the minute volume of gaseous nitrogen expired by all subjects was greater than the minute volume of gaseous nitrogen inspired. These differences suggest a possible combination of gastrointestinal involvement and metabolic effect which must be accounted for in order to obtain accurate measurements of oxygen consumption. In the extreme case of these studies, the production of nitrogen was sufficient to cause a 13% error in the traditional Haldane calculation for open-circuit measurements of oxygen consumption. That calculation assumes equality between the expired minute volume of nitrogen and the inspired minute volume of nitrogen. (Author)

A72-20883 **Changes in mixed venous gas tensions at start of exercise in man.** R. H. T. Edwards, D. M. Denison, G. Jones, C. T. M. Davies, and E. J. M. Campbell (Hammersmith Hospital, London, England). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 165-169. 29 refs. Research supported by the Medical Research Council and the British Heart Association.

Estimation of mixed venous P sub O2 and P sub CO2 in three healthy men by a rebreathing technique before and after completing periods of upright exercise at 900 kpm/min (150 W) on a cycle ergometer. At rest mixed venous P sub O2 and P sub CO2 averaged 35.5 plus or minus 4.0 and 45.5 plus or minus 2.5 (SD) mm Hg respectively. Mixed venous P sub O2 fell after only 15 sec of work and reached a minimum of 22.5 plus or minus 1.0 mm Hg at 1 min, suggesting that the circulatory adaptation lagged behind the rising tissue oxygen consumption. Mixed venous P sub CO2 started to rise with a 30 sec delay from the start of exercise, probably because of alveolar overventilation, and reached a maximum of 61.5 plus or minus 3.1 mm Hg after 5 min. Experimental hypocapnia, hypercapnia, hypoxia, and hyperoxia in the first minute of exercise greatly altered end-tidal P sub O2, P sub CO2 ventilation and mixed venous P sub CO2 but had less influence on heart rate and mixed venous P sub O2. These respiratory stresses were without influence on exercise performance, and their effect on the measured variables was short-lived, suggesting that there exists a reserve capacity in the homeostatic mechanisms at the start of work. (Author)

A72-20884 **Short-term effects of ozone on the lung.** D. V. Bates, G. M. Bell, C. D. Burnham, M. Hazucha, J. Mantha, L. D. Pengelly, and F. Silverman (McGill University; Royal Victoria Hospital, Montreal, Canada). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 176-181. 20 refs. Research supported by the Medical Research Council of Canada.

Study in which ten normal male subjects were exposed to 0.75 ppm ozone while seated for 2 hr in a large environmental chamber. Three of these subjects were also studied in the chamber during bicycle exercise sufficient to double minute ventilation. Subjects were asked to report the development of any symptoms. From measurements of mouth and esophageal pressure as well as airflow the following parameters of pulmonary function were obtained: VC, Ptp sub max, FEV, Cst, Cdyn, RL, maximum ventilation at 50% VC, and MEFV curves, % CO uptake was also measured. Most subjects noted substernal soreness and cough while a few also complained of symptoms of pharyngitis and dyspnea. Mean data from the ten subjects showed a significant fall in Ptp sub max (P less than 0.005), increase in RL (P less than 0.025), and fall in maximum ventilation at 50% VC (P less than 0.01). However, there was considerable variation in individual response to each test. In two of three subjects who exercised intermittently during ozone exposure, both symptoms and changes in parameters of pulmonary function were markedly accentuated. It is concluded that 0.75 ppm of ozone, in the absence of other pollutants, is too high a level for 2-hr exposure of a general population. (Author)

A72-20885 **Oxygen intake and cardiac output during maximal treadmill and bicycle exercise.** M. Miyamura and Y. Honda (Kanazawa University, Kanazawa, Japan). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 185-188. 15 refs.

Measurement of oxygen intake and cardiac output in 17 male students, aged 18 to 23 years, during maximal treadmill and bicycle ergometer exercise with stepwise incremental loading and constant loading. The average values of oxygen intake and cardiac output during treadmill exercise were higher than during bicycle ergometer exercise, either with incremental loading or constant loading. These differences were statistically significant (P less than 0.001 to 0.01). No statistically significant differences are found in stroke volume, whereas significant differences were seen in maximum heart rate between all four different modes of exercise. Arteriovenous oxygen differences were higher during treadmill exercise than during bicycle ergometer exercise. It is suggested that lower maximum oxygen intake during bicycle ergometer exercise is related to the lower maximum cardiac output and lower arteriovenous oxygen differences as compared with treadmill exercise. (Author)

A72-20886 * **External auditory canal temperature as an estimate of core temperature.** J. E. Greenleaf and B. L. Castle (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 194-198. 13 refs.

Measurement of rectal (T sub re), auditory canal (T sub ac), positioned 8 to 10 mm from the tympanic membrane, and mean skin temperature (mean T sub sk) in five men during various exercise regimens at an ambient temperature (T sub a) of 25 C (phase one) and in two men during rest and exercise at 5, 15, 25, and 35 C T sub a (phase two). The purpose was to determine if T sub ac can be used as an accurate estimate of core temperature. Previous observations that T sub ac was highly correlated with T sub re but T sub ac was consistently lower than T sub re are confirmed; the mean difference varied from 0.4 C at rest to 1.1 C at the end of exercise. It is concluded that auditory canal temperature cannot be utilized as an estimate of core temperature, but T sub ac may be used to estimate mean body temperature where very accurate measurements are not required. (Author)

A72-20887 # **Effect of sustained muscular contraction on tolerance to +G z acceleration.** L. A. Lohrbauer, R. L. Wiley, S. J. Shubrooks, and M. McCally (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio; USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 203-209. 14 refs.

Evaluation of the increase in +G z acceleration tolerance afforded by static forearm muscular contraction (handgrip), and comparison of this value with that of the standard G suit. Acceleration tolerance was assessed in eight subjects in each of four conditions for both rapid onset (1.0 G/sec) and slow onset (0.1 G/sec) acceleration profiles. The conditions were: (1) unprotected, (2) handgrip, (3) G suit, and (4) handgrip and G suit. The mean tolerance levels achieved for those four conditions for the rapid onset runs as defined by peripheral light loss were 3.6, 4.5, 4.8, and 5.4 G, respectively. For the slow onset runs, the tolerance levels were 4.6, 5.6, 5.8, and 6.3 G. Thus the handgrip and G-suit procedures each provided approximately 1 G of protection. Significantly, the effect of the two procedures combined proved to be additive. (Author)

A72-20888 **Muscle blood flow during submaximum and maximum exercise on a bicycle ergometer.** F. Pirnay, R. Marechal, R. Radermecker, and J. M. Petit (Liège, Université, Liège, Belgium). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 210-212. 19 refs.

Measurement of the blood flow in the quadriceps in four subjects during pedaling on a bicycle ergometer at different intensities until the tolerated maximum. The method used the clearance of a radioactive substance (xenon 133) locally injected. The blood flow reached an average of 13.3 ml/min for 100 g of muscle tissue when the work load was 50 W. It rose progressively with the intensity of the exercise so as to attain 30.7 and 43.2 ml/min at 200 and 300 W, respectively. The rise of flow persisted, but with a weaker increment as maximum exertion was reached. Compared with the evolution of the heart rate, a reference of cardiac output, the increase of the peripheral circulation presents no leveling off in any of the subjects examined. On the contrary, the blood flow in the quadriceps measured during maximum exercise while pedaling with two legs on the bicycle ergometer is exceeded if the arterial circulation is occluded in the opposite leg. Therefore, the hypothesis of a limitation of O2 consumption in the muscular circulation is hardly probable. (Author)

A72-20889 * Importance of the splanchnic vascular bed in human blood pressure regulation. L. B. Rowell, J.-M. R. Detry, J. R. Blackmon, and C. Wyss (Washington, University, Seattle, Wash.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 213-220. 30 refs. NIH Grant No. RR-37; Grant No. NGR-48-002-082.

Three-part experiment in which five subjects were exposed to lower body negative pressure (LBNP) at -50 mm Hg below the iliac crests. Duration of LBNP to earliest vagal symptoms was 7 to 21 min; all data are expressed as changes from control period to the last measurements before these symptoms. In part I, forearm blood flow (by Whitney gauge) fell 45% during LBNP. In part II, splanchnic blood flow (from arterial clearance hepatic extraction of indocyanine green) fell 32% and splanchnic vascular resistance rose 30%. In part III, cardiac output fell 28%, stroke volume 51%, and central blood volume 21%. Total peripheral resistance and heart rate rose 19% and 52%. Of the reduction in total vascular conductance, decreased splanchnic conductance accounted for approximately 33%; skin plus muscle conductance decreased similarly. (Author)

A72-20890 Pulmonary capillary carbon dioxide gradients and the Wien effect. R. M. Effros (New Jersey, College of Medicine and Dentistry, Newark, N.J.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 221, 222. 7 refs. Research supported by the Life Insurance Medical Research Fund; NIH Grant No. HE-12879.

The calculation of free energy which would be required each minute to maintain a 10 mm Hg difference of P sub CO2 between the plasma at the pulmonary capillary wall and the plasma 1 micron away from the wall. This free energy is found to be far greater than that which would be available via the pulmonary circulation. It is concluded that such a gradient could not be maintained regardless of mechanism. (Author)

A72-20891 Hemodynamic effects of oxygen at 1 and 2 Ata pressure in healthy subjects. A. C. F. Kenmure, W. R. Murdoch, I. Hutton, and A. J. V. Cameron (Western Infirmary, Glasgow, Scotland). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 223-226. 23 refs. Research supported by the British Heart Foundation.

Results of hemodynamic measurements made in 20 healthy men at rest while breathing air at 1 Ata and 100% oxygen at 1 and 2 Ata pressure for successive periods of 45 min. Inhalation of oxygen at 2 Ata caused a statistically significant 10% fall in cardiac index which was brought about mostly by a fall in heart rate. There was a 15% increase in systemic vascular resistance, an 8% decrease in left ventricular work, and a statistically insignificant 3% rise in mean arterial pressure. Similar but less pronounced effects occurred with inhalation of pure oxygen at 1 Ata. (Author)

A72-20892 Convective heat transfer from the human form. Y. Tamari and E. F. Leonard (Columbia University, New York, N.Y.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 227-233. 20 refs. NIH Grants No. HE-06831; No. GM-14546.

Derivation of the convective heat transfer coefficient for the human form by two techniques. These two techniques involved, respectively, calculations based on a set of cylinders and a single cylinder the dimensions of which approximated an average human subject, and results obtained from a physical replica using heat transfer and model theories. The replica was an aluminum statue, approximately one-fourth normal size. For cross flow, results agreed very well with those obtained by others experimenting directly with human subjects. However, for parallel flow, both calculations and experiment gave values lower than those obtained by direct experimentation. The disagreement was attributed mainly to larger errors in the direct experiment. For both situations, the comparison with heat transfer theory improves the certainty of estimates of heat loss in forced convection. (Author)

A72-20893 Effect of carbon monoxide on oxygen transport during exercise. J. A. Vogel and M. A. Gleser (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 234-239. 17 refs.

Study of oxygen transport in eight men at rest and during submaximal and maximal work while exposed to air and a 225-ppm carbon monoxide/air mixture. The latter resulted in a carboxyhemoglobin saturation of 18 to 20% with no change in arterial O2 tension. During CO inhalation, resting oxygen uptake was maintained with unchanged cardiac output and unchanged arteriovenous difference, although arterial and venous oxygen contents were lower. During submaximal exercise, O2 delivery was maintained with a greater cardiac output but smaller arteriovenous O2 difference as compared to normoxic controls. During maximal work, cardiac output was no greater and mixed venous O2 content no less than in normoxia and, as a result, maximal O2 uptake fell by 23% - i.e., proportional to the arterial desaturation. This indicates that the leftward shift of the oxyhemoglobin dissociation curve which accompanies CO exposure is compensated for by a lower venous O2 tension so that O2 transport capacity is not different from that seen in hypoxic hypoxia. (Author)

A72-20894 Heart and lung functions in swimmers and nonathletes during growth. G. M. Andrew, M. R. Becklake, J. S. Guleria, and D. V. Bates (Royal Victoria Hospital; McGill University, Montreal, Canada). *Journal of Applied Physiology,* vol. 32, Feb. 1972, p. 245-251. 33 refs. Research supported by the John A. Hartford Foundation, the Medical Research Council of Canada, and by the Department of National Health and Welfare.

Study of lung and heart function over a three-year period in children engaged in swim training. Resting lung volumes, expiratory flow rates, and diffusing capacity on exercise have been measured annually, and cardiac output and related functions during graded exercise have been measured on one occasion. These results were compared with similar measurements in a group of children who were not undergoing any specific athletic training. In general, swimmers were taller at a given age and the difference between groups became greater in older children. Swimmers also had larger lung volumes (TLC) as a consequence of larger values for vital capacity, as well as higher expiratory flow rates for any given height; these differences were apparent even in the youngest swimmers. Absolute diffusing capacity was significantly higher in swimmers, a difference consistent throughout the height range studied, but the difference disappeared if diffusing capacity was expressed per unit volume of TLC. Cardiac output in relation to oxygen comsumption was lower in swimmers, a difference attributable to a lower heart

rate, since no group difference in stroke volume was found. Although endowment may have contributed to the superior measurements in swimmers, the data do suggest that training between ages of 8 and 18 has effects on physical growth rate, as well as on heart and lung function. (Author)

A72-20895 Direct-current circuit for regulating temperature of small experimental animals. M. A. Bakker, R. O. Davies, and M. W. Edwards, Jr. (Pennsylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 252, 253. PHS Grant No. NS-08383.

Description of a circuit for regulating the temperature of small experimental animals. Direct-current battery-powered amplifiers are used to eliminate interference in neurophysiological recordings. Integrated circuits simplify construction and reduce cost. Commercially available temperature probes and heating pads are used. (Author)

A72-20896 Analysis on diffusion and convection of protein in tissue. J. S. Lee (Virginia, University, Charlottesville, Va.). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 254-256. 12 refs. PHS Grant No. HE-11747; NIH Grant No. FR-07094-04.

Theoretical study of the distribution of protein concentration in the tissue and the change of colloidal osmotic pressure near the capillary wall when a fluid filters across the wall. In the analysis, the tissue is considered as a porous material and the capillary-tissue system is simplified to the Krogh capillary model with only radial diffusion and convection. The diffusion theory developed by soil and petroleum engineers is used for constructing the solution of the problem. The calculations show that for normal transcapillary fluid movement, the colloidal osmotic pressure next to the capillary wall may be altered by a magnitude ranging from 0.5 to 3 mm Hg. Physiological conditions under which the change becomes important in the transcapillary fluid exchange are discussed. (Author)

A72-20897 An improved transducer to measure left ventricular wall thickness in open-chest dogs. P. A. McHale, C. A. Haliasos, and J. C. Greenfield, Jr. (Duke University; U.S. Veterans Administration Hospital, Durham, N.C.). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 257, 258. 5 refs. Research supported by the North Carolina Heart Association; PHS Grant No. HE-09711.

A transducer to provide continuous measurement of free wall thickness in the intact left ventricle is described. It is an adaptation of the mutual inductance coil technique and is used in the open-chest dog preparation. The measuring coils are placed on the endocardial and epicardial surfaces and are mechanically connected by a small shaft to prevent relative angular rotation. The system is linear over the ranges of wall thickness encountered and the dynamic response curve is flat to 15 Hz. The changes in ventricular wall thickness as well as the absolute magnitudes measured with this instrument compare favorably with those measured by previous methods. (Author)

A72-20898 Transmitter for recording respiration rate information by radiotelemetry. J. L. Riley (U.S. Department of Agriculture, National Animal Disease Laboratory, Ames, Iowa). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 259, 260.

Description of a small, inexpensive pressure transducer developed for measuring pressure variations in a pneumograph. This transducer was built into a radio transmitter and was used to transmit animal respiration rate over an FM-FM telemetry system. The transmitter is compatible with existing FM-FM telemetry systems using standard components and allows transmission of respiration rate at low cost. M.V.E.

A72-20899 Applications of analog computing circuits to cardiovascular research. P. M. Mellor (Imperial Chemical Industries, Ltd., Macclesfield, Ches., England). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 265-270. 7 refs.

Description of some easily constructed solid-state modules which use integrated circuit operational amplifiers and are compatible with applications in the cardiovascular field. The proposed modules give analog outputs representing: (1) the maximum rate of rise of left ventricular pressure in the isovolumic phase; (2) stroke volume or cardiac output, derived from aortic flow velocity curves; (3) atrioventricular conduction time, measurable at low chart recorder speeds. (Author)

A72-20900 Long-term measurement of pulsatile blood pressure and ECG in the squirrel monkey. J. E. Levasseur, K. C. Corley, R. M. Butler, C. R. Fields, and F. T. Grove (Virginia Commonwealth University, Richmond, Va.). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 271-275. 7 refs. Research supported by the Richmond Area Heart Association; NIH Grants No. HE-13454; No. NS-07839; Grant No. DADA17-67-C-7090.

Description of a procedure for long-term measurement of phasic blood pressure and ECG in squirrel monkeys. Specially prepared small-bore intravascular polyethylene tubing is inserted in the descending aorta. ECG leads are implanted subcutaneously on both sides of the thorax. The tubing and leads terminate on connectors affixed to the calvarium with screws and dental acrylic. Anticoagulants are not required to maintain tubing patency and, to date, all cannulas have remained patent without intervention. Recordings are presented from three animals indicating continuous data acquisition without changes in waveform for sessions as long as 5 hr over periods up to 6 months. These results indicate that this catheter electromanometer system overcomes the difficulties normally associated with maintenance of physiologically stable intravascular cannulas. Placement of connectors on the calvarium has eliminated the problem of protecting the exteriorized cannula and leads. (Author)

A72-20901 A Teflon membrane for measurement of blood and intramyocardial gas tensions by mass spectroscopy. J. W. Brantigan, V. L. Gott, and M. N. Martz (Johns Hopkins University, Baltimore, Md.). *Journal of Applied Physiology*, vol. 32, Feb. 1972, p. 276-282. 25 refs. PHS Grant No. HE-09997.

Description of a Teflon diffusion membrane which allows continuous in vivo blood and tissue gas measurement by mass spectrometry without the need for a chemically bonded heparin surface. Tested for blood gas measurements in both aorta and inferior vena cava in a series of five dogs for periods from 24 to 48 hr, these Teflon membranes were thromboresistant and provided quantitatively accurate measurement of P sub O2 and P sub CO2 throughout the total time period. This Teflon membrane also provides a new technique for measurement of tissue gas tensions. Measurements of left ventricular intramyocardial gas tensions in a series of 13 anesthetized dogs averaged P sub O2 18 and P sub CO2 40. In six dogs, tissue gas tensions were measured in the myocardium at the time of ligation of the left anterior descending coronary artery. These measurements averaged P sub O2 18 and P sub CO2 33 before ligation and P sub O2 4 and P sub CO2 248 30 min after ligation in three experiments that were not interrupted by ventricular fibrillation. P sub O2 measurements correlate well with previous measurements with a polarographic electrode. Intramyocardial P sub CO2 measurements have not been published previously. (Author)

A72-20984 Auditory evoked response - Meaningfulness of stimuli and interhemispheric asymmetry. Y. Matsumiya, V. Tagliasco, C. T. Lombroso, and H. Goodglass (Harvard University,

Boston, Mass.). *Science*, vol. 175, Feb. 18, 1972, p. 790-792. 15 refs. NIH Grants No. 1-PO1-NS-09704-01; No. NS-06Z09; No. HD-03-0773.

Interhemispheric asymmetries of different magnitudes were observed in human cortical auditory evoked responses to speech and sound-effect stimuli. The wave with peak asymmetry occurred 100 milliseconds after signal onset. The amount of asymmetry of the amplitude of this wave was related to the meaningfulness to the subject of the auditory stimulus rather than to the mere use of verbal vs nonverbal materials. (Author)

A72-20986 Reaction time to change in visual orientation. A. S. Gilinsky (Bridgeport, University, Bridgeport, Conn.) and H. H. Cohen (North Carolina, University, Durham, N.C.). *Perception and Psychophysics*, vol. 11, Feb. 1972, p. 129-134. 33 refs. NSF Grant No. GB-6067.

The aftereffects of viewing diagonal lines for 50, 500, and 1000 msec were measured by the speed and accuracy of identification of a variably tilted test grating. Significant RT and tilt aftereffects were found as functions of the duration of orientation-specific adaptation and the angle of separation between inspection and test lines. The results throw light on anchoring effects of the main visual co-ordinates and support a structural interpretation of orientational selectivity in human vision. (Author)

A72-20987 Effects of rotating backgrounds upon the perception of verticality. P. C. Hughes, G. A. Brecher, and S. M. Fishkin (Oklahoma, University, Oklahoma City, Okla.). *Perception and Psychophysics*, vol. 11, Feb. 1972, p. 135-138. 5 refs. PHS Grant No. MH-10322.

The effect of various types (sandpaper, spoke, spiral, and white) and speeds (0, 0.5, 3, 6, 12, and 30 rpm) of rotating disk backgrounds upon 276 subjects' estimates of the apparent verticality of a line moved toward physical verticality in either a clockwise or counterclockwise direction was investigated. The general finding was that the estimate of verticality was displaced away from pretest judgments in the direction of the disk rotation. The speed of rotation was significant with maximal vertical displacement at 6 rpm. The direction of line movement was significant with the result that maximal vertical displacement occurred when the line was moved in opposition to the direction of disk rotation. The type of disk employed made a significant difference in the estimates only when the line movement was opposite from the direction of disk rotation. (Author)

A72-20988 On counteradaptation. H. Wallach and K. J. Frey (Swarthmore College, Swarthmore, Pa.). *Perception and Psychophysics, vol. 11, Feb. 1972, p. 161-165. 8 refs. NSF-*supported research.

The main purpose of the experiments discussed was to establish firmly the concept of counteradaptation and the closely related idea of cue discrepancy as a basis of perceptual adaptation. It was found that exposure to a luminous object in the dark which grew as it moved toward the subject and shrank as it moved away caused changes in size perception and in stereoscopic depth perception. This phenomenon can only be interpreted as resulting from a change in registered distance. The same exposure also caused changes in apparent distance demonstrated by a pointing response. G.R.

A72-20989 Adjustments of visual tilt as a function of age. F. C. Volkmann and P. B. Pufall (Smith College, Northampton, Mass.). *Perception and Psychophysics*, vol. 11, Feb. 1972, p. 187-192. 47 refs.

Using a psychophysical method of adjustment, 175 subjects, ranging in age from 3 to 20 years, made four adjustments each of a luminous line to subjective vertical, horizontal, and 45-deg tilts in the dark. There were no significant differences in mean errors of adjustment to the vertical and horizontal over the ages tested. There were significant differences in intrasubject variability of adjustment to the horizontal and vertical. Older children and adults produced significantly larger mean errors of adjustment to the 45-deg tilt than did younger children. G.R.

A72-21000 # Reliability of electroencephalography. J. Majkowski, W. Horyd (Akademia Medyczna, Warsaw, Poland), M. Kicińska (Akademia Medyczna, Gdańsk, Poland), J. Narębski (Toruń, Uniwersytet, Toruń, Poland), I. Gościński (Akademia Medyczna, Kraków, Poland), and B. Darwaj (Akademia Medyczna, Lublin, Poland). (*Neurologia i Neurochirurgia Polska*, vol. 5, no. 2, 1971.) *Polish Medical Journal*, vol. 10, no. 5, 1971, p. 1223-1229. Translation.

Investigations have been conducted to assess the objectiveness of electroencephalography as a diagnostic method, and to check the unanimity of electroencephalographists in the description of morphological features of the EEG curve. For this purpose, results of EEG interpretations of six specialists were correlated. In all, 720 descriptions and conclusions were evaluated. All participants agreed in their opinions on 60 per cent of EEG records, five participant on 73 per cent, and four participants on 88 per cent of the records; in 12 per cent the opinions were halved. Most discrepancies were found in the evaluation of normal EEG records. Discrepancies in the assessment of the localization of pathological changes occurred in 11 per cent of the records. No major differences were observed in the morphological description of the EEG records. O.H.

A72-21080 Metabolism during flight in the laughing gull, Larus atricilla. V. A. Tucker (Duke University, Durham, N.C.). *American Journal of Physiology*, vol. 222, Feb. 1972, p. 237-245. 26 refs. Research supported by Duke University; NSF Grant No. GB-6160-X.

The mean metabolic rates of two laughing gulls (mean body mass, 0.30 kg) flying in a wind tunnel were between 23 and 38 watts per kilogram raised to the 0.325 power, depending on flight speed and angle of flight. A change in the intensity of air turbulence in the tunnel from 0.88 to 1.44% had little effect on the mean metabolic rate in flight. The drag of the mask and tube carried by the gulls increased metabolic rates by as much as 10%. The metabolic rates of the gulls in level flight, after correcting for the drag of the mask and tube, were 6-8 times the metabolic rates of the gulls resting at temperatures between 25 and 35 C, and 12-14 times the mean basal metabolic rate of nonpasserine birds of the same size. (Author)

A72-21081 Circadian variation in rat serum 5-hydroxytryptamine and effects of stimuli on the rhythm. L. E. Scheving, J. D. Dunn, J. E. Pauly, and W. H. Harrison (Arkansas, University, Little Rock, Ark.; Louisiana State University, New Orleans, La.; Rush-Presbyterian-St. Luke's Medical Center, Chicago, Ill.). *American Journal of Physiology*, vol. 222, Feb. 1972, p. 252-255. 14 refs. NSF Grant No. B8-2530-R; PHS Grants No. AM-12389; No. NS-08929.

Fluorometric measurements were made of 5-hydroxytryptamine levels in serum obtained from separate subgroups of adult male rats killed at 2-hr intervals over three separate 24-hr spans. For three weeks prior to obtaining blood, all rats were standardized carefully and were subjected to 12 hr of light (0600-1800) followed by 12 hr of darkness. Analyses show that 5-hydroxytryptamine levels are highest during the last part of the light span and the first part of the dark span. A rhythm in 5-hydroxytryptamine levels also is demon-

strated for female rats maintained on a schedule with light extending from 0400 to 1800. A study was made of the effect of three different experimental conditions on this rhythm in female rats: exposure to ether, to immobilization, and to a novelty situation. The ether and immobilization stimuli had a damping effect on the 5-hydroxytryptamine rhythm; the novelty had no effect. (Author)

A72-21082 * Action of acetylstrophanthidin on experimental myocardial infarction. G. T. Nola, S. E. Pope, and D. C. Harrison (Stanford University, Palo Alto, Calif.). *American Journal of Physiology*, vol. 222, Feb. 1972, p. 265-271. 24 refs. Research supported by the American Heart Association; NIH Grants No. HE-5709; No. HE-09058; No. HE-05866; No. 5SO-1FR-05353-08 Grant No. NGR-05-020-305.

An experimental animal model with acute myocardial infarction of a size insufficient to produce profound heart failure or shock was used to study the effects of acute infarction on digitalis tolerance and the hemodynamic changes produced by moderate and large doses of acetylstrophanthidin. With acute myocardial infarction, digitalis toxic arrhythmias could be precipitated with significantly lower doses of digitalis than in animals without myocardial infarction. There was no precise correlation between the size of infarction and the toxic dose of glycoside. Coronary artery ligation produced a stable but relatively depressed circulatory state, as evidenced by lowered cardiac output and stroke volume and elevated systemic vascular resistance and left atrial mean pressure. When digitalis was infused, the following significant changes were observed at nontoxic doses: (1) elevation of aortic and left ventricular pressures; (2) further decline in cardiac output; and (3) decreased left atrial mean pressure. (Author)

A72-21083 Respiratory capacity of white, red, and intermediate muscle - Adaptative response to exercise. K. M. Baldwin, G. H. Klinkerfuss, R. L. Terjung, P. A. Molé, and J. O. Holloszy (Washington University, St. Louis, Mo.). *American Journal of Physiology*, vol. 222, Feb. 1972, p. 373-378. 22 refs. PHS Grants No. HD-01613; No. 5-P01-NS-04513-08.

A program of running can result in a twofold increase in the respiratory capacity of mixed muscles such as the gastrocnemius and quadriceps in the rat. This study was undertaken to determine which fiber type or types participate in the increase in oxidative capacity. The soleus muscle, and the superficial, white and deep, red portions of the quadriceps were used to determine the responses of intermediate, white and red muscle to endurance exercise. (Author)

A72-21084 * Role of distal reabsorption and peritubular environment in glomerulotubular balance. R. W. Schrier and M. H. Humphreys (California, University, San Francisco, Calif.). *American Journal of Physiology*, vol. 222, Feb. 1972, p. 379-387. 38 refs. Research supported by the University of California; NIH Grants No. AM-12753; No. HE-13319; Grant No. NGR-05-025-007.

Total kidney glomerulotubular balance was examined during aortic constriction and release in saline-loaded dogs and in dogs undergoing water diuresis. Aortic constriction lowered the glomerular filtration rate by 45% in both groups, and glomerulotubular balance, as judged by changes in absolute sodium reabsorption, was also comparable. During water diuresis, a linear relationship was observed between free water clearance and urine flow during all maneuvers, suggesting that distal sodium reabsorption is related primarily to distal delivery. The results suggest that if alterations in the peritubular environment are responsible for the changes in tubular sodium reabsorption during aortic constriction in the saline- or water-loaded dog, then a change in renal plasma flow, and presumably delivery rate of oncotic force, may be the most likely mediator. (Author)

A72-21085 * Heat and cold acclimation in helium-cold hypothermia in the hamster. X. J. Musacchia (Missouri, University, Columbia, Mo.). *American Journal of Physiology*, vol. 222, Feb. 1972, p. 495-498. 13 refs. Research supported by the University of Missouri; Grant No. NGR-26-004-021.

A study was made of the effects of acclimation of hamsters to high (34-35 C) and low (4-5 C) temperatures for periods up to 6 weeks on the induction of hypothermia in hamsters. Hypothermia was achieved by exposing hamsters to a helox mixture of 80% helium and 20% oxygen at 0 C. Hypothermic induction was most rapid (2-3 hr) in heat-acclimated hamsters and slowest (6-12 hr) in cold-acclimated hamsters. The induction period was intermediate (5-8 hr) in room temperature nonacclimated animals (controls). Survival time in hypothermia was relatable to previous temperature acclimations. The hypothesis that thermogenesis in cold-acclimated hamsters would accentuate resistance to induction of hypothermia was substantiated. (Author)

A72-21136 # Force and contraction velocity of the middle ear muscles in the cat and the rabbit. E. Teig (Oslo, Universitetet; Rikshospitalet, Oslo, Norway). *Acta Physiologica Scandinavica*, vol. 84, Jan. 1972, p. 1-10. 19 refs.

Contractions of the stapedius and the tensor tympani muscles in cats and rabbits have been produced by electric stimulation of the motor nerves at varying stimulus frequencies. Both muscles were found to be stronger than in previous investigations. The tetanic tension of the stapedius on an average was 13.9 g (cat) and 15.4 g (rabbit). The tetanic tension of the tensor tympani averaged 54.3 g (cat) and 32.3 g (rabbit). Each muscle developed sufficient tension to cause a reduction in the sound transmission of the middle ear by more than 20 dB. G.R.

A72-21137 # Tension and contraction time of motor units of the middle ear muscles in the cat. E. Teig (Oslo, Universitetet; Rikshospitalet, Oslo, Norway). *Acta Physiologica Scandinavica*, vol. 84, Jan. 1972, p. 11-21. 28 refs.

The all-or-none contractions of 46 individual tensor tympani motor units and 44 individual stapedius motor units in response to threshold stimulation of their motor neurons have been recorded. The tensor tympani was found to contain two types of twitch motor units, including a fast and a slow type. The fast type had a contraction time in the range from 23 to 40 msec, a half relaxation time in the range from 17 to 46 msec, and a tetanic fusion rate of 75 Hz. The slow type had a contraction time in the range from 58 to 92 msec, a half relaxation time in the range from 52 to 100 msec, and a tetanic fusion rate in the range from 15 to 20 Hz. G.R.

A72-21186 * Airway structure and alveolar emptying in the lungs of sea lions and dogs. D. M. Denison, D. A. Warrell, and J. B. West (California, University, La Jolla, Calif.). *Respiration Physiology*, vol. 13, Dec. 1971, p. 253-260. 11 refs. Grant No. NGL-05-009-109.

Investigation of the effects of various cycles of compression and decompression on the alveolar volumes of the excised lungs of sea lions and dogs. The results obtained include the finding that, in comparison to dog lungs, sea lion lungs empty more completely on mild compression and much more completely on severe compression. These findings support Scholander's (1940) hypothesis that some marine mammals are protected from decompression sickness by cartilaginous reinforcement of the small airways which permits alveolar emptying during a dive, so isolating compressed gas from pulmonary capillary blood. M.V.E.

A72-21187 * Effects of pentobarbital on plasma glucose and free fatty acids in the rat. R. L. Furner (NASA, Ames Research

Center, Environmental Biology Div., Moffett Field, Calif.; National Academy of Sciences, Washington, D.C.), E. D. Neville, K. S. Talarico, and D. D. Feller (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.). *Society for Experimental Biology and Medicine, Proceedings,* vol. 139, Jan. 1972, p. 231-234. 6 refs.

Hyperglycemia and hypolipemia were observed in rats after the injection of sodium pentobarbital. The observed changes were independent of whether the blood was collected by decapitation or by needle puncture of the aorta. The hyperglycemic response was caused by two factors including the stress of the injection per se and the pharmacological action of the drug. Hyperlipemia was observed at 5 min postinjection. However, pentobarbital decreased plasma free fatty acids by 15 min postinjection. Both the hyperglycemia and hypolipemia responses were dose dependent. G.R.

A72-21194 # **Changes in evoked cortical potentials in response to emotional visual stimuli in man under the action of amyzil (Izmeneniia korkovykh vyzvannykh potentsialov na emotsional'nye zritel'nye stimuly pod vliianiem amizila u cheloveka).** E. A. Kostandov and Iu. L. Arzumanov (Tsentral'nyi Nauchno-Issledovatel'skii Institut Sudebnoi Psikhiatrii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 21, Nov.-Dec. 1971, p. 1247-1255. 16 refs. In Russian.

Study of the effect of amyzil (benactyzine), an anticholinesterase drug, on the averaged evoked potentials (AEP) of subjects in a state of prolonged emotional stress. AEP responses to neutral and emotional visual and verbal stimuli were recorded from the vertex and occipital areas by means of a computer. The possible nervous mechanisms governing the AEP responses observed are discussed. M.V.E.

A72-21195 # **Neurophysiological mechanisms of the action of barbiturates on projection systems of the brain (Neirofiziologicheskie mekhanizmy deistviia barbituratov na proektsionnye sistemy mozga).** R. A. Durinian, V. L. Glants, and A. G. Rabin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 21, Nov.-Dec. 1971, p. 1256-1260. 28 refs. In Russian.

An analysis of published data is shown to reveal certain features in the characteristic action of barbiturates on the thalamo-cortical level of the somatosensory system. It is found that substantial changes in the mechanism of transmission of afferent signals are elicited already by subanaesthetic doses of barbiturates. M.V.E.

A72-21196 # **Comparative bioelectrical characteristics of the frontal and occipital areas of the human brain cortex (Sravnitel'naia bioelektricheskaia kharakteristika lobnykh i zatylochnykh oblastei kory golovnogo mozga cheloveka).** A. I. Krupnov and V. D. Nebylitsyn (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 21, Nov.-Dec. 1971, p. 1261-1267. 14 refs. In Russian.

Experimental study of the correlation between the occipital and frontal parts of the brain in terms of the parameters of intensity, EEG rhythm frequency, and EEG wave asymmetry. The data obtained suggest that some bioelectrical characteristics of the ante- and retrocentral brain areas change under the influence of unrelated causes and that the underlying neurophysiological factors may have a varying psychophysiological significance. M.V.E.

A72-21198 * **Viruslike particles in the tissues of normal and gamma-irradiated Drosophila melanogaster.** J. Miquel, K. G. Bensch, and D. E. Philpott (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, Calif.). *Journal of Invertebrate Pathology,* vol. 19, Jan. 1972, p. 156-159.

A new finding of viruslike particles in the salivary and accessory glands, muscles, and nerves of normal and gamma-irradiated Drosophila melanogaster is discussed. In morphology and size, the particles seemed identical to those described in earlier reports. On the basis of the available results, it cannot be affirmed that these particles infect only dividing cells, since they are found in all the Drosophila tissues so far examined. Their relation to the aging process is felt to be an interesting subject for further study. M.V.E.

A72-21200 * **Effects of n-dominance and group composition on task efficiency in laboratory triads.** E. C. Lampkin (NASA, Ames Research Center, Moffett Field, Calif.). *Organizational Behavior and Human Performance,* vol. 7, Apr. 1972, p. 189-202. 13 refs.

Task-oriented triads were formed into various homogeneous and heterogeneous combinations according to their scores on the n-dominance personality trait of the Edwards Personal Preference Schedule. Five group categories were used. The group task required a consensus decision on each trial. High cooperation and interdependence were reinforced by partially restricting the communication network. Results showed heterogeneous groups significantly better at organizing their group communication processes. They consequently performed the task more efficiently than homogeneous triads. G.R.

A72-21269 **Information and teaching - Little known tasks of civil aviation physicians (L'information et l'enseignement - Des tâches peu connues des médecins de l'aviation civile).** J. Pasquet and M. Medvedeff (Compagnie Nationale Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 4th Quarter, 1971, p. 167-170. In French.

Review of duties performed by physicians for air line personnel and for the benefit of passengers. For the latter, medical advice must be available concerning inoculations, health precautions (especially for tropical countries), and diet. Arrangements must be made for ill, elderly, and infirm passengers. Aircrew, both cabin and operating personnel, should have first aid training. Training programs provided by physicians and nurses are described. F.R.L.

A72-21270 **Evolution of asthmatics in armed forces operating aircrew (Le devenir des asthmatiques dans le personnel navigant des armées).** R. Pannier, G. Leguay, and J. Dronioû (Hôpitaux des Armées, Paris, France). *Revue de Médicine Aéronautique et Spatiale,* vol. 10, 4th Quarter, 1971, p. 171-174. In French.

Discussion of asthmatic subjects, in 50 per cent of whom the asthma manifests itself before age 20, and in the other 50 per cent, in the course of their air force careers. In the first group the asthma is intermittent, with paroxystic dyspnea, and frequently disappears. In the second group, early asthma may be aggravated. To detect asthmatics, all aircrew candidates should be subjected to an acetylcholine test. Various treatments are discussed. F.R.L.

A72-21271 **Hyperuricemia, gout, and lithiasis among operating air crew (Hyperuricémie, goutte et lithiase chez le personnel navigant).** J. Pasquet (Compagnie Nationale Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 4th Quarter, 1971, p. 175-179. 11 refs. In French.

Discussion of hyperuricemia which, although often without symptoms, is a sign of gouty diathesis, and often occurs among aircrew. Hyperuricemia is of importance because of its relation to arteriosclerosis, and because of the significant risk of urinary lithiasis, which is often latent. This exposes the constitution to interstitial nephropathy. Methods of determining hyperuricemia are described, and its causes among aircrew are discussed. F.R.L.

A72-21272 **Resistance to dazzle among aircrew (Résistance à l'éblouissement chez le personnel navigant).** J. P. Chevaleraud (Ministère des Armées, Service de Santé des Armées, Paris, France) and G. Perdriel. *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 4th Quarter, 1971, p. 180-182. In French.

Investigation of the effects of dazzle or glare on aircrew, a subject of importance since some recent civil and military aircraft accidents have been attributed to this cause. Dazzle can occur during daytime and nighttime flights, both in the air and on the ground. It causes deterioration of the optical image, as well as sensorial and psychological troubles. In tests on aircrew acuity recuperation from dazzle varied little with age. Excellent adaptation was shown by 30 per cent of subjects, 60 per cent adapted normally, and 10 per cent had inadequate adaptation. F.R.L.

A72-21273 **Permanent flight unfitness and attributability to air service (Inaptitudes définitives au vol et imputabilité au service aérien).** J. Raboutet, E. Lafontaine, Ch. Gignoux, and J. Lavernhe (Conseil Médical de l'Aéronautique Civile; Compagnie Nationale Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 10, 4th Quarter, 1971, p. 183, 184. In French.

Consideration of the cases of 134 civil aircrew who were declared medically unfit, permanently, for flight duties. Of these, 64 benefited from a decision that the unfitness was a result of their air service. Causes of unfitness were orthopedic traumatic sequelae, cardiovascular illnesses, psychological problems, and ophthalmological unfitness. F.R.L.

A72-21332 **Spectral response of the eye.** G. A. Leavitt (California, University, Livermore, Calif.). *Optical Spectra,* vol. 5, Sept. 1971, p. 28-32. 13 refs. AEC-sponsored research.

Discussion of thresholds of vision of the human eye both for the detection of light and the sensation of color. Although the response curve and spectral range of the human eye at normal light levels are well defined, the eye can also handle light well outside this spectral range if the source is intense enough or if the eye is adapted to the dark. The discussion relates the physiology of the eye to its ability to distinguish colors and to handle a range of brightness exceeding one trillion to one. Useless as an instrument for measuring luminous energy, the eye is an excellent device for comparing the equivalence of adjacent fields as to brightness or contrast. M.V.E.

A72-21333 **The bioeffects of light.** W. F. van Pelt, W. R. Payne, H. F. Stewart, and R. W. Peterson (U.S. Department of Health, Education, and Welfare, Food and Drug Administration, Washington, D.C.). *Optical Spectra,* vol. 5, Sept. 1971, p. 33-36. 8 refs.

Discussion of the biological hazards of high intensity light sources, and review of the physiological factors that must be considered in determining 'threshold' eye damage values. Light, whether from a laser, a movie projector, or a spotlight, may cause damage when it impacts on living tissue. The mechanisms of damage are briefly outlined, along with the pertinent structural features of the eye. Research to determine the levels of light that will cause 'threshold' damage has been under way for a considerable period of time and has accelerated with the widespread availability of the laser. Most current work in light bioeffects uses a laser as the light source. Current knowledge of light damage is reviewed for the three classical regions of the spectrum: UV, visible, and IR. M.V.E.

A72-21460 **Rod-cone interaction in human scotopic vision.** T. E. Frumkes, M. D. Sekuler, and E. H. Reiss (Queens College, Flushing, N.Y.). *Science,* vol. 175, Feb. 25, 1972, p. 913, 914. 11 refs. NIH Grants No. EY-00575-07; No. 805-FR-07064-05.

Thresholds of a test flash were measured at various time intervals from onset of a conditioning flash under parafoveal scotopic conditions; rods or cones were selectively stimulated by utilizing either 420- or 680-nanometer light. Rod-cone interaction was indicated because conditioning flash presentation increased test threshold above control level for heterochromatic as well as for homochromatic stimulus pairs. The time course of these threshold changes indicates that the rod system has a longer latency than the cone system. (Author)

A72-21471 # **Analysis of hypothalamic neuron discharges induced by somatosensory, sound, and light stimuli (K analizu vyzvannykh razriadov v neironakh gipotalamusa na somatosensornoe, zvukovoe i svetovoe razdrazheniia).** O. G. Baklavadzhian, A. G. Arakelian, and L. A. Balasanian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR). *Neirofiziologiia,* vol. 3, Nov.-Dec. 1971, p. 592-598. 13 refs. In Russian.

Investigation of the responses of single neuron units of the supramamillary, mamillary, and anterior hypothalamic areas to different (acoustic, photic, and sciatic) stimulations in cats anesthetized by chloralose and immobilized by succinylcholine. The three sensory modalities were found to cause increases or decreases in background activity and in induced discharges of 'silent' neuron cells. It is suggested that the discharges of hypothalamic neurons induced by sensory stimuli of all three modalities represent responses of a secondary nonspecific type. M.V.E.

A72-21472 # **Rhythmic patterns of motoneurons in man during voluntary muscle contraction (Ritmika motoneironov cheloveka pri proizvol'nom napriazhenii myshtsy).** R. S. Person and L. P. Kudina (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Neirofiziologiia,* vol. 3, Nov.-Dec. 1971, p. 609-619. 40 refs. In Russian.

M. rectus femoris motor unit potentials were studied under voluntary isometric contraction, the tension being 17-35% of the maximum strength. Two types of motoneuron activity were found: (1) in the frequency range below 8-10 imp/sec, the interspike interval histograms were skewed to the right, the rather high standard deviation depended on the mean interval, and no correlation between adjacent intervals was apparent; (2) at frequencies higher than 10-13 imp/sec, the histograms showed a normal distribution, the rather low standard deviation was independent of the mean interval, and a negative correlation between adjacent intervals was found. M.V.E.

A72-21473 # **Responses of bulbar respiratory neurons to stimulations of the receptor zones of the aeriferous tracts (Reaktsii bul'barnykh dykhatel'nykh neironov na razdrazhenie retseptornykh zon vozdukhonosnykh putei).** V. S. Vasilevskii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia,* vol. 3, Nov.-Dec. 1971, p. 620-630. 21 refs. In Russian.

Modifications in the discharge patterns of bulbar respiratory neurons caused by air insufflation into the nasal ducts and through an isolated tracheal segment were studied in cats anesthetized by nembutal. The observed stimulating and inhibiting changes in neuronal activity were compared with the simultaneous changes in intratracheal pressure. It is concluded that during normal breathing impulses from the nasal and tracheal receptors propagate to all groups of bulbar respiratory neurons responsible for driving respiratory movements. M.V.E.

A72-21474 # **Thresholds and latencies in the responses of retina ganglion cells of cats to local stimulations of separate areas of the receptive field (Porogi i latentnosti reaktsii ganglioznykh kletok setchatki koshki pri lokal'noi stimuliatsii otdel'nykh chastei ikh retseptivnogo polia).** L. I. Tanengol'ts (Akademiia Nauk SSSR,

Institut Problem Upravleniia, Moscow, USSR). *Neirofiziologiia,* vol. 3, Nov.-Dec. 1971, p. 644-649. 5 refs. In Russian.

Separate stimulation of the center and periphery of the receptive field makes it possible to divide the retinal ganglion cells of cats into two types: those with on-center (off-periphery) neurons, and others with off-center (on-periphery) neurons. The two types seem to be symmetrical with respect to all investigated parameters. This symmetry reflects the equality in informative significance of the brightening and darkening of the different parts of the visual field. It also appears to represent a means to widen the dynamic range of the visual information channel. M.V.E.

A72-21475 A digital simulation of the human cardiovascular system. B. W. Hyndman (Dalhousie University, Halifax, Nova Scotia, Canada). *INFOR - Canadian Journal of Operational Research and Information Processing,* vol. 10, Feb. 1972, p. 8-35. 31 refs.

Description of the development of a model of the human cardiovascular system with the aid of a digital computer, and review of the uses made of this model for testing some important theories of cardiovascular physiology. A brief account of the physiological reflexes that control blood pressure, as studied by animal experimentation, is given and shown to suggest the particular hydraulic parameters which are controlled in each reflex, as well as the approximate dynamics of these reflexes. The digital implementation of the reflexes are then outlined and their effect, when used to control parameters of the hydraulic system model, is studied. It is demonstrated how experimentation in the form of computer simulation trials can be utilized to characterize these reflexes more accurately so that certain key experimental phenomena observed in man may be reproduced in the model. These phenomena are indicative of a highly nonlinear control system and may be reproduced in the model if 'on-off' control of simulated peripheral resistance and venomoter tone is implemented. M.V.E.

A72-21487 # Survey of the sleep study program at North Carolina State University. D. M. O'Brien, F. D. Hart, and T. E. LeVere. *Acoustical Society of America, Fall Meeting, 82nd, Denver, Colo., Oct. 19-22, 1971, Paper W 11.* 13 p.

A program to determine the effect of aircraft noise on sleep is discussed. The electroencephalogram of a sleeping subject who is disturbed by an acoustic stimulus was obtained. When the subject awoke in the morning, he performed a simple psychomotor task which involved memory and reaction time. The acoustic stimulus consisted of jet aircraft flyovers. It was found that the acoustic stimulus shifts a person's sleep pattern. The subjects did not necessarily wake up at any time during the acoustic stimulus, they only went from what is commonly known as a deep sleep to a lighter sleep. The effect of the disturbance on the morning performance is discussed. Plans for tests involving a simulated sonic boom are also considered. G.R.

A72-21541 Recent therapeutic contributions for atheromatosis, chest angina, and arrhythmia; Société Belge de Cardiologie, Symposium, Brussels, Belgium, October 9, 10, 1970, Proceedings (Apports thérapeutiques récents dans l'athéromatose, l'angine de poitrine et les arythmies; Société Belge de Cardiologie, Symposium, Brussels, Belgium, October 9, 10, 1970, Proceedings). *Acta Cardiologica, Supplementum,* no. 15, 1972. 315 p. In French and English.

The papers deal with the pathogenesis, epidemiology, and treatment of athermatosis and with therapy by beta-blocking medication. Among the subjects discussed are risk factor in ischemic heart disease; the effects of lipids on platelets, blood coagulation and fibrinolysis; the thyroid and plasmatic lipids; hyperlipidemia in flying personnel; plasmatic and alimentary lipids in atherosclerotic subjects; corrective therapy of atherogenic hyperlipidemias; some aspects of the physiology of the autonomic nervous system; the action of beta-adrenergic inhibitors on the coronary output of man; and adrenergic beta receptor inhibition and hyperthyroidism. F.R.L.

A72-21542 # Risk factors in ischaemic heart disease. Z. Fejfar (Universita Karlova, Prague, Czechoslovakia; World Health Organization, Geneva, Switzerland). *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 7-35. 94 refs.

Attempt to evaluate present knowledge on individual and combined risk factors in ischemic heart disease. The concept of risk factors, as exemplified by increases in the blood pressure or in the levels of lipids and sugar in the blood, etc., has been of considerable value to research on atherosclerosis and cerebrovascular disease, as well as on the pathogenic mechanisms involved and the prevention and prognosis of these pathological conditions. Although there is no conclusive evidence as yet, it is recommended that the amounts of saturated fats and simple sugars in the diet should be reduced. F.R.L.

A72-21543 # The effect of lipids on platelets, blood coagulation and fibrinolysis. M. Verstraete (Leuven, Katholieke Universiteit, Louvain, Belgium). *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 37-47. 53 refs.

Demonstration that so-called 'thrombogenic' diets in animals and lipemia in human subjects after intake of an excess of long-chain saturated fatty acids can produce changes in platelet aggregation and enhance some coagulation tests in vitro. These effects appear to be more marked in patients with atherosclerotic disease. There is no clear evidence that an excess of fat decreases the fibrinolytic activity. The correlation between the observed changes and the presence or absence of thrombosis and atherosclerosis is poor. A common link between increased platelet adhesiveness and aggregation, enhanced blood coagulation, and a questionable diminished fibrinolysis and atherosclerosis remains to be demonstrated. F.R.L.

A72-21544 # The thyroid and plasmatic lipids (Thyroide et lipides plasmatiques). P. A. Bastenie (Hôpital Saint-Pierre, Brussels, Belgium). *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 49-56. 20 refs. In French.

Results of clinical and pathological studies, which support the classical concept that hypothyroidism may lead to severe atherosclerosis. Abnormalities in lipid metabolism may be responsible. Clinical hypothyroidism is usually due to the destruction of the thyroid parenchyma by a process of autoimmune thyroiditis. Before reaching this extreme degree of atrophy, autoimmune thyroiditis may induce disorders in iodine and lipid metabolism. This process is frequently present in women over fifty, and is statistically associated with an increased incidence of cardiovascular disease. The accompanying hypercholesterolemia is readily depressed by mild thyroid therapy. F.R.L.

A72-21545 # Hyperlipidemia among flying personnel /Civil aviation/ (Hyperlipidémies chez le personnel navigant /Aviation civile/). P. Anet, H. Brouns, K. G. Van Den Abeele, and A. Delescluse

(Société Anonyme Belge d'Exploitation de la Navigation Aérienne, Brussels, Belgium). *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 75-85. In French.

Demonstration, by means of graphs, of the progressive increase during ten years of controls of the rates of hyperlipidemias among 61 aircrew members of Sabena World Airways. The outright lowering, or the return to normal, of the rates of lipidemia for the 32 men treated by Clofibrate (ICI atromidin) for more than one year are shown. The 29 controls under observation without treatment showed no improvement. F.R.L.

A72-21546 # **Plasmatic and alimentary lipids among atherosclerotic subjects (Lipides plasmatiques et lipides alimentaires chez les sujets athéroscléreux).** A. Jouve, Ph. Vague, P. Avril, and J. Lioult. *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 87-99. 8 refs. In French.

Study of blood lipid levels and dietary habits in a group of patients and healthy subjects which showed that there was a significant increase of metabolic disturbances in the coronary cases, 56 per cent of the cases having disturbances of lipid metabolism and almost as many having disturbances of glucose metabolism. The diet of the patients was characterized by an increase in the total caloric content (50 per cent) and a lack of balance, almost always associated with an excess of lipids. Results are compared with those of earlier studies. F.R.L.

A72-21547 # **Corrective therapy of atherogenic hyperlipidemias (Thérapeutique correctrice des hyperlipidémies athérogènes).** J. L. De Gennes, G. Turpin, J. Truffert, and B. Labrousse. *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 115-137. 10 refs. In French.

Discussion of dietetical and pharmacological aspects of the management of atherogenic hyperlipidemias, with suggestion of a new classification of these diseases. New insights on the balance of lipids and sugars have greatly increased the efficiency of dietetic means. Only three classes of really efficient drugs are available: aryl-oxybutyril compounds; nicotinic acid and its compounds; and cholestyramine. It is shown why drugs of the first class (especially Clofibrate) are preferred. Clofibrate is the only drug of that class marketed in France which has proved efficient in practice. Indications and dosage are outlined. F.R.L.

A72-21548 # **Some aspects of the physiology of the autonomic nervous system.** I. Leusen (Gent, Rijksuniversiteit, Ghent, Belgium). *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 175-197.

Discussion of some dynamic aspects of the orthosympathetic control of the cardiovascular system, following review of some data concerning the efferent elements linking the autonomic vasomotor and cardiac centers to the cardiac and vascular effector cells. Schematically, a distinction can be made between the elements which are located before the effector cells (the preganglionic and the postganglionic orthosympathetic nervous fibers with their terminals), and the effector elements themselves: the pacemaker and the muscle cells of the heart and the smooth muscle cells of the blood vessels. The elements which link the centers with the effector cells show comparable structural and functional characteristics; the effector elements, however, can show considerable differences according to the organs or the regions. F.R.L.

A72-21549 # **Action of beta-adrenergic inhibitors on the coronary output of man (Action des inhibiteurs bêta-adrénergiques sur le débit coronaire de l'homme).** M. E. Bertrand, Y. Houdas, J. Y. Ketelers, and H. Warembourg (Clinique Médicale Ouest, Lille, France). *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 223-237. 38 refs. In French.

Study of the action of propranolol (5 mg), following a review of previous work. After injection of the drug, coronary blood flow decreased significantly in normal patients (13 per cent), and in patients with coronary artery disease (18 per cent). Propranolol also reduced myocardial oxygen consumption. Mechanisms to explain these results are discussed. Changes appear to be related to the negative chronotropic and inotropic properties of propranolol; these properties reduce the needs of the heart. F.R.L.

A72-21550 # **Adrenergic beta receptor inhibition and hyperthyroidism.** J. Malcolm. *(Société Belge de Cardiologie, Symposium sur les Apports Thérapeutiques Récents dans l'Athérmatose, l'Angine de Poitrine et les Arythmies, Brussels, Belgium, Oct. 9, 10, 1970.) Acta Cardiologica, Supplementum,* no. 15, 1972, p. 307-326. 40 refs.

Consideration of the role of the sympathetic nervous system in the production of the clinical features of hyperthyroidism. Adrenergic beta receptor stimulation produces many of these features, i.e., increased rate and force of contraction of the heart, sweating, dilatation of the blood vessels, and central nervous system hyperactivity, thus providing a rational basis for the use of adrenergic inhibition to ameliorate the signs and symptoms of hyperthyroidism. The use of propranolol slows the ventricular rate in hyperthyroid sinus tachycardia and atrial fibrillation, and favorably influences the myopathy, palpitations, agitation, tremor, sweating, and occasionally diarrhea associated with the condition. The use of propranolol allows specific antithyroid medication to be used with restraint, shortens the preparation time for thyroid surgery, and contributes to the comfort of patients. F.R.L.

A72-21566 Hypoxia incidents in Strategic Air Command 1969-1970. R. A. Lucchesi (USAF, Office of Surgeon, Offutt AFB, Neb.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 26-28.

Discussion of three hypoxia incidents which involved cabin pressurization malfunction. The greatest danger of hypoxia is that it is impossible to predict exactly when or where it will occur or how it will manifest itself. Poor oxygen discipline contributes to hypoxia incidents. F.R.L.

A72-21567 The custom fit oxygen mask. G. W. Hall (USAF, Washington, D.C.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 28, 29.

Discussion of the custom fit oxygen mask program, a service extended to crew members who cannot be fitted safely and comfortably with the standard issue oxygen mask because of unusual facial contour, dimension, or disfigurement. The mask has proven to be popular with crew members, as it is comfortable and is a personal Life Support item. F.R.L.

A72-21568 **Head protection.** F. W. Feldmann (ILC Industries, Inc., Dover, Del.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 30-36.

Discussion of helmet systems, the primary function of which is to prevent head acceleration from reaching a level at which concussion would occur. At the same time the helmet should prevent skull deformation, which increases intracranial pressure. The secondary function of the helmet is to distribute the impacting force over a larger area, and to absorb energy that would be transmitted to the head. Comfort and retention, type of suspension, helmet design, and helmet testing are considered. F.R.L.

A72-21569 **The effectiveness of a vibrotactile device under conditions of auditory and visual loading.** W. L. Johnston, A. M. Mayyasi (Texas A & M University, College Station, Tex.), and M. F. Heard (U.S. Army, Materiel Command, Washington, D.C.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 36-41. 8 refs.

Results of an investigation of the attention demanding qualities of an experimental tactual warning device. A vibrating device making use of an unbalanced crankshaft and a rapidly reciprocating piston contacting the skin was used. In comparison to visual and auditory warnings, the tactual device appears to effect a quicker reaction. F.R.L.

A72-21571 **Physiological evaluation of a modified jet transport passenger oxygen mask.** E. B. McFadden (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 53-61. 14 refs.

Description of altitude chamber experiments conducted with human subjects using new disposable passenger oxygen masks. These masks, applicable for emergency use to 40,000-ft altitudes, differ in configuration from the previous mask. The inner face flap or seal has been eliminated and the cylindrical shape has been reduced to a modified cone. The tests showed that the average inspired tracheal oxygen partial pressure remained above 83.3 mm Hg under all conditions of rest and exercise at all altitudes except for the third minute of exercise at 40,000 ft. G.R.

A72-21574 **Psychophysiological and environmental factors affecting disorientation in naval aviation accidents.** E. H. Ninow, W. F. Cunningham, and F. A. Radcliffe (U.S. Navy, Naval Safety Center, Norfolk, Va.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 78-82.

A two year review of naval aircraft accidents involving disorientation was undertaken. Twelve factors were found to have caused disorientation. Visibility restriction as most important factor was responsible for mishaps in 10% of all cases. Other factors include limited total experience, delay in taking necessary action, and failure to use accepted procedures. Improvements will come only from responsible flight scheduling which considers environmental and psychophysiological exposure as well as training and flight crew experience. G.R.

A72-21575 **Experience in treating decompression sickness in U.S. Air Force hyperbaric chambers.** B. E. Bassett (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 83-87.

Discussion of treatments conducted at USAF compression chamber facilities for patients with decompression sickness or air embolism. In addition, other treatments were conducted for patients with other disorders which are benefitted by hyperbaric oxygen therapy such as gas gangrene. A very large majority of cases treated received satisfactory relief of symptoms on their initial treatment in the compression chamber. Decompression sickness resulting from diving has also been treated successfully. F.R.L.

A72-21577 **Dynamic principles for seat cushion evaluation.** J. T. Shaffer (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 93-97. 9 refs.

Until the development of dynamically similar models of the seated human body, seat cushion design for +Gz impact environments was conducted with little regard for the cushions effect on human body tolerance. Evaluation of seat cushion behavior in the environments associated with helicopter crash or aircraft ejection is discussed using recently developed dynamic models of the cushion and the seated human body. An analytical technique is presented for determining the effects of a particular cushion on the probability of the occurrence of a spinal injury. Models of cushions are discussed from the viewpoint of the applicability of statically determined properties of the materials used. The conclusions indicate that the method presented is consistent with responses observed during impact tests using either rigid masses or human subjects. (Author)

A72-21578 **Crashworthy personnel restraint systems for general aviation.** R. A. Hughes (Pacific Scientific Co., City of Commerce, Calif.). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 98-103. 5 refs.

Study of occupant safety in general aviation aircraft, with emphasis on effective personnel restraint systems incorporating upper torso restraint. It is proposed that effective cooperation between the restraint system designers and aircraft installation engineers will insure that the aircraft equipped with these systems will also meet the qualitative requirements of comfort and easy fit, ease of donning and removing, and user confidence. F.R.L.

A72-21585 **Systems approach testing for new aircraft fire-fighters protective clothing.** N. L. Arnold (U.S. Department of Defense, Aircraft Ground Fire Suppression and Rescue Systems Program Office, Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association, Annual Symposium, 9th, Las Vegas, Nev., September 27-30, 1971, Proceedings. Van Nuys, Calif., Survival and Flight Equipment Association, 1972, p. 136, 137.

An extensive study, including flame resistant materials tests and fire fighters' exposure tests, has been conducted to obtain the necessary data for the development of a new aircraft fire fighters' protective clothing. Results indicate that new lighter weight protective clothing can be developed for large quantity production, and that it will meet or exceed the requirements desired by users and, at the same time, will be competitive in total cost with existing standard issue clothing. O.H.

A72-21834 **Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior (Fiziologiia vysshei nervnoi deiatel'nosti. Part 2 - Uslovnye refleksy i adaptivnoe povedenie).** Edited by M. G. Airapetiants. Moscow, Izdatel'stvo Nauka, 1971. 393 p. 1274 refs. In Russian.

Neuronal mechanisms of the conditioned reflex are examined, together with processes responsible for fixation of temporal associations, the physiology of emotions, features of intrinsic (instinctive) behavior, and the physiology of sleep and dreams. Contemporary notions on the genetics and classification of higher nervous activity are surveyed, and special attention is given to problems associated with studies of various types of human nervous activity. Additional topics examined include the effects of various neurotropic substances on the central nervous system, mathematical and structural modeling of conditioned-reflex activity, and some methodological aspects of Pavlovian concepts of higher nervous activity.

T.M.

A72-21835 # **Neuronal mechanisms of the conditioned reflex (Neironnye mekhanizmy uslovnogo refleksa).** M. Ia. Rabinovich. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior.
Moscow, Izdatel'stvo Nauka, 1971, p. 3-33. In Russian.

Review of the current knowledge on neurophysiological mechanisms responsible for conditioned reflexes. General characteristics of conditioned reactions of neurons are summarized, and attention is given to specific features of the conditioned activity of cells in different brain structures. Topics examined include dynamics of conditioned activity, temporal relationships between conditioned reactions of cells and the behavioral acts of animals, interactions of conditional and nonconditional stimuli at the neuronal level, internal inhibitions, and conditioned-reflex reproduction of trace processes (conditioned reactions to time). T.M.

A72-21836 # **Regularities in the fixation of temporal relationships (Zakonomernosti zakrepleniia vremennykh sviazei).** R. I. Kruglikov. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior.
Moscow, Izdatel'stvo Nauka, 1971, p. 34-59. In Russian.

Survey of research on factors affecting storage of information in the central nervous system. The memory function is divided into stages corresponding to the imprinting of a temporal relationship, the storage of this relationship, and the reproduction process. Retrograde amnesia is examined in connection with the consolidation of temporal relationships, and attention is given to the roles played by different brain structures in the fixation of memory imprints. The influence of emotions on the imprinting processes is examined, together with known features of the temporal organization of memory. T.M.

A72-21837 # **Physiology of emotions and conditioned-reflex theory (Fiziologiia emotsii i uslovnoreflektornaia teoriia).** P. V. Simonov. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior.
Moscow, Izdatel'stvo Nauka, 1971, p. 97-127. In Russian.

It is proposed that the physiological basis of emotions in higher-order animals and humans is provided by the activity of a special nerve apparatus which compensates (in the adaptive behavior process) for the lack of experience required in organizing activities to satisfy an existing need. A conceptual approach is formulated for elucidating the role of emotions in behavior and for analyzing available data on the neurophysiological substrate of emotions. Attention is given to necessary conditions for activation of the nerve apparatus responsible for emotions, the morphophysiological substrate of emotions in the brain, intrinsic and conditioned-reflex mechanisms regulating emotional centers, and participation of the nerve apparatus in the generalization phase of conditioned reflexes and in orientational reactions. T.M.

A72-21838 # **Physiology of sleep and of dreams (Fiziologiia sna i snovidenii).** A. N. Shepoval'nikov. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior. Moscow, Izdatel'stvo Nauka, 1971, p. 128-163. In Russian.

A survey of current research on the nature of sleep indicates rapid accumulation of facts testifying to the presence of highly organized, specialized, and interacting neurohumoral systems exhibiting alternating forms of activity in different phases of sleep. Available experimental data are evaluated and consolidated for such topics as the bioelectric activity of the sleeping brain, vegetative and motor phenomena accompanying sleep, reactivity of the brain during sleep, neurohumoral mechanisms of sleep, and the physiological significance of sleep phases and dreams. T.M.

A72-21839 # **Problems in studying the main properties of the human nervous system (Problemy izucheniia osnovnykh svoistv nervnoi sistemy cheloveka).** B. M. Teplov and V. D. Nebylitsyn. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior. Moscow, Izdatel'stvo Nauka, 1971, p. 224-239. In Russian.

Pavlov's four types of higher nervous activity are rejected as the basis for studies on mechanisms responsible for individual behavioral differences, and emphasis is placed on the need for detailed and extensive studies of the main properties of the nervous system to obtain the primary characteristics of any future typological classification. Methodological problems in developing and selecting adequate research procedures are discussed from the viewpoint of specific biological criteria. The effects of individual main properties of the nervous system are shown to correspond to defined syndromes, and attention is given to relations between the strength and the sensitivity of the central nervous system. T.M.

A72-21840 # **Cortical synthesis and the informational significance of evoked potentials in man (Korkovyi sintez i informatsionnoe znachenie vyzvannykh potentsialov u cheloveka).** A. M. Ivanitskii. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior.
Moscow, Izdatel'stvo Nauka, 1971, p. 240-255. In Russian.

The study of evoked potentials in man from the viewpoint of their information-handling properties is justified as an approach to the analysis of normal and pathological behavior. The method of evoked potentials permits objective recording of the arrival of two forms of information into the cerebral cortex. Impulses that arrive from receptors along a specific system carry information about the physical parameters of the stimulus. Impulsation that arrives along a nonspecific system from subcortical brain structures provides data on the signaling significance of the stimulus. Synthesis of these two forms of quantitative information in the cortex provides a basis for the initial stages of perception. T.M.

A72-21841 # **Pharmacology of higher nervous activity (Farmakologiia vysshei nervnoi deiatel'nosti).** R. Iu. Il'iuchenok. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior. Moscow, Izdatel'stvo Nauka, 1971, p. 256-289. In Russian.

Survey of research on changes induced in the activity of the central nervous system by somniferous, narcotic, and neurotropic substances whose biochemical mechanisms are not fully understood in spite of usage in medical practice and experimental brain research. Attention is given to acetylcholine, carbacholine, anticholinesterase substances, cholinomimetic media, anticholinergic substances, adrenalin, noradrenalin, serotonin, substances affecting amine synthesis and storage, substances acting in the region of adrenergic synapses, tranquilizers, strychnine, pyrotoxin, corasole, antidepressants, and other media. T.M.

A72-21842 # **Simulation of conditioned-reflex activity (Modelirovanie uslovnoreflektornoi deiatel'nosti).** A. B. Kogan. In: Physiology of higher nervous activity. Part 2 - Conditioned reflexes and adaptive behavior. Moscow, Izdatel'stvo Nauka, 1971, p. 290-330. In Russian.

Some general problems arising in the simulation of biological systems and nervous-system mechanisms are examined, and published research in this area is surveyed. Mathematical models of some general regularities in learning processes are described, together with structural modeling of the threshold closing of temporal links. Substantial attention is devoted to the functional and structural modeling of conditioned reflexes in classifying and self-organizing systems. Schematic diagrams are given for electrical analogs of various system functions, and future trends in simulation studies are discussed from the viewpoint of expected gains from such research. T.M.

A72-21849 **Non-reproducibility of serial vectorcardiograms obtained by the Frank system.** D. D. dos Reis, V. M. Lopes, B. B. da Costa, F. de Pádua (Lisboa, Universidade, Lisbon, Portugal), R. Álvares, and S. M. Félix. *(World Congress of Cardiology, 6th, London, England, Sept. 1970.) Journal of Electrocardiology,* vol. 4, no. 4, 1971, p. 307-314. 9 refs.

Three vectorcardiograms were obtained from each of 33 normal subjects. Special care was taken to avoid the influence of factors known to cause significant variations in serial electrocardiograms and vectorcardiograms. Such factors include respiratory movements, shifts in the location of the electrodes, inaccuracies of the visual measurements, and the presence of low resistance paths. Important variations in some measurements were found in the vectorcardiograms of individual cases. The study demonstrates that differences in the position of the electrodes are not the only important cause of intra-individual day-to-day variations in the vectorcardiograms of normal subjects. G.R.

A72-21850 **Vectorcardiographic features of left anterior hemiblock combined with complete right bundle branch block.** A. Benchimol, K. B. Desser, and E. C. Barreto (Good Samaritan Hospital, Phoenix, Ariz.). *Journal of Electrocardiology,* vol. 4, no. 4, 1971, p. 322-330. 20 refs. Research supported by the Nichols' Memorial Fund.

The vectorcardiographic features of left anterior hemiblock (LAHB) combined with right bundle branch block (RBBB) were characterized using the Frank lead system. In the presence of RBBB, the following criteria appeared to be most useful for the additional diagnosis of coexisting LAHB: superior displacement and counterclockwise inscription of the frontal plane QRS loop, and QRS duration of 120 msec or more, with delayed inscription of the terminal 60-msec vectors. LAHB combined with RBBB results in a more superior frontal plane maximum QRS vector than does isolated RBBB or LAHB. (Author)

A72-21895 # **Perceived level of noise by Mark VII and decibels /E/.** S. S. Stevens (Harvard University, Cambridge, Mass.). *Acoustical Society of America, Journal,* vol. 51, Feb. 1972, pt. 2, p. 575-601. 60 refs. NIH-supported research.

The calculation procedure Mark VII gives the perceived level of loudness or noisiness in PLdB. It utilizes a set of frequency-weighting contours based on an average of 25 experimental contours. The standard reference sound is defined as a 1/3-oct band centered at 3150 Hz. The perceived magnitude (loudness or noisiness) grows as the 2/3 power of the sound pressure, so that perceived magnitude doubles with each increase of 9 dB. Perceived level in decibels (PLdB) is approximately 8 dB lower than the older loudness level in phons. Except for the nearly constant difference of 8 dB, Mark VI and Mark VII give closely similar results for typical broad-band noises. The 8-dB downward shift makes it possible for a sound level meter with an 'ear weighting' to give readings (E) in decibels within a decibel or two of perceived level in PLdB. With the frequency-weighting contours extended down to 1.0 Hz, Mark VII also provides a procedure for calculating the perceived levels of sonic booms and other impulse noises. (Author)

A72-21896 # **Intensity, frequency, and duration effects in the measurement of monaural perstimulatory loudness adaptation.** T. E. Stokinger, W. A. Cooper, Jr. (U.S. Veterans Administration Hospital, Oklahoma City, Okla.), W. A. Meissner, and K. O. Jones (Oklahoma, University, Oklahoma City, Okla.). *Acoustical Society of America, Journal,* vol. 51, Feb. 1972, pt. 2, p. 608-616. 20 refs. Research supported by the U.S. Veterans Administration.

An experiment is described in which perstimulatory loudness adaptation is measured by delayed balance and by single simultaneous balance methods. The adapting signals consisted of all combinations of intensity (sound-pressure level 30, 50, 80, and 100 dB), frequency (250, 1000, and 4000 Hz), and duration (1, 2, 4, 8, 12, 16, and 30 sec). The results reveal little adaptation with simultaneous balances and slightly negative adaptation with delayed balances. Duration of the adapting signal had no significant effect on the data. However, the differences between methods of measurement, intensities, and frequencies of the adapting signal were statistically significant. All interactions, except those involving the duration factor, were statistically significant. (Author)

A72-21897 # **Auditory adaptation and its relationship to a model for loudness.** E. M. Weiler (Cincinnati, University, Cincinnati, Ohio), M. Loeb, and E. A. Alluisi (Louisville, University, Louisville, Ky.). *Acoustical Society of America, Journal,* vol. 51, Feb. 1972, pt. 2, p. 638-643. 15 refs. Contracts No. DA-49-193-MD-2197; No. DA-49-193-MD-2688; Grant No. DAHC19-69-C-0009. Project THEMIS.

Predictions, inferred from Small's model, of significantly lower auditory adaptation when test-tone intensity exceeds adapting-tone intensity were confirmed. Adaptation effects with test and adapting tone equal in intensity increased between 40 and 60 dB and remained relatively constant between 60 and 80 dB. When adapting-tone intensity exceeded test-tone intensity, previous findings that adaptation does not increase generally were confirmed. Theoretical implications of the results are discussed. (Author)

A72-21909 **Animal response to sonic booms.** W. B. Bell (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *(Acoustical Society of America, Meeting, 80th, Sonic Boom Symposium, 2nd, Houston, Tex., Nov. 3, 1970.) Acoustical Society of America, Journal,* vol. 51, Feb. 1972, pt. 3, p. 758-765. 31 refs.

Individual domestic or pet animals may react to a boom, a simple startle response being the most common reaction. However, specific reactions differ according to the species involved, whether the animal is alone, and perhaps whether there has been previous exposure. Occasional trampling, moving, raising head, stampeding, jumping, and running are among the reactions reported. Avian species occasionally run, fly, or crowd. Reactions vary from boom to boom and are not predictable. Animal reactions to booms are similar to their reactions to low-level subsonic airplane flights, helicopters, barking dogs, blown paper, and sudden noises. Conclusive data on effects of booms on production are not available, but no change in milk production by one dairy herd was noted. The reactions of mink to sonic booms have been studied in considerable detail. Female mink with kits may be alerted, pause in activity, and look for source of sound. Sleeping females may awaken and mating pairs may show momentary alertness, but the mating ritual is not disturbed. The effect of booms on eggs being hatched under commercial conditions was examined in detail, and no effects on hatchability were found. However, a mass hatching failure of the Dry Tortugas Sooty Tern

occurred in 1969, and the circumstantial evidence suggests that physical damage to the eggs by severe sonic booms caused by low-level supersonic flights was responsible. (Author)

A72-21910 # **Human response to sonic boom in the laboratory and the community.** H. E. von Gierke and C. W. Nixon (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *(Acoustical Society of America, Meeting, 80th, Sonic Boom Symposium, 2nd, Houston, Tex., Nov. 3, 1970.) Acoustical Society of America, Journal,* vol. 51, Feb. 1972, pt. 3, p. 766-782. 30 refs.

Present-day estimates regarding the acceptability of sonic booms by man are derived from various observations, overflight programs, and experimental field and laboratory studies conducted both within and outside the United States. The loudness and annoyance of individual booms and their dependence on the boom overpressure and pressure-time function as well as the complex reaction of individuals, groups, and communities exposed to sonic booms of varied magnitude and frequency are discussed. The few experiments available proving that even sonic booms of the maximum intensity presently feasible do not produce direct medical injury are described. Based on the integrated body of results of recent physiological, psychoacoustic, behavioral, and sociological studies in various countries, estimates of the effects and acceptability of regular, frequent supersonic commercial overland flight schedules are presented and discussed in terms of aircraft noise pollution in general, and of potential certification of aircraft with respect to noise and sonic boom. Findings support the current policy that commercial supersonic transport aircraft will not be permitted to fly over the United States unless and until the noise factors are brought within acceptable limits. (Author)

A72-21912 **Experiments on the effect of sonic-boom exposure on humans.** R. Rylander, S. Sörensen, K. Berglund, and C. Brodin (Kungl. Karolinska Institutet; Stockholm, Universitet, Stockholm, Sweden). *(Acoustical Society of America, Meeting, 80th, Sonic Boom Symposium, 2nd, Houston, Tex., Nov. 3, 1970.) Acoustical Society of America, Journal,* vol. 51, Feb. 1972, pt. 3, p. 790-798. 21 refs.

This paper reports the results of a field experiment initiated by the Division of House Construction at Chalmers' University of Technology in connection with the Swedish Aeronautical Research Institute, whose primary aim was to study boom exposure effect on structures. Military aircraft were used which flew over a test area generating sonic booms of various intensities. Test persons were exposed directly under the flight path, the exposure effect being measured with the aid of a visual performance test and a tracking test. In addition, the subjective reactions of the test persons and military recruits, present at other sites under the sonic-boom carpet, were evaluated with the aid of a questionnaire. (Author)

A72-22001 **Exobiology.** Edited by C. Ponnamperuma (Maryland, University, College Park, Md.). Amsterdam, North-Holland Publishing Co. (Frontiers of Biology. Volume 23), 1972. 504 p. $31.25.

The papers recapitulate the manner in which life began on the earth and discuss the possibility of extraterrestrial life. The appearance of life in the universe, Precambrian paleobiology, the geology of juvenile carbon, primordial organic chemistry, electronic factors in biochemical evolution, origins of molecular chirality, the origin of membranes and related surface phenomena, the evolution of proteins, the emergence of genetic organization, and early cellular evolution are treated. Attention is given to planetary atmospheres, distribution and significance of carbon compounds on the moon, organic molecules in space, and life beyond the solar system. F.R.L.

A72-22002 **The appearance of life in the universe.** A. I. Oparin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 1-15. 8 refs.

Discussion of possible pathways of the origin and development of extraterrestrial life. The same initial carbonaceous material that was needed for terrestrial life and life analogous to that formed on the earth may be present in other heavenly bodies. Therefore, the absence of life cannot serve as an impediment to its formation. The whole question centers around how this material evolved further on one or another cosmic object. It is clear that a successive evolution, analogous to that of the earth of carbon compounds could only exist within a relatively narrow framework of exterior conditions: temperature, gravitation, magnetic field, illumination, hydration, etc. It appears that only planetary systems are able to satisfy these conditions. The pathways of evolution could strongly differ on different cosmic objects even under relatively similar external circumstances. F.R.L.

A72-22008 **The origin of membranes and related surface phenomena.** D. O. Shah (Lamont-Doherty Geological Observatory, Palisades, N.Y.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 235-265. 196 refs.

Elucidation of the structure and function of the boundary layer, generally called the membrane, which serves as a barrier with selective permeability, thereby controlling many biochemical reactions within the cell. Current concepts of the structure and function of biological membranes, surface phenomena related to membrane function, and the significance and mechanisms of formation of prebiological membrane systems are described. The conditions of the primitive environment discussed point strongly to the inference that the structure and transport properties of membranes of prebiological systems must have contributed significantly to the evolution of 'living systems'. F.R.L.

A72-22009 **Evolution of proteins.** M. O. Dayhoff (National Biomedical Research Foundation, Silver Spring, Md.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 266-300. 73 refs.

Study of the amino acid sequences of proteins from living organisms. The interweaving of the biochemical with the fossil evidence promises to make it possible to work out the complete, detailed, quantitative phylogenetic tree: the history of the origin of all living species back to the very beginning of life. The structure and functions of proteins, the synthesis of proteins in the cell, the evolutionary process, and phylogenetic trees derived from protein sequences are examined. Intuitive considerations, computer methods, ancestral sequences, the cytochrome c phylogenetic tree, geological time scale, ferredoxin, and globins are discussed. Attention is drawn to information potentially available. F.R.L.

A72-22010 **The emergence of genetic organization.** C. R. Woese (Illinois, University, Urbana, Ill.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 301-341. 73 refs.

Examination of the problems of cellular evolution concerned with emergence of cellular 'tape reading' processes, with emphasis on the evolution of translation. The dynamics of the evolution of macromolecules and the role of quaternary structure are considered. The evolution of translation with reference to the molecular mechanics of the translation process, and stages in the evolution of translation are considered. Pretranslational evolution in nontranslational protein synthesis is studied, as well as the evolution of nucleic acid and the origin of the gene. F.R.L.

A72-22011 * **Early cellular evolution.** L. Margulis (Boston University, Boston, Mass.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 342-368. 68 refs. NSF-supported research; Grant No. NGR-22-004-002.

Study of the evolutionary developments that occurred subsequent to the origin of ancestral cells. Microbial physiology and ecology are potential sharp tools for shaping concepts of microbial evolution. Some popular unjustified assumptions are discussed. It is considered that certain principles derived mainly from the advances of molecular biology can be used to order the natural groups (genera) of extant prokaryotes and their patterns phylogenetically. F.R.L.

A72-22012 * **Planetary atmospheres.** S. I. Rasool (NASA, Goddard Institute of Space Studies, New York, N.Y.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 369-399. 21 refs.

Study of the composition of the atmospheres of the planets. Their wide variety is of interest in view of the fact that all nine planets were probably formed at the same time and out of the same chemically homogeneous mixture of gas and dust, i.e., the primitive solar nebula. The most likely explanation for this diversity in composition seems to be that the planetary atmospheres have undergone important evolutionary changes during their history of about 4.5 billion years. The early history of the earth's atmosphere is reviewed, as well as that of Venus and Mars. The most interesting aspect of Jupiter is that its present atmosphere seems to be composed of the same gases, hydrogen, methane, and ammonia, out of which the first living organisms are believed to have been synthesized on the earth. F.R.L.

A72-22013 * **Distribution and significance of carbon compounds on the moon.** S. Chang and K. A. Kvenvolden (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 400-430. 97 refs.

Exploration of available information concerning carbon on the moon, following review of what is known about carbon on the earth, and consideration of the results of studies of meteorites, which have provided the first direct clues about extraterrestrial carbon. Carbon and carbon isotope composition data taken from Apollo 11 samples are tabulated. Carbon compounds produced by pyrolysis, extracted with benzene-methanol, extracted with water, and freed by acid treatment are discussed. Carbon and carbon compounds in lunar rocks and soils appear to be distributed heterogeneously. F.R.L.

A72-22014 * **Organic molecules in space.** B. Donn (NASA, Goddard Space Flight Center, Laboratory for Space Sciences, Greenbelt, Md.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 431-448. 51 refs.

Examination of the question of chemical evolution. Observational evidence for the occurrence of some organic compounds in space is presented, and the likely existence of more complex molecules which are as yet undetected or unidentified is pointed out. This implies that massive solid objects, i.e., planets and asteroids, were accumulated from material which already contained a variety of organic compounds. The objects or regions of the galaxy studied are comets, interstellar space, prestellar nebulae, and cool stellar atmospheres. F.R.L.

A72-22015 * **Potential targets in the search for extraterrestrial life.** H. P. Klein (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 449-464. 51 refs.

Discussion of the potential for increasing understanding of the origins of terrestrial life by examination of other planets. If living organisms should be found on another planet, they could only have been transported from an inhabited planet or originated independently. The fundamental chemical and structural attributes of terrestrial organisms are so remarkably uniform that any living forms outside the terrestrial blueprint would almost certainly be regarded as alien organisms. It has been shown experimentally by various investigators that life can exist in an extremely wide range of temperatures and pressures. The presence of an atmosphere appears to be necessary. F.R.L.

A72-22016 * **Life beyond the solar system.** C. Sagan (Cornell University, Ithaca, N.Y.). In: Exobiology. Amsterdam, North-Holland Publishing Co., 1972, p. 465-477. 21 refs. Grant No. NGR-33-010-101.

Review of some of the highlights and more recent developments in the search for extraterrestrial intelligence. The first major problem is one of the generality of the formation of planetary systems. Observations of the nearest stars which are not members of binary or multiple stars indicates that fully half have companions of planetary mass. The presence of organic compounds in meteorites, probably in Jovian planets, in comets, in the interstellar medium, and in cool stars implies that the production of organic compounds essential for the origin of life should be pervasive throughout the universe. Possibilities of interstellar communication are discussed. F.R.L.

A72-22019 **Peripheral thermoregulation - Foot temperature in two arctic canines.** R. E. Henshaw, L. S. Underwood, and T. M. Casey (Pennsylvania State University, University Park, Pa.). *Science*, vol. 175, Mar. 3, 1972, p. 988-990. 25 refs. Research supported by the Arctic Institute of North America.

Arctic foxes and gray wolves maintain their foot temperature just above the tissue freezing point (about -1 C) when standing on extremely cold snow, or when the foot is immersed in a -35 C bath in the laboratory. Proportional thermoregulation stabilized the subcutaneous temperature of the foot pad to a precision of plus or minus 0.7 C (largest deviations). Selective shunting of blood-borne body heat through a cutaneous vascular plexus in the food pad accounted for more than 99% of measured heat loss from the pad surface. Maximum energetic efficiency is achieved because the unit of heat exchange is located in the pad surface which contacts the cold substrate rather than throughout the pad. (Author)

A72-22073 # **General regularity of blood-circulation changes in the human aging process (Obshchaia zakonomernost' izmenenii krovoobrashcheniia v protsesse stareniia u cheloveka).** N. I. Arinchin, T. V. Kalinina, and E. M. Logvinov (Akademiia Nauk Belorusskoi SSR; Belorusskii Institut Fizicheskoi Kul'tury, Belorussian SSR). *Akademiia Nauk BSSR, Doklady*, vol. 15, Nov. 1971, p. 1041-1044. 70 refs. In Russian.

Available data show that minute volume of circulation increases and overall peripheral resistance decreases from birth to the age of 16, with a reversal of these relations taking place in old age. Previous studies leading to these conclusions did not account for body weight (particularly in children), and the present work compensates for this omission by reducing the minute volume and peripheral resistance values to equivalent indices per kilogram of body weight. Results indicate a drop in the new index of minute volume and a rise in the new index for peripheral resistance during aging from the moment of birth to the age of 89. T.M.

A72-22076 # **Respiration control characteristics during hyperoxia (Osobennosti reguliatsii dykhaniia giperoksii).** A. G. Zhironkin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1762-1767. 35 refs. In Russian.

Experimental data are presented that put in doubt currently held views about the supposedly great significance of arterial chemoreceptors for the mechanism of the short-duration oxygen-caused reduction in the minute volume respiration rate at the onset of hyperoxia. The hypothesis about the existence of 'silent' chemoreceptor zones in highlanders seems confirmed by the observation in Pamir mountain aborigines of a weakened natural breathing reaction to oxygen. The mechanism of inverse breathing response to oxygen excess is discussed. Current opinions on respiration control during hyperoxia are reviewed. M.V.E.

A72-22077 # **Voluntary respiration control in an altered gas environment (Proizvol'naia reguliatsiia dykhaniia v izmenennoi gazovoi srede).** I. S. Breslav, N. N. Kariev, and A. M. Shmeleva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1768-1773. 17 refs. In Russian.

Reactions to inhalation of different gas mixtures were studied in healthy young people under conditions of: (1) spontaneous breathing and (2) a voluntarily maintained pulmonary ventilation level in accordance with verbal instructions. Instructed to maintain their usual level, subjects were able to maintain it not only when inhaling air and hyperoxic gas mixtures, but also with moderately hypoxic and, to a lesser extent, hypercapnic gas mixtures. The performance of these young people is compared with that of native highlanders, and the possible causes of performance differences are discussed. M.V.E.

A72-22078 # **Influence of arterial chemoreceptor deafferentation on respiratory responses in rats (Vliianie deafferentatsii arterial'nykh khemoretseptorov na dykhatel'nye reaktsii krys).** E. A. Konza (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1774-1779. 12 refs. In Russian.

Study of the role of chemoreceptors of the sinocarotid and aortal areas in the regulation of breathing in rats during inhalation of hypoxic and hypercapnic gas mixtures and also after intravenous administration of dilute potassium cyanide. Surgical deafferentation of these areas was not accompanied by hyperventilation disappearance during hypoxia, and the ventilatory response to cyanide shrunk. The possibility is suggested that some other chemosensitive structures participate in the hypoxic stimulation of breathing in rats. M.V.E.

A72-22079 # **Characteristics of breathing regulation under normal conditions and in an altered gas environment (Osobennosti reguliatsii dykhaniia v norme i v usloviiakh izmenennoi gazovoi sredy).** M. V. Sergievskii (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *(Simpozium po Funktsii Vneshnego Dykhaniia v Izmenennoi Gazovoi Srede, Leningrad, USSR, Jan. 20-22, 1971.) Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1780-1787. 39 refs. In Russian.

Respiration control is studied in a normal and altered gas environment. Under normal conditions, the regulation of the automatic and adjustive respiratory functions may be regarded as being reflex-controlled. Under hypoxia, the products of incomplete oxidation exert a mainly 'direct' effect on the cortex and subsequently on the medulla oblongata. Considerable importance devolves upon the signalization from the brain tissue receptors which are the first to be affected by the effluent cerebral blood. M.V.E.

A72-22080 # **Respiration control and physiological adaptations of the respiratory function under hypoxia (Reguliatsiia dykhaniia i fiziologicheskie prisposobleniia dykhatel'noi funktsii pri gipoksii).** N. N. Sirotinin (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *(Simpozium po Funktsii Vneshnego Dykhaniia v Izmenennoi Gazovoi Srede, Leningrad, USSR, Jan. 20-22, 1971.) Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1788-1792. 20 refs. In Russian.

Discussion of the control and adaptation mechanisms of the respiratory function in the light of its evolution history. The respiratory function arose and developed in a gas environment that was changing as a result of the oxygen accumulation in the earth's atmosphere. A parallel and simultaneous development is that of the great sensitivity to oxygen deficiency, particularly pronounced in man. Respiration control is also most highly developed in man. The interconnected physiological adaptations of the respiratory function (hemoglobin, glutathione, etc.) have developed in the course of evolution. M.V.E.

A72-22081 # **External respiration in an altered gas environment during human motor activity (Vneshnee dykhanie v izmenennoi gazovoi srede pri dvigatel'noi deiatel'nosti cheloveka).** A. B. Gandel'sman (Institut Fizicheskoi Kul'tury, Leningrad, USSR). *(Simpozium po Funktsii Vneshnego Dykhaniia v Izmenennoi Gazovoi Srede, Leningrad, USSR, Jan. 20-22, 1971.) Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1793-1798. 19 refs. In Russian.

Breathing hypoxic gas mixtures during intense muscular activity at moderate altitudes (1700-2000 m) was observed to induce restrictions in the compensatory role of lung ventilation, a reduction in CO2 elimination in relation to O2 consumption, and a degradation in motor performance. By contrast, breathing normoxic gas mixtures (i.e., helium-oxygen, compressed-air, and argon-oxygen gas mixtures containing oxygen in normal proportion) under the same circumstances was observed to bring about a direct dependence of the motor performance on oxygen consumption and carbon dioxide elimination magnitudes. M.V.E.

A72-22082 # **Breathing in high-pressure atmospheres (Dykhanie v atmosfere pod vysokim davleniem).** G. V. Troshikhin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *(Simpozium po Funktsii Vneshnogo Dykhaniia v Izmenennoi Gazovoi Srede, Leningrad, USSR, Jan. 20-22, 1971.) Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1808-1812. 24 refs. In Russian.

The electrical activity of the intercostales externi muscles and the respiratory cycle time were observed in adult Wistar rats placed in various gas mixtures under increased pressure. Density increases of the gas mixture, due either to the physical properties of the inert gas component or to increased pressure, are found to lead to increases in the amplitude of the electrical impulses and in respiratory cycle time. The mechanism of increased resistance to breathing in high pressure atmospheres is discussed. M.V.E.

A72-22083 # **Corticosterone content in various tissues during adaptation to hypoxia (Soderzhanie kortikosterona v razlichnykh tkaniakh v protsesse adaptatsii k gipoksii).** L. Ia. Borisova and L. N. Simanovskii (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1817-1819. 9 refs. In Russian.

In the blood plasma, cerebral cortex, and skeletal muscles (m. gastrocnemius) of adult white rats, the corticosterone content was determined on the 3rd, 5th, 10th, 14th, 20th, 30th, and 60th day of adaptation to hypoxia (at a simulated altitude of 7600 m). During the first 20 days of adaptation, corticosterone synthesis increased, while its content in the cortex decreased. In the skeletal muscles, the corticosterone content decreased on the third day of adaptation. M.V.E.

A72-22084 # **Respiration changes during growing hypercapnia (Izmenenie dykhaniia pri narastaiushchei giperkapnii).** V. P. Zagriadskii (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1820-1822. 6 refs. In Russian.

Study of the changes in external respiration characteristics occurring in man during carbon dioxide accumulation in the inhaled air at various concentration growth rates. It is found that the slower the CO2 concentration rate, the more completely apparent become the compensatory external respiration mechanisms, and the better does man endure carbon dioxide concentration increases up to 6%. M.V.E.

A72-22085 # **Brain and muscle state during stepwise adaptation to high mountain conditions (Sostoianie golovnogo mozga i myshtsy v protsesse stupenchatoi akklimatizatsii k usloviiam vysokogor'ia).** M. M. Mirrakhimov, A. A. Aidaraliev, and Zh. V. Nepomniashchaia (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 57, Dec. 1971, p. 1840-1843. 27 refs. In Russian.

Review of the results of an investigation indicating that stepwise adaptation to the high mountain air of Tian'-Shan' is attended by intensified oxidation processes in the brain up to the 7th day, whereafter physiological characteristics return to the initial level. Oxidation processes in the sural muscle decrease and reach a minimum on the 7th day; an intensification is observed toward the 30th day and a return to the initial level toward the 45th day. A preliminary stay at an altitude of 2220 m accelerates the process of adaptation to high-altitude conditions. M.V.E.

A72-22095 # **Effect of renin and angiotensin on blood clotting (Vliianie renina i angiotenzina na svertyvanie krovi).** Iu. Ia. Rodionov, V. Ia. Rodinov, and V. I. Koshelapov (Vitebskii Gosudarstvennyi Meditsinskii Institut, Vitebsk, Belorussian SSR). *Akademiia Nauk SSSR, Doklady,* vol. 201, Dec. 21, 1971, p. 1504-1506. 17 refs. In Russian.

Thromboelastographic study of the effect of renin and angiotensin on the blood clotting system of anesthetized and unanesthetized dogs. It is found that within the first minute after the introduction of renin or angiotensin (intravenously) a shortening of the reaction time of the thromboelastogram reflecting the rates of the first and second phases of blood clotting is observed. It is concluded that renin and angiotensin have a stimulating effect on certain components determining the reaction time. It is suggested that renin per se or through angiotensin activates in vivo the Hagemana factor. It is also possible that this activation of the blood clotting system is mediated by the adrenal gland, since angiotensin stimulates the adrenal gland to eject catecholamines. A.B.K.

A72-22137 **Effects of noise on human efficiency and some individual differences.** G. R. J. Hockey (Durham, University, Durham, England). *(British Acoustical Society, Spring Meeting, Birmingham, England, Apr. 5-7, 1971.) Journal of Sound and Vibration,* vol. 20, Feb. 8, 1972, p. 299-304. 23 refs.

This paper begins with a brief review of research on the way in which loud noise affects the efficiency of human work, leading to an examination of some differences between individuals in the extent to which efficiency is affected. Noise is regarded as producing a narrowing of attention towards work components of high priority, an effect which is seen as providing a basis for understanding previous contradictory interpretations in this area. Extroverted people seem more susceptible to this narrowing of attention, while the performance of introverts is more stable. Some related research on individual differences in performance, and preference for noisy environments is also discussed. (Author)

A72-22138 **Some correlates of the loudness function.** J. T. Reason (Leicester, University, Leicester, England). *(British Acoustical Society, Spring Meeting, Birmingham, England, Apr. 5-7, 1971.) Journal of Sound and Vibration,* vol. 20, Feb. 8, 1972, p. 305-309. 9 refs.

This paper summarizes a number of studies in which significant correlations were obtained between the slope of the loudness function and (1) the slope of the function relating spiral after-effect persistence to the duration of prior stimulation with objective motion, (2) motion sickness susceptibility, as indicated by a personal history inventory, (3) the slopes of other psychophysical magnitude functions, and (4) the slope of the function relating auditory reaction time to sound pressure level. These results were explained on the basis of consistent individual differences in receptivity, or the characteristic way the central nervous system transduces stimulus energy. (Author)

A72-22141 **Human aspects of vibration and noise in helicopters.** C. E. P. Jackson and W. F. Grimster (Westland Helicopters, Ltd., Yeovil, Somerset, England). *(British Acoustical Society, Spring Meeting, Birmingham, England, Apr. 5-7, 1971.) Journal of Sound and Vibration,* vol. 20, Feb. 8, 1972, p. 343-351.

A résumé is given of the types and sources of helicopter vibration. Methods of vibration testing and monitoring are dealt with, together with the relative merits of various methods of vibration reduction. The paper describes levels which are acceptable in service in terms of a velocity limit and the ISO/BSI proposals. Internal and external noise are briefly discussed and some information is given on results of internal cabin noise reduction. (Author)

A72-22164 # **Psychic phenomena and the brain (Psikhicheskie iavleniia i mozg).** D. I. Dubrovskii. Moscow, Izdatel'stvo Nauka, 1971. 386 p. 831 refs. In Russian.

Concepts of natural sciences and philosophy are applied to link psychophysiology with cybernetics. Emphasis is placed on the substantiation of the informational nature of psychic phenomena. Approaches to the modelling of higher neurodynamic structures of the cerebrum are discussed. Other topics include dialectical materialism and psychophysiology, the inadequacy of idealistic and dualistic theories to treat the problem of consciousness and brain, and physiological interpretation of psychic processes. V.Z.

A72-22175 * **Component duration and relative response rates in multiple schedules.** J. C. Todorov (São Paulo, Universidade, São Paulo, Brazil). *Journal of the Experimental Analysis of Behavior,* vol. 17, Jan. 1972, p. 45-49. 8 refs. Grant No. NsG-450.

Pigeons were trained on a multiple variable-interval 30-sec, variable interval 90-sec schedule with each component presented alternately for an equal duration. This duration of exposure was varied from 5 to 300 sec. The rate of response in the variable-interval 30-sec component relative to the rate of response in the variable-interval 90-sec component was studied. Results are plotted and discussed. O.H.

A72-22184 # **Adrenergic innervation of internal carotid arteries (Adrenergicheskaia innervatsiia vnutrennikh sonnykh arterii).** A. V. Borodulia and E. K. Plechkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 202, Jan. 1, 1972, p. 200-202. 16 refs. In Russian.

Results of a study of the adrenergic innervation of the internal carotid arteries in dogs by a luminescence method. It is found that in normal healthy animals the internal carotid arteries are surrounded along their entire length by a nerve plexus which displays a specific green fluorescence. The adrenergic nerve plexus in the extra- and intracranial regions of the internal carotid artery shows structural

differences apparently related to structural features of the vessel wall in the different sections of the vessel. In particular, it is found that the intracranial section of the internal carotid artery, especially in the region of the so-called siphon, is much more abundantly innervated with adrenergic fibers than the extracranial sections. Adrenergic effector innervation is represented especially abundantly in the intracranial part of the internal carotid artery. A.B.K.

A72-22185 # **Abiogenic formation of porphin, chlorin, and bacteriochlorin (Abiogennoe obrazovanie porfina, khlorina i bakteriokhlorina).** A. A. Krasnovskii and A. V. Umrikhina (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 202, Jan. 1, 1972, p. 221-224. 11 refs. In Russian.

Consideration of the abiogenic formation of porphyrins during chemical evolution by studying a model system, consisting of a mixture of pyrrhol and formaldehyde, which simulates prebiological conditions on the earth. The effect of oxygen, extraneous compounds, electron donors and acceptors, and fractionation on the fluorescence spectra of porphyrins is investigated. It is concluded that the fluorescence maxima observed at 685 and 620 microns in the presence of air (and in vacuum at 704 and 622 microns) may be attributed to isomeric forms of porphin, while the maximum observed at 633 microns (in vacuum at 648 microns) is attributable to chlorin. The maximum at 764 microns in concentrated pigment solutions is apparently due to the presence of bacteriochlorin. A scheme for the photoreduction of porphin by ascorbic acid to chlorin and thence to bacteriochlorin is proposed. A.B.K.

A72-22186 # **An investigation of the contractile function of the myocardium by the phase-coordinate method (Issledovanie sokratitel'noi funktsii miokarda metodom fazovykh koordinat).** N. M. Amosov, B. T. Agapov, and Iu. V. Panichkin (Kievskii Nauchno-Issledovatel'skii Institut Tuberkuleza i Grudnoi Khirurgii, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady,* vol. 202, Jan. 1, 1972, p. 245-247. In Russian.

Demonstration of the possibilities inherent in the use of the phase-coordinate method as a means of detecting abnormalities in the contractile function of the ventricular myocardium. In the proposed method each heart contraction cycle has its own phase trajectory, and the steady regime has a cyclically repeating trajectory called a phase portrait. It is shown that by studying phase portraits of the heart contraction cycle it is possible to evaluate the contractility of the myocardium in the presence of pathological disorders and to perform differential diagnoses of heart defects. Also, it is possible to investigate the effect of the state of noncontractile elements of the heart, such as valves, on intracardial hemodynamics. A.B.K.

A72-22191 # **Comparator function of the hippocampus (O komparatornoi funktsii gippokampa).** O. S. Vinogradova and K. I. Dudaeva (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino-na-Oke, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 202, Jan. 11, 1972, p. 486-489. 19 refs. In Russian.

The realization of the memory function is not possible without the comparison of incoming information with stored imprints by the brain. It is proposed that reactions of hippocampus neurons arise either when signals arriving in two channels do not coincide or when there is a complete absence of signals in one of the channels. In secondary application of stimuli which have now lost their novelty (i.e., have been recorded in the memory), the signals from both channels coincide, and no neuron reactions occur. The hypothesis is corroborated by experimental data on isolated and joint stimulation of afferent inputs in the hippocampus of rabbits. T.M.

A72-22192 # **Influence of protein biosynthesis inhibitors on the development of noradrenalin- and serotonin-induced hyperpolarization of neurons in the sensomotor region of the cortex (Vliianie ingibitorov biosinteza belka na razvitie giperpoliarizatsii neironov sensomotornoi oblasti kory, vyzvannoi noradrenalinom i serotoninom).** V. V. Frol'kis and L. A. Gromov (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady,* vol. 202, Jan. 11, 1972, p. 494, 495. 6 refs. In Russian.

Serotonin- and noradrenalin-induced changes of the membrane potential of neurons in the sensomotor region of the cortex were measured in rabbits, and the influence of protein-synthesis inhibitors (actinomycin D and ribonuclease) on the reaction of serotonin- and noradrenalin-affected cortex neurons was analyzed. Serotonin and noradrenalin are shown to produce acute hyperpolarization of the neurons, while the protein inhibitors forestall this effect. T.M.

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STAR ENTRIES

N72-16003*# Naval Aerospace Medical Inst., Pensacola, Fla.
THE INFLUENCE OF VISION ON SUSCEPTIBILITY TO ACUTE MOTION SICKNESS STUDIED UNDER QUANTIFIABLE STIMULUS-RESPONSE CONDITIONS
Wihelmus J. Oosterveld, Ashton Graybiel, and D. Bryant Cramer 17 Nov. 1971 8 p refs
(NASA Order L-43518)
(NASA-CR-125546; NAMRL-1149) Avail: NTIS CSCL 06S

Twenty-four healthy men, 22 to 25 years of age, were exposed to stressful accelerations in a rotating room until acute mild motion sickness was elicited. Thirteen subjects in one group were exposed first with eyes open and later with eyes covered; the reverse order was used with the remaining eleven in the other group. The stressful accelerations were generated by requiring the subject to execute 120 standardized head movements at each 1-rpm increase in angular velocity until the desired endpoint was reached. When susceptibility to motion sickness with eyes open and covered is compared, 19 subjects were more susceptible with eyes open, three with eyes covered, and in the remaining two susceptibility was the same. The maximum difference in velocity between trial 1 and 2 was 7 rpm when susceptibility was greater with eyes open and 3 rpm when it was greater with eyes covered; the means, respectively, were 3.2 and 2.0 rpm. Among subjects manifesting greater susceptibility with eyes open than covered the group differences were small, indicating little or no adaptation effects. The findings are discussed mainly on the basis that vision may act also to decrease susceptibility under the stimulus conditions described.
Author

N72-16004# Royal Aircraft Establishment, Farnborough (England).
STUDY OF NOCTURNAL VIGILANCE IN THE HUMAN OPERATOR (PHASE 1). PART 1: EXPERIMENTER PROCEDURE
M. Defayolle, J. P. Dinand, and J. Jacq Sep. 1971 42 p Transl. into ENGLISH of "Etude de la Vigilance Nocturne chez l'Operateur Human (Premiere Phase). 1: Procedure Experimentale, Centre de Rech. du Service de Sante des Armees, France, report 245/CRSSA/PS
(RAE-Lib-Trans-1607; Rept-245/CRSSA/PS) Avail: NTIS

The sleep-inhibiting effects of certain medicinal products on human performance are examined. These products were administered to a number of subjects who were then called upon to perform various tasks, involving alertness, during the period from 2000 h to 0600 h on each of four nights. Only the tasks given to the subjects and the methods of analysing the results are given here. The tasks covered: (a) measurements of reaction time, (b) tests requiring maintained attention, (c) letter marking tasks (with and without a secondary task), (d) calculation tests, (e) visual detection tasks (with and without a secondary task), and (f) tests of thymic auto-evaluation. In addition, electroencephalograph and electrocardiograph measurements were made throughout the periods of the tests, and these were analysed by frequency spectra and by the extraction of evoked visual potentials.
Author

N72-16005*# North Carolina State Univ., Raleigh.
DEVELOPMENT OF A NOISE ANNOYANCE SENSITIVITY SCALE
Howard L. Bregman and Richard G. Pearson Washington NASA Feb. 1972 44 p refs
(Grant NGL-34-002-055)
(NASA-CR-1954) Avail: NTIS CSCL 05E

Examining the problem of noise pollution from the psychological rather than the engineering view, a test of human sensitivity to noise was developed against the criterion of noise annoyance. Test development evolved from a previous study in which biographical, attitudinal, and personality data was collected on a sample of 166 subjects drawn from the adult community of Raleigh. Analysis revealed that only a small subset of the data collected was predictive of noise annoyance. Item analysis yielded 74 predictive items that composed the preliminary noise sensitivity test. This was administered to a sample of 80 adults who later rate the annoyance value of six sounds (equated in terms of peak sound pressure level) presented in a simulated home, living-room environment. A predictive model involving 20 test items was developed using multiple regression techniques, and an item weighting scheme was evaluated.
Author

N72-16006*# Techtran Corp., Glen Burnie, Md.
EFFECT OF COMPOSITION OF A GAS MIXTURE ON GROWTH OF BACTERIA ASSIMILATING GASEOUS HYDROCARBONS
Z. S. Smirnova Washington NASA Jan. 1972 14 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, Jan.-Feb. 1970 p 30-37
(Contract NASw-2037)
(NASA-TT-F-14109) Avail: NTIS CSCL 06M

The results of studies of the effect of the composition of a gas mixture on the growth of bacteria oxidizing methane and propane are presented. It was found that the biomass concentration in the medium (all other conditions being equal) is directly proportional to the concentration of hydrocarbon and oxygen in the gaseous mixture. An oxygen concentration of up to 50% in a medium with methane and up to 55% in a medium with propane will not inhibit the growth of bacteria. The degree of utilization of the methane or propane for the construction of cell substance depends on the ratio of hydrocarbon and oxygen. Methane is most effectively utilized by bacteria at a volume ratio between O2 and CH4 equal to 1.5. Propane assimilation takes place most effectively at an O2:C3H8 ratio equal to 3. It is shown that carbon dioxide is required for growth of methane-oxidizing bacteria. The optimum CO2 concentration is between 5 and 10%. A higher concentration of hydrocarbon has an inhibiting effect on the development of gas-oxidizing bacteria. A CO2 concentration above 20% completely suppresses growth.
Author

N72-16007*# Techtran Corp., Glen Burnie, Md.
COMMENTS ON EXCESS CALCIUM IN THE BODY
J.-P. Rombauts Washington NASA Feb. 1972 14 p refs Transl. into ENGLISH from the Belgium Rept.
(Contract NASw-2037)
(NASA-TT-F-14155) Avail: NTIS CSCL 06P

The possible ill effects of excess calcium in the body are discussed in connection with clinical observations, together with the importance of proper diet.
Author

N72-16008*# Techtran Corp., Glen Burnie, Md.
PATHOGENESIS OF WEIGHTLESSNESS SYNDROME
Ye. A. Kovalenko and P. V. Vasilyev Washington NASA Jan. 1972 23 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Viol. (Moscow), no. 2 1971 p 356-269
(Contract NASw-2037)
(NASA-TT-F-14049) Avail: NTIS CSCL 06S

Under conditions of a prolonged space flight a reorganization of many physiological systems of the organism, such as the analyzers, blood circulation organs, respiration, the stato-kinetic apparatus, and various kinds of metabolism etc., takes place. The pecularities of the character of the organism's reaction to the action of weightlessness permit discerning five stages: (1) transition from super gravitational stress to weightlessness; (2) partial adaptation to weightlessness; (3) gradual increase (cumulation) of the unfavorable effects of weightlessness influence; (4) transition from weightlessness to super gravitational stress and terrestrial gravitation; and (5) residual effects of the weightlessness influence and adaption to terrestrial gravitation. The basic pathegenetic links of the disturbances arising in connection with the influence of weightlessness on the system of analyzers, hydrostatic pressure of the fluids stato-kinetic apparatus, the organism's energetics and metabolism are considered. Author

N72-16009# University of Southern Calif., Los Angeles. Dept. of Electrical Engineering.
ON A CLASS OF HEREDITARY PROCESSES IN BIOMECHANICS
Kenneth L. Cooke, Nestor Distefano, and Bayesteh Kashef Jan. 1972 23 p refs
(Grant GM-16197-04)
(TR-72-5) Avail: NTIS

The description of biomechanical hereditary processes leads to the study of nonlinear Volterra integral equations. It is shown that under convenient assumptions regarding the nature of the memory of the system approximate equations of evolution of the process can be given in terms of a system of difference-differential equations subject to initial conditions. Alternative formulations are discussed, mainly emphasizing numerical aspects. The identification problem is briefly discussed and some numerical examples, obtained using synthetic data, are presented to exhibit the application and the principal ideas of the method. Author

N72-16010# Sloan-Kettering Inst. for Cancer Research, New York.
BIOLOGICAL AND CLINICAL DOSIMETRY Annual Progress Report, 1 Jul. 1970 - 30 Jun. 1971
John S. Laughlin Jun. 1971 26 p refs
(Contract AT(30-1)-3510)
(NYO-3510-18) Avail: NTIS

Progress is reported for the use of dosimeters in clinical medicine and biological analysis. Data include (1) fabricating tissue equivalent absorbed dose calorimeter for neutrons; (2) determination of the sensitivity of hexahydroxyethyl pararosaniline cyanide radiochromic dosimeter to gamma rays and neutrons; (3) measurements of LET distributions produced by various neutron sources; and (4) measurement of absorbed dose rates with Pilot-B disks. E.H.W.

N72-16011# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
ANNUAL REPORT FOR 1970 TO THE USAEC DIVISION OF BIOLOGY AND MEDICINE. VOLUME 2: PHYSICAL SCIENCES. PART 1: ATMOSPHERIC SCIENCES
C. L. Simpson Jun. 1971 178 p refs
(Contract AT(45-1)-1830)
(BNWL-1551-Vol-2-Pt-1) Avail: NTIS

Progress reports covering atmospheric processes as related to the USAEC programs are given. The summaries include scavenging studies, diffusion and turbulence studies, radioisotope as particles and volatiles, and ecological micrometeorology and climatology. E.H.W.

N72-16012# Central Electricity Generating Board, Berkeley (England). Nuclear Labs.
BIOLOGICAL ASPECTS OF SKIN IRRADIATION. PART 3: NEW EPIDERMAL THICKNESS MEASUREMENTS AND THEIR IMPORTANCE
J. T. Whitton Apr. 1971 54 p refs
(RD/B/R-1934-Pt-3) Avail: AEC Depository Libraries

A new method for measuring epidermal thickness that is applicable in radiation dosimetry is described. The procedure has several advantages over conventional techniques since elasticity is accounted for. Quick measurements were made on 214 samples taken from 188 persons by means of a biopsy punch. Epidermal thickness was correlated with sex, age, and body site. The complete detailed results are given and discussed together with simplified adaptations for use in radiation protection. NSA

N72-16013# Human Engineering Labs., Aberdeen Proving Ground, Md.
NOISE AND BLAST: AN ANNOTATED BIBLIOGRAPHY OF RESEARCH PERFORMED AT THE HUMAN ENGINEERING LABORATORIES, 1956 - 1970
Violet J. Confer and Thelma M. Ashley Sep. 1971 28 p refs
(AD-731468) Avail: NTIS CSCL 20/1

The bibliography is an annotated compilation of 70 formally published reports dealing with noise and blast. The reports are arranged alphabetically by author. Author (GRA)

N72-16014# Notre Dame Univ., Ind. Lobund Lab.
BIBLIOGRAPHY OF GERMFREE RESEARCH, 1885-1963, 1969 SUPPLEMENT
Bernard A. Teah 1971 31 p refs
(Grant CA-07271-06)
(PB-202005; LOB/Bibl-69) Avail: NTIS CSCL 06C

A bibliography of 414 references concerning germfree research for the year 1969 is presented. GRA

N72-16015* Bendix Corp., Kennedy Space Center, Fla.
COLOR PERCEPTION TESTER Patent
Robert B. Martin, Eddie L. Brawner, and Wayne E. Pate, inventors (to NASA) Issued 28 Sep. 1971 4 p Filed 9 Sep. 1969 Sponsored by NASA
(NASA-Case-KSC-10278; US-Patent-3,609,740; US-Patent-Appl-SN-856327; US-Patent-Class-340-279; US-Patent-Class-35-8; US-Patent-Class324-66) Avail: US Patent Office CSCL 06B

A color perception tester is presented for testing individuals in order to determine if the individual can correctly identify wires in accordance with their respective color code. The tester includes a plurality of colored wires, which, when plugged in the appropriate receptacle or plug, will cause a pair of adjacent lamps to be illuminated. Indicia are printed adjacent the plug identifying the proper colored wire which should be plugged in the circuit. Official Gazette of the U.S. Patent Office

N72-16016*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
BEHAVIORAL, PSYCHIATRIC, AND SOCIOLOGICAL PROBLEMS OF LONG-DURATION SPACE MISSIONS
Nick A. Kanas (Univ. of Southern Calif., Los Angeles) and William E. Fedderson Oct. 1971 90 p refs
(NASA-TM-X-58067) Avail: NTIS CSCL 05E

A literature search was conducted in an effort to isolate the problems that might be expected on long-duration space missions. Primary sources of the search include short-term space flights, submarine tours, Antarctic expeditions, isolation-chamber tests,

space-flight simulators, and hypodynamia studies. Various stressors are discussed including weightlessness and low sensory input; circadian rhythms (including sleep); confinement, isolation, and monotony; and purely psychiatric and sociological considerations. Important aspects of crew selection are also mentioned. An attempt is made to discuss these factors with regard to a prototype mission to Mars. Author

N72-16017*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ELECTRONIC CIRCUIT THAT DETECTS LEFT VENTRICULAR EJECTION EVENTS BY PROCESSING THE ARTERIAL PRESSURE WAVEFORM
Vernon D. Gebben and John A. Webb, Jr. Feb. 1972 4 p (NASA-TM-X-68001) Avail: NTIS CSCL 06B

An electronic circuit for processing arterial blood pressure waveform signals is described. The circuit detects blood pressure as the heart pumps blood through the aortic valve and the pressure distribution caused by aortic valve closure. From these measurements, timing signals for use in measuring the left ventricular ejection time is determined, and signals are provided for computer monitoring of the cardiovascular system. Illustrations are given of the circuit and pressure waveforms. E.H.W.

N72-16018# Joint Publications Research Service, Washington, D.C.
CORRELATION BETWEEN ELECTROGRAPHIC TRACE PHENOMENA IN THE BRAIN AND IMMEDIATE MEMORY
L. G. Voronin, V. F. Konovalov, R. Ya. Senina, and I. S. Serikov 27 Jan. 1972 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 201, no. 1, 1971 p 253-256 (JPRS-55048; UDC-612.821.6.001.5) Avail: NTIS

An effort to measure the retention mechanism of the human brain is discussed. Tests were conducted on 70 healthy subjects ranging in age from 5 to 35 years, and on 46 patients suffering from alcoholism and cerebrosclerosis. The subjects were given pairs of auditory and photic stimuli at specific intervals. After the stimuli the subjects were asked to identify pictures or signals they had seen or heard. When the subject started to make mistakes, the last correct identification sequence made served as the criterion of volume of immediate memory. Results show 5 to 6 year olds retained traces for 252 to 306 seconds, 8 to 10 year olds retained traces for 144 to 234 seconds, and 16 to 35 year olds retained traces for 126 to 144 seconds. Patients with memory disorders showed a marked increase in time of retention of traces to neutral stimuli: 360 to 400 seconds. E.H.W.

N72-16019# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
HUMAN FACTORS ENGINEERING [ANTHROPOTECHNIK]
1970 76 p In GERMAN Proc. of a Seminar held at Meckenheim, West Ger., 11-12 Jun. 1970 (Anthropotech-4/70) Avail: NTIS

Research facilities, mission, and performance data processing at the German Research Institute for Human Factors Engineering are summarized. The distribution of display devices in control cabins and psychological measurements in human factors laboratories are discussed.

N72-16020# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
THE RESEARCH INSTITUTE FOR HUMAN FACTORS ENGINEERING [DAS FORSCHUNGSINSTITUT FUER ANTHROPOTECHNIK]
G. W. Radl *In its* Human Factors Eng. 1970 p 9-17 In GERMAN
Avail: NTIS

A description is given of the test equipment available at the German Research Institute for Human Factors Engineering. This institute is concerned with improvement of man machine systems, especially with the adaptation of vehicles to man and vice versa. This includes information systems, computerized simulation, and the role of man in automatic control systems. ESRO

N72-16021# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
STATIC MACHINE-TO-MAN ADAPTATION [STATISCHE ADAPTATION DER MASCHINE AN DEN MENSCHEN]
G. Rothbauer *In its* Human Factors Eng. 1970 p 18-22 In GERMAN
Avail: NTIS

Static adaptation of machine to man implies a knowledge of human size, muscle forces, and sensivity limits. Data to be collected and the way the extreme values should be included are discussed. Other elements of interest such as clothing, display devices, and feedback control are analyzed. ESRO

N72-16022# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
DYNAMICAL ADAPTATION [DYNAMISCHE ADAPTATION]
E. Donges *In its* Human Factors Eng. 1970 p 23-27 In GERMAN
Avail: NTIS

The capacity of man, as part of a dynamic control system, to adapt himself to changes in the input or noise signals, is considered. The quasi-linear model and the crossover model are discussed, and it is shown that the optimization criterion appears to be the minimization of the root mean square error. ESRO

N72-16023# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
PROBLEMS OF INDICATOR DISPLAYS IN AIRCRAFT [PROBLEME DER ANZEIGENAUSLEGUNG BEI LUFTFAHRZEUGEN]
Hannelore Radl-Koethe *In its* Human Factors Eng. 1970 p 28-35 In GERMAN
Avail: NTIS

Visual aids and display systems for flight control, navigation, and engine control, are discussed. Position, form, color, and illumination of indicators are discussed in relation to optimal perception by the pilot. ESRO

N72-16024# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
DISPLACEMENT/RESISTANCE CHARACTERISTIC OF THE CONTROL STICK [WEG-WIDERSTANDS-CHARAKTERISTIK DES LENKKNEUPPELS]
K. F. Kraiss *In its* Human Factors Eng. 1970 p 36-43 In GERMAN
Avail: NTIS

The system man/control stick is considered. Man is represented as the addition of a conscient component and a proprioceptive component. The response times of these two parts are different, and thus man forms a nonlinear system. The reaction to sensory feedback was analyzed. ESRO

N72-16025# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
TEST PLANNING AND DATA EVALUATION [VERSUCHSPLANUNG UND DATENAUSWERTUNG]
G. W. Radl *In its* Human Factors Eng. 1970 p 44-49 In GERMAN
Avail: NTIS

Some functions of man as part of a man machine system must be observed and recorded in artificial conditions. These points were analyzed. Test methods and processing of human performance data in human factors laboratories are discussed. Several statistical methods and their limitations are also considered. ESRO

N72-16027# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
POSSIBILITIES FOR MEASURING PSYCHOLOGICAL STRAIN [MESSMOEGLICHKEITEN PSYCHISCHER BEANSPRUCHUNG]
G. W. Radl *In its* Human Factors Eng. 1970 p 59-68 In GERMAN
Avail: NTIS

Psychological reactions of a pilot were analyzed in a human factors laboratory. Methods for quantitative psychological analysis are described, including the evaluation of task difficulty by trained external observers, empirical performance evaluation, secondary task evaluation, measurement of physiological parameters, interviews, and questionnaires. ESRO

N72-16029# European Space Research Organization, Paris (France).
SPACE BIOLOGY RELATED TO THE POST-APOLLO PROGRAMME
Aug. 1971 524 p refs Partly in ENGLISH and partly in FRENCH Proc. of a Colloq. held in Paris, 15-17 Mar. 1971; sponsored jointly by Council of Europe, Intern. Cell Res. Organ., Intern. Union of Cardiology, European Soc. for Radiation Biol., European Cell Biol. Organ., and Intern. Assoc. of Gerontology
(ESRO-SP-73) Avail: NTIS HC $6.00/MF $0.95

The utilization opened up by the post-Apollo program in the field of biology and medicine is discussed, and the advantages which European biological and medical research might derive from laboratory uses of the space shuttle are outlined.

N72-16031*# National Aeronautics and Space Administration, Washington, D.C.
FLIGHT RESULTS IN MANNED SPACE FLIGHTS TO DATE AND PROPOSED PROGRAMME FOR SKYLAB MEDICAL EXPERIMENTS
S. White *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 57-99
(NASA-TM-X-67504) Avail: NTIS HC $6.00/MF $0.95 CSCL 06E

Significant medical results from the Gemini and Apollo flights are assessed, and include loss of red cell mass, cardiovascular deconditioning, loss of exercise capacity and bone density, body weight loss and metabolic expenditure. The proposed program for Skylab medical experiments is discussed and covers such aspects as the musculoskeletal system, cardiovascular function, hematology and neurophysiology, pulmonary functions and biotechnology experiments. ESRO

N72-16032*# National Aeronautics and Space Administration, Washington, D.C.
THE INTERACTION OF LIVING SYSTEMS WITH THE SPACE ENVIRONMENT OBSERVATIONS FROM THE UNITED STATES SPACE BIOLOGY MISSIONS
J. F. Saunders *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 100-181 refs
(NASA-TM-X-67505) Avail: NTIS HC $6.00/MF $0.95 CSCL 06C

The evolution of space biology is briefly considered with reference to the USSR programs. The NASA experiments over the past decade, flown in particular on Gemini and Biosatellites 1, 2, and 3, are discussed and the future programs described. The effects of aerospace environment, in particular weightlessness, are discussed in relation to viruses and bacteria, cellular systems, plants, invertebrates, amphibians, and primates. ESRO

N72-16033*# National Aeronautics and Space Administration, Washington, D.C.
LIFE SCIENCES ASPECTS OF THE SPACE SHUTTLE AND SPACE STATION
S. White *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 182-234
(NASA-TM-X-67506) Avail: NTIS HC $6.00/MF $0.95 CSCL 06K

The space station concept is considered in the light of achieving an interpretation of bioscience, biotechnology, and biomedicine aspects. The objectives and details of such a life science program are discussed and the research facilities and equipment in the station are described. ESRO

N72-16034*# California Univ., Berkeley. Lawrence Radiation Lab.
LIGHT FLASH PHENOMENON SEEN BY ASTRONAUTS
T. F. Budinger, C. A. Tobias, J. T. Lyman, P. K. Chapman (NASA. Manned Spacecraft Center, Houston Tex.), L. S. Pinsky (NASA. Manned Spacecraft Center, Houston, Tex.), H. Bichsel (Washington Univ.), J.D. Denney (Washington Univ.), and W. B. Nelp *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 235-270 refs Sponsored by NASA
(Contracts W-7405-eng-48; AT(45-1)2225; Grant PHS-CA-t2446)
(NASA-CR-1235453) Avail: NTIS HC $6.00/MF $0.95 CSCL 06P

Experiments conducted on earth at cyclotrons together with observations made by Apollo astronauts suggest that cosmic nuclei interacting with the visual apparatus cause the phenomenon of light flashes seen on the four Apollo moon missions. Experiments with high and low energy neutron beams and 5 cm range helium ions suggest that slow protons and helium ions with a stopping power greater than 10 to the 8th power eV/gram sq cm cause light flashes and streaks in the partially dark adapted eye. The fact that charged particles induced by neutrons and helium ions stimulate the visual apparatus is demonstrated and some approaches to understanding the long term mission effects of galactic cosmic nuclei interacting with man are indicated. Author (ESRO)

N72-16035# Centre de Recherches Nucleaires, Strasbourg (France).
SOME POSSIBILITIES FOR COLLABORATION IN THE POST-APOLLO PROGRAM [QUELQUES POSSIBILITES DE COLLABORATION AU PROGRAMME POST-APOLLO]
P. Cuer *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 271-278 In FRENCH
Avail: NTIS HC $6.00/MF $0.95

The structure and activities of the astrobiophysics group within the Council of Europe are described and general ideas on

three projects are presented which the group has put forward for the post-Apollo program. The summarized projects throw light on cosmic rays and heavy ion acceleration and the effects of cosmic rays and heavy ions on cells and tissues. ESRO

N72-16036# Bordeaux Univ. (France). Dept. of Physiology.
SEARCHES FOR PHYSIOLOGICAL MECHANISMS CONCERNING THE MODIFICATIONS OF BEHAVIOR IN WEIGHTLESSNESS [RECHERCHES DES MECANISMES PHYSIOLOGIQUES CONCERNANT LES MODIFICANTIONS DU COMPORTHMENT EN ABSENCE DE PESANEUR]
R. Crandpierre *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 279-294 refs In FRENCH
Avail: NTIS HC $6.00/MF $0.95

The effects of weightlessness on animals and humans are discussed with reference to previous experiments. The diminuation of physiological responses are particularly considered together with pulmonary and cerebral circulation. The measuring equipment is also briefly described. ESRO

N72-16037# Bordeaux Univ. (France). Dept. of Physiology.
TECHNIQUE FOR MEASURING AND CONTINUED RECORDING OF THE PARTIAL PRESSURE OF OXYGEN IN ARTERIES OF SUPERIOR VERTEBRATES IN VIEW OF A SPACE EXPERIMENT [TECHNIQUE DE MESURE ET ENREGISTREMENT CONTINUE DE LA PRESSION PARTIELLE D'OXYGENE DANS LE SANG ARTERIEL CHEZ DES VERTEBRES SUPERIEURS EN VUDE D'UNE EXPERIENCE SPATIALE]
R. Grandpierre and P. Baum *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 295-300 refs In FRENCH
Avail: NTIS HC $6.00/MF $0.95

A technique, using an electrode, is described for measuring the partial pressure of oxygen in arteries. Results of experiments conducted on rabbits, dogs, and monkeys are given. ESRO

N72-16038# Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany). Forschungsgruppe fuer *Extraterrestrische Biologie.*
PREPARATION OF A SPACE EXPERIMENT
R. Lotz *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 301-309 refs

Avail: NTIS HC $6.00/MF $0.95

The preparation of space biological experiments is discussed with reference to *hirudo medicinalis*. Specific aspects such as life support systems are described and possible European cooperation in space biology noted. ESRO

N72-16039# Commissariat a l'Energie Atomique, Cadarache (France).
INSTANTANEOUS MEASUREMENT OF METABOLIC NEEDS OF PLANTS: AGRONOMIC AND POSSIBLY SPACE APPLICATIONS [MESURE INSTANTANEE DES BESOINS METABOIQUES DES PLANTES: APPLICATIONS AGRONOMIQUES ET EVENTUELLEMENT SPATIALES]
c04
P. Guerin de Montgareuil, M. Andre, and P. Lespinat *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 310-319 In FRENCH
Avail: NTIS HC $6.00/MF $0.95

A method is described which consists of an automatic means for continuous measurement and regulation when necessary of the various parameters essential for plant growth. The agronomic aspects are considered and related to space biology. ESRO

N72-16040# Ulm Univ. (West Germany). Abteilung fuer Klinische Physiologie.
CELL PHYSIOLOGICAL PROBLEMS IN SPACE MEDICINE
T. M. Fliedner and O. Bock *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 320-333 refs

(Contract EURATOM-079-69-1-BIAC)
Avail: NTIS HC $6.00/MF $0.95

Cell system physiology is considered relevant to space missions since the long-term adaptation of humans to environmental conditions is maintained through the adaptive capabilities of cell systems. These capabilities, especially cell renewal, are discussed in relation to the epithelium, hematopoietic and lymphopietic systems using eruthroposiesis as an example of cell system regulation. The physical, chemical and microbial effects on the cells are also discussed. ESRO

N72-16041# Centre Hospitalier Universitaire, Creteil (France).
THE VENTILATION MECHANISM IN WEIGHTLESSNESS [LA MECANIQUE VENTILATOIRE EN NON PESANTEUR]
C. Jacquemin *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 334-344 refs In FRENCH
Avail: NTIS HC $6.00/MF $0.95

Experiments were carried out to study the pulmonary ventilation mechanism in weightlessness conditions. It is shown that a plesthysmograph can be used in weightlessness conditions to measure the outgoing gas flow. The input data are the action of the diaphragm which is measured by electromyography. One of the main difficulties was the calibration of pressure measuring instruments and some new experiments which should be performed are given. They include the study of pulmonary circulation by maintaining the lower part of the body at a pressure lower than that of the thorax and the variation of the lung volume with respect to pressure. ESRO

N72-16042# Royal Coll. of Surgeons, Dublin (Ireland). Dept. of Physiology.
HUMAN CIRCADIAN RHYTHMS AND SPACE RESEARCH
R. T. W. L. Conroy *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 345-351

Avail: NTIS HC $6.00/MF $0.95

The circadian rhythm is described and the difference between exogenous and endogenous rhythms explained. It is shown that the endogenous rhythm is an important factor in space missions. ESRO

N72-16043# College Scientifique Universitaire de Tours (France). Lab. of Physiology.
STUDY OF THE WEIGHTLESSNESS AND PERTURBATIONS OF THE RHYTHMS IN THE GASTROINTESTINAL SYSTEM OF ANIMALS AND HUMAN BEINGS [ETUDE DE L'AGRAVITE ET DES PERTURBATIONS DES RHYTHMES SUR LE TRACTUS GASTRO-INTESTINAL CHEZL'ANIMAL ET CHEZ L'HOMME]
J. Thouvenot and C. Gaudeau (Lab. de Rech. Avancees en Moyens d'Informatique) *In* ESRO Space Biology Related to the Post-Apollo Programme Aug 1971 p 352-389 refs In FRENCH
Avail: NTIS HC $6.00/MF $0.95

A method is described for obtaining bioelectric signals from the viscera in animals and humans. Biological effects are discussed as well as analyses of the signals. Experiments using the method are also described. ESRO

N72-16044# Kiel Univ. (West Germany). Inst. fuer Reine und Angewandte Kernphysik.

BASIC DATA OF COSMIC RADIATION c04
O. C. Allkofer *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 390-416

Avail: NTIS HC $6.00/MF $0.95

Cosmic rays can be regarded from four aspects: astrophysics, geophysics, elementary particle physics, and biophysics. The first three are briefly considered and the biophysical aspects discussed in more detail. The main characteristics of galactic and solar radiation are described and the radiation hazards discussed. ESRO

N72-16045# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
ECOPHYSIOLOGY AND SPACE FLIGHT
W. Briegleb *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 417-425 refs

Avail: NTIS HC $6.00/MF $0.95

After a general introduction to geobiology, the effects of weightlessness are discussed in general terms. An experiment for simulating weightlessness is briefly described and results of other experiments summarized. ESRO

N72-16047# Christie Hospital and Holt Radium Inst., Manchester (England).
EFFECTS OF RADIATION AND ACCELERATION ON THE STRUCTURE OF CYTOPLASM IN VIVO c04
L. Cercek and B. Cercek *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 435-442 refs

Avail: NTIS HC $6.00/MF $0.95

After emphasizing the importance of cell structure on optimum organization in space, results obtained by measuring changes in the structure of cytoplasm in vivo caused by acceleration and radiation are discussed. Among the types of material used were root-cap cells of barley and yeast. Experiments in conjunction with space flight are also considered. ESRO

N72-16048# Weizmann Inst. of Science, Rehovoth (Israel).
A SYSTEM OF DIFFERENTIATION IN VITRO OF AEDES AEGYPTI [UN SYSTEME DE DIFFERENTIATION IN VITRO: AEDES AEGYPTI] c04
M. Herzberg, H. Atlan, J. Peleg, and A. Shahar *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p p 443-454 In FRENCH
Avail: NTIS HC $6.00/MF $0.95

A diploid system of differentiation in vitro of aedes aegypti is described and the cultivation and cycle of the mosquito cells are discussed. ESRO

N72-16049# Laboratory of Molecular Embryology, Naples (Italy).
HOW CAN SPACE FACILITIES ANSWER FUNDAMENTAL QUESTIONS IN DEVELOPMENTAL BIOLOGY c04
A. Monroy *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 455-457
Avail: NTIS HC $6.00/MF $0.95

These systems: unicellular alga, acetabularia; differentiation of nerve cells; and development of amphibia eggs are briefly considered in an attempt to answer the question of whether experiments in development biology could be carried out in space flight. ESRO

N72-16050# Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany). Arbeitsgruppe Physikalische Raumforschung.
THE COMBINED ACTION OF INDIVIDUAL HEAVY NUCLEI OF COSMIC RADIATION AND SPACE FLIGHT FACTORS ON BIOLOGICAL SYSTEMS IN RESTING STATE: 'BIOSTACK' c04
H. Buecker *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 458-464
Avail: NTIS HC $6.00/MF $0.95

The biological effects of heavy nuclei of cosmic rays during spaceflight are investigated in order to see whether the effects produced by the cosmic ions differ from those of accelerators. The biological effects are noted and the contents of the experimental package is described. ESRO

N72-16051# Toulouse Univ. (France). Faculte de Medecine et de Pharmacie.
RESEARCH PROJECT PRESENTED BY THE SPACE BIOLOGY GROUP [PROJET DE RECHERCHE PRESENTE PAR LE GROUPE DE BIOLOGIE SPATIALE] c04
H. Planel *In* ESRO Space Biology Related to the Post-Apollo Programme Aug. 1971 p 465-509 In FRENCH
Avail: NTIS HC $6.00/MF $0.95

The experimental projects of the space biology group of the CNRS are presented. Three projects are singled out for fuller discussion. These are the effects of cosmic radiation on aging and lifespan, the effects of cosmic radiation on cells and the lesion-producing action of heavy ions on the cerebral cortex. ESRO

N72-16052# Institut Za Nuklearne Nauke (Boris Kidric), Belgrade (Yugoslavia).
HEALTH PHYSICS INSTRUMENTATION AND SYSTEMS
S. Muzdeka, A. Koturovic, M. Sobajic, M. Smelcerovic, D. Damljanovic, and B. Kovac May 1971 20 p refs Presented at the 4th Intern. Conf. on the Peaceful Uses of Atomic Energy, Geneva, 6-16 Sep. 1971
(A/Conf-49/P/352; Conf-710901-119) Avail: AEC Depository Libraries

Health physics instruments and systems developed at the Boris Kidrich Institute are described. Topics include portable measuring meters and monitors, sample measurements, mobile laboratory for radioprotection, and instrumentation systems and networks. NSA

N72-16053# Royal Aircraft Establishment, Farnborough (England). Structures Dept.
VERTICAL COCKPIT ACCELERATIONS MEASURED ON AN OPERATIONAL JET TRANSPORT AIRCRAFT
G. B. Hutton 1971 28 p refs Supersedes RAE-TR-69214; ARC-32768
(RAE-TR-69214; ARC-CP-1183; ARC-32768) Avail: NTIS; HMSO: 40p; PHI: $1.75

An analysis was made of vertical accelerations recorded in the cockpit of a Boeing 707-436 jet transport aircraft during take-off and landing. Twenty-five take-offs and twenty-five landings from twenty airports were studied. The results could be used to prepare a flight simulator input program representing a generalized flight deck vibration environment of a subsonic jet transport aircraft. Turbulence response data from 9436 flying hours on the same type of aircraft was used to obtain assessments of the probability of exceeding various levels of cockpit acceleration while airborne for comparison with the high speed taxying phases of landing and take-off. Author (ESRO)

N72-16054# School of Aerospace Medicine, Brooks AFB, Tex.
EAR PROTECTION PROVIDED BY SEVERAL STANDARD AIR FORCE DEVICES Final Report, Nov. 1970 - Feb. 1971
Harrell C. Sutherland, Jr., Donald C. Gasaway, and George N. Wren May 1971 21 p refs
(AF Proj. 7755; Work Order 002)
(AD-731123; SAM-TR-71-15) Avail: NTIS CSCL 06/17

Sound attenuation achieved with several routinely procured standard Air Force devices was determined with 10 subjects. Devices and their combinations studied were: earplugs, earmuffs, earplugs and earmuffs, communication-type headset-microphone, and headset-microphone with dry cotton in the ear canals. Results indicate that occasionally a need may exist to measure the protection an individual is getting with ear-protective devices. Also, results with the earmuffs were somewhat different from results found at another facility. Attenuation resulting from dry cotton and a headset-microphone in combination suggests the need to investigate speech intelligibility with that condition.
Author (GRA)

N72-16055# Harry Diamond Labs., Washington, D.C.
A STUDY OF LASER EYE PROTECTION BY DIRECT INITIATION OF THIN EXPLOSIVE WAFERS
Z. G. Sztankay and R. J. Holland Aug. 1971 48 p refs
(DA Proj. 1T0-61101-A-91-A; HDL Proj. ILR91)
(AD-731780; HDL-TR-1556) Avail: NTIS CSCL 20/6

A system is described that protects eyes of personnel using optical sighting devices from laser radiation throughout the visible and near IR range. A key element is an explosive-mirror assembly capable of being destroyed by a laser burn beam before it reflects the optically delayed see beam to a viewer's eyes. The work was concentrated on polyvinyl alcohol lead azide. Explosive wafers as thin as 0.0025 cm were pressed and confined next to the mirror with epoxy. Instrumentation permitting 10-nsec resolution was developed to measure initiation and mirror destruction times. The PVA lead azide charge doped with 1 and 2.6% by weight of carbon black destroyed mirrors in as little as 20 nsec, when initiated by beams focused to energy densities of > or = 10 J/sq cm. Focusing to this level may be possible with a beam that is at the threshold eye-damaging intensity. Destruction times at focused energy densities of approximately 1 J/sq cm were 100 nsec, but improvements may reduce this to the required 30 nsec. Author

N72-16056# Illinois Univ., Urbana. Aviation Research Lab.
A VISUAL LANDING SIMULATOR FOR A GROUND BASED TRAINER M.S. Thesis
Martin John Michlik May 1971 45 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-732323; ARL-71-10; AFOSR-71-3; AFOSR-71-2615TR) Avail: NTIS CSCL 05/9

Electrical circuitry was developed to utilize voltage signals from a Link general aviation trainer (GAT-1) to drive a visual display system simulating the changing geometry of the outline of a runway as seen by a pilot while landing. The resulting landing simulator is to be used as part of a study of pilot training techniques. The circuitry was based on a series of geometric equations previously developed for such a visual display. The GAT-1 voltage signals represented the aircraft's altitude, range from the end of the runway, and right-left angular deviation from the extended runway centerline. The outputs of the circuitry were used to drive a mechanical shutter system that, together with a simple overhead projector, generated the images of the four edges of the runway. The projected runway image was found to agree with that calculated from the geometric equations to within four percent. Author (GRA)

N72-16057# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYSIS OF THE FACTORS GOVERNING THE SCHEDULING OF FLIGHT CONTROLLERS IN SUPPORT OF LONG DURATION MANNED SPACEFLIGHT MISSIONS M.S. Thesis
Carroll E. Hopkins Dec. 1971 187 p refs
(AD-731765; GSM/SM/71-6) Avail: NTIS CSCL 05/9

The study has two main purposes: to identify the factors, or variables, that govern the scheduling of flight controllers in support of long duration manned spaceflight; and to develop a scheduling system that best satisfies the needs of these personnel and the activity they support. A review of related research yielded a tentative list of nine scheduling variables: fatigue, flexibility of schedules, length of shift, morale, office work, overtime, personnel qualifications, shift cycle, and training. A questionnaire was developed to verify these variables, to measure the relative importance of them, and to determine which of five proposed schedules were perceived by the flight controllers as being the best. Hypotheses were tested to determine if the flight controllers and their supervisors perceive the importance of these scheduling variables differently. Other organizations performing similar tasks were studied to provide a data base of scheduling systems in use. A schedule is proposed which the author says will provide the best mission support.
Author (GRA)

N72-16058# North American Rockwell Corp., Los Angeles, Calif.
LIFE SUPPORT SYSTEMS REQUIREMENTS. VOLUME 5: APPENDIXES B, C, AND D Final Report, Oct. 1969 - Jul. 1970
Marvin N. Goldberg, William J. Adams, and James W. Raeke Wright-Patterson AFB, Ohio ASD Nov. 1970 441 p refs
(Contract F33657-70-C-0374; AF Proj. 421A)
(AD-732163; NA-70-397-Vol-5; ASD-70-47-Vol-5) Avail: NTIS HC $6.00/MF $0.95 CSCL 06/11

The volume contains the top level, life support system, functional analysis and requirement allocation sheets (RAS's) in conjunction with the first three levels below top. RAS's presented are a two-part format. RAS-A provides the functional performance requirements relative to aircraft/mission/environment matrix. RAS-B provides documentation of support requirements to maintain adequate aircrew performance levels for the various environmental stressors potentially encountered on various types of missions undertaken. Author (GRA)

N72-16059# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
EFFECTS OF G AND TARGET POSITION ON STATIC HELMET SIGHTING Final Report
Carl Reichwein, Joseph Cunningham, and Richard J. Crosbie 31 Dec. 1970 38 p refs
(Airtask-ZF32-412-001; IED Proj. SD-1)
(AD-731728; NADC-MR-7023) Avail: NTIS CSCL 05/9

Preliminary experiments were performed on the NADC Human Centrifuge to determine the effect of steady-state -G sub c accelerations on the subject's ability to aim a helmet-mounted sight at stationary targets located at four extreme positions in the subject's field of view. Performance was measured as percent time on target. Average performance decrements ranged were obtained for elevated and eye-level targets. Asymmetrical target performance scores were noted. Coriolis effects were noted also. GRA

N72-16060# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
CENTRIFUGE VALIDATION OF A TACTILE G-LIMIT WARNING DEVICE Final Report
David E. Thorburn Aug. 1971 10 p
(Task-718410)
(AD-732194; AMRL-TR-71-80) Avail: NTIS CSCL 06/17

The purpose of the experiment was to evaluate the effectiveness of a tactile, pulsating, warning signal under G-load conditions. Subjects were required to respond to a tactile pulsating signal in their anti-G suit while under varying G loads by pulling a trigger on their control stick. The tactile G-limit warning pulse proved to be a very effective signaling device. Not one warning signal at any frequency was missed by any subject. One subject even reported feeling the signal after he had blacked out which points out the obvious advantage of a tactile warning in not requiring a pilot visual or even audio attention.
Author (GRA)

N72-16061# TRW Systems Group, Redondo Beach, Calif.
MAGNETIC RECORDING OF THE HEART'S ELECTRICAL ACTIVITY WITH A CRYOGENIC MAGNETOMETER Final Report
A. Rosen, G. T. Inouye, A. L. Morse, D. L. Judge, and S. C. K. Liu 4 Jun. 1971 71 p refs
(Contract PHS-69-2243)
(PB-201939; TRW-13207-6014-RO-00) Avail: NTIS CSCL 06P

A two junction superconducting Josephson tunneling magnetometer has been developed for the measurement of magnetic field strengths of the order of 10 to the minus ten gauss per Hz to the 1/2 power in an unshielded environment. The application of the device to the measurement of the heart's magnetic signature, the magnetocardiogram; and the problems associated with the measurement techniques are discussed. It is demonstrated that the fine details of the heart's magnetic signature (the magnetocardiogram) can be resolved in real time in an unshielded environment. Author (GRA)

N72-16062# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A MODEL OF A VISUAL ANALYSOR AND THE PROBLEM OF PATTERN RECOGNITION
Yu. I. Nikolaev 10 Aug. 1971 19 p refs Transl. into ENGLISH from the publ. "Seminar po Kibernetike. Modelirovaniye Biologicheskikh Sistem. Materialy. no. 8" 11 1969 p 30-41
(DIA-Task-T71-05-09; DIA-Task-T71-05-13)
(AD-731898; FTD-MT-24-73-71) Avail: NTIS CSCL 06/4

The ocular movements of tremor and drift are well known to physiologists but their purpose is unknown. The work describes a model of a peripheral section of a visual analysor which offers an explanation for the functions of these movements and considers them as a specialized system for the active analysis of images which are moved to the periphery by the organism. In addition, the model permitted looking at the recognition process as a dynamic process (and not a static process) in a new manner. Author (GRA)

N72-16063# Naval Training Device Center, Orlando, Fla. Computer Lab.
INSTRUCTOR CONSOLE INSTRUMENT SIMULATION Interim Report, May 1970 - Jun. 1971
John L. Booker and Igor V. Golovcsenko Sep. 1971 45 p
(NAVTRADEVCEN-Task-7884-27)
(AD-731739; NAVTRADEVCEN-IH-195) Avail: NTIS CSCL 05/9

The object of the task is to investigate the use of computer generated display devices in training device instructor console applications. The first phase in accomplishing this objective is to demonstrate the ability to provide all control and monitoring functions presently available from conventional instructor consoles. Typical functions to be provided are the insertion of various normal and abnormal problem conditions; the initiation of various test aid functions, control over the modes of operation, and a duplicate set of instruments and indicators from the simulated vehicle trainee station. Author (GRA)

N72-16064# Illinois Univ., Urbana. Biological Computer Lab.
NATURAL NUMBERS IN TRANSCLASSIC SYSTEMS
Gotthard Gunther 1 Nov. 1970 46 p refs
(Grants AF-AFOSR-1865-70; AF-AFOSR-1391-68; AF Proj. 9768)
(AD-732294; BCL-3.4; UILU-ENG-70-299; AFOSR-71-2802TR; Rept-61102F; Rept-681305) Avail: NTIS CSCL 06/4

The reason why natural numbers follow the unilinear sequence prescribed by the Peano axioms is that these axioms presuppose that natural numbers are mapped unto the classic two-valued system of logic. If the same numbers are mapped unto transclassic systems of logic which contain an indefinite number of values any natural number selected may have several immediate predecessors and an indefinite number of immediate successors. The number of predecessors or successors depends on whether the structural basis of counting is provided by proto-, deutero-, or trito-structure. The paper shows the sequences which the numbers follow in each of these cases and their horizontal structural relations. Author (GRA)

N72-16426*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO SPACE-SUIT MATERIALS **c05**
Frederick S. Dawn and Ralph L. Jarboe *In its* Conf. on Mater. for Improved Fire Safety 1971 p 145-149

Avail: NTIS; SOD $2.25 CSCL 06Q

The design, construction, and materials used in the Apollo space suit are discussed. The various materials and combinations of materials to obtain the desired type of protection are identified. Detailed descriptions are provided of the pressure garment, liquid cooled garment, extravehicular gloves, helmet, and boots. Author

N72-16432*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
SPECIALIZED TESTING AND EVALUATION OF SPACE-SUIT MATERIALS **c05**
Thomas J. Ballentine *In its* Conf. on Mater. for Improved Fire Safety 1971 p 187-190
Avail: NTIS; SOD $2.25 CSCL 06Q

The selection of nonmetallic materials used in the Apollo space suits is discussed. The specialized test program to determine the flammability of selected space suit materials is described. Emphasis is placed on the equipment used to test and qualify the space suit materials and subassemblies for operation in the deep space environment. Author

N72-16434*# MSC White Sands Test Facility, N.Mex.
ODOR TEST **c05**
L. A. Schluter and D. L. Pippen *In its* Conf. on Mater. for Improved Fire Safety 1971 p 203-205 ref

Avail: NTIS; SOD $2.25 CSCL 06K

To prevent the use of spacecraft material that would outgas objectionable or nauseating odors, an odor test was developed. This test provided a means whereby candidate spacecraft materials were subjected to a particular environment and the outgassed products were evaluated by an odor panel. This panel was comprised of individuals with acute olfactory senses. The test results of the odor panel provided design engineers with data regarding potential material-odor problems. The odor-test procedure, panel-member selection, and odor scoring methods are described and typical test results are presented. Author

N72-16435*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
TOXICOLOGY OF SPACECRAFT MATERIALS **c04**

Elliott S. Harris *In its* Conf. on Mater. for Improved Fire Safety 1971 p 207-210
Avail: NTIS; SOD $2.25 CSCL 06T

The procedures for determining the toxicity of products outgassed from spacecraft structures are discussed. The test equipment involved in the tests and the criteria for acceptability are described. The use of animals as the final step in determining toxicity of a spacecraft environment is explained. Author

N72-16767 Naval Ship Research and Development Center, Washington, D.C.
TESTING AND MODELING STANDING, MAN'S RESPONSE TO IMPACT c04
Joseph Gesswein and Paul Corrao *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., no. 41, pt. 2 Dec. 1970 p 5-12 refs
Avail: Director, Navy Publ. and Printing Serv. Office, Naval District of Washington, Bldg. 157-2, Washington Navy Yard, Washington, D. C. 20390; $15.00/set

Volunteers were dropped from heights of two to nine inches to land, stiff-legged on a rigid force gage. A linear relationship was found to exist between the logarithms of the peak force developed and the kinetic energy at impact. A mathematical model was then developed to reproduce this relationship and to adhere to the general shape of the subject's force-time response. Author

N72-16768 Birmingham Univ. (England). Dept. of Mechanical Engineering.
EQUAL ANNOYANCE CONTOURS FOR THE EFFECT OF SINUSOIDAL VIBRATION ON MAN c04
C. Ashley *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., no. 41, pt. 2 Dec. 1970 p 13-20 refs

Avail: Director, Navy Publ. and Printing Serv. Office, Naval District of Washington, Bldg. 157-2, Washington Navy Yard, Washington, D. C. 20390; $15.00/set

A method for solving problems of subjective response to vibration is suggested. A random vibration spectrum was used as a datum, and a cross-matching procedure with sinusoidal vibration was employed to find constant annoyance contours. This method was applied experimentally to the standing position and shows a minimum sensitivity of 1.7 Hz with increased sensitivity towards 0.7 Hz. Maximum sensitivity occurred between 6 and 15 Hz. The standard deviations of the results were small compared to previous investigations. The contours agreed with the proposed International Standards Organization recommendation on vibration sensitivity of man. Author

N72-16974# Joint Publications Research Service, Washington, D.C.
PHILOSOPHICAL PROBLEMS OF THE CONTROL OF THE BIOSPHERE c05
M. N. Rutkevich and S. S. Shvarts *In its* Readings in Soviet Cybernetics and Sociology 19 Jan. 1972 p 36-53 refs

Avail: NTIS

Philosophical effects are briefly discussed of the transformation from a dialectic interaction between society and the biosphere into the control of the biosphere. Environmental pollution in the U.S.A., Japan, Western Europe, and the U.S.S.R. is criticized, along with both extreme pessimists and credulous optimists. The noosphere concept of Thayer and modifications by Soviet philosophers are discussed. It is felt that ecology must be used to control the biospheric development, and the functions of biogeocoenoses are described. N.E.N.

N72-17027*+ National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 95, OCTOBER 1971
Nov. 1971 101 p *refs*
(NASA-SP-7011(95)) Avail: NTIS CSCL 06E

Subject coverage concentrates on the biological, physiological psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry for the 311 reports consists of a standard citation accompanied by its abstract. Author

N72-17028*# Techtran Corp., Glen Burnie, Md.
RELATIONSHIP BETWEEN CHANGES IN POTASSIUM AND PLASMA MAGNESIUM LEVEL DURING STRESS
P. DiLeo Washington NASA Feb. 1972 5 p refs Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper. (Italy), v. 43, no. 13, 1967 p 850-852
(Contract NASw-2037)
(NASA-TT-F-14126) Avail: NTIS CSCL 06P

Stress leads to a drop in the magnesium level in the blood plasma and a rise in potassium level and is attributed to an indirect link with the adrenal cortex. Author

N72-17029*# Techtran Corp., Glen Burnie, Md.
THE HUMAN BODY AND VIBRATIONS
Alain Berthoz Washington NASA Feb. 1972 22 p refs Transl. into ENGLISH from Le Recherche (France), v. 2, no. 9, Feb. 1971 p 121-129
(Contract NASw-2037)
(NASA-TT-F-14113) Avail: NTIS CSCL 06P

The mechanical impact of vibrations on biological receptors is summarized. Debilitating mechanisms and their results are examined in view of clinical tests on animals and human subjects. Application to therapeutic and scientific research is also discussed. Author

N72-17030*# Translation Consultants, Ltd., Arlington, Va.
BLOOD SERUM LIPIDS IN YOUNG MEN IN RELATION TO STRESS AND PHYSICAL ACTIVITY
A. Caganova, S. Cagan, V. Simko, and P. Glesk Washington NASA Feb. 1972 23 p refs Transl. into ENGLISH from Bratislav. Lekarske Listy (Bratislava), v. 50, no. 3, Sep. 1968 p 321-336
(Contract NASw-2038)
(NASA-TT-F-14075) Avail: NTIS CSCL 06S

The values of blood serum lipids found in young men 18 to 26 years of age, are reported in relation to acute stress situation and regular sports activites. At the period of stress situation, on the day of an examination, statistically significantly raised values of beta lipoproteins, iodine number, of the beta: alpha lipoprotein ratio and a decrease in alpha lipoproteins were found in comparison with the values obtained in the course of the university term. Between the group of athletes and nonathletes, there were not found such pronounced differences in the levels of blood serum lipids as reported by several authors in literature. A single physical load exerted no substantial influence on blood serum lipids in any of the investigated groups. Likewise, no substantial differences were found between the groups of athletes and nonathletes when serum lipids were studied in the course of the term, in the period of a relative psychic rest. Author

N72-17031*# Scientific Translation Service, Santa Barbara, Calif.
POTASSIUM AND PHYSICAL EXERCISE
M. Mitolo, D. Leone, and E. Vitellio Washington NASA Feb. 1972 25 p refs Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper. (Italy), v. 42, no. 14, 1966 p 881-885
(Contract NASw-2035)
(NASA-TT-F-14124) Avail: NTIS CSCL 06P

The influence of potassium on the muscles is investigated. Male albino rats were used for the study. It is found that potassium increases the operational time of the muscles. Author

N72-17032*# Scientific Translation Service, Santa Barbara, Calif.
PERCEPTION OF THE RESPIRATORY MEDIUM AND GAS PREFERENCE IN MAN AND ANIMALS
I. S. Breslav Washington NASA Jan. 1972 112 p refs Transl. into ENGLISH of the publ. "Vospriyatiye Dykhatel'noy Sredy i Gazopreferendum u Zhivotnykh i Cheloveka" Leningrad, Nauka, 1970
(Contract NASw-2035)
(NASA-TT-F-649) Avail: NTIS CSCL 06P

The book is devoted to the problem of the perception of the respiratory medium and to the behavioral responses of the organism to its composition changes. A method of active choice of preferred gas mixtures (gas preference) is developed and employed for investigations in animals and man. Particularly, man's ability to detect changes of inspired air gas composition was determined. A physiological analysis of the active choice was performed. The relation between these responses and tuning of the organism with a certain composition of the atmosphere was demonstrated. It was shown that the gas preference method can be applied to the evaluation of physiological adequacy of different respiratory mixtures. Author

N72-17033# University of Southern Calif., Los Angeles. Dept. of Electrical Engineering.
ON A MODEL OF NEURONAL SPIKE TRAINS
Shunji Osaki and R. Vasudevan Jan. 1972 11 p refs
(Grant GM-16197-04)
(TR-72-1) Avail: NTIS

A stochastic model of neuron firing is proposed in which excitatory and inhibitory events are described by general renewal processes and the neuron fires whenever the total excitation exceeds a given positive threshold value. The interval density between successive neuronal firings which can lead to the calculation of the mean and higher moments of the number of firings in a given interval of time is derived. Author

N72-17034# Brookhaven National Lab., Upton, N.Y.
MEMBRANES, MATERIAL TRANSFER, AND IDEAL TRACER THEORY
Leslie F. Nims Jun. 1971 8 p refs Sponsored by AEC
(BNL-50299) Avail: NTIS

A derivation of ideal tracer theory based upon the concepts of field and resistive forces demonstrates that the local resistance coefficients are positive in sign, while the cross resistive coefficients are all negative. This conclusion follows since the resistive force vector is directed oppositely from the relative velocity vector. The ratio of the magnitudes of the osmotic to the tracer diffusion coefficient of a resistive barrier to the flow of a given chemical species is greater than one and approaches unity as the concentration of the mobile chemical species in question approaches zero at any plane of observation within the barrier. From the general equations it is possible to obtain practical equations descriptive of actual experimental situations which can be used to estimate the magnitude of the integral exchange coefficient, the resistance coefficient determinable in tracer experiments. The magnitude can be determined from either stationary state or relaxation experiments. Author

N72-17035# California Univ., Berkeley. Lawrence Radiation Lab.
IN VIVORADIOBIOLOGICAL STUDIES OF 910 MeV HELIUM ION BEAM Ph.D. Thesis
Claude Y. L. Chong Aug. 1971 97 p refs
(Contract W-7405-eng-48)
(LBL-314) Avail: NTIS

Both the modified Bragg peak and the plateau portion of the 910 MeV helium ion beam from the Berkeley 184 synchrocyclotron (henceforth abbreviated as peak and plateau respectively) were compared to cobalt-60 gamma rays by using 3 modes of total body exposure to evaluate 3 parameters in each of 4 in vivo systems in 13 to 14 week old female LAF1 mice. The 3 modes of exposure were single dose in air, split dose in air, and single dose under hypoxia, and the 3 parameters evaluated included relative biological effectiveness (RBE) in air, recovery pattern in air expressed as percentage of recovery of the first dose (%R), and oxygen enhancement ratio (OER). The 4 test systems consisted of 6-day animal survival, 30-day animal survival, survival of microscopic intestinal colonies, and survival of macroscopic endogenous spleen colony forming units (CFU). The RBE of peak alpha was significantly greater than unity for all end points of the 4 systems under consideration. On the other hand, plateau-alpha RBE was not significantly different from unity. Author (NSA)

N72-17036# Oak Ridge National Lab., Tenn. Health Physics Div.
PROPER USE OF INFORMATION ON ORGAN AND BODY BURDENS OF RADIOACTIVE MATERIAL
Karl Z. Morgan 1971 22 p refs Presented at Symp. on the Assessment of Radioactive Organ and Body Burdens, Stockholm, 22 Nov. 1971 Sponsored by AEC
(Conf-711104-1; SM-150/50) Avail: NTIS

Applications of data on the uptake and retention of various radioisotopes by human body organs and tissues in establishing maximum permissible values for internal radiation doses are discussed. Criteria used in the development of radiation protection standards by the International Commission on Radiological Protection (ICRP) since 1934 are reviewed. It is postulated that changes in values of maximum permissible concentrations of a number of radioisotopes will be incorporated in the 1973 edition of the ICRP Internal Dose Handbook on the basis of new uptake and retention data. NSA

N72-17037# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
ECOLOGICAL AND ENVIRONMENTAL PROBLEMS IN THE APPLICATION OF BIOMATHEMATICS
Burton E. Vaughan [1971] 29 p refs Presented at 6th Symp. on Mathematical Statistics and Probability, Berkeley, Calif., 19 Jul. 1971
(BNWL-SA-3977-Rev; Conf-710716-1) Avail: NTIS

Biostatistical procedures to delineate the broad range of ecological and environmental problems are reported; they encompass systematized operational analysis, statistical estimation, and some deterministics models of ecological systems. It is shown that energy demands in a projected technical growth rate of about 4% per year for the United States will produce a waste heat in the year 2000 that exceeds total electrical generation as of 1955. Increased need for pesticide use will result in a crop yield increase of only 3-fold at a 10-fold increase of pesticide application. G.G.

N72-17038# California Univ., Berkeley. Lawrence Radiation Lab.
HEAVY ION INDUCED SINGLE AND DOUBLE STRAND BREAKS IN PHIX-174 REPLICATIVE FORM DNA
Ralph Chresten Christensen Aug. 1971 106 p refs
(Contract W-7405-eng-48)
(LBL-28) Avail: NTIS

Radiation damage in phiX-174 replicative form 1 (RF 1) DNA was measured as a function of linear energy transfer (LET), using radiation qualities ranging from that of CO-60 gamma rays to that of highly stripped argon nuclei of average initial charge +16.5 and maximum energy 7.4 MeV/nucleon. Irradiations were performed at room temperature in a highly radioprotective broth to minimize free radical effects. With the exception of deuterons, all ion beams terminated in the continuously mixed samples. Samples were assayed for relative proportions of RF 1 (supercoil), RF 2 (open coil), and RF 3 (linear) DNA configurations, using neutral sucrose gradient sedimentation of tritiated thymidine-labeled phiX-174 RF DNA. Viability of bulk and gradient-separated samples was determined using a spheroplast assay. Total viability radiosensitivity of irradiated samples remained approximately constant over nearly the entire LET range investigated. Author (NSA)

N72-17039# California Univ., Davis. Radiobiology Lab.
[EXTERNAL RADIATION AND INTERNAL EMITTER STUDIES IN RADIOBIOLOGY] Annual Report, Fiscal Year 1971
Jun. 1971 143 p refs
(Contract AT(04-3)-472)
(UCD-472-118; UC-48) Avail: NTIS

The research activities during the fiscal year 1971 are reported. Both external irradiation studies and internal emitter studies are included. Fifty-five references to publications and presentations during the report period are cited. NSA

N72-17040# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
[RADIOBIOLOGY, BIOCHEMISTRY, ENVIRONMENTAL RADIATION, AND NUCLEAR MEDICINE] Annual Progress Report, period ending 30 Jun. 1971
31 Jun. 1971 165 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-815) Avail: NTIS

Research activities in biochemistry, radiobiology, and environmental radiation are reported. Studies center on the effects of radiation in living systems, and radiation uptake in soil and water bodies with subsequent entry into the food-chain ecology resulting in general environmental pollution hazards. G.G.

N72-17041# Wayne State Univ., Detroit, Mich. Dept. of Neurosurgery.
BREAKING STRENGTH OF THE HUMAN SKULL VS IMPACT SURFACE CURVATURE Final Report, 30 Jun. 1970 - 30 Jun. 1971
Voigt R. Hodgson and L. M. Thomas 30 Jun. 1971 65 p refs
(Contract DOT-FH-11-7609)
(PB-204239; DOT-HS-800583) Avail: NTIS CSCL 06E

Forty intact, moist, embalmed, human cadavers were dropped with their heads striking at various locations against several surfaces. Parameters measured and computed include drop height, velocity, force, head accelerations, pulse duration, injury indices, angular acceleration and anthropometry. Frontal plate impact data is compared to that obtained from the Alderson 50 percentile anthropomorphic dummy. The purpose of this research is to obtain impact data at skull fracture level which can be used to set Federal Motor Vehicle Safety Standards. Author (GRA)

N72-17042# Michigan Univ., Ann Arbor. Human Performance Center.
SPATIAL EFFECTS IN VISUAL SELECTIVE ATTENTION
Inge Fryklund Bennett Aug. 1971 79 p refs
(Contract AF 49(638)-1736; ARPA Order-461)
(AD-730924; Rept-08773-87-T; AFOSR-71-2610TR; TR-36) Avail: NTIS CSCL 05/10

In many visual selection experiments, Ss view displays of colored letters and numbers. They are instructed to attend to some stimulus dimension (e.g., row location, color, class) and are cued to report the items indicated by one value (e.g., top row, red color) on that dimension. Accuracy is always highest for row report. Since the items cued by row are spatially connected and easily coded for memory, and those cued by color or class spatially scattered and difficult to code, it cannot be concluded that row selection is more efficient than, say, color selection. In these experiments, selection criterion is held constant, and the spatial arrangement of the targets is varied. In experiment I, Ss reported the identities of the 5 red letters appearing in a 5 x 5 matrix. Four types of target arrangements were tested. Four backgrounds, varying in degree of confusability with the targets, were combined factorially with the four target patterns. The effects of pattern and background and their interaction were highly significant. It is suggested that spatial arrangement per se is not crucial; rather the target pattern serves to control the degree of background interference. Experiments II and III were detection analogs of the Letters background similarity condition of experiment I. The Ss had to report whether an A or a T appeared among the red letters. The results for the pattern types were similar, indicating that there are spatial constraints on visual processing at a level low enough to be tapped in a detection task. Author (GRA)

N72-17043# School of Aerospace Medicine, Brooks AFB, Tex.
POSSIBLE CATARACTOGENIC EFFECTS OF RADIOFREQUENCY RADIATION
Daner R. Reider, David L. Epstein, and John H. Kirk Aug. 1971 12 p refs
(AD-730922; SAM-Review-3-71; SAM-TR-71-24) Avail: NTIS CSCL 06/18

Use of the electromagnetic spectrum for man's benefit has increased tremendously. However, the complete understanding of its potential and real biologic hazards has failed to keep pace. The present threshold limit value for microwaves is the subject of much debate. The eye and lens have been damaged by microwaves experimentally, but the mechanism of damage is as yet unexplained. A preliminary study was performed using radiofrequency exposure and rhesus monkeys. No cataracts were formed at a frequency of 19.27 MHz. Problems involved in future radiofrequency studies, and areas which require further studies, are discussed. Author (GRA)

N72-17044# Naval Aerospace Medical Inst., Pensacola, Fla. Research Lab.
ANNOTATED BIBLIOGRAPHY OF REPORTS: SUPPLEMENT NO. 3, 1 JULY 1970 - 30 JUNE 1971
Catherine F. Kasparek and Christine E. Turner 30 Jun. 1971 30 p refs
(AD-731993) Avail: NTIS CSCL 06/19

Documents published at the Naval Aerospace Medical Research Laboratory (NAMRL), Naval Aerospace Medical Institute (NAMI), since 1 July 1970 are included in this third annual supplement to the annotated bibliography of reports dated 30 June 1968. That bibliography is DDC accession number AD 674914, the first supplement is AD 691 415, and the second supplement is AD 710 764. Contents: Ground based investigations for flight experiments on primates in long duration zero g; Mechanisms underlying the behavior of the organs of equilibrium which result in motion sickness, functional reflex disturbances and other unwanted side effects in navy personnel; Aviation personnel procurement and selection; Predicting fleet effectiveness of Navy and Marine Corps pilots and flight officers; Performance limits under flight disorientation conditions in military pilots; Optimization of auditory performance in naval

aviation; Optimization of speech communications in naval aviation; Determine applicability of nuclear emulsions to long-term radiation monitoring in high altitude flights and on space platforms. GRA

N72-17045# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HUMAN HEAD LINEAR AND ANGULAR ACCELERATIONS DURING IMPACT
Thomas D. Clarke, C. Dee Gragg, James F. Sprouffske, Roger M. Zimmerman (New Mexico State Univ.), William H. Muzzy (Naval Aerospace Med. Res. Lab.), and Edwin M. Trout New York Soc. of Automotive Engr. 1971 15 p Presented at 15th STAPP Car Crash Conf., Coronado, Calif., 17-19 Nov. 1971
(AF Proj. 7231)
(AD-732290; AMRL-TR-71-95) Avail: NTIS CSCL 06/19

Head linear and angular accelerations of humans were investigated during exposure to abrupt linear deceleration. The 14 subjects were restrained with three different restraints: lap belt only, Air Force shoulder harness and air bag plus lap belt. Peak sled decelerations ranged from 7.7 to 10.3 g. The results indicated that peak head angular and linear resultant accelerations were elevated with the air bag in contrast to the Air Force shoulder harness or lap belt only restraints. However, the peak angular and linear accelerations may have less traumatic consequences than the degree of head-neck hyperextension. GRA

N72-17046# Cincinnati Univ., Ohio.
SYNTHESIS OF STERICALLY RIGID CYSTAMINE DERIVATIVES Annual Summary Report, 1 Jun. 1970 31 Aug. 1971
R. Marshall Wilson and Douglas N. Buchanan 31 Aug. 1971 23 p refs
(Contract DADA17-69-C-9107)
(AD-732509; ASR-2) Avail: NTIS CSCL 06/15

The possibility exists that the cystamine class of radiation protection drugs may be active only in certain conformations. If this should prove to be the case then cystamine derivatives that are rigidly held in the required conformation may be much more effective radiation protection agents than the freely-rotating cystamine. This investigation has been directed toward the synthesis of bicyclic disulfides that can be converted into sterically rigid cystamine derivatives. The specific synthetic goals of this project are the syntheses of the syn and anti isomers of 8-amino-2,3-dithiabicyclo(3.2.1) octane. Towards this objective a single isomer of 2,3-dithiabicyclo(3-2-1)octan-8-ol was prepared. The synthesis of this alcohol has been improved during the past year through the application of high dilution and depolymerization procedures. The stereochemistry of the hydroxyl group in this bicyclic alcohol has been determined to be syn to the disulfide linkage. A potential precursor for the anti isomer has been obtained in the form of trans-2,trans-6-dithioacetylcyclohex-r-1-yl acetate. The preparations of the p-toluenesulfonate and trifluoromethane-sulfonate esters of syn-2,3-dithiabicyclo(3-2-1) octan-8-ol are described. An extensive investigation of the nucleophilic displacement of these esters indicates that they are either inert or that the disulfide linkage cleaves more easily than the desired displacement of the sulfonate ester. Author (GRA)

N72-17047# Naval Submarine Medical Center, Groton, Conn.
BIOCHEMISTRY OF SUBMARINE AND DIVING STRESS. 2: THE EFFECT OF CHRONIC HYPERCAPNIA ON BLOOD PHOSPHOFRUCTOKINASE ACTIVITY AND THE ADENINE NUCLEOTIDE SYSTEM Interim Report
Michael J. Jacey and Karl E. Schaefer 9 Mar. 1971 14 p refs
(MF Proj. 12.524.006)
(AD-731984; NSMRL-659; NAVMED-MF12.524.006-9028B) Avail: NTIS CSCL 06/19

Phosphofructokinase activity and adenine nucleotide levels were determined in blood of guinea pigs exposed to 15% CO2 in 21% O2, balance N2 for varying periods of time up to one week. Acute exposure produced a decrease in enzyme activity while the chronic phase increased activity without attainment of control values. These alterations in blood phosphofructokinase activity strikingly paralleled the biphasic changes in blood pH during acute and chronic hypercapnia. These findings demonstrate that blood phosphofructokinase activity is capable of responding to in vivo fluctuations in blood pH. ATP, ADP, AMP, and the energy charge were virtually unchanged during both phases indicating that hypercapnia is characterized by conservation of high-energy phosphates. Author (GRA)

N72-17048# Naval Aerospace Medical Inst., Pensacola, Fla.
RESPONSE FROM AROUSAL AND THERMAL SWEAT AREAS DURING MOTION SICKNESS
Joseph A. McClure, Alfred R. Fregly, Efrain Molina, and Ashton Graybiel Aug. 1971 13 p refs
(MR Proj. 041.01.01)
(AD-731995; NAMRL-1142; NAVMED-MR041.01.01-0120B8) Avail: NTIS CSCL 06/19

The sweat response from the palm (an arousal sweat area) is compared with that from the dorsal hand and arm (a thermal sweat area) during the elicitation of motion sickness by vestibular stimulation. Both palmar and dorsal sweating were detected by using galvanic skin response techniques. In addition, the dorsal sweat response was monitored by an electrochemical sweat sensor. The palmar sweat response is maximal during the first few head movements while a subject is rotating at constant velocity and quickly declines with continuation of the stimulus. This is typical of the arousal sweat response seen on the palm of the hand in response to any unusual sensory input. On the other hand, dorsal sweating has a definite latency, followed by a gradual increase in magnitude of the response. This is characteristic of most motion sickness symptomatology. With two of the eight subjects an increase in environmental temperatures was required to obtain a dorsal sweat response. This suggests that the neural activity evoked by vestibular stimulation is superimposed on that already existing as a result of the thermal state. Author (GRA)

N72-17049# Oregon State Univ., Corvallis. Radiation Center.
IONIZATION IN MICROSCOPIC VOLUMES IRRADIATED BY ENERGETIC PHOTONS Final Report
Leslie A. Braby and William H. Ellett 10 Oct. 1971 166 p refs
(Contract N00014-67-A-0369-0006; NR Proj. 105-515)
(AD-731709) Avail: NTIS CSCL 06/18

The energy absorbed by microscopic volumes exposed to ionizing radiation is not well represented by the average dose due to the small number of discrete energy transfers involved. The energy deposited in a microscopic volume can be determined by measuring the ionization in a detector filled with gas at low pressure. A grid-walled spherical proportional counter suitable for making such measurements for photon irradiation is described and compared to a solid-walled counter. Measured ionization distributions are presented for 60Co gamma irradiation, filtered and unfiltered 250 kVp X-rays, and for 65 kVp X-rays. Other distributions which may be of use in understanding radiation damage models are calculated from these measured distributions. Author (GRA)

N72-17050# California Univ., Los Angeles. Dept. of Psychology.
CENTER FOR COMPUTER-BASED BEHAVIORAL STUDIES Semiannual Technical Report, 1 Jan. - 30 Jun. 1971
Gerald H. Shure 31 Jul. 1971 72 p refs
(Contract F30602-70-C-0016; ARPA Order 1488)
(AD-731859; SATR-4) Avail: NTIS CSCL 05/10

The Center for computer-based Behavioral Studies (CCBS) on the UCLA campus is designed and will be developed to

overcome a number of the methodological limitations blocking significant research advances in, and behavioral sciences contributions to, the study and analysis of national policies and problems. The Center is to be designed around a time-shared computer system that will make its informational and technological resources available to behavioral scientists and policy analysts located at widely dispersed university and research centers, offering them new and powerful research, policy planning, and educational tools. A number of these tools for studying and analyzing the behavior of individuals, groups, and social-political units are specifically relevant to help bridge the enormous gap that continues to exist between the policy analyst and the behavioral scientist. An essential part of the development of these broad methodological and technological areas is an ongoing program of substantive research on bargaining the conflict resolution behavior relevant to political crisis management. With the three areas of development (laboratory gaming and simulation research, inductive data analysis, and data resources management) sharing a common and systematic base of operation, the potentials for mutual support among them will be substantially enhanced. Central to all of these activities are plans based on a number of highly integrated software systems, hardware configurations and laboratory design and equipment requirements, stemming from ARPA supported research and development projects conducted over the past six years. Author (GRA)

N72-17051# North Carolina Univ., Chapel Hill. Dept. of Psychology.
GROUP BEHAVIOR IN A SIMULATED PANIC SITUATION Final Report, Oct. 1966 - Oct. 1971
Duane P. Schultz 15 Oct. 1971 9 p refs
(Contract N00014-67-C-0131; NR Proj. 120-274)
(AD-731741) Avail: NTIS CSCL 05/10

Research and theoretical efforts attempting to define the causes and nature of panic are reviewed briefly. Topics covered include the incidence of panic as a function of personality variables, the nature of the group, and the type and age of the subjects studied. Two different experimental approaches to the study of panic are described; a laboratory simulation and a role-playing approach. The most clear-cut finding involves subject age. The findings suggest that those who panic may be high in pain sensitivity and that low cohesive groups may be more inclined to panic than high cohesive groups. Particular attention has been paid to practical, theoretical, and ethical issues involved in the conduct of research using human subjects, with reference to the present studies as well as all psychological research. GRA

N72-17052# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
EXPOSURE OF MARIGOLD (TAGETES) TO GASEOUS HYDROGEN CLORIDE Final Report, 6 Nov. 1970 - 2 Jun. 1971
Christopher T. Lind and Sheldon A. London Sep. 1971 19 p refs
(AF Proj. 630204)
(AD-732195; AMRL-TR-71-90) Avail: NTIS CSCL 06/3

To ascertain the extent of environmental pollution problems attendant with Air Force missile operations, mature flowering marigold plants were exposed to one of the known exhaust products, hydrogen chloride. All plants died after 5 minutes exposure to 2071 ppm the highest concentration used. At 95 ppm no effect was noted. Seeds obtained from the exposed plants did not appear to be affected by the HCl treatment.
Author (GRA)

N72-17053# Naval Aerospace Medical Inst., Pensacola, Fla.
CENTRAL NERVOUS SYSTEM EFFECTS AS MEASURED BY REACTION TIME IN SQUIRREL MONKEYS EXPOSED FOR SHORT PERIODS TO EXTREMELY LOW FREQUENCY MAGNETIC FIELDS
James D. Grissett and John DeLorge 10 Aug. 1971 16 p refs
(AD-731994; NAMRL-1137) Avail: NTIS CSCL 06/18

The U.S. Navy has current interest in electromagnetic radiation including the extremely low-frequency (ELF) region. The Navy has begun a major research effort to scientifically document any physiological effects which these fields can have on man and his ecology. This present experiment was designed to detect any acute instantaneous central-nervous-system effects resulting from exposure to an ELF magnetic field. Reaction-time measurements were taken on three squirrel monkeys for 37 one-hour daily sessions. No significant changes in these measurements were observed between control sessions and sessions in which the animals were exposed to 3 Gauss at 45 Hz or to a field of 3 Gauss at 7 Hz. Two other indices of performance, reinforcement ratio and efficiency ratio, were also unchanged. The small number of subjects does not permit a firm conclusion; however, the evidence indicates that the magnetic field did not produce a central-nervous-system response measurable by the technique employed in this study.
Author (GRA)

N72-17054# Naval Ordnance Lab., White Oak, Md.
EXPOSURE RATES FROM EXPERIMENTALLY FRACTIONATED FISSION PRODUCTS
Leland R. Bunney and Daniel Sam 2 Sep. 1971 16 p refs
(Contract DAHC20-70-C-0283)
(AD-732375; NOLTR-71-154) Avail: NTIS CSCL 06/18

Exposure rates, at three feet above a uniformly contaminated smooth plane, were calculated from recent experimentally measured gamma-ray spectra of fractionated products of thermal-neutron fission of 235U. The fractionation had been carried out by very early removal of the rare gas fission products in a reproducible manner. The exposure rates were obtained at nine selected times (1/4, 1/2, 1, 2, 5, 10, 24, 48 and 72 hours) after fission. The photon energy of the gamma-rays released were calculated and are tabulated. Author (GRA)

N72-17055# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EFFECTS OF HIGH G FORCES ON THE VESTIBULO-OCULAR COUNTERROLL REFLEX OF RHESUS MONKEYS M.S. Thesis
Richard H. Wheeler Jun. 1971 89 p refs
(AF Proj. 7222)
(AD-730156; GE/EE/71S-5) Avail: NTIS CSCL 06/19

A model of the vestibulo-ocular reflex manifest by counterroll was used to determine the effects of high G forces on the response of the vestibular system of rhesus monkeys. Baseline data for determining model parameters were generated prior to subjection to high Gs. After subjecting monkeys to high G, the tests were again run to determine if significant changes had occurred in the model's parameters. The tests consisted of constant speed rotation, pendular oscillations and multiple sine wave oscillations about their line-of-sight. Counterroll was recorded using a linear resolver mechanically fixed to the monkey's eyeball and the data collected analyzed by use of the Fast Fourier transform. The results of this study indicate that the response is not significantly affected by G loading as high as 70G. Author (GRA)

N72-17056# Joint Publications Research Service, Washington, D.C.
SPACE BIOLOGY AND MEDICINE, VOLUME 5, NO. 6, 1971
4 Feb. 1972 139 p refs Transl. into ENGLISH from Kosm. Biol. Med. (Moscow), v. 5, no. 6, 1971 p 1-138
(JPRS-55100) Avail: NTIS

Articles from Russina publications concerning space biology and medicine are presented. Subjects discussed are: (1) selection and training of cosmonauts, (2) evaluation and analysis of data to facilitate the transition from orbital to interplanetary flights, (3) research aimed at guaranteeing safety on long flights and reliability of humans in the spacecraft system, (4) space psychology and physiology, (5) environmental problems and control, and (6) telemetry.

N72-17057# Joint Publications Research Service, Washington, D.C.
CONDITIONS AND PRINCIPAL RESULTS OF RADIOBIOLOGICAL RESEARCH c04
Yu. G. Grigoryev, V. N. Benevolenskiy, and Yu. P. Druzhinin *In its* Space Biol. and Med., v 5, no. 6, 1971 4 Feb. 1972 p 1-9 refs
Avail: NTIS

An outline of radiobiological investigations, including pre- and postflight irradiation of biological specimens is presented. Experiments performed with dormant yeast cells, hydrogen bacteria, lettuce and pea seeds aboard the Cosmos-368 artificial earth satellite are described. An analysis of certain radiation effects (cell division inactivation, chromosomal aberration induction, growth stimulation and inhibitation reveals no substantial modification of radiation damage in response to nonradiation flight factors. Author

N72-17058# Joint Publications Research Service, Washington, D.C.
POSTFLIGHT MUTABILITY AND STATE OF THE SEX FACTOR IN E COLI K-12 c04
A. A. Lukin and G. P. Parfenov *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 10-14 refs

Avail: NTIS

An E. coli culture exposed to space flight aboard the Cosmos-368 artificial earth satellite was examined for the presence of auxotrophic and thermolabile mutants, as well as for the state of the sex factor. No mutants were detected either in the experiment or in the control. No disintegration of the sex factor from the bacterial chromosome was detected. Author

N72-17059# Joint Publications Research Service, Washington, D.C.
PERSISTENCE OF THE RADIATION EFFECT IN YEASTS IRRADIATED BY GAMMA QUANTA ON EARTH AND IN SPACE c04
V. N. Benevolenskiy, Yu. G. Kapultsevich, V. I. Korogodin, and S. A. Chepelev *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 20-26 refs
Avail: NTIS

During the flight experiment of Cosmos-368 satellite a study was made of the effect of specific flight factors on preirradiated yeast cells Saccharomyces ellipsoides, strain Megri 139-B. The 6-day space flight produced insignificant effects on the occurrence and development of previously existing damage. Prolonged storage of cells in a state of inhibited metabolism influenced the radiation effects to a greater extent. Author

N72-17060# Joint Publications Research Service, Washington, D.C.
PERSISTENCE OF THE RADIATION EFFECT IN YEASTS IRRADIATED BY GAMMA QUANTA ON EARTH AND IN SPACE c04
V. N. Benevolenskiy, Yu. G. Kapultsevich, V. I. Korogodin, and S. A. Chepelev *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 20-26 refs
Avail: NTIS

During the flight experiment of Cosmos-368 satellite a study was made of the effect of specific flight factors on preirradiated yeast cells Saccharomyces ellipsoides, strain Megri 139-B. The 6-day space flight produced insignificant effects on the occurrence and development of previously existing damage. Prolonged storage of cells in a state of inhibited metabolism influenced the radiation effects to a greater extent. Author

N72-17061# Joint Publications Research Service, Washington, D.C.
EFFECT OF FLIGHT CONDITIONS ON THE RADIOSENSITIVITY OF HYDROGEN BACTERIA CELLS c04
V. M. Abramova, V. N. Benevolenskiy, and Yu. P. Druzhinin *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 27-30 refs
Avail: NTIS

Investigations were carried out to determine the effect of flight conditions and prolonged ground storage on the viability and radiosensitivity of Hydrogenomonas eutropha, strain Z-1, exposed as an aqueous suspension. Radiosensitivity was measured during pre and postflight exposures to cobalt 60 gamma radiation. The absolute number of cells with inactivated division declined slightly and their radiosensitivity decreased as a result of extended (up to 24 days) storage at the temperature of melting ice and at room temperature, including during orbital flight. There was no distinct differences in the radiosensitivity of the Hydrogenomonas bacteria used in the experiment and in the control. Author

N72-17062# Joint Publications Research Service, Washington, D.C.
CHANGE IN GROWTH PROCESSES IN IRRADIATED LETTUCE SEEDS c04
Yu. I. Shaydorov, A. T. Miller, I. V. Nikitina, L. V. Alekseyenko, A. O. Krustyn, and V. N. Nekrasova *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 31-35 refs

Avail: NTIS

The effect of spaceflight factors on the biological effectiveness of gamma rays was studied with respect to lettuce seeds. It was found that the flight exerted no significant effect on the energy of seed germination. The length of the primary root in flight specimens irradiated before flight was similar to that in the ground controls. According to this test, flight factors increased the effectiveness of postflight irradiation insignificantly. The influence of a synchronous exposure inhibited the weight of 30-day plants to the greatest extent. The seed exposure to all the doses tested during the flight resulted in a slight decline of plant weight in comparison with the laboratory control. Author

N72-17063# Joint Publications Research Service, Washington, D.C.
EFFECT OF FLIGHT FACTORS ON DORMANT LETTUCE SEEDS c04
Yu Farber, V., L. V. Nevzgodina, N. M. Papyan, and T. N. Soboleva *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 36-45 refs
Avail: NTIS

The effect of spaceflight factors on gamma-irradiated and unirradiated lettuce seeds was examined. The experiments were carried out using seeds with normal and increased levels of spontaneous and induced mutagenesis. The flight was shown to influence spontaneous and induced mutagenesis in lettuce seeds. Author

N72-17064# Joint Publications Research Service, Washington, D.C.
EFFECT OF FLIGHT FACTORS ON RADIATION DAMAGE TO CHROMOSOMES IN DORMANT PEA SEEDS c04
L. S. Tsarapkin, L. V. Alekseyenko, and K. A. Tsarapkina *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 46-51 refs
Avail: NTIS

Dormant pea seeds with a moisture content of 7.0-7.5 percent exposed before flight to cobalt 60 gamma irradiation in doses of 5 and 10 kilorads were carried aboard the Cosmos-368 artificial earth satellite during the postradiation period. A synchronous experiment was conducted 5 days after the launching. The experiment simulated the changes in the ambient atmosphere aboard the satellite and was also followed by a transport control. Mitotic activity and chromosomal aberrations in anaphase were determined in the root meristem during the first cycle of cell division after wetting. The percentage of dividing cells remained unaltered despite the exposures used. An analysis of the cytogenetic data by the statistical variations method revealed no effects from satellite flight, the ambient atmosphere, and delivery to the launching site. The damage level correlated only with the irradiation doses. Author

N72-17065# Joint Publications Research Service, Washington, D.C.
EFFECT OF FLIGHT FACTORS ON THE FORMATION OF ANOMALOUS METABOLITES AND ACTIVITY OF ENZYMES IN PLANTS c04
P. A. Sharkovskiy, A. T. Miller, Yu. I. Shaydorov, and A. O. Krustyn *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 52-56 refs
Avail: NTIS

The effects of flight factors on the formation of anomalous metabolites and activity of enzymes in plants are discussed. Oxidation processes as an important role in the development of primary radiation damage reactions are described. The activity of enzymes as an index of radiation impairment of metabolism in plants is examined. The accumulation of primary radiotoxins due to the activation of oxidative enzymatic processes in the tissues of irradiated plants is investigated. Author

N72-17066# Joint Publications Research Service, Washington, D.C.
EFFECT OF SPACEFLIGHT CONDITIONS ON A CHLORELLA CULTURE c04
T. B. Galkina and I. V. Aleksandrova *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 57-60 refs

Avail: NTIS

A Chlorella culture exposed without illumination aboard the Cosmos-368 artificial earth satellite was examined. The postflight study of the cells and their subsequent cultivation in agarized and liquid media gave evidence that the flight induced no significant changes in cell morphology and photosynthetic activity. Author

N72-17067# Joint Publications Research Service, Washington, D.C.
STUDY OF THE EFFECT OF FLIGHT FACTORS ON THE ZOND-8 AUTOMATIC STATION ON A CULTURE OF YEASTS AND ALGAL BACTERIA c04
E. A. Romanova, L. A. Maksimova, L. A. Siletskaya, A. L. Mashinskiy, Ye. A. Krasavin, and V. K. Kovalenkova *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 61-64 refs

Avail: NTIS

The results of studying the yeast Candida tropicalis SK-4 and the bacterium Hydrogenomonas eutropha Z-1 which were aboard the automatic station Zond-8 during its lunar flight are presented. The survival of yeast cells during flight and the physiological and biochemical properties of their subsequent generations remained unchanged. The survival of bacteria decreased by 5 percent in comparison with the control. Subsequent generations of bacteria tended to decrease their productivity during autotrophic cultivation, the level remaining within the limits of productivity variations under laboratory conditions. Bacterial radiosensitivity did not change after the flight. Author

N72-17068# Joint Publications Research Service, Washington, D.C.
USE OF EMBEDDED ELECTRODES AND SENSORS IN CHRONIC EXPERIMENTS ON RATS
N. T. Svistunov, V. M. Garin, and N. I. Kosterev *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 65-70 refs

Avail: NTIS

Electrodes used to register the EMG and ECG, temperature sensors, a special harness fixed to the rat body immediately after operation, as well as procedures for preparing white rats for chronic experiments are discussed. The procedure and harness help to avoid destruction of wires by the animals and to prevent any complications in the postoperation period. Author

N72-17069# Joint Publications Research Service, Washington, D.C.
COORDINATION STRUCTURE OF WALKING OF SOYUZ-9 CREW MEMBERS BEFORE AND AFTER FLIGHT
I. F. Chekirda, R. B. Bogdashevskiy, A. V. Yeremin, and I. A. Kolosov *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 71-77 refs
Avail: NTIS

The cyclogrammetric method was used in studying the structure of walking of Soyuz-9 crew members after recovery. It is shown that the long-duration flight induced rearrangements in the walking structure which involved changes in the intensity and time of controlling impulses sent to the periphery, increases in the number of movement corrections, and other kinematic and dynamic peculiarities. During early readaptation one can discriminate two stages: (1) a stage of a stamping gait, in which the changes are seen visually, and (2) a stage of an impact gait in which the foot evidently impacts the support normally but the cyclogrammetric analysis reveals abnormalities in motor skills.
Author

N72-17070# Joint Publications Research Service, Washington, D.C.
EFFECT OF BRIEF SPACE FLIGHTS ON THE HUMAN NEUROMUSCULAR SYSTEM c04
L. I. Kakurin, M. A. Cherepakhin, and V. I. Pervushin *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 78-83 refs
Avail: NTIS

The results of examinations given to crew members of the Soyuz-3, 4, 5, 6, 7 and 8 are reviewed. The reflex excitability of the neuromuscular system, tone and contractability of the muscles were studied. Space flights of 2 to 5 days in duration brought about an insignificant deterioration in the functional state of the human motor system. This is suggested by changes in neuromuscular excitability in response to a physical load and a dropoff in the tone and strength of skeletal muscles, primarily the postural muscles. Author

N72-17071# Joint Publications Research Service, Washington, D.C.

EFFECT OF AN ATMOSPHERE WITH A HIGH CARBON DIOXIDE CONTENT ON HUMAN TOLERANCE TO ACUTE HYPOXIA AND ACCELERATION c04

N. A. Agadzhanyan, Ye. B. Shulzhenko, I. F. Vil-Vilyams, and A. V. Serginenko *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 84-90 refs

Avail: NTIS

Human tolerance to acute hypoxia and accelerations was studied following exposure to a hypercapnic atmosphere. The reserve time was determined at an altitude of 7,500 meters. Back-to-chest accelerations were imparted on a centrifuge with a large radius. The experimental results show that a many-day exposure to a hypercapnic atmosphere (with a CO2 centration over 30 mm Hg) decreased human tolerance to acute hypoxia and accelerations. Author

N72-17072# Joint Publications Research Service, Washington, D.C.

DEVELOPMENT OF STAPHYLOCOCCAL INFECTION IN HUMAN SUBJECTS UNDER THE INFLUENCE OF SOME SPACEFLIGHT FACTORS c04

B. A. Chukhlovin, P. B. Ostroumov, and S. P. Ivanova *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 91-98 refs

Avail: NTIS

Healthy male test subjects exposed to extended bedrest, partial or complete isolation and inadequate personal hygiene were studied for the size of microbial foci in the nasal mucosa and pathogenicity of nasopharyngeal staphylococci. Most test subjects exhibited an increase in size of staphylococcal foci and an increased presence of staphylococci producing coagulase, hyaluronidase and lecithovitellase. They also exhibited an increased level of antibodies to staphylococcal enzymes in the blood. The carrying of a main phagotype was usually established in isolated groups of subjects. The possibility of mutual infection of human subjects by pathogenic staphylococci under the influence of certain spaceflight factors was demonstrated. Author

N72-17073# Joint Publications Research Service, Washington, D.C.

HISTOPATHOLOGIC SUBSTRATE OF ATHEROSCLEROSIS TRANSPIRING WITHOUT SYMPTOMS IN YOUNG PEOPLE c04

M. L. Kolomiyevskiy *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 99-104 refs

Avail: NTIS

The histologic substrate of atherosclerosis transpiring without symptoms in a young man (24 years old) has histologic elements typical of active atherosclerosis during different stages in its developmental stages demonstrates that in young people the disease has a wavelike development. This also indicates a necessity of preventing the progress and inducing a reversal of the atherosclerotic process by various prevention and therapeutic measures. It is also suggested that hazardous atherosclerotic forms be diagnosed in one's lifetime. Author

N72-17074# Joint Publications Research Service, Washington, D.C.

THERMOTOPOGRAPHY OF THE SKIN IN HEALTHY HUMAN SUBJECTS UNDER COMFORTABLE CONDITIONS

A. Ya. Tizul *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 105-111 refs

Avail: NTIS

Over a 12-month period the temperature of the human skin (thermotopography) was measured at ten symmetric points (forehead, cheek, neck, chest, shoulder, back of hand, stomach, thigh, shin, back of the foot) in 150 healthy male subjects in the age group 24-35 under comfortable conditions. The most thermostable areas of the human body surface were those of the neck, chest, stomach and proximal regions of the limbs and cheeks. The latter areas exhibited distinct seasonal variations with respect to temperature. The determined mean skin thermotopography parameters can be used together with clinical data in studying autonomic-vascular regulation and thermal regulation during body exposure to various stress factors. Author

N72-17075# Joint Publications Research Service, Washington, D.C.

PHYSIOLOGICAL-HYGIENIC EVALUATION OF REGENERATED DRINKING WATER c04

L. I. Elpiner *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 112-120 refs

Avail: NTIS

The problems involved in producing potable water from condensates and poorly mineralized water are discussed. A method for correcting the distillate mineral composition is described. It is concluded that good quality potable water can be produced from the calcium-sodium group in the hydrocarbonate class by this method. Author

N72-17076# Joint Publications Research Service, Washington, D.C.

EFFECT EXERTED BY MAN BY ROTATIONS IN THE SAGITTAL PLANE

F. A. Solodovnik and G. F. Khlebnikov *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 121-123 refs

Avail: NTIS

The effect exerted on man by rotation in the sagittal plane is discussed. The subjects were rotated at rates of 60 and 120 degrees per second with accelerations of 12 and 24 degrees per second square, respectively. The duration of a constant angular velocity was 60 seconds. The positive and negative accelerations were equal. After each rotation the subject reported on his feeling of well being and cessation of counterrotation illusion. The results of twenty two experiments using twenty subjects are reported. Author

N72-17077# Joint Publications Research Service, Washington, D.C.

POSSIBILITY OF SYNTHESIS OF PRECURSORS OF COMPLEX ORGANIC COMPOUNDS IN REGIONS OF SUBMARINE VOLCANISM c04

L. M. Mukhin *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 124-126 refs

Avail: NTIS

The genesis of life and the origin of complex organic compounds in the regions of submarine volcanoes is discussed. The stability of the synthesized organic compounds is examined. The chemical reactions leading to the formation of reactive molecules which are precursors of biologically important compounds are presented. Author

N72-17078# Joint Publications Research Service, Washington, D.C.

POSSIBILITY OF USING A CONDENSATE OF ATMOSPHERIC MOISTURE IN A SYSTEM FOR FUNCTIONING OF HIGHER PLANTS c04

N. T. Nilovskaya, S. V. Chizhov, Yu. Ye. Sinyak, N. N. Shekhovtsova, M. I. Shikina, L. E. Yegorova, and V. V. Krasnoshchekov *In its* Space Biol. and Med., v. 5, no. 6, 1971 4 Feb. 1972 p 127-131 refs

Avail: NTIS

The possibility of purifying a condensate of atmospheric moisture forming in a man-occupied pressure chamber and a greenhouse for the purpose of its repeated use for cultivating plants is discussed. The various methods considered are: (1) sorption, (2) exidative-catalytic, (3) extraction, and (4) lyophilization. The chemical composition of the condensate is examined and the amounts and types of materials present are described. The characteristics of plants in control and experimental groups which were cultivated with the condensate are tabulated. Author

N72-17079*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A CONTROL-THEORY MODEL FOR HUMAN DECISION-MAKING
William H. Levison and Robert B. Tanner Washington NASA Dec. 1971 112 p refs
(Contract NAS2-5884)
(NASA-CR-1953) Avail: NTIS CSCL 05E

A model for human decision making is an adaptation of an optimal control model for pilot/vehicle systems. The models for decision and control both contain concepts of time delay, observation noise, optimal prediction, and optimal estimation. The decision making model was intended for situations in which the human bases his decision on his estimate of the state of a linear plant. Experiments are described for the following task situations: (a) single decision tasks, (b) two-decision tasks, and (c) simultaneous manual control and decision making. Using fixed values for model parameters, single-task and two-task decision performance can be predicted to within an accuracy of 10 percent. Agreement is less good for the simultaneous decision and control situation. Author

N72-17080*# Massachusetts Inst. of Tech., Cambridge. Charles Stark Draper Lab.
STUDY DIRECTED AT DEVELOPMENT OF AN IMPLANTABLE BIOTELEMETRY ION DETECTOR
L. David Hanley and David Kress Nov. 1971 58 p refs
(Contract NAS2-5951)
(NASA-CR-114415; R-701) Avail: NTIS CSCL 06D

A literature search was conducted to currently update known information in the field of ion-selective electrodes. The review attempts to identify present trends in cation and anions selective electrodes pertinent to the area of bioimplantable units. An electronic circuit was designed to provide the high impedance interface between the ion-selective sensors and signal-processing equipment. The resulting design emphasized the need for low power and miniaturization. Many of the circuits were constructed and used to evaluate the ion-selective electrodes. A cuvette capable of holding the ion-selective and the reference electrodes was designed and constructed. This equipment was used to evaluate commercially available ion-selective electrodes and the electrodes designed and constructed in the study. The results of the electrode tests are included. Author

N72-17081*# Becton, Dickinson and Co., Raleigh, N.C.
DEVELOPMENT, FABRICATION AND TESTING OF A MAGNETICALLY CONNECTED PLASTIC VACUUM PROBE SURFACE SAMPLER
G. B. Phillips and V. A. Pace, Jr. Washington NASA Feb. 1972 22 p refs
(Contract NAS1-9887; 191-58-23-01)
(NASA-CR-1947) Avail: NTIS CSCL 06B

The sampler utilizes permanent magnets and soft metal pole pieces to connect the cone/filter assembly to the sampling head and vacuum supply. The cone/filter assembly is packaged in a plastic container and presterilized so that the need for any human contact during the sampling procedure is completely eliminated. Microbiological tests have demonstrated that the sampling efficiency is not affected by the magnetic coupling apparatus and that the probe appears to function as efficiently as the conventional plastic and Sandia vacuum probes. Author

N72-17082# Sandia Labs., Albuquerque, N.Mex. Exploratory Measurements Div.
EYE-CONTROLLED VERSUS HAND-CONTROLLED TRACKING
F. K. Bechtel and J. W. Langenhorst May 1971 62 p refs Sponsored by AEC
(SC-RR-71-0502) Avail: NTIS

A simulator comparison of eye-controlled and hand-controlled tracking reveals no definite superiority of one technique over the other. For small step angular acceleration stimuli, errors are comparable; however, hand-control can maintain track for larger step accelerations than eye-control. On the other hand, for short period triangle-wave angular acceleration stimuli, eye-control yields the smaller peak tracking errors. To its favor, eye-control requires less operator training than hand-control. To its detriment, a field implementation of eye-control is more complex than the hand-control presently in use. By adding a cursor to hand-control, its performance can be improved in those areas where eye-control is superior, but adding the cursor increases the complexity of a field implementation. Author

N72-17083# Columbia Univ., New York. Radiological Research Lab.
[RADIOLOGICAL PHYSICS, BIOPHYSICS, AND RADIOBIOLOGY] Annual Report
1 Jul. 1971 259 p refs
(Contract AT(30-1)-2740)
(NYO-2740-8; TID-4500) Avail: NTIS

Research projects to determine the biological and physiological effects of radium gamma rays are reported. Experiments on the effects of split doses of X-rays on the production of subcapsular opacities in mice were conducted. Inhibition of cell division in hamster cells exposed to a range of low dose rates from radium gamma rays is discussed. Theorems on dose effect relations are described and equations are developed to show the minimum number of events involved in the effect on the cell and the meaning of the slope of the dose effect curve in double logarithmic scale. Author

N72-17084# Texas Technological Univ., Lubbock.
STUDY OF OPTIMAL SPEED ON BICYCLE ERGOMETER
G. Meikandan 1971 57 p refs
(Contract DAAD05-69-C-0102; Proj. Themis)
(AD-729831) Avail: NTIS CSCL 06/9

The purpose of the study was to determine the optimal speed of work on a bicycle ergometer. During the experiment the heart rate and oxygen uptake of the subjects while working at different levels of work, load on the dynamometer of bicycle, and speed were monitored. Author(GRA)

N72-17085# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS OF BIONICS, NO. 2 1970 (SELECTED ARTICLES)
E. V. Uteush 9 Jul. 1971 38 p refs Transl. into ENGLISH

from Probl. Bioniki (USSR), no. 2, 1970 p 62-67, 107-110, and 131-136
(FTD Proj. 60101)
(AD-730045; FTD-MT-24-57-71) Avail: NTIS CSCL 06/4

Contents: Research on the psychophysiological peculiarities of the operator; Mathematical simulation of functional systems for evaluating remoteness according to the apparent magnitude of the orientator, its gradient, and the apparent velocity; new approach to the analysis, electroencephalograms. GRA

N72-17086# New York Univ., N.Y. Dept. of Psychology.
THE OPTIMAL USE OF SIMULATION Final Report
Joseph Weitz and Seymour Adler Aug. 1971 29 p refs
(Grant AF-AFOSR-1800-69; AF Proj. 9778)
(AD-730951; AFOSR-71-2601TR) Avail: NTIS CSCL 05/10

One hundred subjects were run on a foot-hand-eye coordination task. The apparatus used was a collator. It was set up as a simulator as well as the real task. Twenty subjects (10 male and 10 female) were run in each of five conditions. Condition I - training on collating three pages then transferred to collating eight pages. Condition IA - trained on three pages then overtrained before transferring to eight pages. Condition II - trained on five pages then transferred to eight. Condition IIA - trained on five pages then overtrained before transferring to eight. Condition III - trained immediately on eight pages. For the males, overtraining degraded performance on the transfer trials. This was not true for the females. The closer the training was to the real task (8 pages) the poorer the performance of the males on the transfer performance. Overtraining males who reached criterion early in the initial training had the greater deleterious effect on the transfer trials when compared to those reaching criterion later. This was not true for the females. For the males, no prior training produced the best terminal performance on the transfer task. This was not true for the females. Some suggested explanations of the sex difference are given and some hypothesis are made concerning the optimal use of simulation training. Author (GRA)

N72-17087# BioTechnology, Inc., Falls Church, Va.
THE DEVELOPMENT OF EQUIPMENT FOR PSYCHOMOTOR ASSESSMENT
James H. Sanders, Jr., Lonnie D. Valentine, Jr., and David F. McGrevy Brooks AFB, Tex. AFHRL Jul. 1971 20 p ref
(Contract F41609-70-C-0015; AF Proj. 7719)
(AD-732210; AFHRL-TR-71-40) Avail: NTIS CSCL 05/10

The purpose of the work was to develop a highly flexible psychomotor testing system capable of reproducing the psychological task structure of two electromechanical tests used earlier in Air Force pilot selection programs. These were the SAM Complex Coordination Test and the SAM Two-Hand Coordination Test. The work was conducted in two phases, the first of which resulted in the definition, design, assembly, and testing of the psychomotor testing system. The second phase involved the testing of 120 Air Force pilot candidates and analysis of the data. The system developed to implement these tests consists of two test stations (expandable to eight) and a test control unit. Test control station functions are performed with a PDP-8/L digital computer which can generate graphical, alphanumeric, or point displays on a direct-view storage tube. The feasibility of this psychomotor testing system was demonstrated and found to be highly flexible and efficient, with a capability for conducting test sessions under automated conditions. Author (GRA)

N72-17088# Columbia Univ., New York.
VISUAL PERCEPTION Final Report, 31 Aug. 1968 3 Aug. 1971
Barbara Gillam Lawergren 30 Sep. 1971 33 p refs
(Contract N00014-67-A-0108-0009; NR Proj. 197-009)
(AD-731747; CU-7) Avail: NTIS CSCL 06/16

Research projects in visual perception are presented. Subjects discussed are: (1) Ames window, (2) perceptual grouping, (3) illusions, (4) movement perception, and (5) retinal integration and differentiation. The factors which affect these parameters of visual perception are examined. Author

N72-17089# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
SYSTEM DESIGN TRADE STUDIES: THE ENGINEERING PROCESS AND USE OF HUMAN RESOURCES DATA Technical Report, 1 Jan. 1970 - 31 May 1971
Larry M. Lintz, William B. Askren (Air Force Human Resources Lab.), and Wayne J. Lott Wright-Patterson AFB, Ohio Air Force Human Resources Lab. Jun. 1971 104 p refs
(Contract F33615-70-C-1564; AF Proj. 1124)
(AD-732201; AFHRL-TR-71-24) Avail: NTIS CSCL 05/9

The engineering trade study process was investigated to determine the feasibility of including human resources data in trade studies. First, sixty one completed trade studies from actual McDonnell Douglas Corporation aeronautical, missile, and command and control systems were analyzed to determine the characteristics of system design trade studies. Four simulated trade studies containing engineering and human resources data and representing flight control and avionics subsystems then were constructed for experimental use. Seventy two experienced design engineers performed the simulated trade studies. It was found that engineers can and do use human resources data in system design trade studies. Personnel costs and quantities are assigned more weighting in the trade studies than skill types, skill levels and availability of personnel. A detailed presentation of human resources data is given more weighting than is a very condensed presentation. Such data should be presented in tabular form, in quantitative fashion and in units familiar to the engineer to be most useful. The four major sources of variability in trade study results were found to be choice of parameters, weighting factors for the parameters, methods of normalizing the parametric data, and methods of combining parametric data and weighting factors. Air Force standardization of trade study methods is recommended to help overcome this variability. Author (GRA)

N72-17090# Federal Aviation Administration, Washington, D.C. Office of Management Systems.
THE 1970 US CIVIL AIRMEN STATISTICS
Jun. 1971 41 p
(AD-732568) Avail: NTIS CSCL 05/9

Statistics pertaining to airmen, both pilot and nonpilot, were obtained from the official airmen certification records. Data are provided concerning active pilot certificates held, active nonpilot certificates held, and airman certificates issued. GRA

N72-17091# Army Aeromedical Research Lab., Fort Rucker, Ala.
ENGINEERING TEST OF LIGHTWEIGHT UNDERWEAR OF THE WINTER FLIGHT CLOTHING SYSTEM: THERMAL PROTECTION
Francis S. Knox, III, George R. McCahan, Jr., Thomas L. Wachtel, Walter P. Trevethan, Andrew S. Martin, David R. DuBois, and George M. Keiser Jun. 1971 46 p refs
(DA Proj. 3AO-62110-OA-819)
(AD-732429; USAARL-71-19) Avail: NTIS CSCL 11/5

The report describes the use of a bioassay technique to evaluate the fire resistant and thermal protection capabilities of the lightweight underwear of the Army winter flight clothing system. Samples of fabrics were mounted on a template and

held in contact with the side of a pig. Thus protected, the pig was exposed to a flame source calibrated to simulate a well developed JP-4 fire. Evaluation of resultant skin burns shows that none of the fabric systems, as evaluated, meet the essential requirement of 10 seconds protection. Author (GRA)

N72-17092# Army Natick Labs., Mass. Clothing and Personal Life Support Equipment Lab.

INVESTIGATION OF METHODS FOR IMPROVING THE FRICTIONAL PROPERTIES OF RUBBER COMPOUNDS USED IN FOOTWEAR

Patrick J. Mahoney Jul. 1971 39 p refs
(DA Proj. 1T0-1101-A-91-A)
(AD-733312; C/PLSEL-88; USANLABS-TR-72-2-CE) Avail: NTIS CSCL 06/17

Efforts to improve frictional qualities entailed the testing of various tread designs, additve materials such as cork and cotton flock, composite specimens, and channeled and siped specimens. Tests were also conducted at room temperature and in some cases at 0F. The data obtained show (1) changes in tread design, composites and coarse additive materials are ineffective in improving friction on smooth surfaces; (2) siping of flat specimens showed slight improvement of friction on wet surfaces; (3) compounds that resist hardening at 0F show better retention of friction at that temperature; and (4) the order of skid resistance of several compounds changes when tested on a different surface. Author (GRA)

N72-17617*# Oak Ridge National Lab., Tenn.

CALCULATION OF THE ABSORBED DOSE AND DOSE EQUIVALENT INDUCED BY MEDIUM ENERGY NEUTRONS AND PROTONS AND COMPARISON WITH EXPERIMENT c04

T. W. Armstrong and B. L. Bishop *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 123-127 refs
(NASA Order H-38280A)
Avail: NTIS HC $10.00/MF $0.95 CSCL 20H

Monte Carlo calculations have been carried out to determine the absorbed dose and dose equivalent for 592-MeV protons incident on a cylindrical phantom and for neutrons from 580-MeV proton-Be collisions incident on a semi-infinite phantom. For both configurations, the calculated depth dependence of the absorbed dose is in good agreement with experimental data. Author

N72-17618*# Oak Ridge National Lab., Tenn.

PRIMARY AND SECONDARY PARTICLE CONTRIBUTIONS TO THE DEPTH DOSE DISTRIBUTION IN A PHANTOM SHIELDED FROM SOLAR FLARE AND VAN ALLEN PROTONS c04

R. T. Santoro, H. C. Claiborne, and R. G. Alsmiller, Jr. *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 128-136 refs

(NASA Order H-38280A)
Avail: NTIS HC $10.00/MF $0.95 CSCL 03B

Calculations have been made using the nucleon-meson transport code NMTC to estimate the absorbed dose and dose equivalent distributions in astronauts inside space vehicles bombarded by solar flare and Van Allen protons. A spherical shell shield of specific radius and thickness with a 30-cm-diam. tissue ball at the geometric center was used to simulate the spacecraft-astronaut configuration. The absorbed dose and the dose equivalent from primary protons, secondary protons, heavy nuclei, charged pions, muons, photons, and positrons and electrons are given as a function of depth in the tissue phantom. Results are given for solar flare protons with a characteristic rigidity of 100 MV and for Van Allen protons in a 240-nautical-mile circular orbit at 30 degree inclination angle incident on both 20-g/sq cm-thick aluminum and polyethylene spherical shell shields. Author

N72-17621*# San Francisco Univ., Calif.

HIGH Z PARTICLE APOLLO ASTRONAUT DOSIMETRY WITH PLASTICS c04

E. V. Benton and R. P. Henke *In* NASA, Washington Proc. of The Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 149-156 refs Sponsored by NASA

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

On Apollo missions, the individual astronauts' high Z particle exposure is measured by means of Lexan polycarbonate plastic. These layers form one component of the passive dosimetry packets worn in the constant wear garment. They serve as threshold type, high Z, charged particle track detectors, recording only the very highly ionizing particles. The detectors yield information on the particles' charge, energy, and direction of travel. This data, in turn, is used to obtain the track fluence, the stopping particle density as an integral Z distribution, and the particles' integral LET spectrum. Some of the data gathered on Apollo missions 8-13 is presented. Author

N72-17622*# California Univ., La Jolla. Dept. of Radiology.

FLUCTUATIONS IN ENERGY LOSS AND THEIR IMPLICATIONS FOR DOSIMETRY AND RADIOBIOLOGY c04

Norman A. Baily and John E. Steigerwalt *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 157-161 refs
(Grant NGL-05-009-103)
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Serious consideration of the physics of energy deposition indicates that a fundamental change in the interpretation of absorbed dose is required at least for considerations of effects in biological systems. In addition, theoretical approaches to radiobiology and microdosimetry seem to require statistical considerations incorporating frequency distributions of the magnitude of the event sizes within the volume of interest. Author

N72-17623*# Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.

THE MEASUREMENT OF RADIATION EXPOSURE OF ASTRONAUTS BY RADIOCHEMICAL TECHNIQUES c04

R. L. Brodzinski *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 162-167 refs
(Contract AT(45-1)-1830)
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

The principal gamma-ray emitting radioisotopes, produced in the body of astronauts by cosmic-ray bombardment, which have half-lives long enough to be useful for radiation dose evaluation, are Be-7, Na-22, and Na-24. The sodium isotopes were measured in the preflight and postflight urine and feces, and those feces specimens collected during the manned Apollo missions, by analysis of the urine salts and the raw feces in large crystal multidimensional gamma-ray spectrometers. The Be-7 was chemically separated, and its concentration measured in an all NaI (TL), anticoincidence shielded, scintillation well crystal. The astronaut radiation dose in millirads, as determined for the Apollo 7, 8, 9, 10, 11, 12, and 13 missions, was 330, 160, smaller than 315, 870 plus or minus 550, 31, 110, and smaller than 250, respectively. Author

N72-17629*# Wisconsin Univ., Madison. Radiotherapy Center.
A REVIEW: SOME BIOLOGICAL EFFECTS OF HIGH LET RADIATIONS c04
Albert Wiley, Jr. *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 223-228 refs
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

There are qualitative and quantitative differences in the biological damage observed after exposure to high LET radiation as compared to that caused by low LET radiations. This review is concerned with these differences, which are ultimately reflected at the biochemical, cellular and even whole animal levels. In general, high LET radiations seem to produce biochemical damage which is more severe and possibly less repairable. Experimental data for those effects are presented in terms of biochemical RBE's with consideration of both early and late manifestations. An LET independent process by which significant biochemical damage may result from protons, neutrons and negative pion mesons is discussed. Author

N72-17630*# Washington Univ., Seattle.
EFFECTS OF X-RAY IRRADIATION ON HUMAN SPERMATOGENESIS c04
T. W. Thorslund and C. A. Paulsen *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 229-232
(Contracts AT(45-1)-1781; AT(45-1)-2225; Grants AM-05161; AM-05436)
Avail: NTIS HC $10.00 MF $0.95 CSCL 06R

Direct cell kill and inhibition of mitosis have been suggested as mechanisms to explain the occurrence of absolute sterility following the irradiation of the testes. In order to obtain information on the existence and dose dependency of the mechanisms for man, a controlled study was initiated. Sixty-four men received a single midorgan dose to both of their testes ranging from 7.5 to 400r (f = .95). It was deduced from resulting pre-sterile period and sterile period data that both cell kill and mitosis halting mechanisms were operating. The maximum observed sterile period was 501 days with eventual recovery observed in each individual where the follow-up was complete. Thus man appears to be highly radiosensitive in regard to temporary sterility but quite radioresistant in regard to permanent sterility. Author

N72-17631*# Oak Ridge National Lab., Tenn.
MULTIFACTORIAL ANALYSIS OF HUMAN BLOOD CELL RESPONSES TO CLINICAL TOTAL BODY IRRADIATION c04
John M. Yuhas, T. R. Stokes, and C. C. Lushbaugh *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 233-237 refs Sponsored by AEC and NASA Prepared in cooperation with Oak Ridge Assoc. Univ.
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Multiple regression analysis techniques are used to study the effects of therapeutic radiation exposure, number of fractions, and time on such quantal responses as tumor control and skin injury. The potential of these methods for the analysis of human blood cell responses is demonstrated and estimates are given of the effects of total amount of exposure and time of protraction in determining the minimum white blood cell concentration observed after exposure of patients from four disease groups. Author

N72-17632*# Oak Ridge Associated Universities, Tenn.
PULMONARY-IMPEDANCE POWER SPECTRAL ANALYSIS: A FACILE MEANS OF DETECTING RADIATION-INDUCED GASTROINTESTINAL DISTRESS AND PERFORMANCE DECREMENT IN MAN c04
Robert C. Rick, C. C. Lushbaugh, Earl McDow, and Edward Frome (Emory Univ., Atlanta) *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 238-248 refs Sponsored by NASA and AEC

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Changes in respiratory variance revealed by power spectral analysis of the pulmonary impedance pneumogram can be used to detect and measure stresses directly or indirectly affecting human respiratory function. When gastrointestinal distress occurred during a series of 5 total-body exposures of 30 R at a rate of 1.5 R/min, it was accompanied by typical shifts in pulmonary impedance power spectra. These changes did not occur after protracted exposure of 250 R (30 R daily) at 1.5 R/hr that failed to cause radiation sickness. This system for quantitating respiratory effort can also be used to detect alterations in one's ability to perform under controlled exercise conditions. Author

N72-17647*# Air Force Weapons Lab., Kirtland AFB, N.Mex.
A MODULAR APPROACH FOR ASSESSING THE EFFECT OF RADIATION ENVIRONMENTS ON MAN IN OPERATIONAL SYSTEMS. THE RADIOBIOLOGICAL VULNERABILITY OF MAN DURING TASK PERFORMANCE c04
Dean E. Ewing *In* NASA, Washington Proc. of Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 364-367 refs
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

A modular approach for assessing the affects of radiation environments on man in operational systems has been developed. The feasibility of the model has been proved and the practicality has been assessed. It has been applied to one operational system to date and information obtained has been submitted to systems analysts and mission planners for the assessment of man's vulnerability and impact on systems survivability. In addition, the model has been developed so that the radiobiological data can be input to a sophisticated man-machine interface model to properly relate the radiobiological stress with other mission stresses including the effects of a degraded system. Author

N72-17653*# Oak Ridge Associated Universities, Tenn. Medical Div.
PREDICTED LEVELS OF HUMAN RADIATION TOLERANCE EXTRAPOLATED FROM CLINICAL STUDIES OF RADIATION EFFECTS c04
C. C. Lushbaugh *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 398-415 refs Sponsored in part by AEC and NASA

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Results of clinical studies of radiation effects on man are used to evaluate space radiation hazards encountered during manned space travel. Considered are effects of photons as well as of mixed fission neutrons and gamma irradiations in establishing body radiosensitivity and tolerance levels. Upper and lower dose-response-time relations for acute radiation syndromes in patients indicate that man is more than sufficiently radioresistant to make the risks of an early radiation effect during one short space mission intangibly small in relation to the other nonradiation risks involved. G.G.

N72-17655*# California Univ., Irvine. Coll. of Medicine.
ON THE USE OF QUALITY FACTORS AND FLUENCE TO DOSE RATE CONVERSION IN HUMAN RADIATION EXPOSURES c04
C. A. Sondhaus *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972

p 424-434 refs
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

It is shown that various combinations of numbers and factors arrive at estimates of dose and dose effectiveness from values of fluence; but as yet it has not been possible to use biological data with the same degree of precision to estimate the physical data. It would seem that the most reasonable way to use the human data that exist is to apply them as far as possible to the human animal as a whole. Author

N72-17656*# Columbia Univ., New York. Radiological Research Labs.
METHODS AND APPROACHES TO DOSIMETRY c04
Harald H. Rossi *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 435-437 refs
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

The development of a dosimetric system capable of determining energy depositions in tissue regions that are smaller than a few 100 nanometers is projected. These objectives are met by evaluation of the data produced by a macro-subsystem and a micro-subsystem. Both systems are in essence multiple ionization chambers that are normally operated in a gated pulse mode. The macro-system yields absorbed radiation dose as a function of location in a phantom of the human trunk when it operates in the dose mode; it registers only those sections as a signal in which the primary particle or any of its secondaries have passed, in the pulse mode. The function of the micro-system is to provide detailed information of the track structure by determining lateral energy spread due to delta ray formation or other secondary particle production. G.G.

N72-17683*# National Cancer Inst., Bethesda, Md.
FACTORS MODIFYING THE RESPONSE OF LARGE ANIMALS TO LOW-INTENSITY RADIATION EXPOSURE c04
Norbert P. Page and Edwin T. Still (AEC, Washington, D. C.) *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 622-632 refs Prepared in cooperation with AEC, Washington, D. C.
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

In assessing the biological response to space radiation, two of the most important modifying factors are dose protraction and dose distribution to the body. Studies are reported in which sheep and swine were used to compare the hematology and lethality response resulting from radiation exposure encountered in a variety of forms, including acute (high dose-rate), chronic (low dose-rate), combinations of acute and chronic, and whether received as a continuous or as fractionated exposure. While sheep and swine are basically similar in response to acute radiation, their sensitivity to chronic irradiation is markedly different. Sheep remain relatively sensitive as the radiation exposure is protracted while swine are more resistant and capable of surviving extremely large doses of chronic irradiation. This response to chronic irradiation correlated well with changes in radiosensitivity and recovery following an acute, sublethal exposure. Author

N72-17684*# Los Alamos Scientific Lab., N.Mex.
EFFECT OF CONTINUOUS GAMMA-RAY EXPOSURE ON PERFORMANCE OF LEARNED TASKS AND EFFECT OF SUBSEQUENT FRACTIONATED EXPOSURES ON BLOOD-FORMING TISSUE c04
J. F. Spalding, L. M. Holland, J. R. Prine, D. N. Farrer (Aeromed. Res. Lab. (6571st), Holloman AFB, N. Mex.), and R. G. Braun (Aeromed. Res. Lab. (6571st), Holloman AFB, N. Mex.) *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 633-640 refs Supported by AEC
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Sixteen monkeys trained to perform continuous and discrete-avoidance and fixed-ratio tasks with visual and auditory cues were performance-tested before, during, and after 10-day gamma-ray exposures totaling 0, 500, 750, and 1000 rads. Approximately 14 months after the performance-test exposures, surviving animals were exposed to 100-rad gamma-ray fractions at 56-day intervals to observe injury and recovery patterns of blood-forming tissues. The fixed-ratio, food-reward task performance showed a transient decline in all dose groups within 24 hours of the start of gamma-ray exposure, followed by recovery to normal food-consumption levels within 48 to 72 hours. Avoidance tasks were performed successfully by all groups during the 10-day exposure, but reaction times of the two higher dose-rate groups in which animals received 3 and 4 rads per hour or total doses of 750 and 1000 rads, respectively, were somewhat slower. Author

N72-17685*# Civil Aeromedical Inst., Oklahoma City, Okla.
RELATIVE BIOLOGICAL EFFECTIVENESS OF FAST NEUTRONS COMPARED WITH X-RAYS: PRENATAL MORTALITY IN THE MOUSE c04
W. Friedberg, G. D. Hanneman, D. N. Faulkner, and E. B. Darden, Jr. (ORNL) *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 641
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

The effects of fission neutrons and of X-rays on the mouse zygote are discussed. Seven-week-old virgin mice were allowed a 12-hour mating opportunity beginning at 7:00 P.M. Between 1:30 and 4:00 P.M., except where indicated otherwise, the females which had mated (vaginal plug) during the night were either irradiated or sham-irradiated. At the time of irradiation the zygotes were in a pronuclear stage. Sixteen days later the mice were killed and the uteri dissected. The number of dead embryos, live embryos, and gross anomalies were determined. Dead embryos were classified as to stage of development. Author

N72-17686*# Kansas Univ., Kansas City. Medical Center.
PROTON IRRADIATION OF STEM CELLS: RADIATION DAMAGE AND CHEMICAL RADIOPROTECTION c04
Richard C. Riley, James L. Montour, and Clifford W. Gurney (Med. Coll. of Va.) *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 642-646 refs Prepared in cooperation with Med. Coll. of Va., Richmond. Div. of Radiation Biol.
(Grants NGR-47-002-018; AM-14377-02)
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Effects of high energy protons on erythropoietic stem cells and radioprotection by chemicals were investigated in NASA Space Radiation Effects Laboratory. The effects of a parallel beam of 600 MeV protons. The fluence, when converted to dose, were referenced to the synchrocyclotron beam monitors which were then used to administer radiation exposures. Mice were given graded doses to 300 rads to determine dose-response curve. Other mice received saline, AET, or 5-hydroxytryptamine 10 to 15 minutes before exposure. Author

N72-17687*# Michigan Univ., Ann Arbor. Dept. of Zoology.
RADIATION CARCINOGENESIS AND ACUTE RADIATION MORTALITY IN THE RAT AS PRODUCED BY 2.2 GeV PROTONS c04
C. J. Shellabarger, R. F. Straub, J. E. Jesseph, and J. L. Montour *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 647-651 refs

Prepared in cooperation with Brookhaven Natl. Lab., Upton, N. Y. Med. Dept.
(Grant NGR-23-005-009)
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Biological studies, proton carcinogenesis, the interaction of protons and gamma-rays on carcinogenesis, proton-induced acute mortality, and chemical protection against proton-induced acute mortality were studied in the rat and these proton-produced responses were compared to similar responses produced by gamma-rays or X-rays. Litter-mate mice were assigned to each experimental and control group so that approximately equal numbers of litter mates were placed in each group. Animals to be studied for mammary neoplasia were handled for 365 days post-exposure when all animals alive were killed. All animals were examined frequently for mammary tumors and as these were found, they were removed, se ctioned and given a pathologic classification. Author

N72-17688*# California Univ., Berkeley. Lawrence Radiation Lab.
RESPONSE OF MOUSE EPIDERMAL CELLS TO SINGLE DOSES OF HEAVY-PARTICLES c04
J. T. Leith, W. A. Schilling, and G. P. Welch *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 652-658 refs Prepared in cooperation with Calif. Univ., Berkeley. Donner Lab.

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

The survival of mouse epidermal cells to heavy-particles has been studied In Vivo by the Withers clone technique. Experiments with accelerated helium, lithium and carbon ions were performed. The survival curve for the helium ion irradiations used a modified Bragg curve method with a maximum tissue penetration of 465 microns, and indicated that the dose needed to reduce the original cell number to 1 surviving cell/square centimeters was 1525 rads with a D sub o of 95 rads. The LET at the basal cell layer was 28.6 keV per micron. Preliminary experiments with lithium and carbon used treatment doses of 1250 rads with LET's at the surface of the skin of 56 and 193 keV per micron respectively. Penetration depths in skin were 350 and 530 microns for the carbon and lithium ions whose Bragg curves were unmodified. Results indicate a maximum RBE for skin of about 2 using the skin cloning technique. An attempt has been made to relate the epidermal cell survival curve to mortality of the whole animal for helium ions. Author

N72-17689*# Medical Coll. of Virginia, Richmond. Dept. of Radiology.
LYMPHATIC INVOLUTION AND EARLY MORTALITY IN THE YOUNG CHICKEN PRODUCED BY 2.2 GeV PROTONS c04
James L. Montour and Claire J. Shellabarger *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Spa ce Jan. 1972 p 659-663 Supported in part by AEC
(Grant NGR-23-005-009)

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Young single-comb white Leghorn cockerels were subjected to single acute doses of either 2.2 GeV protons or 250 kVp X-rays. Since young chickens exposed in the lethal range die within 48 hours of exposure, an hourly tabulation of deaths was recorded for this length of time after exposure. Animals which were exposed to sublethal doses were killed five days after exposure and their major lymphatic organs, (thymus, bursa, and spleen), removed and weighed. In the lethal range, animals exposed to 2.2 GeV protons died sooner than those receiving similar doses of X-rays, but total mortality was similar in each case at similar dose levels. The 48 hour LD sub 50 was determined to be 710 rad. Measured five days after exposure, 50% depression ED sub 50 for lymphatic organs occurred as follows: (1) thymus, 350 rad; (2) pursa, 500 rad, and (3) spleen, 450 rad. In all case R.B.E. values were not different from unity. Author

N72-17690*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EVALUATION OF THE HAZARD FROM EXPOSURE TO ELECTRON IRRADIATION SIMULATING THAT IN THE SYNCHRONOUS ORBIT c04
Stuart W. Lippincott, Trutz Foelsche, James L. Montour, Roger Bender, and John Wilson *In its* Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 665-671 ref Prepared in cooperation with Med. Coll. of Va. and the Citadel, Charleston, S. C.
Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

The electron spectrum predicted for the synchronous orbit was simulated to determine the effects that might occur to astroscientists exposed to such irradiation while on a prolonged space station mission in that region. Miniature pigs were exposed to monoenergetic and spe ctral-fra ctionated irradiations with 0.5 to 2.1 MeV electrons. Clinical and pathological alterations observed in biopsies were correlated with depth-dose pattern and length of post irradiation period up to one year. With monoenergetic electrons, the lowest dose causing a recognizable lesion was 1450 rad and with increasing dose lesions appeared earlier and were more severe. At the highest dose given, 2650 rad, ulceration extending into the dermis was present by twenty one days and required about four months for complete healing. Spectral-fractionated irradiations, in which the total dose range was essentially comparable to that of the monoenergetic series, resulted in very minimal outer dermis edema at 1790 rad and at no dose employed did necrosis of epidermis or ulceration into dermis occur. Author

N72-17705*# Martin Marietta Corp., Denver, Colo.
INFLUENCE OF A DETAILED MODEL OF MAN ON PROTON DEPTH/DOSE CALCULATION c04
Paul G. Kase *In* NASA, Washington Proc. of the Natl. Symp on Nat. and Manmade Radiation in Space Jan. 1972 p 773-78(refs Sponsored by NASA and Air Force

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

The development of a detailed radiation shielding model o man is discussed. This model will be used to plan for mannec space missions in which sensitive human tissues may be subjected to excessive radiation. The model has twc configurations: standing and seated. More than 2500 individual elements were used to depict the external conformation, skeleton, and principal organs. The model is briefly described and several examples of its application to mission planning are given. Author

N72-17729*# Oak Ridge Associated Universities, Tenn.
DOSIMETRY FOR RADIOBIOLOGICAL STUDIES OF THE HUMAN HEMATOPOIETIC SYSTEM c04
W. L. Beck, T. R. Stokes, and C. C. Lushbaugh *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 974-981 refs

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

A system for estimating individual bone marrow doses in therapeutic radiation exposures of leukemia patients was studied. These measurements are used to make dose response correlations and to study the effect of dose protraction on peripheral blood cell levels. Three irradiators designed to produce a uniform field of high energy gamma radiation for total body exposures of large animals and man are also used for radiobiological studies. Author

N72-17730*# Case Western Reserve Univ., Cleveland, Ohio.
HAIR RADIOACTIVITY AS A MEASURE OF EXPOSURE TO RADIOISOTOPES c04
W. H. Strain (Cleveland Metro. Gen. Hosp.), W. J. Pories (Cleveland Metro. Gen. Hosp.), R. B. Fratianne (Cleveland Metro. Gen Hosp.)04(Cleveland Metro. Gen. Hosp.), and A. Flynn *In*

NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 982-999 refs

Avail: NTIS HC $10.00/MF $0.95 CSCL 06R

Since many radioisotopes accumulate in hair, this tropism was investigated by comparing the radioactivity of shaved with plucked hair collected from rats at various time intervals up to 24 hrs after intravenous injection of the ecologically important *radioisotopes, iodine-131, manganese-54, strontium-85, and* zinc-65. The plucked hair includes the hair follicles where biochemical transformations are taking place. The data indicate a slight surge of each radioisotpe into the hair immediately after injection, a variation of content of each radionuclide in the hair, and a greater accumulation of radioactivity in plucked than in shaved hair. These results have application not only to hair as a measure of exposure to radioisotopes, but also to tissue damage and repair at the hair follicle. Author

N72-17732*# California Univ., Berkeley. Lawrence Radiation Lab.

THE HEAVY PARTICLE HAZARD, WHAT PHYSICAL DATA ARE NEEDED? **c04**

S. B. Curtis and M. C. Wilkinson (Boeing Co., Seattle) *In* NASA, Washington Proc. of the Natl. Symp. on Nat. and Manmade Radiation in Space Jan. 1972 p 1008-1015 refs

Avail: NTIS HC $10.00/MF $0.95 CSCL 20H

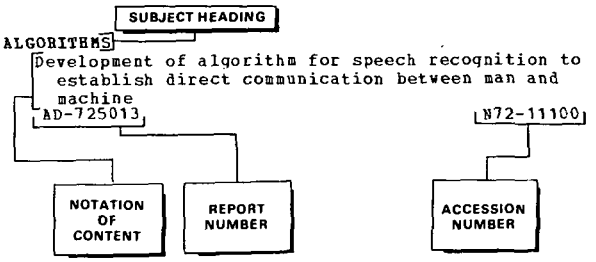
The physical data required to evaluate the radiation hazard from heavy galactic cosmic rays to astronauts on extended missions are discussed. The spectral characteristics, nuclear interaction parameters, and track structure of particles are emphasized. The data on the lower energy portion of the differential spectrum of the iron group and nuclear fragmentation in tissue and aluminum are tested, and results are shown.

J.A.M.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 102)* MAY 1972

Typical Subject Index Listing



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ABIOGENESIS
- Book on origin of life by natural causes covering physical geology, astronomy, biopoesis and evolution of life stages, orogenetic cycle, fossils, and primeval atmosphere A72-19185
- Papers on exobiology covering abiogenesis, extraterrestrial life, primordial organic chemistry, biochemical evolution electronic factors, membranes origin, molecular chirality, protein and cellular evolution, etc A72-22001
- Extraterrestrial life origin and development possibilities from earth chemical and biological evolution description, noting external conditions requirements A72-22002
- Structure, function and origin of biological membranes, considering related surface phenomena A72-22008
- Amino acid sequences of proteins from living organisms, considering evolutionary process A72-22009
- Genetic organization emergence, considering pretranslational evolution in nontranslational protein synthesis, nucleic acid evolution and gene origin A72-22010
- Terrestrial life origin understanding by investigating life possibilities in nonterrestrial environments A72-22015
- Life beyond solar system, discussing planetary formation and prebiological organic chemistry developments and interstellar communication A72-22016
- Abiogenic formation and fluorescence spectra of porphin, chlorin and bacteriochlorin during chemical evolution, using pyrrhol-formaldehyde model A72-22185
- Production of complex organic compounds in vicinity of volcanoes as precursors of significant biological products and relation to genesis of life N72-17077

ACCELERATION PROTECTION
- Acceleration tolerance increase by static forearm muscular contraction exercise comparison to g-suit protection during human centrifuge tests A72-20887

ACCELERATION STRESSES (PHYSIOLOGY)
- Mathematical model for semicircular canal dynamic response to angular acceleration, emphasizing role of perilymph over endolymph in cupula displacement A72-19491
- Radiation and acceleration effects on structure of cytoplasm in aerospace environments N72-16047
- Vertical cockpit acceleration and vibration measurement in Boeing 707 noting pilot performance [RAE-TR-69214] N72-16053
- Head linear and angular accelerations of humans during exposure to abrupt linear deceleration during impact [AD-732290] N72-17045
- Analysis of vestibulo-ocular counterroll reflex in Rhesus monkeys subjected to high gravity forces [AD-730156] N72-17055
- Physiological effects produced by rotation of human subjects in sagittal plane at various rates of rotation and accelerations N72-17076

ACCELERATION TOLERANCE
- Acceleration tolerance increase by static forearm muscular contraction exercise comparison to g-suit protection during human centrifuge tests A72-20887
- Human tolerance to acute hypoxia and acceleration following exposure to hypercapnic atmosphere N72-17071
- Physiological effects produced by rotation of human subjects in sagittal plane at various rates of rotation and accelerations N72-17076

ACID BASE EQUILIBRIUM
- Acid base balance in arterialized capillary blood in men after maximal short duration exercise A72-19441

ACOUSTIC ATTENUATION
- Tests to determine sound attenuation achieved by several Air Force ear protector devices [AD-731123] N72-16054

ACOUSTIC MEASUREMENTS
- Loudness scaling methods for transportation noises, discussing matching procedures, reference sources, etc A72-20165
- Standard procedures development for perceived noisiness or noise annoyance evaluation, taking into account spectral complexity, spectra weighting, time integration and onset duration A72-20166
- Noise rating methods for speech communication effectiveness evaluation, presenting charts and tables for intelligibility limits with various communication techniques and equipment A72-20167

ACTIVATION (BIOLOGY)
- Stretch activation of myogenic oscillation of isolated contractile structures of heart muscle in ATP salt solution A72-20427

ACTIVITY (BIOLOGY)
- Central nervous system pharmacology, discussing somniferous, narcotic and neurotropic substances effects on brain activity A72-21841

ACTIVITY CYCLES (BIOLOGY)
- Circadian rhythms of activity-sleep time in free running birds and man in isolation A72-19527
- Circadian rhythms variations for sleep, EEG, temperature and activity in monkeys, indicating acrophase, amplitude and level regulation A72-19528

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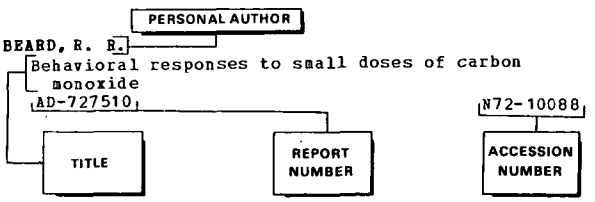
Personal Author Index

Typical Personal Author Index Listing



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—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

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