NASA SP-7011 (107)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 107)

OCTOBER 1972

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (107)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 107)

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 September 1972 in

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

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INTRODUCTION

This Supplement of *Aerospace Medicine and Biology* (NASA SP-7011) lists 353 reports, articles, and other documents announced during September 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, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1972 Supplements.

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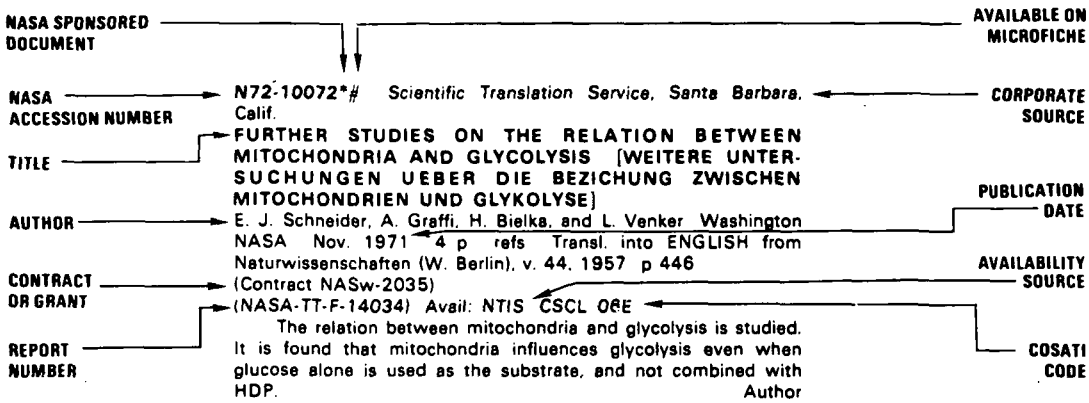

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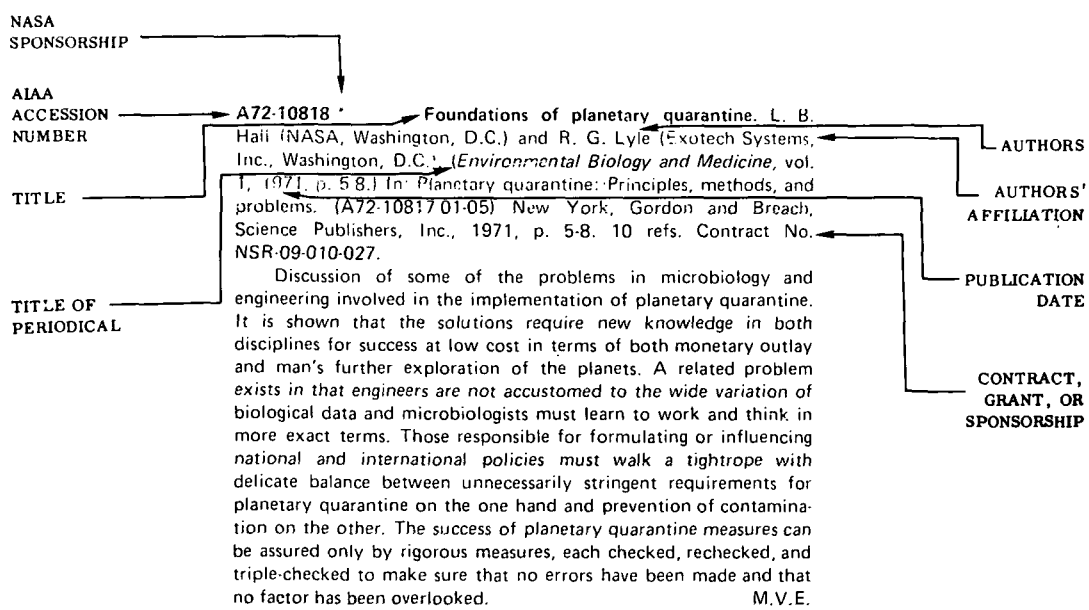

AEROSPACE MEDICINE AND BIOLOGY

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IAA ENTRIES

A72-34221 **Non-invasive assessment of prosthetic mitral paravalvular and intravalvular regurgitation.** J. T. Willerson, J. A. Kastor, R. E. Dinsmore, E. Mundth, M. J. Buckley, W. G. Austen, and C. A. Sanders (Massachusetts General Hospital; Harvard University, Boston, Mass.). *British Heart Journal*, vol. 34, June 1972, p. 561-568. 9 refs. PHS-supported research.

Results of certain noninvasive studies done on 30 patients after mitral valve replacement are reported, and clues aiding in the recognition of mitral paravalvular and intravalvular regurgitation are indicated. The noninvasive techniques employed were phonocardiograms, apex cardiograms, carotid arterial pressure tracings, and electrocardiograms. The patients were divided into three groups: (1) those showing either mitral paravalvular or intravalvular regurgitation, (2) those having clinically normal mitral prosthetic function, and (3) those showing no clinical evidence of paravalvular regurgitation, but with clinical evidence of severe left ventricular failure. Results show that the interval from aortic closure to opening click of mitral prosthesis was significantly reduced in patients with MPR. There was significant shortening of left ventricular ejection time when all the patients with paravalvular regurgitation were compared with all patients with normal prosthetic mitral valve function. Typical third heart sounds were not recorded in any of the 30 patients with mitral prostheses, regardless of whether paravalvular regurgitation or severe left ventricular failure were present. D.F.L.

A72-34222 **Blood coagulation changes at high altitude predisposing to pulmonary hypertension.** I. Singh and I. S. Chohan (Armed Forces Medical Services, New Delhi, India). *British Heart Journal*, vol. 34, June 1972, p. 611-617. 28 refs.

A study was carried out with 38 Indian soldiers, normally plains residents, but stationed at altitudes between 12,000 to 18,000 feet for 2 years. The purpose of the study was to determine the effect of blood coagulation on predisposition to pulmonary hypertension. Six of the subjects developed high altitude pulmonary hypertension by the end of two years, whereas the remaining 32 showed no clinical or other signs of the affliction. These latter served as controls in the study. Sixteen other soldiers, who had remained at sea level, were used as sea-level controls. Compared with the sea-level controls, the six soldiers who developed pulmonary hypertension showed a significant increase of plasma fibrinogen, fibrinolytic activity, platelet adhesiveness, platelet factor 3, factor V, and factor VIII. The remaining 32 subjects showed significant increase in plasma fibrinogen and fibrinolytic activity only. These results indicate that high altitude pulmonary hypertension is of occlusive origin, and is independent of changes in blood coagulation at high altitude. D.F.L.

A72-34247 **Occipital EEG activity during fluctuations of perception under stabilized image and simplified stimulus conditions.** T. D. Creighton, R. C. Tees, and D. E. Creighton (British Columbia, University, Vancouver, Canada). *Canadian Journal of Psychology*, vol. 26, June 1972, p. 127-139. 26 refs. Defence Research Board Grant No. 9425-23; National Research Council Grant No. APA-179.

A72-34248 **Stimulus complexity and the EEG - Differential effects of the number and the variety of display elements.** B. Christie, G. Delafield, B. Lucas, M. Winwood, and A. Gale (Exeter, University, Exeter, Devon, England). *Canadian Journal of Psychology*, vol. 26, June 1972, p. 155-170. 18 refs. Medical Research Council Grant No. G-969/185/C.

A72-34249 **Vision and touch - A reconsideration of conflict between the two senses.** P. M. McDonnell and J. Duffett (New Brunswick, University, Fredericton, New Brunswick, Canada). *Canadian Journal of Psychology*, vol. 26, June 1972, p. 171-180. 12 refs. National Research Council of Canada Grant No. APA-260.

Experimental reexamination of Rock and Victor's (1964) conclusion that visual-tactual conflicts will be resolved in favor of vision. The results of the described experiment present some evidence that methodological problems may have produced a bias in favor of vision and that the generalization of vision as a dominant modality may be premature. M.V.E.

A72-34293 * # **Response functions for sine- and square-wave modulations of disparity.** W. Richards (MIT, Cambridge, Mass.). *(Optical Society of America, Spring Meeting, Tucson, Ariz., Apr. 5-8, 1971.) Optical Society of America, Journal*, vol. 62, July 1972, p. 907-911. 11 refs. NIH-NASA-supported research; Contract No. F44620-69-C-0108.

Depth sensations cannot be elicited by modulations of disparity that are more rapid than about 6 Hz, regardless of the modulation amplitude. Vergence tracking also fails at similar modulation rates, suggesting that this portion of the oculomotor system is limited by the behavior of disparity detectors. For sinusoidal modulations of disparity between 1/2 to 2 deg of disparity, most depth-response functions exhibit a low-frequency decrease that is not observed with square-wave modulations of disparity. (Author)

A72-34298 **Automated constant cuff-pressure system to measure average systolic and diastolic blood pressure in man.** B. Tursky (New York, State University, Stony Brook, N.Y.), D. Shapiro

(Harvard University, Boston, Mass.), and G. E. Schwartz (Harvard University, Cambridge, Mass.). *IEEE Transactions on Biomedical Engineering,* vol. BME-19, July 1972, p. 271-276. 19 refs. Grants No. NIH-MH-04172; No. NIH-MH-08853; Contract No. N00014-67-A-0298-0024.

Description of an automated constant-cuff-pressure system to remotely determine average human blood pressure levels in an effort to overcome problems in measurement caused by natural beat-to-beat fluctuations in arterial pressure. A standard blood pressure cuff is inflated to approximately systolic pressure for a prescribed number of heart cycles. Korotkoff (K) sounds are picked up by a crystal microphone over the brachial artery. The EKG is recorded and an electronic coincidence circuit detects the number of R waves followed by a K sound. Cuff pressure is automatically adjusted until there is a 50% coincidence of R-K sounds. This cuff pressure is now by definition in the median systolic pressure. The same procedure is followed to determine median diastolic pressure. A change of 2 mm Hg in cuff pressure alters the R-K coincidence by 25%, insuring an accuracy of measurement of plus or minus 2 mm Hg. Average measures of pressure obtained by the constant cuff-pressure method were demonstrated to be as accurate as averages based on intra-arterial readings. Application of this system in epidemiological screening is discussed. (Author)

A72-34299 Microwave radiation - Biophysical considerations and standards criteria. H. P. Schwan (Pennsylvania, University, Philadelphia, Pa.). *IEEE Transactions on Biomedical Engineering,* vol. BME-19, July 1972, p. 304-312. 37 refs. Grant No. NIH-5-RO1-HE-01253; Contract No. Nonr-551(05).

The established physical principles relating to thermal and nonthermal effects of microwave radiation are discussed together with the effects of continuous and pulsed radiation. Certain considerations indicate that present guidelines for safe exposure to microwaves are conservative. There should be no need to lower the value of 10 mW/sq cm currently being used for safe long-term exposure in distance fields of antennas. Approaches for extending standards to the case of complex field configurations are also discussed along with a guide number of safe tissue-current densities for the total frequency range. G.R.

A72-34300 Clinical aspects of nonionizing radiation. M. M. Zaret (Zaret Foundation, Inc., Scarsdale, N.Y.). *IEEE Transactions on Biomedical Engineering,* vol. BME-19, July 1972, p. 313-316. 12 refs.

Various types of human injury attributable to nonionizing radiations are presented. Because of the unique combination afforded by the optical qualities of the eye and by the differential diagnostic features of resultant ocular pathology, an ophthalmological examination frequently can provide the signature indicating whether visible or invisible radiations produced the injury. For example, visible radiations principally result in various forms of macular photoretinitis and retinal burn or detachment or chorioretinal melanomata; whereas, invisible radiations principally produce thermal types of cataract or uveitis. Other systemic injuries and effects are also discussed. A rationale is submitted in support of a new concept, elastic membrane fatigue, as an etiological factor for otherwise inexplicable findings, such as the increased incidence of cardiovascular disease, which parallels the increased ambient levels of electronic smog found in urban environments. (Author)

A72-34344 Thermal relationship between tympanic membrane and hypothalamus in conscious cat and monkey. M. A. Baker, R. A. Stocking, and J. P. Meehan (Southern California, University, Los Angeles, Calif.). *Journal of Applied Physiology,* vol. 32, June 1972, p. 739-742. 15 refs. Grant No. NIH-NS-09599-01.

Simultaneous measurements of hypothalamic temperature and tympanic membrane temperature were made in two cats and one monkey in which thermocouples had been chronically implanted at the two sites. The changes that occur in hypothalamic temperature during feeding, sleeping, and arousal, shown previously to be due to changes in temperature of the cerebral arterial blood, are accompanied by similar changes in tympanic temperature. It is concluded that changes in arterial blood temperature affect the hypothalamus and the tympanic membrane in the same way and that tympanic temperature is a good index of hypothalamic temperature in behaving animals. (Author)

A72-34345 Ventilation in man during exercise at high altitude. S. Lahiri (Pennsylvania, University, Philadelphia, Pa.), J. S. Milledge (Christian Medical College, Vellore, India), and S. C. Sorensen (Copenhagen, University, Copenhagen, Denmark). *Journal of Applied Physiology,* vol. 32, June 1972, p. 766-769. 12 refs. Research supported by the Foundation for the Advancement of Medical Science of Denmark; World Health Organization Grant No. SOH-008/1968; Grant No. NIH-HE-08805.

The significance of the peripheral chemoreflex in the ventilation response to hypoxia during physical exercise can be studied in people born and raised at high altitude. Such persons show a blunted peripheral chemoreflex response to hypoxia at rest. Studies were conducted regarding the ventilatory response to exercise during chronic hypoxia in native residents of areas at an altitude of 3,800 m and areas at 2,900 m. Responses in sojourning sea-level natives acclimatized to altitude were also investigated. It was found that during acute hyperoxia, ventilation was somewhat greater in the highlanders than in the lowlanders. G.R.

A72-34346 Effect of carbon dioxide pressure level on alveolar-arterial carbon dioxide pressure difference during rebreathing. N. L. Jones, D. G. Robertson, J. W. Kane, and E. J. M. Campbell (McMaster University, Hamilton, Ontario, Canada). *Journal of Applied Physiology,* vol. 32, June 1972, p. 782-787. 19 refs. Research supported by the Ontario Thoracic Society; Medical Research Council of Canada Grant No. 215-2880.

A range of carbon dioxide contents corresponding to pressures from 25 to 60 mm Hg in arterial blood and from 50 to 110 mm Hg in the rebreathing equilibrium was considered in the investigations. It was found that the values for heart rate, carbon dioxide output, and blood lactic acid concentration were not consistently different at different levels of carbon dioxide content. Studies were conducted during exercise and while the subjects were at rest. During rebreathing the carbon dioxide content in alveolar gas was consistently higher than in the arterial blood sampled 5 sec later. This difference in carbon dioxide content was closely related to the level of carbon dioxide content in the gas phase. G.R.

A72-34347 Myocardial lipid and carbohydrate metabolism in fasting men during prolonged exercise. L. Kaijser, B. W. Lassers, M. L. Wahlqvist, and L. A. Carlson (Uppsala, University, Uppsala; Karolinska Hospital; King Gustav V Research Institute, Stockholm, Sweden). *Journal of Applied Physiology,* vol. 32, June 1972, p. 847-858. 37 refs. Swedish Medical Research Council Grants No. 19x-204-07; No. 19x-204-08.

Study of myocardial metabolism at rest and during prolonged exercise in 15 healthy subjects by measurement of arterial-coronary sinus concentration differences and the intravenous infusion of palmitate H3 as a free fatty acid (FFA) tracer. During prolonged exercise the relative participation of total blood lipid and carbohydrate substrates in myocardial oxidative metabolism, as assessed by the oxygen extraction ratios, did not differ from the pattern at rest. Arterial-coronary sinus difference in oxygen content increased with exercise and was significantly correlated with heart rate. Myocardial extractions of FFA, glucose, and pyruvate, but not lactate, were significantly correlated with their respective arterial concentrations at rest. During prolonged exercise myocardial extractions of pyruvate and lactate, but not FFA and glucose, were correlated with their arterial concentrations. (Author)

A72-34418 **Gain control and contrast sensitivity in the vertebrate retina.** R. A. Normann and F. S. Werblin (California, University, Berkeley, Calif.). In: Institute of Electrical and Electronics Engineers, Southwestern Annual Conference and Exhibition, 24th, Dallas, Tex., April 19-21, 1972, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 164-168. 9 refs. Grants No. NIH-EY-00561-02; No. NIH-RR-7006-06.

Consideration of the human visual system's capability to produce its high contrast sensitivity for background intensities spanning a billionfold range. It is shown that the retina has an automatic gain control mechanism which allows it to be maximally sensitive to variations in intensity of two log units around any given background intensity. This control mechanism is set by the background intensity. There are indications that the photoreceptors themselves, because of their compressive relationship of light intensity to potential, produce this gain control. From the horizontal cells to the photoreceptors, a negative feedback seems to exist that can extend the increment threshold curve for the receptors. M.V.E.

A72-34434 # **Medical and technical aspects of rescue and survival of astronauts in high mountain and mountainous remote areas.** F. Buhler (Schweizerische Rettungsflugwacht, Zurich, Switzerland). In: International Space Rescue Symposium, 4th, Brussels, Belgium, September 21, 1971, Proceedings. Paris, International Academy of Astronautics, 1972, p. 243-252.

A72-34435 # **Some aspects of survival and rescue of astronauts in polar regions.** O. Wilson (Institute of Aviation Medicine, Malmslatt, Sweden). In: International Space Rescue Symposium, 4th, Brussels, Belgium, September 21, 1971, Proceedings. Paris, International Academy of Astronautics, 1972, p. 253-272. 11 refs.

Consideration of factors contributing to the survival and rescue of astronauts accidentally landing in polar regions. The survival possibilities offered by an intact space capsule, the extravehicular spacesuit, and the survival kit are discussed, and improvisations that are within the power of the astronaut himself to make are suggested. The need for training of astronauts in optimum polar use of existing equipment, instruction in improvising needed items, and provision of a minimum of vital supplements is stressed. A.B.K.

A72-34436 # **Possibilities and dangers during long working periods in space rescue.** J. Cmiral, V. Dolezel, J. Dvorak, M. Pipal, and J. Sulc (Institute of Aviation Medicine, Prague, Czechoslovakia). In: International Space Rescue Symposium, 4th, Brussels, Belgium, September 21, 1971, Proceedings. Paris, International Academy of Astronautics, 1972, p. 273-279.

It is pointed out that during rescue operations it is sometimes necessary for individuals to work periods substantially longer than usual. The performance of operators working for 24 hours with only short periods of rest was studied. It is emphasized that the conclusions reached on the basis of the test results refer to situations which do not involve a highly responsible task, although the work load is great. It was found that in long operations and during uninterrupted working processes, the 24 hour work shift, followed by two days of rest, was acceptable. G.R.

A72-34445 * **Simulation of the human cardiovascular system - A model with normal responses to change of posture, blood loss, transfusion, and autonomic blockade.** D. G. Boyers, J. G. Cuthbertson, and J. A. Luetscher (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, Calif.). *Simulation,* vol. 18, June 1972, p. 197-206. 21 refs.

A72-34464 **Effects of instructions on measures of state and trait anxiety in flight students.** S. F. Bucky, R. M. Bale (U.S. Naval Aerospace Medical Center, Pensacola, Fla.), and C. D. Spielberger (Florida State University, Tallahassee, Fla.). *Journal of Applied Psychology,* vol. 56, June 1972, p. 275, 276.

The State-Trait Anxiety Inventory was administered twice to 134 flight students during their routine entrance aviation physical examination, once with standard instructions and then under an artificially induced anxiety situation in which each student was instructed to respond 'as if you had just made your first landing on an aircraft carrier.' As expected, flight students were lower in trait anxiety and higher in state anxiety than a group of 253 previously tested male college students. Unexpectedly, however, with the induced anxiety act, both state and trait anxiety scores were significantly lower than the scores obtained during the initial administration of the test. (Author)

A72-34542 **Regression analysis for steady state N2 inequality in O2 consumption calculations.** J. H. Cissik and R. E. Johnson (Illinois, University, Urbana, Ill.). *Aerospace Medicine,* vol. 43, June 1972, p. 589-591.

A72-34543 **Hemodynamic changes in man during immersion with the head above water.** M. Arborelius, Jr., U. I. Balldin, B. Lilja, and C. E. G. Lundgren (Malmo General Hospital, Malmo; Lund, University, Lund, Sweden). *Aerospace Medicine,* vol. 43, June 1972, p. 592-598. 38 refs. Research supported by the Swedish Medical Research Council, Delegation for Applied Medical Defense Research and Swedish Association Against Heart and Chest Diseases. SMRC Project B70-40P-2633-02; SMRC Project B72-14X-3512-01.

A72-34544 # **Effects of nitrogen and helium upon pulmonary damage after rapid decompression to 2 torr.** J. P. Cooke (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 43, June 1972, p. 599-605. 22 refs.

A72-34545 **Influence of prolonged starvation on the frequency of occurrence of decompression-induced pulmonary hemorrhage.** H. S. Fang and H. S. Lin (National Taiwan University, Taipei, Nationalist China). *Aerospace Medicine,* vol. 43, June 1972, p. 606-609. Research supported by the National Science Council of Nationalist China.

A72-34546 **Effect of Acetazolamide /Diamox/ at different dose levels on survival time of rats under acute hypoxia and on Na/+/-K/+/-ATP-ase activity of rat tissue microsomes.** T. Purshottam and N. C. Ghosh (Calcutta, University, Calcutta, India). *Aerospace Medicine,* vol. 43, June 1972, p. 610-613. 26 refs. Research supported by the Indian Council of Medical Research.

A72-34547 **Effects of combined O-G simulation and hypergravity on eggs of the nematode, Ascaris suum.** A. Schatz and G. Teuchert (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany). *Aerospace Medicine,* vol. 43, June 1972, p. 614-619. 19 refs.

A72-34548 **Cell proliferation in lungs of mice exposed to elevated concentrations of oxygen.** M. J. Evans (Rancho Los Amigos Hospital, Downey, Calif.) and J. D. Hackney (Stanford Research Institute, Menlo Park, Calif.). *Aerospace Medicine,* vol. 43, June 1972, p. 620-622. 17 refs. Contracts No. N00014-70-C-0306; No. NIH-71-2151.

A72-34549 * **Vestibular behavior of fish during diminished g-force and weightlessness.** R. J. von Baumgarten, G. Baldrighi (Michigan, University, Ann Arbor, Mich.), and G. L. Shillinger, Jr. (NASA, Ames Research Center, Systems Engineering Div., Moffett Field, Calif.). *Aerospace Medicine,* vol. 43, June 1972, p. 626-632. 22 refs. Contract No. NAS2-6057.

A72-34550 **Natural acclimatization to work in severe heat.** E. Shvartz, D. Benor, and E. Saar (Negev Institute for Arid Zone Research, Beer-Sheva; Tel Aviv University, Tel-Hashomer, Israel). *Aerospace Medicine,* vol. 43, June 1972, p. 637-640. 12 refs. Research supported by the Ministry of Education and Culture of Israel.

A72-34551 # **Further study of combined heat, noise and vibration stress.** W. F. Grether, C. S. Harris, M. Ohlbaum, P. A. Sampson, and J. C. Guignard (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB; Wright State University, Dayton, Ohio). *Aerospace Medicine,* vol. 43, June 1972, p. 641-645.

Study of a combination of heat, noise, and vibration stress on skin and rectal temperature, heart rate, weight loss, and biochemical urine analyses. An accelerometer was placed on the right shoulder to measure vibration transmitted to the body. Performance measures included two-dimensional compensatory tracking, choice reaction time, a voice communication test of logical alternatives, mental arithmetic, visual acuity and subjective ratings of the stress conditions. As in a previous study, the combination of stresses produced no additive stress interactions. On tracking and reaction time tests the greatest impairment of performance was produced by vibration alone. Accelerometer measures indicated that transmissibility of vibration was not altered by heat or noise. Subjective ratings of stress severity progressively increased with the number of stresses in the combination. Subjective ratings of stress intrusiveness, however, did not show such a trend. (Author)

A72-34552 * **Comparative study of two direct methods of bone mineral measurement.** P. C. Rambaut, L. F. Dietlein, J. M. Vogel, and M. C. Smith, Jr. (NASA, Manned Spacecraft Center, Houston, Tex.; U.S. Public Health Service Hospital, San Francisco, Calif.). *Aerospace Medicine,* vol. 43, June 1972, p. 646-650. 39 refs. NASA-supported research. NASA Order T-58941; NASA Order T-81070.

A72-34553 * # **Effects of in vivo inhalation of 100% oxygen at reduced pressure on serum and red cell lipids.** E. L. Foulds, Jr., F. H. Wilson, Jr., E. C. Larkin, and D. A. Clark (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 43, June 1972, p. 651-655. 25 refs. NASA-supported research.

A72-34554 **Effects of different alcohol dosages and display illumination on tracking performance during vestibular stimulation.** R. D. Gilson (Ohio State University, Columbus, Ohio), D. J. Schroeder, W. E. Collins (FAA, Oklahoma City, Okla.), and F. E. Guedry, Jr. (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine,* vol. 43, June 1972, p. 656-660. 5 refs. FAA-Army-Navy-supported research.

A72-34555 **Airline pilot incapacitation in flight.** R. C. Leighton-White (International Federation of Airline Pilots Associations, London, England). *Aerospace Medicine,* vol. 43, June 1972, p. 661-664. 6 refs.

Following a review of the reported cases of pilot incapacitation in flight, the operational aspects are discussed and suggestions made for reducing the incidence and for dealing with it. The suggested program involves airline management and flight crews in the prevention, detection and dealing with the event, as well as aircraft manufacturers in human engineering factors. (Author)

A72-34556 **Aircraft accident in the Faroe Islands in 1970 - Observations from a medical point of view, with special reference to spinal fractures.** H. D. Joensen and H. D. Joensen. *Aerospace Medicine,* vol. 43, June 1972, p. 665-670. 28 refs.

A72-34557 **Grouping of the causative factors in investigation of aircraft accidents attributed to pilot errors.** N. G. Dudani (Naval Air Station, Dabolim, India). *Aerospace Medicine,* vol. 43, June 1972, p. 671-674. 5 refs.

A72-34559 **USAF custom fit oxygen mask program.** G. W. Hall (USAF, Air Force Advisory Group, San Francisco, Calif.). *Aerospace Medicine,* vol. 43, June 1972, p. 679, 680.

A72-34726 * **Exercise capacity in a population of domestic fowl - Effects of selection and training.** J. T. Morse and A. H. Smith (California, University, Davis, Calif.). *American Journal of Physiology,* vol. 222, June 1972, p. 1380-1385. 32 refs. Grant No. NGR-05-004-008.

A72-34727 **Influence of hyperosmolality on left ventricular stiffness.** G. H. Templeton, J. H. Mitchell, and K. Wildenthal (Texas, University, Dallas, Tex.). *American Journal of Physiology,* vol. 222, June 1972, p. 1406-1411. 24 refs. Research supported by the Dallas Heart Association; Grant No. PHS-HL-06296.

Investigation of the influence of sudden changes in osmolality by giving hypertonic sucrose to five dogs on whole-heart bypass, with paced, isovolumically contracting left ventricles. Stiffness was determined from the ratio of pressure change to volume change during sinusoidal injections of 1 ml saline into the isolated chamber at 6 to 11 times per beat. Increases of serum osmolality from a control of 300 to 400 mOsm and subsequently to 500 mOsm/kg H_2O caused progressive increases in stiffness during both diastole and systole at higher rates (22 Hz) of volume change; during slower perturbation frequencies (12 Hz) the apparent stiffness was not altered, suggesting that time-dependent (i.e., viscoinertial) properties of the muscle were affected selectively by hyperosmolality but that pure elastic properties were not altered. The observed changes in stiffness were not dependent on the simultaneously occurring changes in ventricular pressure and contractile state. (Author)

A72-34728 * **Thermal neutral temperature of rats in helium-oxygen, argon-oxygen, and air.** D. P. Clarkson, C. L. Schatte, and J. P. Jordan (Colorado State University, Fort Collins, Colo.). *American Journal of Physiology,* vol. 222, June 1972, p. 1494-1498. 20 refs. Grant No. NGR-06-002-075.

A72-34729 * **Stress and adaptation responses to repeated acute acceleration.** R. R. Burton and A. H. Smith (California, University, Davis, Calif.). *American Journal of Physiology,* vol. 222, June 1972, p. 1505-1510. 29 refs. Grant No. NGR-05-004-008.

Study in which groups of adult male chickens (single-comb white leghorn) were exposed daily to acceleration (centrifugation) of

2 or 3 G for 10 min, 1, 4, 8, 12, 16, and 24 hr (continuously), or 0 time (controls). After approximately five months of this intermittent treatment (training), the birds were exposed to continuous accelerations of the same G force (intensity). The degree of stress and adaptation of each bird was determined by survival and relative lymphocyte count criteria. Intermittent training exposures of 2 G developed levels of adaptation in birds directly proportional to the duration of their daily exposure. Intermittent training periods at 3 G, however, produced a physiological deterioration in birds receiving daily exposures of 8 hr or more. Adaptive benefits were found only in the 1- and 4-hr-daily intermittent 3-G exposure groups. Exposure to 3 G produced an immediate stress response as indicated by a low relative lymphocyte count which returned to control (preexposed) values prior to the next daily acceleration period in the 10-min, 1-hr, and 4-hr groups. This daily recovery period from stress appeared to be necessary for adaptation as opposed to deterioration for the more severe environmental (3 G) alteration. (Author)

A72-34730 Thyroidal influence on myocardial changes induced by simulated high altitude. L. G. Martin, G. E. Wertenberger, J. R. Hippensteele (Indiana University, Bloomington, Ind.), and R. W. Bullard. *American Journal of Physiology,* vol. 222, June 1972, p. 1599-1603. 44 refs. Contract No. F44620-68-C-0014.

Study in which rats were acclimated for a 5-week period to either a simulated high altitude of 24,800 ft or to a Bloomington, Ind., altitude of 800 ft above sea level and were treated daily with injections of L-thyroxine (sodium) pentahydrate and 6-propyl-2-thiouracil. By means of an in vitro right ventricular preparation, it was demonstrated that making either altitude-acclimated or sea-level animals hypothyroid increases their myocardial anoxic resistance. While exogenous L-thyroxine abolished the added myocardial anoxic resistance induced by altitude acclimation, myocardial tissue from sea-level rats could be made to functionally mimic that taken from control altitude-acclimated animals by inducing hypothyroidism. It was concluded that the development of the hypothyroid state during chronic high-altitude exposure is essential if the myocardium is to show the added anoxic resistance associated with altitude acclimation. However, neither the polycythemia nor the cardiac hypertrophy of altitude-acclimation was obliterated by preventing attainment of the hypothyroid state normally associated with altitude acclimation. Possible mechanisms responsible for these differences are discussed. (Author)

A72-34876 The effect of target contrast variation on dynamic visual acuity and eye movements. B. Brown (Melbourne, University, Melbourne, Australia). *Vision Research,* vol. 12, July 1972, p. 1213-1224. 13 refs. Research supported by the Australian Road Research Board. ARRB Project 95230.

Dynamic visual acuity was investigated in 4 subjects with Snellen letter acuities of 6/6 on Landolt ring targets projected onto a rotating mirror and thence onto a matt-white hemicylindrical screen. The target was brighter than the background, with mean contrast levels varying from 70.3 to 23.3%. The eye movements were recorded photoelectrically, and the signals were amplified, converted into digits and punched on paper tape. The latencies of initial and saccadic eye movements were higher and the final-pursuit eye movement velocities were lower when the target contrast levels were lower. V.Z.

A72-34877 The distribution of the long wave photoreceptors in the compound eye of the honey bee as revealed by selective osmic staining. F. G. Gribakin (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Vision Research,* vol. 12, July 1972, p. 1225-1230. 17 refs.

Darkness-adapted eyes of honeybees were fixed in glutaric aldehyde and then were fixed in osmium tetroxide in light of 480 nm or larger wavelengths. Electron microscopy showed a clearly seen selective staining of receptor-530 rhabdomers. It is theorized that an agent produced by the interaction of osmium tetroxide with the products of visual pigment decomposition is responsible for the staining. V.Z.

A72-34878 Electroretinographic evidence for a photopic system in the rat. R. W. Massof and A. E. Jones (Hamline University, St. Paul, Minn.). *Vision Research,* vol. 12, July 1972, p. 1231-1239. 20 refs.

Experiments on 15 albino and hooded rats and 3 rhesus monkeys, in which b-waves were tape-recorded, showed the generation of a bimodal b-wave amplitude, and a bimodal luminosity curve with maxima at 510 and 570 to 600 nm. The b-wave implicit time varied with wavelength and signal intensity, showing a rod-cone break at 500 nm. An x-wave having a maximum amplitude at 480 nm was isolated from the b-wave. It is theorized that rats have a photopic system and a long-wave receptor pigment which mediates the red response. V.Z.

A72-34879 Effect of target-background luminance contrast on binocular depth discrimination at photopic levels of illumination. A. Lit, J. P. Finn, and W. M. Vicars (Southern Illinois University, Carbondale, Ill.). *Vision Research,* vol. 12, July 1972, p. 1241-1251. 26 refs. NSF Grant No. GB-2553; Grant No. NIH-EY-0383.

A72-34880 Light induced alterations in growth pattern of the avian eye. A. B. Bercovitz, P. C. Harrison, and G. A. Leary (Washington State University, Pullman, Wash.). *Vision Research,* vol. 12, July 1972, p. 1253-1259. 13 refs.

Five hundred day-old Single Comb White Leghorn chicks were exposed to high-intensity or low-intensity clear incandescent light or to low-intensity blue light, with an equal daily photoperiod of 14L/10D. The development of abnormally enlarged eyes was in evidence after 8 days of exposure to low-intensity clear and blue light and became well pronounced by the 49th day of exposure. Also the ocular components were altered after exposure and a marked change in visual parameters occurred leading to an axial length myopia. V.Z.

A72-34881 The uptake, metabolism and release of C/14/-taurine by rat retina in vitro. M. S. Starr and M. J. Voaden (Institute of Ophthalmology, London, England). *Vision Research,* vol. 12, July 1972, p. 1261-1269. 15 refs.

Experiments on Wistar albino rats showed that their retinas actively accumulated C(14)-taurine when incubated with the amino acid in vitro. Ouabain, L-cysteine, beta-alanine, GABA, and L-glutamate inhibited the uptake. Transport of C(14)-taurine was highest at 37 C and went down at lower temperatures; its efflux was a very slow two-stage process, suggesting that the amino acid was firmly bound by the retina. V.Z.

A72-34882 Two types of parafoveal spectral sensitivity. D. A. Palmer (Institute of Ophthalmology, London, England). *Vision Research,* vol. 12, July 1972, p. 1271-1279. 11 refs.

A trichromatic colorimeter with a monochromator was used to produce test stimuli to be matched photometrically in an annular field by two subjects who had normal visual acuity, color vision, scotopic sensitivity, and two different types of parafoveal spectral sensitivity. One subject had a usual type of the photopic curve with a peak at about 540 nm, while the other had a photopic curve with a peak at about 520 nm. Hypotheses are given to explain the nature of the latter type of vision. V.Z.

A72-34883 **The influence of the modulation transfer function of the dioptric apparatus on the acuity and contrast of the retinal image in Rana esculenta.** H. Krueger and E. A. Moser (München, Technische Universität, Munich, West Germany). *Vision Research,* vol. 12, July 1972, p. 1281-1289. 9 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A72-34884 **Evidence for the role of the transient neural 'off-response' in perception of light decrement - A psychophysical test derived from neuronal data in the cat.** B. Brooks and C. Huber (Max-Planck-Gesellschaft zur Förderung der Wissenschaften, W. G. Kerckhoff-Herzforschungsinstitut, Bad Nauheim, West Germany). *Vision Research,* vol. 12, July 1972, p. 1291-1296. 10 refs.

A72-34885 **Linear-nonlinear-linear transition as a function of frequency in the retinal response to light.** J. Levett (Rush Presbyterian St. Luke's Medical Center; Illinois, University, Chicago, Ill.). *Vision Research,* vol. 12, July 1972, p. 1301-1305. Research supported by the Rush Presbyterian St. Luke's Medical Center.

A72-34886 **Release of pursuit eye movements using after-images.** M. J. Steinbach and D. G. Pearce (York University, Downsview, Ontario, Canada). *Vision Research,* vol. 12, July 1972, p. 1307-1311. 14 refs. National Research Council of Canada Grant No. A-7664.

Release and pursuit eye movements were investigated in dark room experiments with flashes producing uniform circular after-images at a visual angle of about one deg. from a mark on an illuminated scale at which the subject's eye was fixed. No evidence was found for initiating microsaccades during the onset of the eye movements elicited by after-images. Drift is believed to play a significant but partial role in pursuit movement initiation. V.Z.

A72-34897 **Relaxation phenomena in the biological carbon cycle under conditions of variable atmospheric CO2-content.** K. Wagener (Kernforschungsanlage Jülich GmbH, Jülich, West Germany) and H. Förstel (Rheinisch-Westfälische Technische Hochschule, Aachen, West Germany). *Zeitschrift für Naturforschung, Teil a,* vol. 27a, May 1972, p. 812-815. 9 refs.

A72-34932 **Exchangeable potassium in heart disease - Long-term effects of potassium supplements and amiloride.** M. S. Croxson, J. M. Neutze, and M. B. John (Green Lane Hospital; Auckland Hospital, Auckland, New Zealand). *American Heart Journal,* vol. 84, July 1972, p. 53-60. 21 refs.

A72-34942 **Increase in skeletal muscle performance during emotional stress in man.** N. A. Berdina, O. L. Kolenko, I. M. Rodionov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR), I. M. Kotz, A. P. Kuznetzov (State Central Institute of Physical Culture, USSR), A. P. Savtchenko (Pervyi Moskovskii Meditsinskii Institut, Moscow, USSR), and V. I. Thorevsky (Akademiia Meditsinskii Nauk, Moscow, USSR). *Circulation Research,* vol. 30, June 1972, p. 642-650. 42 refs.

An emotional stress arising as a result of intense mental arithmetic causes (in most subjects) an increase in blood flow through resting forearm muscle by an average of 85%. Combination of voluntary sustained handgrip contraction with mental arithmetic has shown that the duration of contraction increases by an average of 46%. This effect appears only in subjects who display an increase in blood flow as a result of mental arithmetic. A rise in muscle performance is also observed during mental arithmetic when contraction of forearm muscle is caused by direct stimulation of the motor nerve in the upper arm. Intra-arterial injection of atropine sharply reduces both the increase in blood flow through the resting muscle and the increase in muscle performance associated with mental arithmetic. (Author)

A72-34976 **Metabolism of the hypoxic and ischaemic heart; Proceedings of the Symposium, Geneva, Switzerland, June 14-17, 1971. Part 1.** Symposium sponsored by the International Society of Cardiology, World Health Organization, and Swiss National Science Foundation. Edited by P. Moret (Geneva, University, Geneva, Switzerland) and Z. Fejfar (World Health Organization, Geneva, Switzerland). *Cardiology,* vol. 56, no. 1-6, 1971-1972. 397 p.

Topics related to acute hypoxia are considered, giving attention to questions of substrate utilization and glycolysis in the heart, the regulation of phosphofructokinase in muscle tissue, electron transport and mitochondria, and myocardial protein synthesis in acute myocardial hypoxia and ischaemia. Subjects examined in connection with chronic hypoxia include myocardial metabolic changes in chronic hypoxia and the effect of chronic hypoxia on the kinetics of energy transformation in heart mitochondria. Contributions in the area of ischaemia are also discussed together with some controversial methodological aspects. G.R.

A72-34977 **Substrate utilization and glycolysis in the heart.** L. H. Opie (Cape Town, University; Groote Schuur Hospital, Cape Town, Republic of South Africa). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 2-21. 76 refs. Research supported by the Chris Barnard Fund, University of Cape Town, and Medical Research Council of the Republic of South Africa.

A historical introduction concerning the evolution of the concepts regarding the control of glycolysis in the heart is given. The contributions of the classical physiologists to problems of the control of glycolosis in relation to acute hypoxia are reviewed, giving attention to substrate competition, the effects of insulin, and the effects of oxygen-lack on glucose metabolism and glycolysis. Other questions considered are related to the importance of glucose for the oxidative metabolism of the heart, the control of glycolysis by oxidative metabolism, and the contribution of anaerobic glycolysis to energy demands of the anoxic heart and of the ischaemic infarcting myocardium. G.R.

A72-34978 **Electron transport and mitochondria.** A. Schwartz (Methodist Hospital, Houston, Tex.). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 35-42. Research supported by the American Heart Association; Grants No. PHS-HE-05435; No. PHS-HE-07906; No. PHS-HE-13873; No. PHS-HE-05925.

The process of mitochondrial metabolism in both normal and hypoxic heart muscle is reviewed. The electron transport system is very active in heart mitochondria. The system is specifically located in or on the inner membrane system. Substrates, such as glutamic acid and citric acid, can pass electrons and protons to bound NAD. Electrons and protons then pass down the electron transport chain to the ultimate electronic acceptor, oxygen. Studies of the function and structure of mitochondria from a variety of pathological tissues are discussed. Ion transport processes were investigated and experiments were conducted with the aid of a portable perfusion chamber. Mitochondria isolated from hearts showed a remarkable stability in vitro. It was found that electron transport and phosphorylation may be preserved during hypoxia by the use of certain agents. G.R.

A72-34979 **The effects of acute hypoxia on lipid synthesis in the rat heart.** P. Harris and J. Gloster (London, University, London, England). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 43-47. 6 refs.

A72-34980 **Myocardial protein synthesis in acute myocardial hypoxia and ischemia.** A. Wollenberger, K. Onnen, U. Hinterberger, G. Rabitzsch, and B. Kleitke (Deutsche Akademie der Wissenschaften, Institut für Kreislaufforschung, Berlin, East Germany). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 48-64. 49 refs.

A72-34981 **Acute myocardial anoxia - Anatomical changes and their possible relation to immunological processes.** A. Laufer (Hebrew University, Jerusalem, Israel). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 65-72. 8 refs. Research supported by the Hebrew University and Hadassah University Hospital.

A72-34982 **Acute hypoxia of the myocardium - Ultrastructural changes.** P. Y. Hatt and J. Moravec (Institut National de la Santé et de la Recherche Médicale, Limeil-Brévannes, Val-de-Marne, France). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 73-84. 84 refs. Délégation Générale à la Recherche Scientifique et Technique Contract No. 6700536.

Alterations attributed to hypoxic injury of the myocardium are considered together with the reversibility of changes, the relationship between the degree of hypoxia and the appearance of structural alterations, and the significance and specificity of electron microscopic lesions. Other subjects discussed include problems of mitochondrial swelling, and the effect of drugs which modify electron transport and oxidative phosphorylation on the ultrastructure of heart mitochondria. G.R.

A72-34983 **Extracellular acid-base changes in the dog myocardium during hypoxia and local ischemia, measured by means of glass micro-electrodes.** H. Benzing, G. Gebert, and M. Strohm (Physiologisches Institut, Tübingen; Ulm, Universität, Ulm, West Germany). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 85-88. 5 refs.

A72-34984 **Changes of intracellular myocardial electrolytes in experimental hypertension.** H. Hochrein, G. Hunsmann, and K. Stoepel (Rudolf Virchow Krankenhaus, Berlin; Institute of Pharmacology, Wuppertal-Elberfeld, East Germany). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 96-99. 29 refs.

A72-34985 **Changes in energy stores in the hypoxic heart.** R. E. Olson, N. S. Dhalla, and C. N. Sun (St. Louis University, St. Louis, Mo.). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 114-124. 19 refs. Grant No. NIH-HE-09772; Contract No. NIH-PH-43-67-680.

The heart from male albino rats after decapitation was removed, chilled, and arranged for perfusion by the conventional Langendorff technique. Two gas mixtures were used. Initially, the mixture was 95% oxygen and 5% carbon dioxide. The mixture was changed to one with 95% nitrogen and 5% carbon dioxide to induce tissue anoxia. The isometric contractile force of the isolated heart was monitored. The adenine nucleotides, ATP, ADP, and AMP were determined enzymatically using fluorometric methods. Changes in coronary flow, dry/wet weight ratio of the isolated heart, and the high-energy phosphate stores during perfusion are discussed. G.R.

A72-34986 **The intramyocardial oxygen pressure at normoxia and hypoxia.** S. Schuchhardt (Institut für Arbeitsphysiologie, Dortmund, West Germany). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 125-128.

A72-34987 **The influence of exogenous ATP on cardiac metabolism in acute hypoxia.** A. Ziegelhöffer, M. Fedelesova, and K. Siska (Slovak Academy of Sciences, Institute of Experimental Surgery, Bratislava, Czechoslovakia). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 136-142. 18 refs.

A72-34988 **Myocardial ultrastructure in acute and chronic hypoxia.** V. J. Ferrans and W. C. Roberts (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 144-160. 87 refs.

Cardiac hypoxia is defined as the state of inadequate oxygenation of the myocardium for normal function. It is pointed out that the ultrastructural changes caused by myocardial hypoxia vary according to its duration and severity, mechanism of production, age, and species. Ultrastructural changes caused by various mechanisms are considered, giving attention to the permanent and the temporary occlusion of a coronary artery, acute cardiac hypoxia produced by means other than coronary obstruction, acute hypoxia due to toxic inhibition of oxidative processes, cardiac arrest, and chronic hypoxia. G.R.

A72-34989 **Myocardial metabolic changes in chronic hypoxia.** P. R. Moret (Hôpital Cantonal, Geneva, Switzerland). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 161-172. 49 refs. Research supported by the World Health Organization, Foundation S. I. Patino, Swiss National Science Foundation, Swiss Cardiology Foundation, Cantonal Hospital, and University of Geneva.

Populations of high-altitude regions have adapted to the conditions of chronic hypoxia. Three groups of young normal subjects born or living at different altitudes for several years were studied. It was found that the decrease in coronary flow observed in residents of high altitudes is not compensated by the increased

oxygen transport capacity of the blood due to a higher hematocrit. Therefore, the oxygen supply to the myocardium is also decreased. The utilization of substrates in subjects living in regions of different altitudes is discussed together with differences in anaerobic metabolism, aerobic capacity, and myocardial stores. G.R.

A72-34990 Role of the synthesis of nucleic acids and proteins in the adaptation of the organism to altitude hypoxia. F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 173-187. 47 refs.

A72-34991 Anoxic tolerance of the heart muscle in different types of chronic hypoxia. O. Poupa (Goteborg, University, Goteborg, Sweden). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 188-196. 30 refs. Swedish Medical Research Council Grants No. K69-14X-2729-01; No. B70-14X-2729-02; No. K70-14P-3025-01; No. B71-14P-3025-02A.

A72-34992 Cardiac performance and the coronary circulation of man in chronic hypoxia. R. F. Grover (Colorado, University, Denver, Colo.) and J. K. Alexander (Baylor University, Houston, Tex.). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 197-206. 15 refs. Grants No. NIH-HE-05435; No. NIH-HE-08728; Contract No. DA-49-193-MD-2551.

At an altitude of 3,100 m the oxygen tension in the arterial blood of a person is about one third less than at sea level. Numerous changes in the body oxygen transport systems occur in response to this stimulus. Data were obtained from healthy young men first at sea level and subsequently after transportation to an altitude of 3,100 m. It was found that a decrease in coronary blood flow and a decrease in cardiac output follows the adaptation to high altitude. G.R.

A72-34993 Effect of chronic hypoxia on the kinetics of energy transformation in heart mitochondria. B. Reynafarje (Instituto de Biologia Andina, Lima, Peru). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 206-208. 6 refs.

A72-34994 Ion alterations during myocardial ischemia. R. B. Case (St. Luke's Hospital, New York, N.Y.). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 245-262. 25 refs.

It is pointed out that intracellular potassium loss is apparently a general tissue response to a disturbance of the oxygen supply. In the case of the cardiac muscle this loss becomes critical because of deleterious effects on rhythm and contractility. A continuous sampling technique for analyzing potassium and lactate in blood was designed. The technique was used for the study of myocardial ischemia, giving attention to the relation between the potassium loss and oxygen deficiency. The lactate concentration was used as an index of the adequacy of the oxygen supply. G.R.

A72-34995 Morphological alterations in the ischaemic heart. H. A. Heggtveit (Ottawa, University, Ottawa, Canada). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 284-290. 24 refs.

Aspects of the pathological diagnosis of acute ischaemic heart disease are considered, giving particular attention to difficulties in the assessment of early ischaemic lesions in the myocardium. The development of microscopical changes in acute myocardial infarction is discussed. The correlation of ultrastructural data with biochemical findings confirms the importance of catecholamine release and ionic shifts in the early evolution of ischaemic myocardial injury. G.R.

A72-34996 Effects of hypoxia and ischemia on myocardial contraction - Alterations in the time course of force and ischemia-dependent inhomogeneity of contractility. E. H. Sonnenblick (Peter Bent Brigham Hospital, Boston, Mass.) and E. S. Kirk (Harvard University, Boston, Mass.). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 302-313. 10 refs. Grant No. NIH-HE-11306.

A72-34997 Induction of ventricular arrhythmias by elevation of arterial free fatty acids in experimental myocardial infarction. M. F. Oliver and P. A. Yates (Royal Infirmary, Edinburgh, Scotland). *(International Society of Cardiology and World Health Organization, Symposium on Metabolism of the Hypoxic and Ischaemic Heart, Geneva, Switzerland, June 14-17, 1971.) Cardiology,* vol. 56, no. 1-6, 1971-1972, p. 359-364. 13 refs.

A72-35001 Effect of magnetic fields on biological objects (Vliianie magnitnykh polei na biologicheskie ob'ekty). Edited by Iu. A. Kholodov. Moscow, Izdatel'stvo Nauka, 1971. 215 p. 407 refs. In Russian.

Studies of the effects of constant, alternating, and pulsed magnetic fields on various biological subjects are included. The mechanisms of these effects in humans, animals, plants and microorganisms are discussed. Among the topics considered are physical effects, such as mhd blood flow inhibition and elastic biological fiber vibrations; effects on enzymes, respiration, chromosome aberrations, and plant growth; and pathological changes caused by magnetic fields. Magnetic field effects under working conditions are examined, along with experimental techniques. V.Z.

A72-35002 # Physical phenomena occurring in living objects under the action of constant magnetic fields (Fizicheskie iavleniia proiskhodiashchie v zhivykh ob'ektakh pod deistviem postoiannykh magnitnykh polei). Ia. G. Dorfman (Akademiia Nauk SSSR, Institut Istorii Estestvoznaniia i Tekhniki, Moscow, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 15-23. In Russian.

Theoretical consideration of the main physical phenomena arising in living material subjected to the action of constant magnetic fields. It is shown that under the action of constant magnetic fields three main types of physical effects can arise in living objects - namely, magnetodynamic braking of the circulation of the blood and other fluids; elastic vibrations of nerve, muscle, and plant fibers during the propagation of bioelectric pulses through them (these vibrations in turn cause a distortion and delay of the pulses themselves); and, finally, orientation and concentration changes in biologically active macromolecules in solutions (changes which affect the kinetics of biochemical reactions and other physicochemical processes). A.B.K.

A72-35003 # **Magnetic field effects in enzymes, tissue respiration and some metabolism characteristics of an intact organism (Vliianie magnitnogo polia na fermenty, tkanevoe dykhanie i nekotorye storony obmena v intaktnom organizme).** M. A. Shishlo (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 24-40. In Russian.

A72-35004 # **Effects of magnetic fields on microorganisms (Vliianie magnitnykh polei na mikroorganizmy).** S. A. Pavlovich (Ivano-Frankovskii Meditsinskii Institut, Ivano-Frankovsk, Ukrainian SSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 41-55. In Russian.

A72-35005 # **Mechanism of the biological action of a constant magnetic field (O mekhanizme biologicheskogo deistviia postoiannogo magnitnogo polia).** A. B. Kogan, T. S. Sachava, L. I. Dorozhkina, V. M. Pavelko, and I. N. Gol'tseva (Rostovskii-na-Donu Gosudarstvennyi Universitet, Rostov, Ukrainian SSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 56-68. In Russian.

A72-35006 # **Action of a constant magnetic field on plant growth (Deistvie postoiannogo magnitnogo polia na rost rastenii).** Iu. I. Novitskii, V. Iu. Strekova, and G. A. Tarakanova (Akademiia Nauk SSSR, Institut Fiziologii Rastenii, Moscow, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 69-88. In Russian.

A72-35007 # **Influence of a magnetic field on radiation-induced chromosome aberrations in plants (Vliianie magnitnogo polia na radiatsionno-indutsirovannye khromosomnye aberratsii u rastenii).** A. A. Pozolotin (Akademiia Nauk SSSR, Institut Ekologii Rastenii i Zhivotnykh, Sverdlovsk, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 89-97. In Russian.

A72-35008 # **Pathologo-anatomic characterization of changes induced by magnetic fields in experimental animals (Patologoanatomicheskaia kharakteristika izmenenii voznikaiushchikh u eksperimental'nykh zhivotnykh pod vliianiem magnitnykh polei).** I. V. Toroptsev, G. P. Garganeev, T. I. Gorshenina, and N. L. Tepliakova (Tomskii Gosudarstvennyi Meditsinskii Institut, Tomsk, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 98-107. In Russian.

A72-35009 # **The magnetic field, infection and immunity (Magnitnoe pole, infektsiia i immunitet).** N. V. Vasil'ev, I. B. Shternberg, and L. F. Boginich (Tomskii Gosudarstvennyi Meditsinskii Institut, Tomsk, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 108-123. In Russian.

Some effects of magnetic fields upon the immunity mechanism of an organism are described. In a study of the effect of a magnetic field upon the infection process, white mice were subjected to constant and alternating magnetic fields, after having been inoculated with an antiencephalitis vaccine. It was found, from the resistance index and from the antibody titer, that the application of a magnetic field during the period of immunization sharply depresses the resistance of the animals to subsequent inoculation with mite encephalitis. Other investigations indicate that the effect of the magnetic field upon an organism is influenced by the factors of natural humoral immunity. Results of studies describing the effect of magnetic fields with different characteristics, but high intensity, applied immediately before immunization, as a rule somewhat inhibit the formation of antibodies (although this tendency is statistical), and the same factors, applied in the early period of immunization, markedly stimulate antibody formation. Later stages of antibody growth are relatively resistant to a magnetic field. D.F.L.

A72-35010 # **Effect of a magnetic field on the nervous system (Vliianie magnitnogo polia na nervnuiu sistemu).** Iu. A. Kholodov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 124-146. In Russian.

Review of the literature on the effects of a constant magnetic field on the organisms of animals and human beings. It is shown that, although a magnetic field does not cause any special 'magnetic' sensations in human beings, this stimulus penetrates into the sense sphere mainly through the visual or cutaneous analysor. Experiments on both humans and animals showing the effect of a constant magnetic field on the activity of the neuromuscular apparatus are described, as well as experiments dealing with the effect of a magnetic field on the reactions of intact organisms of fish, birds, and mammals. Finally, a detailed review is presented of experiments dealing with the primary physiological reactions of the central nervous system of rabbits to an applied magnetic field. A.B.K.

A72-35011 # **Effect of a magnetic field on experimental tumors /direct and via nervous system/ (Vliianie magnitnogo polia na eksperimental'nye opukholi /priamoe i cherez nervnuiu sistemu/).** M. A. Ukolova and E. B. Kvakina (Rostovskii Nauchno-Issledovatel'skii Onkologicheskii Institut, Rostov-na-Donu, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 147-164. In Russian.

Ac and dc LF magnetic fields were applied either directly to tumors or to the animal's head, or combined, in a study of the effects of this treatment on grafted and induced tumors in albino rats. Tumor growth reversal, and in some cases disappearance, was observed in most cases after direct magnetic field applications, and the effect was enhanced by injections of copper sulphate with ascorbic acid, or adrenalin. Stimulation of tissue respiration, aerobic glycolysis, phosphorylation and hypothalamus activity was observed after applications to the animal's head. Hypothalamus activity is viewed as a key element in one of the mechanisms responsible for the effecs of magnetic fields on tumors. V.Z.

A72-35012 # **Clinical hygienic and experimental data on magnetic field effects under working conditions (Klinikogigienicheskie i eksperimental'nye dannye o deistvii magnitnykh polei v usloviiakh proizvodstva).** A. M. Vialov (Moskovskii Nauchno-Issledovatel'skii Institut, Moscow, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 165-177. In Russian.

A72-35013 # **Methodical and methodological characteristics of a magneto-biological experiment (Metodicheskie i metodologicheskie osobennosti magnitobiologicheskogo eksperimenta).** A. A. Shul'pekov (Moskovskii Nauchno-Issledovatel'skii Institut Priborostroeniia, Moscow, USSR). In: Effect of magnetic fields on biological objects. Moscow, Izdatel'stvo Nauka, 1971, p. 178-189. In Russian.

A72-35014 **Mechanisms regulating physiological functions (Mekhanizmy reguliatsii fiziologicheskikh funktsii).** Edited by M. I. Gol'danskaia and A. A. Antonova. Leningrad, Izdatel'stvo Nauka, 1971. 317 p. 1186 refs. In Russian.

The influence of thermal, osmotic, and chemical stimulations of the hypothalamus on food and water intake; the pathogenesis of experimental tumors in the stomach and duodenum of dogs; and clinical observations as a research method in physiology are among the topics covered in papers concerned with general problems of physiology. Other subjects include the role of inhibition in fatigue, multilevel control of movements, and physiology of single mechanoreceptors (Pacini's corpuscles).

M.V.E.

A72-35015 # **The role of inhibition in the fatigue phenomenon (O roli tormozheniia v fenomene utomleniia).** E. A. Asratian (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 6-8. In Russian.

Consideration of the protective and restoring roles of inhibition as an antifatigue factor, with reference to Pavlov's theories and teachings. The author's past studies are also referred to in support of the view that inhibition tends to oppose fatigue. V.Z.

A72-35016 # **Influence of thermal, osmotic, and chemical stimulations on food and water intake (Vliianie termicheskogo, osmoticheskogo i khimicheskogo razdrazhenii gipotalamusa na priem pishchi i vody).** P. G. Bogach (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 16-24. 36 refs. In Russian.

A72-35017 # **Clinical observations as a research method in physiology (Klinicheskie nabliudeniia kak metod issledovaniia v fiziologii).** I. E. Ganelina, M. Ia. Ratner (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), and A. Ia. Iaroshevskii. In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 24-42. 77 refs. In Russian.

A72-35018 # **Multilevel motion control (O mnogourovnevom upravlenii dvizheniiami).** V. S. Gurfinkel' and M. L. Shik (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 48-55. 23 refs. In Russian.

Discussion of experiments in which the state of some parts of the nervous system was investigated during natural motor activity or during simulated natural motor activity in humans and animals. Details are given on experiments on humans in sitting and standing postures in which the electrical signals of muscles were recorded during movements in an experimental stand. A controlled-motion stand for locomotive reflex studies on animals is also described. V.Z.

A72-35019 # **Pharmacological effects on the central adrenergic regulation mechanisms of blood circulation (Farmakologicheskie vozdeistviia na tsentral'nye adrenergicheskie mekhanizmy reguliatsii krovoobrashcheniia).** V. V. Zakusov and N. V. Kaverina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 55-63. 21 refs. In Russian.

A72-35020 # **Trophic support of cardiac activity (O troficheskom obespechenii serdechnoi deiatel'nosti).** V. V. Parin. In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 89-95. 4 refs. In Russian.

Review of studies of the effects of higher vegetative centers, extracardial nerves and hormonal mediation agents on the cardiac activity, the state of cardiac rhythm control and cardiac arrhythmia restoration. Special attention is given to the effects of the stimulation of the trophic nuclei of the hypothalamus on these functions. V.Z.

A72-35021 # **New data on physiological adaptations to arid zones (Novye dannye o fiziologicheskikh adaptatsiiakh k aridnoi zone).** A. D. Slonim (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad and Novosibirsk, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 101-108. 28 refs. In Russian.

A72-35022 # **Interrelation of interoceptors and exteroceptors in the process of urination and defecation reflex act maturation in ontogeny (O vzaimootnoshenii intero- i eksterotseptorov v protsesse stanovleniia reflektornykh aktov mocheispuskaniia i defekatsii v ontogeneze).** T. S. Lagutina (Moskovskii Oblastnoi Nauchno-Issledovatel'skii Klinicheskii Institut, Moscow, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 228-241. 15 refs. In Russian.

A72-35023 # **New experimental data on the morpho-physiological analysis of the adaptation phenomenon in the somatic reflex arch (Novye eksperimental'nye dannye po morfofiziologicheskomu analizu fenomena adaptatsii v somaticheskoi reflektornoi duge).** O. S. Merkulova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 241-257. 80 refs. In Russian.

A72-35024 # **Bioelectric activity of the medulla oblongata during hypothermia and bloodletting (Bioelektricheskaia aktivnost' prodolgovatogo mozga pri gipotermii i krovopuskanii).** T. V. Popova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 277-292. 71 refs. In Russian.

A72-35025 # **Vasomotor reflex locking level (Ob urovne zamykaniia vazomotornykh refleksov).** V. M. Khaiutin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). In: Mechanisms regulating physiological functions. Leningrad, Izdatel'stvo Nauka, 1971, p. 292-302. 33 refs. In Russian.

Review of studies concerning the occurrence of vasomotor neuron reflexes after spinal cord cutting at various levels. Particular attention is given to studies by Schäfer et al. (1958, 1960, 1964) indicating the occurrence of bulbar vasomotor reflex locking. Other studies are also interpreted as supporting the existence of vasomotor reflex locking in the spinal cord. V.Z.

A72-35070 **The visual system and 'neuronal specificity.'** R. M. Gaze and M. J. Keating (Medical Research Council, National Institute for Medical Research, London, England). *Nature*, vol. 237, June 16, 1972, p. 375-378. 36 refs.

To explain how neurones make the correct connexions during development and growth, Sperry put forward his hypothesis of neuronal specificity, in which neurones are recognized by individual chemical labels. The basis for this specificity is still unclear; but

recent evidence suggests that it may be more appropriate to think in terms of 'systems matching' than of the matching of individual cells. (Author)

A72-35166 # **Interaction of chronic hypoxia and hypercapnia upon blood gases and acid base status.** W. E. Pepelko (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Society for Experimental Biology and Medicine, Proceedings,* vol. 140, June 1972, p. 628-632. 21 refs.

Rats were exposed for four days to inspired carbon dioxide levels of 0, 30, 60, and 90 torr combined with inspired oxygen levels of 70 or 140 torr. The purpose of the experiment was to measure the partial pressures of oxygen and carbon dioxide in the arterial blood as well as the pH and standard bicarbonate in the arterial blood of rats chronically exposed to these levels of CO2 combined with oxygen. Results show that the arterial blood levels of oxygen increased up to an inspired CO2 of 60 torr in the normoxic rats. At the three levels of inspired CO2, the increased arterial CO2 partial pressure was not influenced by hypoxia to a noticeable degree. Standard bicarbonate increased with increasing inspired CO2 levels in all groups. However, it was consistently lower in the low-oxygen breathing rats than in the normoxic animals. Arterial partial CO2 pressure was markedly lower in the hypoxic rats only when inspired CO2 levels were zero. This resulted in a lower arterial blood pH in the hypoxic than in the nonhypoxic rats inspiring comparable CO2 levels. D.F.L.

A72-35214 # **Effect of lunar ground on radiation damage in mice (Vliianie lunnogo grunta na luchevoe porazhenie u myshei).** V. V. Antipov, B. I. Davydov, N. A. Gaidamakin, T. S. L'vova, V. G. Petrukhin, S. N. Komarova, and E. B. Skvortsova. *Kosmicheskie Issledovaniia,* vol. 10, May-June 1972, p. 439-449. 8 refs. In Russian.

Survival rates and peripheral blood responses to gamma radiation were not changed when fine lunar rock material was introduced aerogenically, orally, or abdominally into mice. Weight gain was lower in irradiated mice after inhalation or oral intake of lunar material. Neoplasms have developed in some of the mice after contact with lunar material. V.Z.

A72-35278 Influence of space-flight factors aboard 'Zond' automatic stations on survival and mutability of chlorella cells. E. N. Vaulina, I. D. Anikeeva, I. G. Gubareva, and G. A. Shtraukh. *(Kosmicheskie Issledovaniia,* vol. 9, Nov.-Dec. 1971, p. 940-945.) *Cosmic Research,* vol. 9, no. 6, June 1972, p. 865-869. 7 refs. Translation.

'Zond' na vyzhivaemost' i mutabil'nost' kletok khlorelly). E. N. Vaulina, I. D. Anikeeva, I. G. Gubareva, and G. A. Shtraukh. *Kosmicheskie Issledovaniia,* vol. 9, Nov.-Dec. 1971, p. 940-945. 7 refs. In Russian.

A marked decrease of survival rates and much more frequent mutations were observed in chlorella cells kept in darkness in a mineral medium during the flight of Zond 5. These observations were reversed in a similar experiment on Zond 7 and were between the two extremes on Zond 6, even though the experimental conditions in all flights were maintained similar. This inconsistence is explained by causes unrelated to flight, notably by exposure of the chlorella cultures to adverse temperature variations during the transportation of the material between the laboratory and the launching and landing sites. V.Z.

A72-35279 Influence of space-flight factors aboard Soyuz-5 satellite on chlorella cells. I. D. Anikeeva and E. N. Vaulina. *(Kosmicheskie Issledovaniia,* vol. 9, Nov.-Dec. 1971, p. 946-948.) *Cosmic Research,* vol. 9, no. 6, June 1972, p. 870-872. 7 refs. Translation.

Increased proportions of cells producing anomalous numbers or nonequivalent autospores were detected in chlorella cell cultures kept in darkness in an agar-agar medium on the Soyuz 5 spaceship during its orbital flight. Survival rates and mutability were also lower in experimental cells than in control cells. It is believed however that these variations were caused by deficient experimental techniques rather than by flight-related factors. V.Z.

A72-35280 Influence of space-flight factors and ethylenimine on barley seeds. K. P. Garina and N. I. Romanova. *(Kosmicheskie Issledovaniia,* vol. 9, Nov.-Dec. 1971, p. 949-952.) *Cosmic Research,* vol. 9, no. 6, June 1972, p. 873-876. Translation.

In oat seeds carried by Soyuz 5 chromosome aberrations were more frequent and germination was faster than in control seeds. Stimulation was still higher in seeds treated with ethylenimine before the flight. Chromosome aberrations and germination normalized after post-flight storage of the exposed seeds. V.Z.

A72-35354 A new model for estimating space proton dose to body organs. R. W. Langley and M. P. Billings (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). *Nuclear Technology,* vol. 15, July 1972, p. 68-74. 9 refs. Research supported by the McDonnell Douglas Independent Research and Development Program.

It has been presumed that geometrically faithful man models are required to accurately account for the effect of body self-shielding on space variation dose to radiation-sensitive organs other than the skin and lens of the eye. It is demonstrated that a simple equivalent sphere model reproduces the results of comprehensive dose analyses that employ a detailed man model, with an accuracy sufficient for dose assessments. A correlation has been established analytically that holds for the full range of observed solar proton spectra and for a range of vehicle shielding worths from 0 to 10 g/sq cm of aluminum. Equivalent sphere model parameters are presented for the blood forming organs, the gastro-intestinal tract, and the testes. (Author)

A72-35376 # **Brief survey of the problems of space radiobiology and radiation safety in space flights.** Iu. G. Grigor'ev and C. A. Tobias. *COSPAR Information Bulletin* no. 62, June 1972, p. 34-48.

Radiations in space which are of particular consequence to manned space flight are considered, giving attention to galactic cosmic radiation, the earth radiation belt, solar flares, radiation from planetary and lunar surfaces, and radiations from man-made sources. Problems to be solved in connection with the exposure of the astronaut to the radiations are related to the establishment of allowable exposures, the determination of the quality factor, the determination of the distribution factor, the assessment of the effective dose, the radiobiological effect and modifying effect of space flight factors, and the study of specialized organ systems of man where radiation injury may significantly affect the astronaut's performance. The possibility of using pharmacological means of protection is also examined. G.R.

A72-35396 Retina - Ultrastructural alterations produced by extremely low levels of coherent radiation. D. O. Adams, E. S. Beatrice, and R. B. Bedell (U.S. Army, Joint Army Medical Research and Development Command, Frankford Arsenal, Philadelphia, Pa.). *Science,* vol. 177, July 7, 1972, p. 58-60. 16 refs.

Results of irradiation with a Q-switched ruby laser of both retinas from two rhesus monkeys, with study of the ultrastructure of the irradiated areas. The data suggest that very low levels of energy from a ruby laser incident upon the retina can produce ultrastructural alterations in the outer segments of the rods and cones there.

The most surprising result of this study is the presence of damage in areas subjected to very small amounts of coherent radiation. Two possible pathogenetic bases for the observed damage are postulated. F.R.L.

A72-35397 * Increased tolerance of leukemic mice to arabinosyl cytosine with schedule adjusted to circadian system. E. Haus (St. Paul-Ramsey Hospital, St. Paul, Minn.), F. Halberg, J. F. W. Kühl, R. B. Sothern, R. N. Shiotsuka, D. S. Hwang (Minnesota, University, Minneapolis, Minn.), L. E. Scheving, J. E. Pauly (Arkansas, University, Little Rock, Ark.), and S. Cardoso (Tennessee, University, Memphis, Tenn.). *Science,* vol. 177, July 7, 1972, p. 80-82. 21 refs. Research supported by the St. Paul-Ramsey Hospital Medical Research and Education Foundation and NASA; Grant No. PHS-5-K6-GM-13,981.

A72-35459 # Eye movements as the basis of spatial vision and as a model of behavior (Dvizheniia glaz kak osnova prostranstvennogo zreniia i kak model' povedeniia). B. Kh. Gurevich. Leningrad, Izdatel'stvo Nauka, 1971. 227 p. 309 refs. In Russian.

A critical analysis is made of current data and theories in the field of spatial vision mechanisms. The rotation of the eye - especially in complete darkness - is proposed as an elementary model for the experimental development of this analysis. Detailed recordings of eye movements in darkness are obtained. These recordings prove that eye movements are regulated by the target not only in the case of rotation toward a visible object but even in complete darkness. It is concluded that Helmholtz's innervation hypothesis and other mechanistic conceptions of localization and behavior are invalid. The recordings revealed a universal law of eye jumps and a hierarchical (two-level) character of the target control of eye rotations. A model scheme of visual fixation changes and of the bases of spatial vision is proposed, as well as a corresponding conceptual model of behavior and its control involving the participation of reinforced temporary brain connections. A.B.K.

A72-35460 # Intracranial blood circulation under conditions of accelerations and weightlessness (Vnutricherepnoe krovoobrashchenie v usloviiakh peregruzok i nevesomosti). Iu. E. Moskalenko, G. B. Vainshtein, and I. I. Kas'ian. Moscow, Izdatel'stvo Meditsina, 1971. 279 p. 628 refs. In Russian.

A detailed study is made of the disturbances of the intracranial blood circulation occurring in response to accelerations and weightlessness. An analysis is made of the intracranial blood circulation system under normal conditions, on the basis of which the patterns of change in the brain blood flow during exposure of the organism to space flight factors are ascertained. The special features of the regulation of the brain blood circulation are considered, as well as the mechanisms ensuring homeostasis of the brain blood circulation under conditions of a changed gravitational field. Special attention is devoted to methodological problems involved in studying the brain blood circulation during exposure of the organism to longitudinal and transverse accelerations and to weightlessness. Methods of biophysical analysis of the phenomena occurring in the intracranial blood circulation system are employed, including mathematical modeling of this system. A.B.K.

A72-35462 Oculomotor coordination following REM and non-REM sleep periods. R. J. Berger and J. M. Walker (California, University, Santa Cruz, Calif.). *(Association for the Psychophysiological Study of Sleep, International Congress, 1st, Bruges, Belgium, June 1971.) Journal of Experimental Psychology,* vol. 94, July 1972, p. 216-224. 19 refs. NSF Grant No. GB-8782.

The hypothesis that one function of rapid eye movement (REM) sleep might be to maintain facilitation of coordinated eye movements throughout sleep was tested. Twelve male Ss performed oculomotor tracking tasks after being awakened alternately at the onset and end of REM periods (counterbalanced across Ss), which required horizontal saccadic versional, smooth versional, and vergence eye movements. Imbalances between the two eyes were measured directly from the output of an analog difference circuit whose inputs were the horizontal electrooculogram of each eye. Ocular imbalances at the onset compared with the end of REM periods were of significantly greater magnitude and number during the saccadic version and smooth version tasks, but did not differ during the vergence task. A control measure of oculomotor reaction time of saccades to step shifts of the target did not vary between the onset and end of REM periods. The results were consistent with the initial hypothesis. (Author)

A72-35463 Behavioral properties of somatosensory-motor interhemispheric transfer. D. Muram and A. Carmon (Jerusalem, Hebrew University, Jerusalem, Israel). *Journal of Experimental Psychology,* vol. 94, July 1972, p. 225-230. 11 refs. Research supported by the Israeli Air Force.

A72-35550 # Performance measurement in helicopter training and operations. W. W. Prophet (Human Resources Research Organization, Alexandria, Va.). *American Psychological Association, Annual Meeting, 79th, Washington, D.C., Sept. 1971, Paper.* 17 p. 13 refs. Grant No. DAHC19-70-C-0012. (PP-10-72)

A flight performance research program, concerned primarily with the measurement of human functioning and performance, is described. Particular attention is given to a series of relatively objective flight performance checklists, termed Pilot Performance Description Records (PPDR), in constructing which each maneuver was analyzed in detail, and as many items or scales as possible describing specific pilot and aircraft behaviors during the maneuver were developed. The uses of the PPDR as part of a training quality control system are discussed. Individual critical maneuvers are examined, which make it possible to assess the causes of deviant performance at a detailed level and to develop means of coping with them. Approaches based on automated performance monitoring in flight simulators are also examined. V.P.

A72-35647 * Brain tumors in irradiated monkeys. W. Haymaker, J. Miquel (NASA, Ames Research Center, Moffett Field, Calif.), and L. J. Rubinstein (Stanford University, Stanford, Calif.). *Acta Neuropathologica,* vol. 20, 1972, p. 267-277. 9 refs.

A study was made of 32 monkeys which survived one to seven years after total body exposure to protons or to high-energy X rays. Among these 32 monkeys there were 21 which survived two years or longer after exposure to 200 to 800 rad. Glioblastoma multiforme developed in 3 of the 10 monkeys surviving three to five years after receiving 600 or 800 rad 55-MeV protons. Thus, the incidence of tumor development in the present series was far higher than the incidence of spontaneously developing brain tumors in monkeys cited in the literature. This suggests that the tumors in the present series may have been radiation-induced. (Author)

A72-35688 Peripheral contrast thresholds for moving images. J. G. Rogers (Hughes Aircraft Co., Culver City, Calif.). *Human Factors,* vol. 14, June 1972, p. 199-205. 20 refs.

Evaluation of perceptual enhancement for image motion in the visual periphery by threshold measurements with a moving-bar stimulus. Lowered peripheral thresholds were found for both

forward and backward image movement with no significant elevation of the contrast threshold for an image in motion out to 55 deg eccentricity from the fovea. Either real or phi-phenomenon movement is recommended for the display of emergency or mission-critical signals. (Author)

A72-35689 The relative importance of contrast and motion in visual detection. H. E. Petersen and D. J. Dugas (RAND Corp., Santa Monica, Calif.). *Human Factors,* vol. 14, June 1972, p. 207-216. 8 refs.

The relative roles of contrast and motion in the detection of targets were investigated using a television display of an artificial target inserted in several different backgrounds of varying complexity. Independent effects of both contrast and motion on the detectability of targets were found. The magnitude of these effects can be accounted for in the detection probability function by modifying the exponent with a linear contrast term and a second-power velocity term. At target speeds greater than about 5 deg/sec, the detection probability began to level off, probably due to interference of the boundaries of the display. Single-fixation experiments confirmed a larger detection field for moving targets than for static, but also demonstrated a gradual increase in the fixation time required to detect a target as a function of its distance from the fixation point. (Author)

A72-35690 Determining the detectability range of camouflaged targets. H. E. Guttmann and R. G. Webster (Sandia Laboratories, Albuquerque, N. Mex.). *Human Factors,* vol. 14, June 1972, p. 217-225. 7 refs. AEC-supported research.

This paper describes a quick economical method for determining the maximum range at which camouflaged targets can be detected. The method produces results which agree within 10% of those obtained by conventional psychophysical methods. (Author)

A72-35691 # Detection and recognition of colored signal lights. R. E. Reynolds (Edinboro State College, Edinboro, Pa.), R. M. White, Jr. (Miami University, Oxford, Ohio), and R. L. Hilgendorf (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Human Factors,* vol. 14, June 1972, p. 227-236. 9 refs. Contract No. AF 33(615)-1212.

Experimental investigation of the effects of stimulus color, background color, and level of ambient illumination upon the time required by a subject to detect a visual signal and make a response, as well as on his ability to identify correctly the color of the signal. The results include the finding that detection and identification are more difficult under bright ambient illumination. M.V.E.

A72-35692 * Congruent and spurious motion in the learning and performance of a compensatory tracking task. J. G. Guercio and R. L. Wall (San Jose State College, San Jose, Calif.). *Human Factors,* vol. 14, June 1972, p. 259-269. 24 refs. Grant No. NGL-05-046-002.

Examination of the importance of congruent and spurious yaw motion in compensatory tracking by eight airline pilots. The pilots, seated erect in the Ames man-carrying rotation device (MCRD), tracked with k/s+1 and k/s(s+1) vehicle dynamics in fixed- and moving-base simulation. Following the learning phase of the experiment, five levels of spurious angular acceleration were superimposed on the motion of the MCRD. Learning of the tracking task was found to be a function of both vehicle dynamics and mode of simulation. The presence of congruent motion information reduced learning time in k/s(s+1) vehicle dynamics and resulted in lower tracking error in both vehicle dynamics. The spurious angular accelerations resulted in an increase in pilot tracking error; however, the relationship between the magnitude of the acceleration and its effect was highly complex. The data suggest that the minimal disturbance level for spurious angular accelerations during tracking is below 0.4 deg/sec. (Author)

A72-35761 * Photon trapping in photosystem II of photosynthesis - The fluorescence rise curve in the presence of 3-/3,4-dichlorophenyl/-1,1-dimethylurea. W. W. Doschek and B. Kok (Martin Marietta Research Institute for Advanced Studies, Baltimore, Md.). *Biophysical Journal,* vol. 12, July 1972, p. 832-838. 13 refs. Contracts No. AT(30-1)-3706; No. NASw-2183.

A72-35821 *Acquired complete right bundle branch block without overt cardiac disease - Clinical and hemodynamic study of 37 patients.* M. C. Lancaster, E. Schechter, and G. K. Massing (USAF, School of Aerospace Medicine, Brooks AFB; USAF, Medical Center, Lackland AFB, Tex.). *American Journal of Cardiology,* vol. 30, July 11, 1972, p. 32-36. 29 refs.

Evaluation of 37 men (mean age 42 years) with acquired right bundle branch block by complete electrocardiographic testing, a glucose tolerance test, determination of serum lipids and total body water, chest roentgenograms, left and right heart catheterization including coronary cineangiography, and coronary sinus catheterization. No patient had significant myocardial lactate production at rest, and in no case did the coronary sinus lactate level during exercise exceed the arterial level. Significant large coronary arterial obstruction could have been an etiologic determinant in only 1 of the 37 patients. The almost consistent and unique association of acquired right bundle branch block with increased end-diastolic ventricular pressure at rest or with exercise, or both, is as yet unexplained but suggests the presence of a mild diffuse abnormality of the ventricular myocardium, including some portion of the right bundle branch. (Author)

A72-35822 Work capacity and physiologic responses to work - Men born in 1913. G. Grimby, J. Bjure, M. Aurell, B. Ekstrom-Jodal, G. Tibblin, and L. Wilhelmsen (Goteborg, University, Goteborg, Sweden). *American Journal of Cardiology,* vol. 30, July 11, 1972, p. 37-42. 18 refs. Research supported by Forenade Liv.

Results of a maximal exercise test performed by a group of 793 54-yr-old men. The purpose was to increase the basic data of a prospective study of ischemic heart disease and other pathological conditions, to study cross-sectionally the physical performance of the population (the occurrence of anginal pain and electrocardiographic anomalies at standardized work loads, comparing these data to other relevant data in the population), and to collect randomly selected control material for comparing groups with different diseases, e.g., patients with myocardial infarction. The study appears to show that a high percentage of 54-yr-old men can perform maximal exercise without demonstrable evidence of increased probability of cardiovascular hazards. F.R.L.

A72-35835 * Lipid composition of growing and starving cells of Arthrobacter crystallopoietes. L. L. Kostiw, C. W. Boylen, and B. J. Tyson (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Journal of Bacteriology,* vol. 111, July 1972, p. 103-111. 57 refs.

A72-35915 # The effect of chlordiazepoxide on visual field, extraocular muscle balance, colour matching ability and hand-eye co-ordination in man. D. P. Austen, B. A. Gilmartin (City University, London, England), and P. Turner (St. Bartholomew's Hospital, London, England). *British Journal of Physiological Optics,* vol. 26, no. 3, 1971, p. 161-165. 8 refs.

A72-35916 # **The tracking of targets located outside of Panum's area.** R. W. Reading (Indiana University, Bloomington, Ind.). *British Journal of Physiological Optics,* vol. 26, no. 3, 1971, p. 217-227. 15 refs. Contract No. DA-49-193-MD-2706.

Experimental study of the usefulness of binocular distance perception from diplopic images, using three subjects and a described apparatus and procedure. The results indicate that the localization of real targets moving at 50 to 80 cm from the entrance pupils and viewed while fixating a target at 123 cm shows superiority for a binocular viewing condition that permits extrahoropteral distance perception to act as a clue to spatial localization. M.V.E.

A72-35917 * **CPPB and vasopressin secretion.** W. H. Moran, Jr. (West Virginia University, Morgantown, W. Va.). *Anesthesiology,* vol. 34, June 1971, p. 501-504. 11 refs. Grant No. NGR-49-001-019.

Discussion of the role of vasopressin (or 'antidiuretic hormone') secretory control system in the maintenance of central vascular volume, and critical comments about the latest paper by Barratz et al. (1971) on the interrelation of antidiuretic hormone (ADH) and fluid balance during continuous positive pressure breathing (CPPB) in dogs. It is felt that, while the increase in plasma ADH levels occurring with CPPB has been more carefully defined in this last paper than previously, still more accurate definitions could be obtained under experimental conditions modified in accordance with presented suggestions. M.V.E.

A72-35925 * **Analysis of vegetable seedlings grown in contact with Apollo 14 lunar surface fines.** C. H. Walkinshaw (U.S. Forest Service, Washington, D.C.; NASA, Manned Spacecraft Center, Houston, Tex.) and P. H. Johnson (Brown and Root-Northrop, Inc., Houston, Tex.). *HortScience,* vol. 6, Dec. 1971, p. 532-535.

Study of plant seedlings treated with lunar material, grown for 14 to 21 days, and then subjected to chemical analyses and other measurements. The purpose of the study was to determine whether plants growing in contact with lunar-surface fines contained a different elemental composition compared with untreated seedlings. The results indicate a direct interaction between germfree plants and lunar material. Treated plants dissolved and absorbed significant quantities of Al, Fe, and Ti from the lunar fines. Cabbage and Brussel sprouts were particularly efficient in the dissolution and absorption of Mn. M.V.E.

A72-35938 * **Lunar horticulture.** C. H. Walkinshaw (NASA, Manned Spacecraft Center, Houston, Tex.). *HortScience,* vol. 6, Dec. 1971, p. 518.

Discussion of the role that lunar horticulture may fulfill in helping establish the life support system of an earth-independent lunar colony. Such a system is expected to be a hybrid between systems which depend on lunar horticulture and those which depend upon the chemical reclamation of metabolic waste and its resynthesis into nutrients and water. The feasibility of this approach has been established at several laboratories. Plants grow well under reduced pressures and with oxygen concentrations of less than 1% of the total pressure. The carbon dioxide collected from the lunar base personnel should provide sufficient gas pressure (approx. 100 mm Hg) for growing the plants. M.V.E.

A72-35943 **Obedience to rotation-indicating visual displays as a function of confidence in the displays.** B. E. Johnson and A. C. Williams, Jr. (Illinois, University, Urbana, Ill.). *Aviation Research Monographs,* vol. 1, Dec. 1971, p. 11-25. 7 refs.

Investigation of the relationship between the confidence of a pilot in his visual display and his susceptibility to disorientation. Experiments were carried out under four different experimental conditions at both high and low levels of confidence in the visual information presented. Differential responses to the various experimental conditions are found at both confidence levels, thus suggesting the existence of inherent differences in the credibility of the information presented by the four displays. An attempt is made to assess the role of the quality of the visual display and the apparent direction of movement of the display in contributing to the differences noted. Also, an analysis is made of the agreement between vestibular and visual cues during acceleration, constant-speed rotation, and deceleration. A.B.K.

A72-35944 **Meaningful shape coding for aircraft switch knobs.** G. K. Slocum, S. N. Roscoe (Hughes Aircraft Co., Culver City, Calif.), and B. H. Williges. *Aviation Research Monographs,* vol. 1, Dec. 1971, p. 27-40. 16 refs.

Evaluation of the speed and accuracy of identification and operation of sets of knobs that were either meaningfully shape coded, arbitrarily shape coded, or noncoded. An analysis is made of the substitution errors with the different knob codings, the time required to identify and manipulate the knobs, and the interference of the coding with performance on other concurrent tasks. It is found that significantly fewer errors were made while using the meaningfully top-coded knobs than while using either the arbitrarily side-coded knobs or the noncoded knobs during the initial block of trials. During the second trial block, the numbers of substitution errors did not differ significantly among the three types of knobs. It is also found that both sets of coded knobs required significantly less discrimination and total time than did the noncoded knobs. However, the meaningfully top-coded knobs required more manipulation time than the other two types of knobs. Finally, it is found that meaningful top coding produced less loading-task interference than did noncoding. A.B.K.

A72-35945 **Time-compressed displays for target detection.** L. A. Scanlan, S. N. Roscoe (Hughes Aircraft Co., Culver City, Calif.), and R. C. Williges. *Aviation Research Monographs,* vol. 1, Dec. 1971, p. 41-66. 25 refs.

Investigation of visual time-compression phenomena, using a simulated radar display with electronically generated targets, noise, and clutter in a target detection task. Six time-compression ratios between unity and infinity were used, three levels of random noise, and two levels of clutter. Radar target detection performances are found to differ reliably as a function of each primary experimental variable, including number of stored frames, time-compression ratio, noise level, and clutter level. Performances associated with two secondary experimental variables - target direction and target speed - show no significant main effect. The data presented are regarded as supporting the belief that significant improvement in an observer's ability to detect a target can be realized by matching the display to the observer's perceptual abilities. A.B.K.

A72-35963 **Effect of posture on heat acclimatization in man.** J. T. Maher, D. E. Bass, D. D. Heistad, E. T. Angelakos, and L. H. Hartley (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Hahnemann Medical College, Philadelphia, Pa.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 8-13. 25 refs.

Cardiovascular, thermoregulatory, and sympathoadrenal responses of two matched groups of four men each were compared during daily 90-min periods of upright and supine bicycle exercise at 49/27 C dry/wet bulb. The groups underwent 8 consecutive days of exercise in the heat at the same work load and level of oxygen consumption, preceded and immediately followed by a uniformity trial in which they walked on a treadmill at 5.6 km/hr. The group which exercised while supine performed with lower mean rectal temperatures and lower heart rates than the group which exercised while upright. Sweat rates were similar for the two groups. It appears that the reduced gravitational stress of the recumbent position

permits attainment of a level of acclimatization to work in the heat similar to that achieved in the upright posture with the benefit of less physiologic strain during induction of acclimatization. (Author)

A72-35964 * 'Diving reflex' in man - Its relation to isometric and dynamic exercise. S. A. Bergman, Jr., J. K. Campbell, and K. Wildenthal (Texas, University, Dallas, Tex.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 27-31. 19 refs. Grants No. PHS-HL-06296; No. NGR-44-012-151.

To test the influence of physical activity on the diving reflex, 10 normal men held their breath with their faces immersed in 15 C water during rest, bicycle exercise, and sustained isometric handgrip contraction. At all conditions, a slight but statistically significant elevation of blood pressure and a marked decrease in heart rate occurred during each dive. During moderate bicycle exercise heart rate fell more rapidly than at rest and the final level of bradycardia approached that achieved at rest, despite the fact that predive heart rates were much higher during exercise. When diving occurred in combination with isometric exercise, bradycardia was less severe than during resting dives and final heart rates could be represented as the sum of the expected responses to each intervention alone. In all conditions apnea without face immersion caused bradycardia that was less severe than during wet dives. (Author)

A72-35965 Transient ventilatory response to graded hypercapnia in man. W. J. Reynolds, H. T. Milhorn, Jr., and G. H. Holloman, Jr. (Mississippi, University, Jackson, Miss.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 47-54. 17 refs. Grant No. NIH-HE-11678.

The transient ventilatory responses of a group of normal male volunteers to mixtures of 3, 5, 6, and 7% CO2 in air were determined by continuous recording of expiratory flow, oxygen tension, and carbon dioxide tension with an FM magnetic tape recorder. The analog data were then digitized and calculations performed by a digital computer to yield breath-by-breath values for tidal volume, respiratory frequency, minute ventilation, and alveolar oxygen and carbon dioxide tension. Minute ventilation was observed to increase smoothly at all stimulus levels. Tidal volume underwent a rapid on-transient and maintained a stable plateau thereafter, while respiratory frequency increased much more slowly. (Author)

A72-35966 * Disproportional changes in hematocrit, plasma volume, and proteins during exercise and bed rest. W. van Beaumont (St. Louis University, St. Louis, Mo.), J. E. Greenleaf, and L. Juhos (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 55-61. 22 refs.

The interrelationships between the changes in plasma volume, hematocrit, and plasma proteins during muscular exercise and bed rest were investigated. Proportionally, the changes in hematocrit are always smaller than the changes in plasma volume. For this reason changes in the concentration of blood constituents can only be quantitated on the basis of plasma volume changes. During short periods of intensive exercise, there was a small loss of plasma proteins. With prolonged submaximal exercise there was a net gain in plasma protein, which contributes to stabilization of the vascular volume. Prolonged bed rest induced hypoproteinemia; this loss of plasma protein probably plays an important role in recumbency hypovolemia. (Author)

A72-35967 * Effects of diffusion impairment on O2 and CO2 time courses in pulmonary capillaries. P. D. Wagner and J. B. West (California, University, La Jolla, Calif.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 62-71. 41 refs. Grants No. NGL-05-009-109; No. PHS-HE-13687-01.

Simultaneous time courses for O2 and CO2 exchange along the capillary have been calculated for homogeneous lungs, allowing for O2-CO2 interactions, dissolved O2, and chemical reaction rates. As diffusing capacity (DI) was reduced, the transfer of CO2 and O2 was impaired by similar amounts, in spite of the 20-fold greater diffusing capacity for CO2. The reason why CO2 is affected so much is that the slope of the content against partial pressure is so much greater in blood than tissue for this gas. Because of the shapes of their respective dissociation curves, O2 transfer was most affected at normal ventilation-perfusion ratios, whereas CO2 was most affected at high ratios. Exercise exaggerated the impairment of transfer of both gases. (Author)

A72-35968 Effect of nicotinic acid on myocardial metabolism in man at rest and during exercise. B. W. Lassers, M. L. Wahlqvist, L. Kaijser, and L. A. Carlson (Uppsala, University, Uppsala; Karolinska Hospital; King Gustav V Research Institute, Stockholm, Sweden). *Journal of Applied Physiology,* vol. 33, July 1972, p. 72-80. 49 refs. Swedish Medical Research Council Grants No. 19X-204-06; No. 19X-204-07.

A72-35969 Skin temperatures in warm environments and the control of sweat evaporation. Y. Houdas, J. Colin, J. Timbal, C. Boutelier, and J.-D. Guieu (Lille, Université, Lille; Aerospace Medical Laboratory, Brétigny-sur-Orge, Essonne, France). *Journal of Applied Physiology,* vol. 33, July 1972, p. 99-104. 26 refs.

A72-35970 Gas-induced osmosis in the lung. B. A. Hills (Duke University, Durham, N.C.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 126-129. 17 refs. Contract No. N00014-67-A-0251-0015.

A preferential retention of water, and even fluid expulsion, has been demonstrated in lungs ventilated with a normoxic mixture of nitrous oxide compared with contralateral controls separately ventilated with air under otherwise identical conditions. This is considered a manifestation of gas-induced osmosis. The probable magnitude of such osmotic pressures is calculated and discussed as a possible factor influencing homeostasis. (Author)

A72-35971 Reproducibility of indirect /CO2/ Fick method for calculation of cardiac output. E. Zeidifard, M. Silverman, and S. Godfrey (Institute of Diseases of the Chest, London, England). *Journal of Applied Physiology,* vol. 33, July 1972, p. 141-143. 19 refs. Research supported by the Brompton Hospital Research Fund and Fisons Pharmaceuticals, Ltd.

Ten normal subjects, aged between 12 and 30 years, performed steady-state exercise tests on a bicycle ergometer at 1- to 3-day intervals. Measurements were made at various work loads between 25% and 75% of maximum working capacity. Mixed venous carbon dioxide tension was measured from the plateau obtained during rebreathing and cardiac output was calculated by the indirect (CO2) Fick method. The coefficients of variation of minute ventilation, gas exchange, heart rate, and cardiac output were less during exercise than at rest; at an oxygen consumption of 1,200 ml/min, the coefficients of variation were 5.7% for cardiac output, 6.8% for heart rate, and 5.6% for stroke volume. (Author)

A72-35972 Flow limitation in a collapsible tube. R. K. Lambert and T. A. Wilson (Minnesota, University, Minneapolis, Minn.). *Journal of Applied Physiology,* vol. 33, July 1972, p. 150-153. 12 refs. PHS-supported research.

A mathematical model for flow through a collapsible tube is presented which predicts that flow limitation should occur as the

pressure at the exit of the tube is reduced. Experimental measurements of flow through a segment of Penrose drainage tubing agree with the prediction of the model for the case where the equal pressure point occurs at the entrance of the tube segment but the measured flow is less than the predicted flow for the case where the tube is collapsed over its entire length. Unsteady flows were observed when the equal pressure point was situated within the tube. (Author)

A72-35973 Algorithms for selected blood acid-base and blood gas calculations. L. J. Thomas, Jr. (Washington University, St. Louis, Mo.). *Journal of Applied Physiology*, vol. 33, July 1972, p. 154-158. 27 refs. Grants No. PHS-HE-00082; No. NIH-RR-00396.

A72-36025 Venous responses to stimulation of carotid chemoreceptors by hypoxia and hypercapnia. C. L. Pelletier and J. T. Shepherd (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *American Journal of Physiology*, vol. 223, July 1972, p. 97-103. 22 refs. Research supported by the Medical Research Council of Canada; Grant No. PHS-HE-5883.

A72-36032 Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Meeting sponsored by the Ballistocardiograph Research Society. Edited by D. H. Jackson (Alabama, University, Birmingham, Ala.). Basel, S. Karger AG (Bibliotheca Cardiologica, No. 29), 1972. 116 p. $10.95.

Subjects related to assisted circulation are discussed, giving attention to questions of body acceleration synchronous with the heartbeat, hemodynamic effects of BASH, and an analysis of assisted circulation. Topics in the field of experimental and clinical ballistocardiography considered include a brief critique of the direct body ballistocardiographic method, the clinical simulation of the ballistocardiogram from pressure pulse measurements, the computer simulation of human ballistocardiogram reading, and a new approach to Bcg simulation. G.R.

A72-36033 Hemodynamic effects of BASH - Body acceleration synchronous with the heartbeat. J. V. Tyberg, W. W. Parmley, S. H. Salzman, and H. J. C. Swan (California, University, Los Angeles, Calif.). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Basel, S. Karger AG, 1972, p. 6-13. Grant No. PHS-5-S01-RR-05468.

An investigation was conducted to evaluate more directly than in previous studies the hemodynamic effects of BASH in acutely-prepared dogs. Short periods of BASH applied to alternate heart beats were studied. In other tests involving normal human volunteers the effects of BASH on ventilation, arterial blood pressure, and heart rate were studied during 15-min intervals of BASH. BASH was also applied asynchronously in an attempt to explore the mechanism of observed changes. A patient study concerning a 60-year-old man with an acute myocardial infarction is also discussed. After baseline hemodynamics were obtained, the patient was subjected to intermittent periods of footward BASH for about 5 hr. G.R.

A72-36034 Correlation between ergometry, ballistocardiography and coronary angiography in 267 patients. M. A. H. W. Schottelndreier and F. A. Rodrigo (Leiden, University Hospital, Leiden, Netherlands). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Basel, S. Karger AG, 1972, p. 35-43. 16 refs.

A study was conducted to correlate the ballistocardiogram (Bcg) with other advanced techniques presently in use for the evaluation of coronary heart disease. The tests considered included the exercise tolerance test, expressed in maximum oxygen consumption, maximum Watts performance, and maximum heart rate. Selective coronary angiograms and left ventriculograms were also considered together with the ballistocardiogram. The results obtained in the study are discussed. The Bcg is found to be a good convenient test for studying the heart function in cases of coronary heart disease. More information is obtained on the basis of the Bcg than from the exercise tolerance test. G.R.

A72-36035 A quantitative relationship between the H-I slope of the head-foot Bcg and the initial acceleration of flow in man. J. Baan, J. H. Manchester, and J. C. Shelburne (Pennsylvania, University, Hospital, Philadelphia, Pa.). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Basel, S. Karger AG, 1972, p. 55-69. 22 refs. Grants No. NIH-HE-08805; No. NIH-HE-05896.

A mathematical model for the early part of ejection is discussed. The model is based on the theory of the displacement ballistocardiogram (Bcg) considered by Noordergraaf (1956). It is assumed that the heart's center of gravity does not move during early ejection. A relationship between aortic root pressure and Bcg is also considered, taking into account the Navier-Stokes equation for the time-dependent flow of an incompressible fluid. Preliminary results obtained in patients during left heart catheterization are reported. The results show the general validity of both models. G.R.

A72-36036 Some preliminary observations on the correlation of the high frequency /acceleration/ direct-body ballistocardiogram with the apex cardiogram, carotid pulse and their derivatives. N. J. Winer (Lenox Hill Hospital, New York, N.Y.). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Basel, S. Karger AG, 1972, p. 74-85. 9 refs. Research supported by the Florence G. Heller Foundation.

A72-36037 Computer simulation of human ballistocardiogram reading. W. K. Harrison (Johns Hopkins University, Baltimore, Md.). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Basel, S. Karger AG, 1972, p. 86-91. Grant No. NIH-HE-13060.

The computer analysis procedure described attempts to simulate both subjective human evaluations and the objective manual measurements. Correlation coefficients are used in the computer program for a comparison of the heartbeat with an ideal pattern. A search is conducted for Bcg wave tips in particular relation to the cardiac cycle. Computer processing steps are discussed together with a record reading algorithm. Successive heartbeats are processed until the complete sequence has been completed. It is pointed out that epoch detection from the smoothed carotid pulse derivative has been reliable in the presence of appreciable heartbeat-to-heartbeat variability. G.R.

A72-36038 A new approach to Bcg simulation. I. Tomek (Alberta, University, Edmonton, Alberta, Canada). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971. Basel, S. Karger AG, 1972, p. 92-101.

The new approach makes use of a digital computer. This has a number of advantages. Thus, segments of vessels which must be

simulated by lumped parameters in the analog computer can be simulated as having distributed parameters. The results obtained can be used for Bcg simulation with the aid of Fourier series for arbitrary pressure or flow input waveforms. Some features of the suggested approach are discussed in detail. G.R.

A72-36039 **Body dynamics and ballistocardiogram.** E. K. Franke (Cincinnati, University, Cincinnati, Ohio). In: Circulatory assist and ballistocardiographic studies; Proceedings of the Fifteenth Annual Meeting, Atlantic City, N.J., May 1, 1971.
Basel, S. Karger AG, 1972, p. 102-106. 6 refs. Grant No. NIH-HE-12025.

A two-component body model in ballistocardiography which was examined by Franke and Braunstein (1967, 1968) is considered. The essential features of the model are briefly recounted. The transfer function of the body model of a given subject can be computed with the aid of certain parameters. It is found that the initial part of the Bcg is the source of the least distorted and most quantitative information on the left ventricular performance. G.R.

A72-36312 **Quantitative decision criteria for identification of visual evoked responses obtained during binocular rivalry.** J. R. Bourne and R. Fox (Vanderbilt University, Nashville, Tenn.). In: Scanning the spectrum; Proceedings of the Tenth Annual Region 3 Convention, Knoxville, Tenn., April 10-12, 1972.
New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. H1-1 to H1-4. 12 refs. NSF Grant No. GK-27863.

A72-36313 **Controlling microbial inactivation environments.** V. L. Dugan (Sandia Laboratories, Albuquerque, N. Mex.). In: Scanning the spectrum; Proceedings of the Tenth Annual Region 3 Convention, Knoxville, Tenn., April 10-12, 1972.
New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. I2-1, I2-2. 5 refs. AEC-supported research.

This paper illustrates a simple application of modern optimal control theory in a problem of modern environmental microbiology. The problem investigated is that of defining an 'optimum' temperature profile for the inactivation of a microbial spore crop by a composite environment of heat and gamma radiation. The selection of the optimum temperature profile is based upon a quadratic performance criterion and is determined using numerical techniques. One set of profiles thus determined is shown to closely simulate a natural heat-up profile and to provide a lower thermal dose than a constant temperature environment which provides the same degree of inactivation. (Author)

A72-36400 # **Frontal cerebrum region and elementary mental activity (Lobnaia oblast' mozga i elementarnaia rassudochnaia deiatel'nost').** O. S. Adrianov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and L. N. Molodkina (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Priroda,* no. 6, 1972, p. 40-46. 21 refs. In Russian.

Discussion of experiments which were conducted in an attempt to explore the intelligence of animals and their ability of extrapolation to foresee the coming events. The topics include the general functions of frontal cerebrum regions, the participation of these regions in the elementary prognostic activity, the relation between emotions and mind, and the lobectomy paradox. V.Z.

A72-36424 # **The imaging properties of the positron camera (Die Abbildungseigenschaften der Positronenkamera nach Anger).** W. J. Lorenz, O. Krauss, H. Luig, H. Ostertag, and P. Schmidlin (Deutsche Krebsforschungszentrum, Heidelberg, West Germany). *Radiobiologia - Radiotherapia,* vol. 13, no. 2, 1972, p. 251-258. In German.

A72-36425 # **Mathematical methods for improving the significance of scintigrams (Mathematische Methoden zur Verbesserung der Aussagekraft von Szintigrammen).** W. J. Lorenz, H. Luig, H. G. Meder, P. Pistor, P. Schmidlin, and G. Walch (Deutsche Krebsforschungszentrum; IBM Deutschland, Heidelberg, West Germany). *Radiobiologia - Radiotherapia,* vol. 13, no. 2, 1972, p. 259-264. 14 refs. In German.

A72-36435 * **The influence of clinostat rotation on the fertilized amphibian egg.** J. W. Tremor and K. A. Souza (NASA, Ames Research Center, Moffett Field, Calif.). *Space Life Sciences,* vol. 3, June 1972, p. 179-191. 31 refs.

Study in which unrestrained, fertilized eggs of Rana pipiens and Xenopus laevis were rotated in a plane parallel to the normal gravity vector. In R. pipiens rotation at 1/4 rpm for five days at 18 C produced a significantly increased number of commonly occurring abnormalities. Rotation at 1/15, 1/8, 1, 2, 5 and 10 rpm did not significantly affect normal development. X. laevis eggs reacted similarly. R. pipiens eggs were most sensitive to rotation at 1/4 rpm when exposure was initiated before first cleavage. Mixing of intracellular constituents apparently occurred only at 1/4 rpm in R. pipiens (of the clinostat speeds studied), and may have been the cause of the increased abnormality observed at this rate. (Author)

A72-36436 * **Habitability factors in a rotating space station.** B. D. Newsom (NASA, Manned Spacecraft Center, Houston, Tex.). *Space Life Sciences,* vol. 3, June 1972, p. 192-197. 12 refs.

Factors aiding man to adjust to the artificial gravity environment of a rotating space station in orbit are considered. From recent experiments reported by Newsom et al. (1966), it is known that, if man is taken stepwise into a rotating environment, he can adjust (without becoming ill) to spin rates above that required for maintaining an artificial gravity environment in a space station. Little or no data are available, and much work remains to be done in the area of prehabituation and the rate at which habituation is extinguished. At least three factors must be considered in the design of an artificial gravity space station, and these factors directly affect the degree of habitability of the space-station environment. The three factors are rotation rate, stability, and Coriolis force. M.V.E.

A72-36437 * **The effects of various cure cycles upon the viability of Bacillus subtillis var. niger spores within solid propellant.** W. A. Brewer, W. W. Paik, C. L. Robillard, R. H. Green (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), and C. D. Smith (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.; Avco Corp., Avco Systems Div., Wilmington, Mass.). *Space Life Sciences,* vol. 3, June 1972, p. 198-205. 5 refs.

Saturethane solid propellant was used in all tests. The spore inoculum was evenly distributed in the propellant. Samples weighing approximately 5 g were aseptically removed, placed into curing ovens, and exposed to cure temperatures. Initial tests were conducted at 82 and 93 C. Analysis of the obtained data indicated that the survivor curves were not linear. Exposure of the inoculated propellant samples to 93 C reduced the initial population to less than 0.01% in about 20 hours. At 82 C, approximately 168 hours were required for a similar reduction. Tests involving curing temperatures of 105 and 115 C were also conducted. It is pointed out that changes in the mechanism of spore inactivation due to chemical and physical changes in the propellant could account for the nonlinear survivor curves obtained. G.R.

A72-36438 **Predictability of PaO2 in different inert gas-oxygen environments.** C. L. Schatte, J. B. Simmons, D. P. Clarkson, and J. P. Jordan (Colorado State University, Fort Collins, Colo.). *Space Life Sciences,* vol. 3, June 1972, p. 206-209. 6 refs.

Evaluation of the blood oxygenating ability of helium and argon environments relative to atmospheric air. Using the alveolar gas equation, the inspired oxygen pressure necessary to produce an arterial oxygen pressure (PaO2) similar to that occurring in atmospheric air was computed for various test environments. Despite the variation in viscosity and density of the mixtures, it is concluded that the mechanical aspects of breathing them are not likely significantly to influence ventilation (and, presumably, arterial oxygenation) at normal to moderately hyperventilatory respiration rates. M.V.E.

A72-36439 * **Neuropathological evaluation of monkeys exposed to body-alone X-radiation.** W. Haymaker (NASA, Ames Research Center, Moffett Field, Calif.), D. Sturrock, J. H. Kirk, H. W. Casey (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), and N. A. Call (Mercy Institute of Biomedical Research, Denver, Colo.). *Space Life Sciences,* vol. 3, June 1972, p. 210-225. 7 refs.

Investigation of the problem of whether morphological changes occurring in the central nervous system (CNS) following whole-body irradiation are attributable in part to abscopal factors. The 12 monkeys irradiated and the 6 that served as controls were chosen from a pool of 25 young monkeys. Over the postirradiation survival period of 14 days the hematocrit and hemoglobin values varied only slightly from the baseline values and from the values in the 6 control animals. White cell fractions were reduced in quantity but tended to recover relatively soon after irradiation. The design of this experiment was regarded as adequate to allow a conclusion whether pathological changes in the CNS of the irradiated animals differed from or exceeded those observed in the control animals. That such occurred on both counts in 3 of the 12 irradiated animals was evident. It appears that all the lesions must have been abscopally induced. F.R.L.

A72-36440 **Of pigs and men and research - A review of applications and analogies of the pig, sus scrofa, in human medical research.** W. R. Douglas (Rigshospitalet, Copenhagen, Denmark). *Space Life Sciences,* vol. 3, June 1972, p. 226-234. 54 refs.

A review of the role of pigs as an ideal experimental animal in human medical research is given, covering applications and analogies of sus scrofa in general medicine encompassing space medicine. It is also a report of some investigations carried out on Danish Landrace pigs that emphasize the similarities of swine and men. The musculoskeletal system, respiration, circulation, blood, lymph, digestion, metabolism, nutrition, excretion, endocrines, dermatological problems, and eyes are discussed along with other aspects to show the value of the pig when a large, human-like biomedical research animal is needed. (Author)

A72-36441 **An hypothesis concerning the mechanism of the sodium-potassium pump /Brief note/.** R. A. Horne (J. B. F. Scientific Corp., Burlington, Mass.). *Space Life Sciences,* vol. 3, June 1972, p. 235-238. 9 refs.

Advancement of the hypothesis that a mechanism repeated in a multistep process could easily give rise to the observed enrichment K(+) relative to Na(+) in the internal liquid of living cells. The hypothesis is based on the fact that the K(+) is enriched relative to Na(+) in the marine aerosol compared to the aerosol's sea water source by natural fractionation processes occurring at the air/sea interfacial boundary. If the process proves to have any validity, it will then afford still another compelling example of the unique fitness of the aqueous environment for the support of biosystems. F.R.L.

A72-36442 * **A stochastic bioburden model for spacecraft sterilization.** A. L. Roark (Sandia Laboratories, Albuquerque, N. Mex.). *Space Life Sciences,* vol. 3, June 1972, p. 239-253. 26 refs. NASA-supported research. NASA Order W-12853.

Development of a stochastic model of the probability distribution for the random variable representing the number of microorganisms on a surface as a function of time. The first basic principle associated with bioburden estimation is that viable particles are removed from surfaces. The second notion important to the analysis is that microorganisms in environments and on surfaces occur in clumps. The last basic principle relating to bioburden modeling is that viable particles are deposited on a surface. The bioburden on a spacecraft is determined by the amount and kind of control exercised on the spacecraft assembly location, the shedding characteristics of the individuals in the vicinity of the spacecraft, its orientation, the geographical location in which the assembly takes place, and the steps in the assembly procedure. The model presented has many of the features which are desirable for its use in the spacecraft sterilization programs currently being planned by NASA. F.R.L.

A72-36443 * **'Thunder' - Shock waves in pre-biological organic synthesis.** A. Bar-Nun (Jerusalem, Hebrew University, Jerusalem, Israel) and M. E. Tauber (NASA, Ames Research Center, Moffett Field, Calif.). *Space Life Sciences,* vol. 3, June 1972, p. 254-259. 13 refs.

Theoretical study of the gasdynamics and chemistry of lightning-produced shock waves in a postulated primordial reducing atmosphere. It is shown that the conditions are similar to those encountered in a previously performed shock-tube experiment which resulted in 36% of the ammonia in the original mixture being converted into amino acids. The calculations give the (very large) energy rate of about 0.4 cal/sq cm/yr available for amino acid production, supporting previous hypotheses that 'thunder' could have been responsible for efficient large-scale production of organic molecules serving as precursors of life. (Author)

A72-36444 * **A note on the biological activity of the noble gas compound xenon trioxide.** S. M. Siegel and C. W. Smith (Hawaii, University, Honolulu, Hawaii). *Space Life Sciences,* vol. 3, June 1972, p. 260-264. 5 refs. Grant No. NGL-12-001-042.

Comparison of xenon trioxide for toxicity in the few common oxidants using three bioassays. On a molar basis XeO3 and HOCl were similar, but XeO3 was less active than expected when comparisons were based on normality. (Author)

A72-36445 **Functional development of the altitude convulsion mechanism in mice and rabbits /Research note/.** C. F. Chen and H. S. Fang (National Taiwan University, Taipei, Nationalist China). *Space Life Sciences,* vol. 3, June 1972, p. 265-267. 6 refs.

A72-36446 **Effects of vagotomy and increased blood pressure on the incidence of decompression-induced pulmonary hemorrhage.** H. S. Fang (National Taiwan University, Taipei, Nationalist China) and C. M. Tang (CAF General Hospital, Taipei, Nationalist China). *Space Life Sciences,* vol. 3, June 1972, p. 268-270.

A72-36447 # **Body weight decreases in some proton exposed primates.** J. H. Kirk (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Space Life Sciences,* vol. 3, June 1972, p. 271-277. 10 refs.

Immature Macaca mulatta were exposed to varying doses of whole body irradiations utilizing 2 MeV X-rays; 55, 138 and 400 MeV protons; and 2.3 GeV protons. Over 200 primates remain in a life-long study of space type irradiation effects. Mean body weight decreases as a function of age, sex, dose and irradiation type have been found in the 55 MeV proton exposed group but not in the other groups. The cause of the decreased weights is unknown at present, as is the reason for the lack of this effect in the more penetrating irradiations. (Author)

A72-36448 **Evidence for activated interfacial charge transport in low-G acceleration stress.** F. W. Cope (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Space Life Sciences,* vol. 3, June 1972, p. 278-281. 20 refs.

Demonstration that the distribution of survival times of rats subjected to acceleration stress of +20 Gz conforms to the Roginsky-Zeldovich or Elovich equation. This equation is derived from the hypothesis of electron or ion conduction across an activation energy barrier at the surface of a cell or subcellular particle, which suggests that tolerance to this acceleration stress is dependent upon such a biophysical process. (Author)

A72-36449 **Neuroinhibition in the regulation of emesis.** J. Zabara, R. B. Chaffee, Jr., and M. F. Tansy (Temple University, Philadelphia, Pa.). *Space Life Sciences,* vol. 3, June 1972, p. 282-292. 31 refs. Grant No. PHS-FR-05339-07.

Elucidation of an inhibitory system in the regulation of emesis is presented in this report. Emesis preceded by retching can be induced in the dog by appropriate electrical stimulation of abdominal vagus nerves at the supradiaphragmatic level. Failure to produce retching or emesis by electrical stimulation of the cervical vagus trunk suggests either that the abdominal vagal emetic afferent does not course in the cervical vagus or that fibers inhibitory to emesis are present. This report presents evidence for afferent fibers inhibitory to retching and emesis in the cervical vagus. Retching and emesis resulting from stimulation of the supradiaphragmatic vagus can be prevented by either transection of the cervical vagus or simultaneous stimulation of the cervical vagus trunk. In addition, retching and emesis occur with stimulation of a fine nerve bundle dissected from the cervical vagus trunk. (Author)

A72-36450 * **Chemical evolution and the origin of life - Bibliography supplement 1970.** M. W. West, E. D. Gill (San Jose State College, San Jose, Calif.), and C. Ponnamperuma (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Space Life Sciences,* vol. 3, June 1972, p. 293-304. 213 refs.

A72-36522 **Observations on microwave hazards to USAF personnel.** L. T. Odland (USAF, Radiological Health Laboratory, Wright-Patterson AFB, Ohio). *Journal of Occupational Medicine,* vol. 14, July 1972, p. 544-547. 17 refs.

Consideration of microwave injury experiences and possible potential hazards of microwave exposures to microwave operators in an attempt to assess the validity of present USAF exposure safety limits. Particular attention is given to the incidence of cataract in members of USAF personnel exposed to microwave radiation. It is pointed out that the present 10 mw/sq cm exposure limit may be subject to a future revision when warranted by new evidence. It is also indicated that the eye is not the most vulnerable organ and that the use of cataract development as a criterion of microwave damage is conditional. V.Z.

A72-36536 **Continuous flow general aviation oxygen masks.** *SAE Aerospace Standard,* AS 1224, Sept. 15, 1971. 7 p.

A72-36559 # **Thermoregulation during positive and negative work at different environmental temperatures.** B. Nielsen, S. L. Nielsen, and F. B. Petersen (Copenhagen, University, Copenhagen, Denmark). *Acta Physiologica Scandinavica,* vol. 85, June 1972, p. 249-257. 25 refs. Research supported by the Danish Medical Research Council.

Study of cardiac output, and thermoregulatory reactions at 20, 30 and 35 C during positive work (pos I) and negative work (neg) at O2 uptakes of 0.8 liter/min, and also during positive work (pos II) at an O2 uptake of 1.7 liter/min - i.e., with a total heat production equal to that during the negative work. At equal O2 uptakes the cardiac output was the same in pos I and neg. The blood flow in the working muscles, estimated with a Xe133 method, was not measurably different in pos I and neg. The upper limit for thermal equilibrium was reached at lower environmental temperature in negative work. This is most probably explained by the higher skin circulation during negative work. Since the total cardiac output and muscle blood flow are the same in pos I and neg, the blood reserve available for heat transport during external heat stress - e.g., in splanchnic organs - is presumably reduced in negative work. (Author)

A72-36560 # **Fluid transfer between blood and tissues during exercise.** J. Lundvall, S. Mellander, H. Westling, and T. White (Lund, Universitet, Lund, Sweden). *Acta Physiologica Scandinavica,* vol. 85, June 1972, p. 258-269. 21 refs. Swedish Medical Research Council Grants No. K71-14X-2210-05CK; No. B72-14X-2210-06A; No. B71-14X-2872-03C.

During 6 min exercise on a bicycle ergometer the volume of the leg in normal males increased so as to indicate, after correction for increased regional blood volume, an average transcapillary fluid loss into the leg muscles of 19, 31, and 45 ml/kg tissue at light (300 kpm/min), moderate (900 kpm/min), and heavy (1200-1500 kpm/min) work load. The total fluid loss into the active muscle mass was calculated to comprise about 1100 ml during heavy work. Since the concomitant decrease of plasma volume was 600 ml, it follows that some 500 ml of fluid must have entered the circulatory system during the work. The study indicated that this compensatory fluid gain was accomplished by absorption of extravascular fluid from inactive tissues and partly caused by osmosis resulting from work induced arterial hyperosmolality (average increase 22 mOsm/kg H2O). Fluid absorption from inactive tissues was studied in experimental animals during exercise and in resting humans during arterial hyperosmolality produced by intravenous hypertonic infusions. The investigations suggested that at least half of the fluid gain to the circulatory system in heavy exercise could be ascribed to the increased arterial osmolality and the remainder to a reflex decrease of capillary pressure. (Author)

A72-36569 **Hemoglobin-facilitated diffusion of oxygen - Interfacial and thickness effects.** J. A. Jacquez, E. Daniels (Michigan, University, Ann Arbor, Mich.), and H. Kutchai (Johns Hopkins University, Baltimore, Md.). *Respiration Physiology,* vol. 15, June 1972, p. 166-181. 15 refs.

A72-36570 **Pulmonary gas exchange in Andean natives at high altitude.** J. C. Mithoefer, G. Zubieta, M. C. Mithoefer (Dartmouth Medical School, Hanover, N.H.; Instituto Boliviano de Biologfa de Altura, La Paz, Bolivia), and J. E. Remmers. *Respiration Physiology,* vol. 15, June 1972, p. 182-189. 11 refs. Research supported by the United Health Foundations; Grants No. NIH-HE-02888-11; No. NIH-HE-09130-03; No. NIH-HE-05869-02.

A72-36571 **A model of fluctuating alveolar gas exchange during the respiratory cycle.** M. P. Hlastala (Washington, University, Seattle, Wash.). *Respiration Physiology,* vol. 15, June 1972, p. 214-232. 19 refs. Grants No. PHS-HE-12174; No. PHS-HE-05819.

A72-36572 **Role of the autonomic nervous system in the hypoxic response of the pulmonary vascular bed.** H. Kazemi, E. F. Parsons (Massachusetts General Hospital; Harvard University, Boston, Mass.), and P. E. Bruecke. *Respiration Physiology,* vol. 15, June 1972, p. 245-254. 31 refs. Grants No. NIH-HE-0666-4; No. NIH-HE-05767.

A72-36573 **In vivo incorporation of C-14/1/palmitate and H-3/U/glucose into lung lecithin.** L. Gassenheimer, R. A. Rhoades, and R. W. Scholz (Pennsylvania State University, University Park, Pa.). *Respiration Physiology,* vol. 15, June 1972, p. 268-275. 34 refs. Grant No. NIH-ES-00335.

Study of pulmonary lipid metabolism through measurements of the biological half-life of mixed lung lecithins and their hydrolytic products under feeding and fasting in rats intravenously injected with a doubly labeled isotropic solution of C-14/1/palmitate and H-3/U/glucose. The fasting condition was chosen because lipid metabolism in liver and adipose tissue is markedly affected by fasting. It was found that fasting did not significantly affect the half-life of whole-lung lecithins. M.V.E.

A72-36605 **Intraocular noise - Origin and characteristics.** A. Troelstra (Rice University, Houston, Tex.). *Vision Research,* vol. 12, Aug. 1972, p. 1313-1326. 15 refs.

A72-36606 **An analytical description of the line element in the zone-fluctuation model of colour vision. I, II.** J. J. Vos and P. L. Walraven (Institute for Perception RVO-TNO, Soesterberg, Netherlands). *Vision Research,* vol. 12, Aug. 1972, p. 1327-1365. 48 refs.

A72-36607 **Effect of selective adaptation on detection of simple and compound parafoveal stimuli.** L. G. Kerr and J. P. Thomas (California, University, Los Angeles, Calif.). *Vision Research,* vol. 12, Aug. 1972, p. 1367-1379. 19 refs. Grant No. PHS-EY-00360.

A72-36608 **On the apparent orbit of the Pulfrich pendulum.** W. R. Levick, B. G. Cleland, and J. S. Coombs (Australian National University, Canberra, Australia). *Vision Research,* vol. 12, Aug. 1972, p. 1381-1388. 21 refs.

A72-36609 **Fly colour vision.** A. W. Snyder (Australian National University, Canberra, Australia) and W. H. Miller (Yale University, New Haven, Conn.). *Vision Research,* vol. 12, Aug. 1972, p. 1389-1396. 17 refs.

A72-36610 **Optokinetic thresholds in the normal monkey.** J. A. Valciukas (New York, City University, New York, N.Y.). *Vision Research,* vol. 12, Aug. 1972, p. 1397-1407. 19 refs. Research supported by the City University of New York; Grant No. NIH-MH-02261.

A72-36611 **Visual brightness - Some applications of a model.** L. E. Marks (John B. Pierce Foundation Laboratory; Yale University, New Haven, Conn.). *Vision Research,* vol. 12, Aug. 1972, p. 1409-1423. 46 refs. Grant No. AF-AFOSR-70-1950.

Application of a model, the essence of which is the postulation of a cascade of filter-like stages; the relation between the output from the filter system and the input to it is seen to parallel the brightness response of the visual system to light. The critical assumption of the model is that the output of each filter stage is modulated by shunting feedback. Psychophysical functions for brightness, parametric effects on brightness (retinal locus of stimulation), temporal and spatial summation, and some anatomical and physiological speculations are considered. F.R.L.

A72-36612 **Vergence eye movements to pairs of disparity stimuli with shape selection cues.** R. Jones and K. E. Kerr (Ohio State University, Columbus, Ohio). *Vision Research,* vol. 12, Aug. 1972, p. 1425-1430. 14 refs. Research supported by the Ohio State University Development Fund and Ohio Lions Foundation.

A72-36613 **Hue shifts accompany phase induced modulation enhancement of sinusoidally flickering lights.** G. K. Bijl and F. T. Veringa (Groningen, State University, Groningen, Netherlands). *Vision Research,* vol. 12, Aug. 1972, p. 1431-1434. 7 refs. Research supported by the Nederlandse Organisatie voor Zuiverwetenschappelijk Onderzoek.

A72-36624 **Circadian variation of RNA in human leucocytes.** W. C. Kohler, I. Karacan, and O. M. Rennert (Florida, University, Gainesville, Fla.). *Nature,* vol. 238, July 14, 1972, p. 94-96. 8 refs. Research supported by the U.S. Veterans Administration and NIH.

Changes in total (quantitative) RNA content, as well as changes in RNA type (qualitative) in human leucocytes are reported. These changes follow a rhythm of approximately 24 hours. Advances in electroencephalographic studies were utilized for extending the diurnal evaluation to include samples during normal sleep. Five healthy young adults were studied. A definite circadian rhythm in total RNA was found to be present in all five subjects. G.R.

A72-36799 # **Studies of the influence of theophylline on the vasodilating action of different medications on the cerebral and coronary circulation of man (Recherches de l'influence de la théophylline sur l'action vasodilatatrice de différents médicaments sur la circulation cérébrale et coronaire de l'homme).** H. H. Hilger, M. Grenzmann, J. Wagner, D. W. Behrenbeck, and H. Hellwig (Bonn, Universität, Bonn, West Germany). *Acta Cardiologica,* vol. 27, no. 3, 1972, p. 383-391. 16 refs. In French.

A72-36829 **Development and results of freeze-etching techniques (Entwicklung und Ergebnisse der Gefrierätz-Technik).** H. Moor (Eidgenössische Technische Hochschule, Zurich, Switzerland). In: Results of high-vacuum technology and the physics of thin films. Volume 2. Stuttgart, Wissenschaftliche Verlagsgesellschaft mbH, 1971, p. 33-58. 29 refs. In German.

Presently used techniques for the study of biological structures with the electron microscope have the disadvantage that chemical transformations occur in the objects of study during the preparation with a casting resin. A new method which does not require the use of a plastic material had been first proposed by Hall (1950). The method was first employed for the study of biological specimens by Steere (1957). The method was technically improved by Moor et al. (1971). It is pointed out that an instrument is now commercially available as an aid for the widespread use of the new method. The design of the instrument is discussed together with some results obtained with it, the freezing living cells, the breaking up of frozen objects, and approaches for obtaining the desired structural image under the electron microscope. G.R.

A72-36902 **Recent research applicable to the design of electronic displays.** M. Munn (U.S. Navy, Crew Systems Dept., Warminster, Pa.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 683-689. 16 refs.

Summary of recent research pertaining to some of the variables involved in various electronic displays such as radar scopes, fire control indicators, clear-plot tactical displays, etc., in the hope that the information will prove useful in the further development of operational electronic systems. Symbols, the number of display variables, the area of display persistency, display update rate, search and detection time, and operator alertness are discussed. F.R.L.

A72-36903 **Extraversion, neuroticism, and color preferences.** A. Choungourian (Pennsylvania State University, University Park, Pa.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 724-726. 8 refs.

Extraverts (N = 80), neurotics (N = 80), and an undifferentiated group (N = 160), with equal numbers of males and females in each group coming from 4 diverse national backgrounds, expressed their preferences for eight Ostwald hues (red, orange, yellow, yellow-green, green, blue-green, blue, and purple) through the method of paired comparisons. The results indicate that there are no significant differences between the color preferences of an undifferentiated group and either extraverts or neurotics; however, neurotics prefer significantly more red and purple than extraverts, while extraverts prefer significantly more yellow-green than neurotics. (Author)

A72-36904 **Autokinesis and attention distribution.** S. Starker (Montefiore Hospital, Bronx, N.Y.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 743-749. 25 refs.

An attempt is made to test experimentally the Voth and Mayman hypothesis that autokinesis is mediated by an attention-distribution mechanism. Experimental manipulations of attention distribution failed to yield significant effects upon autokinetic perception. The tentativeness of the Voth and Mayman model of autokinesis is emphasized. (Author)

A72-36905 **Personality correlates of lateral eye movement and handedness.** C. F. Etaugh (Bradley University, Peoria, Ill.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 751-754. 11 refs. Research supported by Bradley University.

A72-36906 **Developmental relationships between field independence and fixity-mobility.** D. A. Eisner (William Paterson College, N.J.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 767-770. 11 refs.

The level of field independence (measured by the embedded-figures test) was intercorrelated for 20 males with the level of fixity-mobility (measured by the Stroop color-word test) at five different age levels. The Pearson correlations suggested that with an increase in the level of field independence there is a tendency to be mobile, and with a decrease in the level of field dependence there is a tendency to be fixed. (Author)

A72-36907 **Experimenter-expectancy phenomenon - Experience of E, mechanical vs manual stimulus presentation and IQ vs success-failure judgments.** H. McGinley, P. McGinley (Wyoming, University, Laramie, Wyo.), and R. Murray (Manitoba, University, Winnipeg, Manitoba, Canada). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 771-781. 30 refs. National Research Council Grant No. 7458.

Fifty experimenters obtained person perception data from 576 subjects. In Phase I, two experienced experimenters obtained IQ and success-failure (SF) judgments from 50 male and 50 female subjects about 10 women whose pictures they viewed. In Phase II, 48 inexperienced experimenters obtained IQ and SF judgments from 476 female subjects. The independent variables in Phase II were 0 + 5 expectancy, mechanical or manual presentation of picture stimuli, IQ or SF judgments, and order of expectancy inducement. Results showed only a judgment effect, higher ratings for SF than IQ. Questionnaire data showed that subjects whose data were collected by experienced experimenters felt that SF judgments were easier to make than did subjects whose data were collected by inexperienced experimenters. (Author)

A72-36908 **Visual half-field differences in the recognition of bilaterally presented single letters and vertically spelled words.** W. F. McKeever and K. M. Gill (Bowling Green State University, Bowling Green, Ohio). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 815-818. 11 refs.

Tachistoscopic recognition of bilaterally presented single letters and vertically spelled works as a function of the lateral visual-half-field placement of the stimuli was examined. Right visual-field recognition superiority obtained for both types of stimuli, but the percentage of subjects showing right-field superiority was much lower than obtained in earlier experiments using horizontally spelled words as stimuli. It is suggested that reading habits are not fundamental to the results and that all the data can be encompassed within a lateral dominance and visual masking-temporal registration sequence model in which the temporal patterning of inputs from differing retinal locations plays a major role in producing left-right differences for horizontally displayed words. (Author)

A72-36909 **Novelty, recency and frequency effects on visual recognition and pseudo-recognition thresholds.** S. W. Pyke (York University, Toronto, Canada). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 847-856. 20 refs. National Research Council Grant No. APT-60.

A72-36910 **Life-span age differences in visual perception.** D. A. Eisner (William Paterson College, N.J.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 857, 858. 9 refs.

Results of administration of a large number of perceptual tasks to subjects of widely different ages to assess whether some tasks are more age-related than others. The design was cross-sectional, i.e., age differences may reflect both maturational differences along with generational differences (Schaie, 1970). Analyses of variance indicated significant age differences on 13 of the 16 variables. F.R.L.

A72-36911 **Self-paced ergometer performance - Effects of pedal resistance, motivational contingency and inspired oxygen concentration.** M. J. Gerben, J. L. House, and F. R. Winsmann (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 875-881. 5 refs.

A72-36912 **Non-monotonicity of temporal recognition of brief duration.** S. S. Mo and V. A. Michalski (Detroit, University, Detroit, Mich.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 887-890. 7 refs.

Bow-shaped curves were obtained for correct judgments of five brief durations, regardless of whether judgment was of durations themselves or of the apparent brightness of the stimulus. The mechanism of subjective time was shown not to retain the directionality inherent in objective time. (Author)

A72-36913 Division and orientation in the vertical-horizontal illusion. J. A. Becker (Thomas More College, Fort Mitchell, Ky.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 899-902. 11 refs.

This study attempted to determine the influence of the division (bisection of the horizontal line by the vertical line) and orientation (vertical line seems longer than horizontal line) factors on the vertical-horizontal illusion. 100 subjects were divided into two groups, one with knowledge of the division and orientation factors and the other group without knowledge of these factors. The results indicated that the amount of error for the group with knowledge was significantly smaller than for the group without knowledge. (Author)

A72-36914 Effect of reference points and masking on tachistoscopic pattern perception. P. M. Monti (College of William and Mary, Williamsburg, Va.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 923-940. 21 refs. Grant No. NIH-HD-00207-11.

Four experiments examined subjects' tendency to reproduce more accurately elements about reference points, i.e., fixation (fixation facilitation) and extreme positions (end-segregation) of binary patterns. Experiment I varied pattern length from 4 to 28 elements. As predicted, end-segregation was greatest for intermediate lengths, and absent for longer patterns. Unexpected results were an end-segregation effect for shortest patterns and no fixation facilitation. In experiment II, pairs of elements at all eccentric positions were more accurately reproduced when presented alone. Experiment III found no fixation facilitation with 28-element patterns and fixation-reference markers on the responding templates. Experiment IV tested the hypothesis that the fixation marker had masked central elements in experiments I and III. These experiments show that mnemonic factors affect differential perceptual accuracy among elements in tachistoscopic patterns. (Author)

A72-36915 Concurrent task practice conditions and transfer. R. S. Rivenes and C. S. Caplan (California State College, Hayward, Calif.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 941, 942. 6 refs.

Sixty girls practiced rotary pursuit with 10-sec work, 15-sec rest. Twenty transferred to 60 rpm after 20 trials at 45 rpm, 20 transferred from 45 to 60 rpm, and 20 alternated trials. Total time on target was higher for 45 rpm than for 60 rpm and transfer was greater from the slower to the faster speed, but over-all group performance was equivalent. (Author)

A72-36916 Verbal reports of pain without noxious stimulation. K. D. Craig (British Columbia, University, Vancouver, Canada) and S. M. Weiss (Johns Hopkins University, Baltimore, Md.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 943-948. 10 refs. National Research Council of Canada Grant No. APA-136.

It was hypothesized that allowing subjects to observe a confederate model reporting a constant, nonaversive electric shock as progressively more noxious would elicit reports of pain to this same shock from subjects themselves. Two groups of 10 subjects received nonincremental shocks, with one group observing a model rate the shocks as progressively more painful. Subjects concurrently rated shock intensity on a scale varying from undetectable to painful. Subjects paired with a progressively less tolerant model matched this behavior. The findings were discussed in the context of vicarious learning theory and social influences on expressions of pain. (Author)

A72-36917 Repression-sensitization and duration of visual attention. D. Carroll (Australian National University, Canberra, Australia). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 949, 950. 6 refs.

This study attempted to gauge the relationship between score on the repression-sensitization (R-S) scale and the duration of visual attention exhibited to affective (pleasant and unpleasant) and affectively neutral visual stimuli. Position on the R-S dimension differentially influenced the looking times exhibited to the unpleasant and pleasant stimuli by 24 subjects. (Author)

A72-36918 Effects of visual cues on the standing body sway of males and females. S. Weissman (Lafayette College, Easton, Pa.) and E. Dzendolet (Massachusetts, University, Amherst, Mass.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 951-959. 11 refs.

Six male and six female subjects, in a standing position, were exposed for 4 min to the following conditions: eyes closed, vertical luminous rod, horizontal luminous rod, diagonal right luminous rod, eyes closed - body lean left, and eyes open with view of experimental room. Each student was tested in a single session, with the six conditions presented according to their position in a Latin square design. Power spectral density analysis of body sway showed little influence of the visual system in the maintenance of static equilibrium. Possible effects of the visual system in more active or stressful body conditions were discussed. (Author)

A72-36919 Experienced attraction between two parallel bars. K. Holt-Hansen (Copenhagen, University, Copenhagen, Denmark). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 971-974.

The present paper describes judged attraction (forces) between objects, which, in my experiments, are parallel bars, approximately 17 cm long and 8 mm wide, placed in the middle of a black surface measuring 50 by 50 cm. The maximum attraction between the bars was most frequently judged to occur when the distance between the bars was approximately 4 cm. When the distance between the bars grew smaller than 4 cm judged attraction continued for a large majority of subjects until the bars lay close together. The range of judged attraction ended for most at 20 cm but not for all. (Author)

A72-36920 Manipulation of projected afterimages by means of the physiological theory imposed on the observer. G. J. W. Smith and L. Sjoeholm (Lund Universitet, Lund, Sweden). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 975-981. 6 refs. Research supported by the Swedish Council for Social Science Research.

Three previous experiments have shown that subjects presented with a theory of visual afterimages (AIs) emphasizing their outside origin produce more immature images than subjects presented with the opposite, subject-centered type of theory. In the present experiment with 29 20-yr-old students, one subgroup (retinal) was told that the AI is an exclusively retinal affair, the other subgroup (CNS) that it is shaped by the same parts of CNS as control central mental functions. The results indicated that possibilities of individual expression via the AI were constricted by the retinal theory and broadened by the CNS theory. (Author)

A72-36921 Apparatus for programmed oral administration of drugs to large primates in altered environments. L. Wynne and A. G. Koestler (USAF, Aeromedical Research Laboratory, Holloman AFB, N. Mex.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 991-999. 5 refs. Research supported by the U.S. Food and Drug Administration and U.S. Air Force.

This apparatus was designed to administer chronic and high-level doses of clinical drugs (e.g., hydrochlorothiazide, allopurinol, clofibrate) to primates by suspending the drugs in a liquid reinforcer in order to assess their effects on operant baselines. Since nausea, drowsiness, and other common side effects might well be more

pronounced in experimental vibration and altered gravity - conditions of interest to flying personnel - the apparatus was designed to be able to withstand such conditions without degradation of the reinforcement delivery mechanism. (Author)

A72-36922 * Effect of set size, age, and mode of stimulus presentation on information-processing speed. J. C. Norton (Arizona, University, Tucson, Ariz.). *Perceptual and Motor Skills,* vol. 34, June 1972, p. 1003-1010. 19 refs. NSF Grant No. GB-3955; Grant No. NGR-03-002-068.

First, second, and third grade pupils served as subjects in an experiment designed to show the effect of age, mode of stimulus presentation, and information value on recognition time. Stimuli were presented in picture and printed word form and in groups of 2, 4, and 8. The results of the study indicate that first graders are slower than second and third graders who are nearly equal. There is a gross shift in reaction time as a function of mode of stimulus presentation with increase in age. The first graders take much longer to identify words than pictures, while the reverse is true of the older groups. With regard to set size, a slope appears in the pictures condition in the older groups, while for first graders, a large slope occurs in the words condition and only a much smaller one for pictures. (Author)

A72-36977 Restitution of function in the CNS - The pathologic grasp in Macaca mulatta. M. E. Goldberger (Chicago, University, Chicago, Ill.). *Experimental Brain Research,* vol. 15, no. 1, 1972, p. 79-96. 41 refs. NSF Grants No. GB-27614; No. GB-7902.

Investigation of the behavioral changes which constitute recovery of motor function, and evaluation of the contribution of different parts of the nervous system to recovery from forced grasping in particular, by observations on both reflex and conditional movements. Cortical lesions made it impossible for the animals to relinquish a stick or to avoid grasping an unconditioned (tactile) stimulus. The possible mechanisms underlying restitution are discussed; it is suggested that the abnormal grasp is compensated by enhancement of its opposing reflex, tactile evasion, which is subserved by the pyramid. During 'recovery', pyramidal function vis-a-vis tactile evasion was enhanced in response to loss of inhibitory control over tactile and proprioceptive grasp reflex activity. This model is offered as an alternative to 'functional reorganization' and 'vicarious function'. F.R.L.

A72-36999 Servo action in human voluntary movement. C. D. Marsden (National Hospital; Institute of Psychiatry, London, England), P. A. Merton (National Hospital, London; Physiological Laboratory, Cambridge, England), and H. B. Morton (National Hospital, London, England). *Nature,* vol. 238, July 21, 1972, p. 140-143. 19 refs. Research supported by the Department of Trade and Industry.

It is pointed out that so far the evidence for the servo theory of muscle control from animal experiments has been equivocal. Direct evidence regarding the servo theory was obtained by conducting experiments involving an unexpected interference with flexion movements of the top joint of the human thumb. This movement was chosen because it involves only one muscle, the flexor pollicis longus, which lies in the forearm. It was found that there is servo action, sensitive, brisk, and so early as clearly to be automatic, in voluntary movements of the thumb. G.R.

A72-37013 Considerations in the design of an automatic visual field tester. J. A. Gans (Mount Sinai Hospital, Cleveland, Ohio). *Medical Research Engineering,* vol. 10, Dec. 1971, p. 7-11. 6 refs.

Discussion of an automatic visual field tester design which does not require any human assistance for control and operation. Physical, electronic and ophthalmological aspects of this design are considered. A block diagram of a prototype tester is included. The key features of the tester are a stepper, a timer and a power supply system. V.Z.

A72-37026 * Experimental investigation of an astronaut maneuvering scheme. T. R. Kane, M. R. Headrick, and J. D. Yatteau (Stanford University, Stanford, Calif.). *Journal of Biomechanics,* vol. 5, July 1972, p. 313-320. Grant No. NGR-05-020-209.

A new concept for astronaut maneuvering in space is proposed, and an experimental study undertaken to test this concept is described. The series of experiments performed appear to promise advantages over previously proposed schemes in terms of propellant economy, system weight, reliability, and safety. The simulation tests established the feasibility of the proposed maneuvering concept by showing that test subjects were able to place their bodies sufficiently near the reference position to avoid excessive angular momentum build-up; no difficulties were encountered in selecting self-rotation maneuvers suitable for effecting desired changes in orientation; and the execution of these maneuvers produced predicted reorientations without tiring the test subject significantly. M.V.E.

A72-37027 Dynamics of dissolution of gas bubbles or pockets in tissues. W.-J. Yang and C. Y. Liang (Michigan, University, Ann Arbor, Mich.). *Journal of Biomechanics,* vol. 5, July 1972, p. 321-332. 30 refs.

A mathematical model is developed which describes the dynamic characteristics of gas bubbles in subcutaneous tissues. Consideration is given to both inert and reacting gases. The effects of blood perfusion (or oxygen consumption in the tissue in dead animals), diffusion of the dissolved gases, a creep process occurring in the tissue, and thermodynamic behavior of the gases in the cavity on the dissolution of the gas bubbles are taken into account. The stress-strain relation of the tissues in creep is described by the standard linear model of viscoelasticity. The theoretical analysis is presented in three categories. (1) tissue creep controlled, (2) mass transfer controlled, and (3) the intermediate case where both mechanisms are of comparable importance. A close agreement is obtained between the theoretical predictions and the existing experimental data for subcutaneous inert gas pockets in air breathing rats. (Author)

A72-37028 Digital computer simulation of human systemic arterial pulse wave transmission - A nonlinear model. B. W. Schaaf and P. H. Abbrecht (Michigan, University, Ann Arbor, Mich.). *Journal of Biomechanics,* vol. 5, July 1972, p. 345-364. 25 refs. NSF Grant No. GB-5874; Grants No. PHS-AM-10395; No. PHS-GM-01289.

A72-37029 A human left ventricular control system model for cardiac diagnosis. D. N. Ghista, K. M. Patil (Indian Institute of Technology, Madras, India), K. B. Woo (National Cancer Institute, Bethesda, Md.), and C. Oliver (Washington University, St. Louis, Mo.). *Journal of Biomechanics,* vol. 5, July 1972, p. 365-390. 17 refs.

A control system model is presented that describes the functional mechanics of the controlled human left ventricle in interaction with the circulatory system and regulated by the central nervous system. The variables of the model are: those associated with the left ventricle, namely chamber pressure and volume, heart rate, contractility; and (2) those associated with the circulatory system, namely arterial pressure and peripheral resistance. Clinical application of the model is carried out for three subjects. For each subject, the diagnostic parameters of the simulated model are obtained, and the inferred physiological health states of the subjects are discussed. M.V.E.

A72-37030 **Plasma proteins, oxygen transport and atherosclerosis.** G. M. Chisolm, J. L. Gainer, G. E. Stoner (Virginia, University, Charlottesville, Va.), and J. V. Gainer, Jr. (West Virginia University, Morgantown, W. Va.). *Atherosclerosis,* vol. 15, May-June 1972, p. 327-343. 31 refs.

Evidence is given in support of the hypoxic theory for the formation of atherosclerosis. It is shown that oxygen transport is affected by plasma protein concentrations and in most humans probably decreases with age. The result of hypoxia at the aortic lining is a degeneration of surface features which results in increased cellular permeability. The interior structure of the vessel is further disorganized due to the influx of lipids and other plasmatic matter. This in turn accelerates oxygen demand and augments hypoxia. These ideas concerning the effects of proteins on oxygen transport, as well as the importance of the diffusion resistance of blood plasma, provide strong indications of a comprehensive mechanism for the occurrence of atherosclerosis and other vascular changes associated with aging. (Author)

A72-37031 **Changes of the mitral echocardiogram with ageing and the influence of atherosclerotic risk factors.** U. Derman (Istanbul, University, Istanbul, Turkey). *Atherosclerosis,* vol. 15, May-June 1972, p. 349-357. 21 refs.

A72-37193 **The influence of molecular binding on the stopping power of alpha particles in hydrocarbons.** J. Williamson (Steetley, Ltd., Hartlepool, Durham, England) and D. E. Watt (Dundee, University, Dundee, Scotland). *Physics in Medicine and Biology,* vol. 17, July 1972, p. 486-492. 11 refs.

A72-37194 **Needle type solid state detectors for in vivo measurement of tracer activity.** A. Lauber (AB Atomenergi, Nykoping, Sweden) and M. Wolgast (Institute of Physiology and Medical Biophysics, Uppsala, Sweden). *Physics in Medicine and Biology,* vol. 17, July 1972, p. 525-537. 29 refs. Research supported by the Swedish Board for Technical Development.

A72-37195 **Some aspects of the use of small needle-shaped semiconductor detectors in the determination of regional distribution and transport of labelled compounds.** M. Wolgast (Institute of Physiology and Medical Biophysics, Uppsala, Sweden) and A. Lauber (AB Atomenergi, Nykoping, Sweden). *Physics in Medicine and Biology,* vol. 17, July 1972, p. 538-547. 14 refs.

A72-37196 **Image resolution in infrared thermography.** D. J. Macey and R. Oliver (Churchill Hospital, Oxford, England). *Physics in Medicine and Biology,* vol. 17, July 1972, p. 563-571.

The measurements considered were made with the Thermovision Type 652 camera. It is pointed out that the principles involved are relevant to clinical thermography in general. As a point detector is scanned across a temperature discontinuity in the field of view, there is a sudden change in the intensity of radiation received. An experimental demonstration is discussed together with theoretical considerations, and aspects of image resolution between lines. G.R.

A72-37197 **The use of a scintillation counter to measure diagnostic X-ray tube kilovoltage, radiation exposure rates and contamination by low energy gamma emitters.** E. T. Henshaw and J. T. Shaughnessy (Liverpool Regional Hospital Board, Liverpool, England). *Physics in Medicine and Biology,* vol. 17, July 1972, p. 577-583. 5 refs.

A72-37220 * **The elusive tradeoff - Speed vs accuracy in visual discrimination tasks.** R. G. Swensson (Bell Telephone Laboratories, Inc., Holmdel, N.J.). *Perception and Psychophysics,* vol. 12, no. 1A, July 1972, p. 16-32. 48 refs. USAF-supported research; Grant No. NGR-23-005-171.

Explicit payoffs were used to control pressures for speed and accuracy in experiments seeking tradeoffs for difficult visual discrimination tasks. The experiments involved stimuli on a cathode ray tube display controlled by a PDP-1 computer, with the subjects performing increasingly complex discrimination tasks and their earnings increasing with their performance. Models for discrimination under time pressure are proposed on the basis of the results. V.Z.

STAR ENTRIES

N72-26042*+ National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 101, APRIL 1972
Apr. 1972 112 p refs
(NASA-SP-7011(101)) Avail: NTIS HC $7.75 CSCL 06E
This special bibliography lists 348 reports, articles, and other documents introduced into the NASA scientific and technical information system in March 1972. Author

N72-26043*# North Carolina Univ., Chapel Hill.
DISCRIMINATION OF GRAVITATIONAL STIMULI Progress Report, 1 Feb. 1971 - 1 Mar. 1972
Fogle C. Clark 1 Mar. 1972 20 p
(Grant NGR-34-003-041)
(NASA-CR-127067) Avail: NTIS HC $3.00 CSCL 03B
The construction and installation of an animal centrifuge and its electronic support system was completed. Experimental procedures for obtaining data on the relationship between the discriminability of g differences and location along the continuum of effective weight were initiated. Data were obtained under two successive discriminations showing discrimination among g levels. In addition, there was some indication that the discriminability of differences between g levels associated with reinforcement was the same at two locations along the g continuum, although there were differences in measures of absolute discrimination at these locations. Author

N72-26044*# General Electric Co., Philadelphia, Pa. Missile and Space Div.
FLUID DYNAMICS IN FLEXIBLE TUBES: AN APPLICATION TO THE STUDY OF THE PULMONARY CIRCULATION Annual Report
N. R. Kuchar 31 Dec. 1971 108 p refs
(Contract NASw-2138)
(NASA-CR-127111) Avail: NTIS HC $7.50 CSCL 06P
Based on an analysis of unsteady, viscous flow through distensible tubes, a lumped-parameter model for the dynamics of blood flow through the pulmonary vascular bed was developed. The model is nonlinear, incorporating the variation of flow resistance with transmural pressure. Solved using a hybrid computer, the model yields information concerning the time-dependent behavior of blood pressures, flow rates, and volumes in each important class of vessels in each lobe of each lung in terms of the important physical and environmental parameters. Simulations of twenty abnormal or pathological situations of interest in environmental physiology and clinical medicine were performed. The model predictions agree well with physiological data. Author

N72-26045# Advisory Group for Aerospace Research and Development, Paris (France).
SPECIAL BIOPHYSICAL PROBLEMS IN AEROSPACE MEDICINE, PART 3
A. M. Pfister, ed. Mar. 1972 126 p refs Partly in ENGLISH and FRENCH Presented at Aerospace Med. Panel Specialist Meeting, Luchon, France, 30 Sep. - 1 Oct. 1971
(AGARD-CP-95-Pt-3) Avail: NTIS HC $8.50
A biophysical approach to solving the problems faced by man when exposed to cosmic rays, electromagnetic waves, magnetic fields, and laser radiation is summarized.

N72-26047# Atomic Weapons Research Establishment, Aldermaston (England). Radiation Measurements Section.
ACTIVE DOSIMETRY OF COSMIC RADIATION
E. W. Fuller *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 11 p refs
Avail: NTIS HC $8.50
The role assumed for active dosimetry in manned space missions and high altitude flight is to enable the exposure received during flight to be controlled by on-board monitoring. The radiation environment and the need for active dosimetry in the two circumstances are reviewed and then the instrumentation available and under development for this application is described. Methods of calibrating such instrumentation are also considered. It is concluded that satisfactory instruments for both applications are presently available but that there is a need for continuing development of more compact systems for high altitude aircraft. Author

N72-26048# Centre de Recherches Nucleaires, Strasbourg (France). Lab. de Physique Corpusculaire.
PASSIVE DOSIMETRY OF COSMIC RADIATION [DOSIMETRIE PASSIVE DU RAYONNEMENT COSMIQUE]
R. Kaiser *In* AGARD Spec. Biophys. Probl. in Aerospace Med. pt. 3 Mar. 1972 9 p In FRENCH
Avail: NTIS HC $8.50
The use of passive dosimetry to study the biological effects of cosmic radiation is discussed. The problems and functions of using such equipment are also examined. Experimental dose rates were calculated and compared to measured ones. Results are given in tables. Transl. by E.H.W.

N72-26049# Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris (France).
SOME CONSIDERATIONS ON THE DIFFICULTIES OF DOSIMETRIC EVALUATION AND COSMIC RADIATION INJURIES [QUELQUES CONSIDERATIONS SUR LES DIFFICULTES DE L'EVALUATION DOSIMETRIQUE ET LESIONNELLE DES RADIATIONS COSMIQUES]
S. Despres, C. Nogues, and G. Deltour *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 6 p In FRENCH
Avail: NTIS HC $8.50
The difficulties encountered in the dosimetric evaluation of cosmic rays and their effect on living matter are reported. Data cover the effects of heavy ions on skin pigments, nervous tissue, human cells in culture, biological molecules, and microorganisms. Transl. by E.H.W.

N72-26050# Toulouse Univ. (France). Lab. de Biologie Medicale.
EVIDENCE ON THE EFFECT OF NATURAL IONIZING RADIATION ON BIOLOGICAL STIMULATION [MISE EN EVIDENCE D'UN EFFET BIOLOGIQUE DE STIMULATION DES RADIATIONS IONISANTES NATURELLES]
H. Planel, J. P. Soleilhavoup, R. Tixador, M. C. Giess, and F. Croute *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 12 p refs In FRENCH

Avail: NTIS HC $8.50

The effects of radioprotection and very weak irradiations on unicellular organism multiplication and embryonic development of Drosphila melonogaster are studied. Results show that in unicellular organisms, irradiation prolonged the cellular cycle and reduced multiplication. When the organisms were returned to a radioprotected environment, their multiplication and cellular cycles returned to normal. In the fruit fly, radiation exposure caused prolonged embryonic and larvae development.

Transl. by E.H.W.

N72-26051*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

VISUAL PHENOMENA INDUCED BY COSMIC RAYS AND ACCELERATED PARTICLES

Cornelius A. Tobias, Thomas F. Budinger, John T. Leith, Abdel-Megid Mamoon, and Philip Chapman *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 12 p refs Prepared in cooperation with Calif. Univ., Berkeley

(NASA-TM-X-68460) Avail: NTIS HC $3.00 CSCL 06R

Experiments, conducted at cyclotrons together with observations by Apollo astronauts, suggest with little doubt that cosmic nuclei interacting with the visual apparatus cause the phenomenon of light flashes seen on translunar and transearth coast over the past four Apollo missions. Other experiments with high and low energy neutrons and a helium ion beam suggest that slow protons and helium ions with a stopping power greater than 10 to the 8th power eV/gram sq cm can cause the phenomenon in the dark adapted eye. It was demonstrated that charged particles induced by neutrons and helium ions can stimulate the visual apparatus. Some approaches to understanding the long term mission effects of galactic cosmic nuclei interacting with man and his nervous system are outlined.

Author

N72-26052# Centre de Recherches Nucleaires, Strasbourg (France). Lab. de Physique Corpusculaire.

FIRST RESULTS OF PASSIVE DOSIMETRIC COSMIC RADIATION EFFECTS ONBOARD A PROTOTYPE OF THE CONCORDE 001 SUPERSONIC TRANSPORT [PREMIERS RESULTATS DE LA DOSIMETRIE PASSIVE DU RAYONNEMENT COSMIQUE EFFECTURE A BORD DU PROTOTYPE DE L'AVION DE TRANSPORT SUPERSONIQUE CONCORDE 001]

R. Kaiser, A. M. Pfister, and R. P. Delahave *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 10 p refs In FRENCH

Avail: NTIS HC $8.50

After a description of the characteristics of passive dosimetry carried out with the aid of equipment installed onboard a French prototype of the Concorde supersonic transport aircraft, the methods used to calculate the cosmic radiation dose rates and the results obtained are given. A preliminary interpretation of dose rates was made and compared to those obtained in an English prototype. The results from this comparison show the dose rates are in agreement.

Transl. by E.H.W.

N72-26053# Service de Sante des Armees, Toulon (France).

BIOLOGICAL EFFECTS OF UHF ELECTROMAGNETIC RADIATION [EFFETS BIOLOGIQUES DES RAYONNEMENTS ELECTROMAGNETIQUES UHF (RADARS)]

R. Joly and B. Servantie *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 14 p refs In FRENCH

Avail: NTIS HC $8.50

Very high frequency radiation effects, emitted by radar equipment, on the human organism are investigated. The physiological and physiopathological aspects are outlined. Data also cover pulse duration, penetrative power, energy density, and exposure time.

Transl. by E.H.W.

N72-26054# Bureau of Medicine and Surgery, Washington, D.C.

THE US NAVY'S PROGRAM IN NONIONIZING RADIATION

Paul E. Tyler *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 4 p refs

Avail: NTIS HC $8.50

The extent of dependence of military forces upon electromagnetic radiation emitters for their day-to-day operations is discussed. The current concepts and safety standards of the Eastern European countries are reviewed briefly. The current Navy program in the area of nonionization radiation is presented. Three major approaches are emphasized: (1) basic research, (2) exploratory research, and (3) epidemiological surveys. The lack of adequate dosimetric instrumentation is discussed and the current program to develop instrumentation is presented.

Author

N72-26055*# Naval Aerospace Medical Research Lab., Pensacola, Fla.

MAGNETIC FIELDS AND MAN: WHERE DO WE STAND TODAY?

Dietrich E. Beischer and Vernon R. Reno *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 9 p refs Sponsored in part by NASA

(NASA-CR-127049) Avail: NTIS HC $3.00 CSCL 06R

An assessment is made of the effects of very low and very high magnetic fields on man. In preparation for the Apollo flights, magnetic fields of 50 gamma were generated in the laboratory by two different methods. Human volunteers were tested with a comprehensive battery of physiological and psychological tests during and after continuous exposure for various time periods. No significant difference due to the low field was found for exposure periods of up to 10 days. Technological advancements in power generation, antisubmarine warfare, and energy storage and transmission expose man to magnetic fields many orders of magnitude higher than those heretofore encountered. The only available information relevant to these conditions is based upon occasional observations in high energy physics laboratories and Soviet descriptions of clinical effects. Results on incidental human exposure and of primates exposed to high fields indicate that, while actual survival is not threatened by such exposures, high fields can influence man to a degree sufficient to cause serious performance decrement.

Author

N72-26056# Duke Univ., Durham, N.C. Dept. of Ophthalmology.

LASER SAFETY AND HOW TO PROMOTE IT

Myron L. Wolbarsht *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 6 p refs

17-04)

(Contract N00014-67-A-0251-0011)

Avail: NTIS HC $8.50

The characteristics of lasers which may produce danger are briefly discussed with regard to the special characteristics of laser light and also the characteristics they share with other light sources. Types of personnel protection are considered as are regulations and safety programs in relation to the energy and power levels that are currently thought to be nonhazardous. The principles of hazard analysis are described in conjunction with their use at any particular safety level. Two of the programs carried on by the U.S. Navy Medical Department on laser safety are considered in detail. One deals with the functional decrement in visual acuity of monkeys by pulsed laser trains in the near infrared. The other is concerned with the determination of threshold levels for ocular injury by lasers in human volunteers.

Author

N72-26057# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
LASER SAFETY: SOME CONSIDERATIONS IN THE DESIGN OF A CODE OF PRACTICE
R. G. Borland *In* AGARD Spec. Biophys. Probl. in Aerospace Med., Pt. 3 Mar. 1972 13 p refs
Avail: NTIS HC $8.50

Military and industrial research on a safety code for the use of laser equipments is outlined. Data cover safe thresholds, methods for measuring these thresholds, and characteristics of the laser to be used. Special attention is given to retina damage in the operators. E.H.W.

N72-26058*# Naval Aerospace Medical Research Lab., Pensacola, Fla.
OCULAR COUNTERROLLING MEASURED DURING EIGHT HOURS OF SUSTAINED BODY TILT
Earl F. Miller, II and Ashton Graybiel 4 Jan. 1972 11 p refs
(NASA Order T-81633; NASA Order L-43518)
(NASA-CR-127034; NAMRL-1154) Avail: NTIS HC $3.00 CSCL 06S

Adaptation of otolith organ activity was investigated by monitoring the ocular counterrolling response of four normal individuals and three persons with severe bilateral loss of labyrinthine function. Several eye photographs were recorded every 30 minutes during a period of 8 hours in which the subject was held in a lateral tilt (60 deg) position. The recorded eye roll position varied to an expected small extent within each test session; this variation about a given mean roll position was similar among the test sessions for all subjects. The mean roll position, on the other hand, changed from session to session in substantial amounts, but these changes appeared to be random with respect to time and among subjects. Furthermore, the intersessional variation in the mean torsional eye position of the normal subjects was equivalent to that of the labyrinthine-defective subjects who displayed little or no counterrolling. These results suggest that the human counterrolling response is maintained either by essentially nonadapting macular receptors or by extremely fine movements of the head in the gravitational field, such as may have been allowed by the biteboard/headrest restraint system used in this study, which served as an everchanging accelerative stimulus. Author

N72-26059# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
INVESTIGATIONS ON THE BIOLOGICAL EFFECT OF SHOCK WAVES TRANSMITTED THROUGH DIFFERENT MATERIALS
O. Wuensche and G. Scheele 1972 30 p refs In GERMAN; ENGLISH summary
(DLR-FB-72-13) Avail: NTIS HC $3.50; DFVLR Porz-Wahn; 10,60 DM

The special effect of shock waves transmitted through different materials to animal organs is dealt with. Miniature pigs were used for the study. In particular, the typical and reproducible injuries of organs which are caused by defined shock waves on predetermined body regions are demonstrated, described in detail, and verified by photographs. The morphological findings are discussed, and the particulars of special damage effects are given. Author

N72-26060# Joint Publications Research Service, Arlington, Va.
HUMAN ACCLIMATIZATION IN THE POLAR REGIONS
13 Jun. 1972 213 p refs Transl. into ENGLISH from Akklimatizatsiya Cheloveka v Usloviyakh Polyarnykh Rayonov (Leningrad), 1969
(JPRS-56252) Avail: NTIS HC $12.75

A collection of reports is presented on acclimatization, adaptation, and psychophysiological aspects of man in the polar regions. Author

N72-26061# Joint Publications Research Service, Arlington, Va.
TRANSLATION ON EASTERN EUROPE SCIENTIFIC AFFAIRS, NO. 248
7 Jun. 1972 44 p refs Transl. into ENGLISH from various East European publications
(JPRS-56202) Avail: NTIS HC $4.25

Articles are presented concerning the development of, and progress in, various theoretical and applied scientific disciplines and technical fields. Research in the fields of agriculture, computers, and cybernetics, medicine, and electronics is discussed. Author

N72-26062# Joint Publications Research Service, Arlington, Va.
MEDICAL INVESTIGATIONS DURING ARCTIC AND ANTARCTIC EXPEDITIONS
A. L. Matusov et al 9 Jun. 1972 109 p refs Transl. into ENGLISH from Tr. Med. Issled. v Arkt. i Antarkt. Ekspeditsiyakh (Leningrad), v. 299, 1971 p 15-49, 78-82, 120-124, 128-131, 177-195, and 231-235
(JPRS-56225) Avail: NTIS HC $7.50

Physiological, pathological, and psychological aspects of human acclimatization to the cold polar environment are considered.

N72-26063# Joint Publications Research Service, Arlington, Va.
ACCLIMATIZATION AND HUMAN PATHOLOGY IN ANTARCTICA
A. L. Matusov, N. R. Deryapa, I. F. Ryabinin, I. V. Shastin, and B.B. Vensenotsev *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 1-32 refs

Avail: NTIS HC $7.50

In Antarctica predominated physiological versions of human acclimatization to the unusual conditions of a glacial continent and arising pathology assumed, predominantly, a mild form. Established deviations from the norm are restored comparatively easily which is seen by the example of disadaptational meteoneuroses. The role of the distinctive microflora of Antarctica in the development of pathological processes in man is great. The distinctiveness of the course of the wound process and inflammation and their dependence on the phase of acclimatization are established. Author

N72-26064# Joint Publications Research Service, Arlington, Va.
CLINICO-PHYSIOLOGICAL CHARACTERISTICS OF THE PROCESS OF ACCLIMATIZATION OF MAN IN ANTARCTICA
N. R. Deryapa *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 33-46 refs

Avail: NTIS HC $7.50

Diverse changes in the vital activities of the human organism during polar acclimization were observed in protective adaptational body functions: disadaptation neurosis, shifts in cardiac reflexes, electrical skin resistance, capillary blood circulation, and skin thermotopography. The use of clinical methods did not reveal essential acclimatizational changes in external respiration, digestion, urination and the peripheral blood; normal indices of physical development were maintained. However, previously existing pathological processes in humans were aggravated during expeditions to Antarctica. G.G.

N72-26065# Joint Publications Research Service, Arlington, Va.
BRIEF MEDICO-GEOGRAPHIC CHARACTERISTICS OF THE COURSE OF ACCLIMATIZATION IN MEMBERS OF THE BELLINSGAUZEN POLAR STATION

V. A. Zabarsakin and Yu. G. Shalunov *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 47-54 refs

Avail: NTIS HC $7.50

Physiological characteristics of human acclimatization to conditions in western Antarctica constituted pain sensations, sleep disturbances, manifestations of irritability and apathy; neuroleptics and tranquillizers usually stopped these symptoms. Some complaints of dyspnea after physical exertions, poor appetite and fatigability were also registered. The greatest number of subjective disturbances occurred during the coldest period of the wintering. G.G.

N72-26066# Joint Publications Research Service, Arlington, Va.
PSYCHOPHYSIOLOGICAL OBSERVATIONS OF POLAR EXPEDITION MEMBERS IN ANTARCTICA
B. B. Ventsenostsev *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 55-62 refs

Avail: NTIS HC $7.50

Various psychophysiological test data on polar expedition members are reported that characterize different aspects of higher nervous activity, overall capacity to work, tempo of psychic processes and memory; all indicate improvement during wintering. Also observed is a relatively rapid adaptation of the organism to the conditions of life in coastal Antarctica. G.G.

N72-26067# Joint Publications Research Service, Arlington, Va.
THE DYNAMICS OF SLEEP OF POLAR EXPEDITION MEMBERS OF THE SEVERNYY POLYUS-15 (NORTH POLE DRIFTING RESEARCH STATION)
Yu. A. Paramonov *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 63-67 refs

Avail: NTIS HC $7.50

Observations of motor activities and the depth and dynamics of sleep during human adaptation to Antarctic conditions are evaluated. Analyses of actograms and statistical processing of sleep duration data show a definite dependence of sleep dynamics on the natural light circle. In the period of polar day, disturbances of sleep occurred but, with the approach of the usual change of day and night, sleep deepened and improved. Also found is a definite dependence of sleep disturbances on the length of service at the Antarctic base. G.G.

N72-26068# Joint Publications Research Service, Arlington, Va.
THE STATE OF THE BLOOD SYSTEM OF POLAR EXPEDITION MEMBERS DURING WINTERING AT MOLODEZH STATION
B. B. Ventsenostsev *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 68-75 refs

Avail: NTIS HC $7.50

Statistical processing of blood data from polar expedition members shows a somewhat lowered hemoglobin content, lowered erythocytes, decreased leukocyte levels, and slower erythrocyte sedimentation rates. Observed decreases are associated with the photoperiodism of the polar light regime. G.G.

N72-26069# Joint Publications Research Service, Arlington, Va.
THE CHANGE OF SOME ASPECTS OF THE OXYGEN REGIME IN THE HUMAN ORGANISM DURING PROLONGED STAYS UNDER EXTREME CONDITIONS
V. S. Poggenpol and Ye. A. Ilin *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 76-85 refs

Avail: NTIS HC $7.50

Oxygen saturation levels in human arterial blood were studied during prolonged stays in the Antarctic region. Oxygen levels were determined at rest and during the following tests: (1) holding the breath upon inhalation and exhalation; (2) forced hyperventilation; and (3) measured physical exercise. In general, the quantity of oxyhemoglobin was about 10 percent below the norm established for healthy persons. Arterial pressures changed and reached minimum values in the middle of the winter. G.G.

N72-26070# Joint Publications Research Service, Arlington, Va.
A STUDY OF THE FUNCTION OF PULMONARY RESPIRATION AMONG POLAR EXPEDITION MEMBERS IN COASTAL ANTARCTICA
I. F. Ryabinin and O. V. Korovina *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 86-98 refs

Avail: NTIS HC $7.50

Analysis of results of spirographic examinations showed that a year's stay of polar expedition members under conditions of the severe climate of coastal Antarctica had no significant effect upon the ventilation indices of pulmonary respiration functions. Data obtained indicate the great adaptational possibilities of the respiration apparatus in man. The deterioration of bronchial permeability revealed in polar expedition members has a direct relation to the mechanism of the rise of dyspnea in polar regions of the earth. Author

N72-26071# Joint Publications Research Service, Arlington, Va.
COMPARATIVE CHARACTERISTICS OF BASIC FORMS OF CLIMATIC CLOTHING OF POLAR EXPEDITION MEMBERS OF VOSTOK STATION
N. I. Makarov *In its* Med. Invest. during Arctic and Antarctic Expeditions 9 Jun. 1972 p 99-105 refs
17-04)
Avail: NTIS HC $7.50

For polar expedition members in the region of the Antarctic plateau, it is necessary to design new climatic clothing which will meet all the requirements for which wool, flannel and other materials are used, attempting to keep them light with a large volume of air under the clothing. As tests showed, the camel hair costume was most adaptable to the conditions. During the use of this type of protective climatic clothing, the duration of stay in the air was greatest and the value of the weighted mean heat flow and the reaction of the cardio-vascular system were minimal. The leather on fur costume was most unfavorable even during relatively mild weather. Author

N72-26072# Oklahoma Univ., Oklahoma City. Health Sciences Center.
EFFECTS OF BACKSCATTER OF BRIEF HIGH INTENSITY LIGHT ON PHYSIOLOGICAL RESPONSES OF INSTRUMENT RATED PILOTS AND NON-PILOTS
Arthur R. Zeiner and Gerhard A. Brecher Feb. 1972 11 p refs
(Contract DOT-FA71WA-2545)
(FAA-AM-72-8) Avail: NTIS HC $3.00

Thirty-nine human subjects were exposed to repetitive backscatter light stimulation from a Grimes capacitance discharge airplane anticollision light flashing at 1.27 hertz. Both tonic and phasic stimulus-bound occipital EEG, heart rate, respiration, skin potentials, and eyeblinks were recorded. In the first experiment, response decrement to the flashing light occurred only with one out of five response measures over a 40-trial session indicating that the flashing light was a potent stimulus, None of the subjects demonstrated photic driving, seizure activity, or theta wave activity in his EEG. In Experiment II, eyeblink and skin potential measures differentiated between an instrument-rated pilot group and an age-matched control group of non-pilot professional men. The results suggest that, although the flashing anticollision light induces changes in physiological measures which are resistant to habituation, these changes do not extend to the induction of nausea. Author

N72-26073*# Scientific Translation Service, Santa Barbara, Calif.
INHIBITORY EFFECTS OF EXOGENOUS GLUCOSE ON THE BIOSYNTHESIS OF PROTOHEME BY THE YEAST SACCHAROMYCES CEREVISIAE
P. Labbe Washington NASA Jun. 1972 9 p refs Transl. into ENGLISH from Compt. Rend. Soc. Biol. (France), v. 165, no. 4, 20 Apr. 1972 p 808-811
(Contract NASw-2035)
(NASA-TT-F-14330) Avail: NTIS HC $3.00 CSCL 06M

The experiments show that in yeast DAL dehydratase and ferrochelatase are not inhibited by glucose, while DAL synthetase is almost completely inhibited. Author

N72-26074*# George Washington Univ., Washington, D.C. Medical Center.
SCIENTIFIC PUBLICATIONS AND PRESENTATIONS RELATING TO PLANETARY QUARANTINE. VOLUME 5: THE 1971 SUPPLEMENT Biological Sciences Communication Project
Frank D. Bradley and Marcy R. Rettig Jul. 1972 59 p refs
(Contract NSR-09-010-027)
(NASA-CR-127112; GWU-BSCP-72-07P-Vol-5-Suppl) Avail: NTIS HC $5.00 CSCL 06M

A bibliographic compilation, with approximately 200 listings, on planetary quarantine is presented. Also given are scientific publications, and presentations along with an author index. E.H.W.

N72-26075# Kernforschungsanlage, Juelich (West Germany). Zentralabteilung Strahlenschutz.
THE CENTRAL DIVISION OF RADIATION PROTECTION Annual Report, 1970 [ARBEITSBERICHT 1970 DER ZENTRALABTEILUNG STRAHLENSCHUTZ]
M. Keller, ed. and R. Tzschaschel, ed. Sep. 1971 190 p refs In GERMAN; ENGLISH summary
(JUL-787-ST) Avail: AEC Depository Libraries

The Zentralabteilung Strahlenschutz (ZST) of the Nuclear Research Establishment, Juelich, is responsible for an adequate and a proper performance of the radiation protection programs for personnel, installations, and the environment in West Germany. This includes the introduction of the necessary organizations as well as the permanent development of measuring methods and procedures according to the most recent knowledge of science and research. Activities during 1970, as well as the results of investigations and developments in connection with the improvement of methods and procedures, are reported. A complete bibliography of the published and internal literature of the ZST in 1970 is included. Author (NSA)

N72-26076# Kansas State Univ., Manhattan. Inst. for Environmental Research.
RESPONSE OF HUMAN SUBJECTS TO REDUCED LEVELS OF WATER CONSUMPTION UNDER SIMULATED CIVIL DEFENSE SHELTER CONDITIONS Final Report, Sep. 1965 - Aug. 1971
Robert L. Gorton, J. M. Rueck, P. E. McNall, Jr., B. Finkelstein, and E. L. Besch Jan. 1972 97 p refs
(Contract DAHC20-68-C-0173)
(AD-738562) Avail: NTIS CSCL 06/6

Seven tests, employing 16 subjects each, were run under carefully controlled environmental conditions similar to expected conditions in civil defense shelters. The purpose of the tests was to determine response of humans to limited water rations under such conditions. A computational method was developed for determination of body water pool loss. Nutritional, physiological and psychological testing was conducted to measure subject response to the various water rations. Results including subject weight losses and water budgets are presented. Results were analyzed and a correlation equation for water pool loss was developed. It was determined by extrapolation of these results that a water ration of 1 3/4 quarts per person per day for 14 days should prevent severe dehydration of subjects under the conditions of these tests. GRA

N72-26077 Louisiana State Univ., Baton Rouge.
A HUMAN MODEL WHICH OPTIMIZES PURSUIT TRACKING Ph.D. Thesis
Mario Joseph Caluda, Jr. 1971 144 p
Avail: Univ. Microfilms Order No. 71-29348

The feasibility of using an adaptive linear mathematical model to represent a human operator subjected to the task of controlling an attacking fighter aircraft was investigated. The ability of the model to perform pursuit tracking tasks subject to random evader tactics was analyzed by the implementation of the model into a six degree of freedom digital fire control simulation. For the model to approach reality in every flight regime, an adaptive procedure was incorporated into the simulation to adjust the variable gain and lead time parameters of the human model. As a means of evaluating the simulated performance of the human operator when performing this task, the performance data of the attacking aircraft was subjected to a number of spectral analysis operations. These spectral operations compared the frequency content of the data obtained from the simulation to actual data obtained from combat flight maneuvers. For both sets of data the evaders performed the same identical tactics. Dissert. Abstr.

N72-26078 Connecticut Univ., Storrs.
HUMAN OPERATOR DYNAMICS FOR AUDIO COMPENSATORY TRACKING Ph.D. Thesis
Edward Wayne Vinje 1971 189 p
Avail: Univ. Microfilms Order No. 71-29924

Tracking error was presented to the test subjects using one- and two-ear displays. For both displays the pitch of the tone represented the magnitude of the tracking error. Error polarity was indicated in the two-ear display by switching the tone between ears as a function of error sign. For the one-ear display, error polarity was indicated by using modulated and unmodulated tones. The operator's aural control characteristics were modeled as a describing function plus a remnant. The describing function and remnant data indicate that humans can control as well with audio cues as with visual cues for the task considered. However, the reduction in operator time delays, expected because of the generally faster human response to audio stimuli, was not evident in the results. It was also determined that the operators could control equally well with either the one- or two-ear display. The operator model results indicate that the combined audio and visual presentation of tracking error neither improves the operator's control capability nor reduces operator time delays. Dissert. Abstr.

N72-26079*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
DEVELOPMENT OF A SORBER TRACE CONTAMINANT CONTROL SYSTEM INCLUDING PRE- AND POST-SORBERS FOR A CATALYTIC OXIDIZER
Thomas M. Olcott Washington NASA May 1972 185 p refs
(Contract NAS1-9242)
(NASA-CR-2027) Avail: NTIS HC $3.00 CSCL 06K

A general methodology was developed for spacecraft contaminant control system design. Elements considered for contaminant control were catalytic oxidation with isotope or electrical heat and pre- and post-sorbers, charcoal with regeneration and non-regeneration, and reactive constituents. A technique is described for sizing a charcoal bed for a multiple contaminant load. Author

N72-26080*# Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
MECHANISMS OF DETERIORATION OF INTERMEDIATE MOISTURE FOOD SYSTEMS
Theodore P. Labuza Washington NASA Jun. 1972 149 p refs
(Contract NAS9-9426)
(NASA-CR-114861) Avail: NTIS HC $9.50 CSCL 06H

A study of shelf stability in intermediate moisture foods was made. Major efforts were made to control lipid oxidation and nonenzymatic browning. In order to determine means of preventing these reactions, model systems were developed having the same water activity content relationship of intermediate moisture foods. Models were based on a cellulose-lipid and protein-lipid system with glycerol added as the humectant. Experiments with both systems indicate that lipid oxidation is promoted significantly in the intermediate moisture range. The effect appeared to be related to increased mobility of either reactants or catalysts, since when the amount of water in the system reached a level where capillary condensation occurred and thus free water was present, the rates of oxidation increased. With added glycerol, which is water soluble and thus increases the amount of mobile phase, the increase in oxidation rate occurs at a lower relative humidity. The rates of oxidation were maximized at 61% RH and decreased again at 75% RH probably due to dilution. No significant non-enzymatic browning occurred in the protein-lipid systems. Prevention of oxidation by the use of metal chelating agents was enhanced in the cellulose system, whereas, with protein present, the lipid soluble chain terminating antioxidants (such as BHA) worked equally as well. Preliminary studies of foods adjusted to the intermediate moisture range bear out the results of oxidation in model systems. It can be concluded that for most fat containing intermediate moisture foods, rancidity will be the reaction most limiting stability. Author

N72-26081# Joint Publications Research Service, Arlington, Va.
MAN IN PROLONGED SPACE FLIGHT
V. A. Shatalov 6 Jun. 1972 13 p Transl. into ENGLISH from Nauka'i Zhizn (Moscow), no. 3, Mar. 1972
(JPRS-56181) Avail: NTIS HC $3.00

An interview with Maj. Gen. V. A. Shatalov on the peculiarities of space flight and the training of cosmonauts for such flight is presented. Author

N72-26082# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
A SURVEY INTO THE ANNOYANCE CAUSED BY AIRCRAFT NOISE AND ROAD TRAFFIC NOISE
C. G. Bottom and D. M. Waters [1972] 39 p refs
(TT-7204) Avail: NTIS HC $4.00

The results of a social survey designed to investigate the influence of background (road traffic) noise on annoyance due to aircraft noise, and on general dissatisfaction with the total noise environment are presented. Nine sites with 3 aircraft and 3 traffic conditions were selected and 35 people per site interviewed. The regression lines for site mean aircraft annoyance scores (Guttman Scale) for each traffic condition show that the same annoyance score is achieved at an aircraft exposure 10 NN1 lower, when traffic is reduced from heavy to access only. The general noise dissatisfaction shows an increase with traffic at low NN1, but a decrease at high NN1. The use of the noise pollution level unit satisfactorily explains this result, increasing the correlation coefficient for the grouped data from 0.94 against NN1 to 0.96. Author

N72-26083# Joint Publications Research Service, Arlington, Va.
MAN IN THE CONTROL SYSTEM
V. A. Trapeznikov 15 Jun. 1972 18 p Transl. into ENGLISH from Nauka i Zhizn' (Moscow), no. 2, 1972 p 2-10
(JPRS-56277) Avail: NTIS HC $3.00

Human behavior in a control system is considered, as man and technical control means. Author

N72-26084# Joint Publications Research Service, Arlington, Va.
THE PRINCIPLES OF AN ACTIVE OPERATOR AND THE FUNCTIONAL DISTRIBUTION BETWEEN MAN AND MACHINE
N. D. Zavalova, B. F. Lomov, and V. A. Ponomarenko 19 Jun. 1972 13 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 3, 1971 p 3-12
(JPRS-56297) Avail: NTIS HC $3.00

The role of man in control systems is considered and various approaches in engineering psychology are discussed. A proficiency analysis study is cited as an example. Author

N72-26085*# Scientific Translation Service, Santa Barbara, Calif.
METHOD OF STUDYING THE REACTIONS OF A HUMAN OPERATOR CONSIDERED AS AN OSCILLATORY SYSTEM TO HARMONIC AND RANDOM VIBRATIONAL ACTION
K. V. Frolov Washington NASA Jun. 1972 13 p refs Transl. into ENGLISH from the book "Primeneniye Teorii Nelineinykh Kolebanii v Mekhan., 5th Intern. Conf. on Nonlinear Oscillations, Trans., Kiev, 25 Aug. - 4 Sep. 1969" Kiev, Akad. Nauk Ukr. SSR, v. 3, 1971 p 695-703
(Contract NASw-2035)
(NASA-TT-F-14289) Avail: NTIS HC $3.00 CSCL 05E

The results are presented of an experimental study of the dynamic responses and functional state of a human operator subjected to harmonic and random vibrational excitation. A number of problems involved in obtaining objective estimates of the effect of vibrations of various types and spectral compositions on human operators are considered. Some possible ways of constructing human-operator models which are essentially nonlinear oscillatory systems of complex dynamical structure are indicated, and methods of investigating these models are suggested. Author

N72-26086# Southampton Univ. (England). Inst. of Sound and Vibration Research.
SECONDARY TASK PERFORMANCE OF HELICOPTER PILOTS DURING LOW-LEVEL FLIGHT
B. K. Nagaraja Rao and M. J. Griffin Dec. 1971 61 p refs Sponsored by Min. of Defense
(ISVR-TR-54) Avail: NTIS HC $5.25

An investigation was made into the changes of pilot performance at a complex reaction time task during low-level helicopter flight. The two-choice task required responses to a continuous and a similar tone pulse 6 Hz pitch repetition frequency. The mean reaction times for eight pilots are tabulated and commented upon. An extensive bibliography is appended.
Author (ESRO)

N72-26087# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.
PERFORMANCE, RECOVERY, AND MAN MACHINE EFFECTIVENESS Semiannual Progress Report, 1 Sep. 1971 - 29 Feb. 1972
Richard A. Dudek 15 Mar. 1972 25 p refs
(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81-A)
(AD-738916) Avail: NTIS CSCL 05/8

Emphasis is placed on the determination of optimal or near optimal work/rest schedules for individuals and crews to yield high performance with minimal decrement over time followed by

recovery (after rest) to an acceptable high performance. The experimentation is further aimed at consideration of various task levels and differing conditions of environment. Experimentation in progress continues to focus attention on the assessment of human performance under continuous operations or relatively long term activity (2 hours or more of activity). GRA

N72-26088# Naval Postgraduate School, Monterey, Calif.
A HEART BEAT ACCUMULATOR FOR RESEARCH IN EXERCISE PHYSIOLOGY M.S. Thesis
Richard Alexander Creighton Jun. 1971 44 p refs
(AD-738882) Avail: NTIS CSCL 06/2

A system is postulated to count the total number of heart beats in one day. The device is intended for use as a possible indicator of the level of physical fitness of an individual. It is portable, self-contained, and provides for comfortable and natural movement of the subject during the course of daily activities. Electronic design is developed including detailed schematic diagrams of all electronic circuitry involved. The complete plans and photographs of a working prototype are presented. The prototype is to be further tested and evaluated in the exercise physiology laboratory at California State College at Long Beach. It is hoped that this device will prove to be of value in studies and research in physical fitness. Author (GRA)

N72-26089# Harvard Univ., Boston, Mass. Dept. of Psychiatry.
AUTOMATED CONSTANT CUFF PRESSURE SYSTEM TO MEASURE AVERAGE SYSTOLIC AND DIASTOLIC BLOOD PRESSURE IN MAN
Bernard Tursky, David Shapiro, and Gary E. Schwartz Dec. 1971 28 p refs
(Contract N00014-67-A-0298-0024; VR Proj. 144-207)
(AD-738832; TR-4) Avail: NTIS CSCL 06/2

An automated constant cuff-pressure system to remotely determine average human blood pressure levels was developed to overcome problems in measurement caused by natural beat-to-beat fluctuations in arterial pressure. A standard blood pressure cuff is inflated to approximately systolic pressure for a prescribed number of heart cycles. Korotkoff (K) sounds are picked up by a crystal microphone over the brachial artery. The ECG is recorded and an electronic coincidence circuit detects the number of R waves followed by a K sound. Cuff pressure is automatically adjusted until there is a 50% coincidence of R-K sounds. This cuff pressure is now by definition the median systolic pressure. The same procedure is followed to determine median diastolic pressure. A change in 2 mm Hg in cuff pressure alters the R-K coincidence by 25%, insuring an accuracy of measurement of plus or minus 2 mm Hg. Average measures of pressure obtained by the constant cuff pressure method were demonstrated to be as accurate as averages based on intra-arterial readings. Application of this system in epidemiological screening is discussed. Author (GRA)

N72-26194# Joint Publications Research Service, Arlington, Va.
MAN IN CONTROL SYSTEM
V. A. Trapeznikov *In its* Mater. on Fifth All-Union Controls Conf. 13 Jun. 1972 p 1-17 refs
Avail: NTIS HC $5.00

Man's behavior in technical, and socioeconomic control systems is discussed in terms of three types of problems: (1) how to organize the control structure with a correct distribution of functions between man and the automatic machine; (2) how to organize the relationship between man and the automatic machine; and (3) how to make man strive. Feedback and game situations are considered for social and economic control systems. It is concluded that man is the main resource, and the mobilization of all his psychological reserves, along with the use of control hardware will greatly speed up scientific and technical progress and the nation's development. F.O.S.

N72-26278*# Maryland Univ., College Park.
REMOTE SENSING AND EXTRACTABLE BIOLOGICAL RESOURCES
L. Eugene Cronin *In* NASA, Washington Remote Sensing of the Chesapeake Bay 1972 p 83-89 refs

Avail: NTIS; SOD $2.25 CSCL 08A

The nature and quantity of extractable biological resources available in the Chesapeake Bay are discussed. The application of miniaturized radio sensors to track the movement of fish and birds is described. The specific uses of remote sensors for detecting and mapping areas of algae, red tide, thermal pollution, and vegetation beds are presented. The necessity for obtaining information on the physical, chemical, and meteorological features of the entire bay in order to provide improved resources management is emphasized. Author

N72-26768*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
SURVEYOR 3: BACTERIUM ISOLATED FROM LUNAR RETRIEVED TELEVISION CAMERA
F. J. Mitchell (Texas A&M Univ., College Station) and W. L. Ellis *In its* Analysis of Surveyor 3 Mater. and Phot. Returned by Apollo 12 1972 p 239-248 refs
Avail: NTIS; SOD $4.00 CSCL 06M

Microbial analysis was the first of several studies of the retrieved camera and was performed immediately after the camera was opened. The emphasis of the analysis was placed upon isolating microorganisms that could be potentially pathogenic for man. Every step in the retrieval of the Surveyor 3 television camera was analyzed for possible contamination sources, including camera contact by the astronauts, ingassing in the lunar and command module during the mission or at splashdown, and handling during quarantine, disassembly, and analysis at the Lunar Receiving Laboratory K.P.D.

N72-26769*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MICROBIOLOGICAL SAMPLING OF RETURNED SURVEYOR 3 ELECTRICAL CABLING
M. D. Knittel, M. S. Favero (Public Health Serv., Phoenix, Ariz.), and R. H. Green *In* NASA, Washington Analysis of Surveyor 3 Mater. and Phot. Returned by Apollo 12 1972 p 248-251 refs
Avail: NTIS;SOD $4.00 CSCL 06M

A piece of electrical wiring bundle running from the television camera to another part of the spacecraft was selected for microbiological examination. Sampling methods are discussed. The results presented show that no viable microorganisms were recovered from the part of the Surveyor 3 cable which was tested. Factors that could have contributed to the sterility of the cable are thermal vacuum testing, natural dieoff, change in pressure during launch, and lunar vacuum and temperature. K.P.D.

N72-26857 Johns Hopkins Univ., Baltimore, Md.
FINITE AMPLITUDE SHOCK WAVES IN INTERVERTEBRAL DISCS
William F. Hartman *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., No. 42, Pt. 2 Jan. 1972 p 213-219 refs
Avail: Shock and Vibration Information Center, Naval Research Labs., Washington, D. C.: HC $40.00 per set

The nonlinear deformation of intervertebral discs is discussed. The upward turning stress-strain curve implies that the discs will tend to shape pulses having sub-millisecond rise-times into shock waves and that shock inputs will propagate as shocks. These implications are explored for axial compressive impact of the spine, such as is incurred during aircraft-pilot ejection or during a fall onto the buttocks. Correlation with experimental results suggests that the application of finite amplitude wave theory to the shock loading of the spine should be investigated. Author

N72-27060* National Academy of Sciences-National Research Council, Washington, D.C.
PHOTOSYNTHESIS
Roderick Clayton *In its* Solar Cells: Outlook for Improved Efficiency 1972 p 71-73

CSCL 06C

Photosynthesis is discussed in terms of photovoltaic technology. The efficiency of the photosynthesis in plants, and the possible impact on photovoltaic technology are considered.
F.O.S.

N72-27074 National Lending Library for Science and Technology, Boston Spa (England).
ACTIVATION OF BIOLOGICAL PROPERTIES OF STAPHYLOCOCCI ISOLATED FROM PERSONS DURING A PROLONGED STAY IN AN AIRTIGHT CHAMBER
V. Ya. Prokhorov, V. M. Shilov, A. K. Akatov, and I. A. Parchinskaya May 1972 8 p refs Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. i Immunobiol. (Moscow), v. 48, no. 9, 1971 p 63-68
(NLL-RTS-7117) Avail: Natl. Lending Library, Boston Spa, Engl.: £0.70; 2 NLL photocopy coupons

The biological properties of staphylococci isolated from human subjects in the course of a 12-month medical engineering experiment were determined. Efforts were also made to determine if an exchange of microorganisms between the subjects can take place. A combined investigation was carried out to differentiate between pathogenic and nonpathogenic staphylococci. Seeding materials were taken from the nasal mucosa. Besides phage typing, the isolated strains were tested for the presence of enzymes, haemolysins, toxin formation, sensitivity to antibiotics, and virulence. Conclusions show that for long periods of time in a pressurized cabin, pathogenic staphylococci are transmitted from one to another. It was suggested that such activity is associated with the development of diseases of stapylococcal aetiology. Staphylococci strains isolated from humans show increased biological activity.
Author

N72-27075 National Lending Library for Science and Technology, Boston Spa (England).
REACTION MECHANISM OF Na(PLUS)-K(PLUS) DEPENDENT ATP-ase
T. Kanazawa Apr. 1972 47 p refs Transl. into ENGLISH from Seikagaku (Tokyo), v. 42, no. 10, 1970 p 1-24 (777-801)
(NLL-RTS-6898) Avail: Natl. Lending Library, Boston Spa, Engl.: £4.50; 15 NLL photocopy coupons

The association of the active transport of Na(+) and K(+) and the decomposition of ATP by the enzyme are assumed to be significant in elucidating the molecular mechanism of active transport. ATP-ADP cross reactions and the phosphorylation of enzyme proteins are considered. The reaction rate theory analysis of the stationary state is presented. The decomposition reaction of the phosphorylation intermediate (EP) and the EP formation are also considered.
K.P.D.

N72-27076*+ National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 102, MAY 1972
May 1972 147 p refs
(NASA-SP-7011(102)) Avail: NTIS HC $3.00 CSCL 06E

This special bibliography lists 456 reports, articles, and other documents introduced into the NASA scientific and technical information system in April 1972.
Author

N72-27077*# Food and Drug Administration, Cincinnati, Ohio. Div. of Microbiology.
ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Jan. - 31 Mar. 1972
A. L. Reyes, A. J. Wehby, R. G. Crawford, J. C. Wimsatt, and J. E. Campbell 1 Jun. 1972 11 p
(NASA Order R-36-015-001)
(NASA-CR-127525; QPR-28) Avail: NTIS HC $3.00 CSCL 06M

The pregermination phenomenon of spores relative to thermal activation and 100% relative humidity is examined. Attempts were also made to determine the effects of suspending media on the spores. Results show spores treated initially in TGE broth lost their heat resistance in contrast to those treated in 2X distilled water. Morphological changes of spores when viewed under phase microscopy are compared to those assayed by a plate count method.
E.H.W.

N72-27078*# Mayo Clinic, Rochester, Minn.
EFFECTS PLUS Gy ACCELERATION ON BLOOD OXYGEN SATURATION AND PLEURAL PRESSURE RELATIONSHIPS IN DOGS BREATHING FIRST AIR, THEN LIQUID FLUOROCARBON IN A WHOLE BODY WATER IMMERSION RESPIRATOR
D. J. Sass, E. L. Ritman, P. E. Caskey, J. Greenleaf, N. Banchero, D. Mair, and E. H. Wood [1972] 16 p refs Repr. from AGARD Conf. Proc. no. 82 Sponsored in part by the Navy
(Grant NGR-24-003-001; Contract F41609-69-C-0058; Grant NIH HE-3532)
(NASA-CR-127262) Avail: NTIS HC $3.00 CSCL 06E

A total body water immersion, mechanical respiration, body support assembly has been used with dogs on the human centrifuge to compare effects of +1 Gy and +6 Gy acceleration on cardiovascular and respiratory function in dogs under three conditions: (1) normal respiration in air; (2) totally immersed in a saline-filled respiratory chamber providing control of respiratory rate, tidal and residual volumes when breathing air or oxygen; and (3) when respired in the same manner with oxygenated liquid fluorocarbon. Intrathoracic pressures were recorded by strain-gauge manometers connected to fluid-filled catheters introduced without thoracotomy into the thoracic aorta, pulmonary artery, right and left atria, left pulmonary vein, and right and left pleural spaces. Three cuvette oximeters measured oxygen saturation of blood continuously withdrawn from the thoracic aorta, pulmonary artery, and left pulmonary vein. Oxygen saturation measurements and intrathoracic pressures were analyzed on-line by a CDC 3300 digital computer. Results are included.
Author

N72-27079*# Translation Consultants, Ltd., Arlington, Va.
THE EXISTENCE AND ACTIVITY OF THRYOCALCITONIN IN MAN
G. Milhaud, M. S. Moukhtar, J. Bourichon, and A. M. Perault Washington NASA Jun. 1972 7 p refs Transl. into ENGLISH from Compt. Rendu Acad. Sci. (Paris), v. 261, 1965 p 4513-4516
(Contract NASw-2038)
(NASA-TT-F-14341) Avail: NTIS HC $3.00 CSCL 06P

The hypocalcemic activity of extracts purified from six human thyroids in rats, or monkeys, is shown. Hog thyrocalcitonin injected in man can result in a reduction in the calcemia.
Author

N72-27080# Civil Aeromedical Inst., Oklahoma City, Okla.
A COMPARISON OF SERUM CHOLINESTERASE METHODS, 2
Charles R. Crane, Donald C. Sanders, and John K. Abbott Mar. 1972 9 p refs
(FAA-AM-72-12) Avail: NTIS HC $3.00

Among aerial applicator personnel, the primary value of periodic blood cholinesterase (ChE) assays is the detection of

pesticide poisoning indicated by a decrease in enzyme activity since the previous (or pre-season) assay. Comparison of these values is difficult if they are based on different methodologies and expressed in different units, which is frequently the case. An evaluation was made of four serum or plasma ChE methods which are currently in use and the relationships for interconversion among their respective units are established. This was accomplished by performing simultaneous assays by each method on a series of samples whose activities covered the range from normal levels down to the very low level found in organophosphat-e-poisoned individuals. The resulting conversion data (regression equations) are also compatible with those described in other investigations. Author

N72-27081*# Scientific Translation Service, Santa Barbara, Calif.
SPACE BIOLOGY
A. A. Imshenetskiy Washington NASA Jul. 1972 37 p refs Transl. into ENGLISH from Usp. Mikobiol. (USSR), no. 7, 1971 p 46-66
(Contract NASw-2035)
(NASA-TT-F-14307) Avail: NTIS HC $4.00 CSCL 06M

The results of studies on microorganisms with a direct bearing on space biology are presented. The experimental studies have indicated that certain enzymes are stable when exposed to an ultrahigh vacuum; synergism occurs when two bacteriocidal gases are used; and certain microbes can grow, even if the substrate moisture level is very low. Author

N72-27082*# Louisiana State Univ., Baton Rouge. Dept. of Electrical Engineering.
SELECTED BIBLIOGRAPHY ON THE MODELING AND CONTROL OF PLANT PROCESSES
Murli Monahar Viswanathan and Paul M. Julich 1972 18 p refs
(Grant NGR-19-001-024)
(NASA-CR-127426) Avail: NTIS HC $3.00 CSCL 02D

A bibliography of information pertinent to the problem of simulating plants is presented. Detailed simulations of constituent pieces are necessary to justify simple models which may be used for analysis. Thus, this area of study is necessary to support the Earth Resources Program. The report sums up the present state of the problem of simulating vegetation. This area holds the hope of major benefits to mankind through understanding the ecology of a region and in improving agricultural yield. Author

N72-27083# National Research Council of Canada, Ottawa (Ontario).
NEW APPROACH TO THE CONTROL OF MUSCULAR ACTIVITY
L. S. Aleev 1972 11 p refs Transl. into ENGLISH from Nauchnyi Sovet po Kibernetike, Akad. Nauk Ukr. Ukr. SSR, Sektsiya Kibernetiki KDNTP (Kiev), 1966 p 102-113
(NRC-TT-1551) Avail: NTIS HC $3.00

A system of bioelectric control of certain motions of man was developed. The system is based on a study of changes in the bioelectric activity of functional-dynamic groups in the space-time ratio on accomplishing active motor actions in different planes. Preliminary tests of the control device were carried out at a neurological clinic for the treatment of motion disturbances caused by a cutoff of the nucleus of the motor analyzer. Encouraging results were obtained and it was concluded that the method provides a new approach to the problem of controlling the motions of man under normal conditions and certain specific conditions, as well as in the treatment of certain motor disturbances. D.L.G.

N72-27084*# Illinois Univ., Urbana. Engineering Experiment Station.
STEADY STATE AND TRANSIENT TEMPERATURE DISTRIBUTIONS IN THE HUMAN THIGH COVERED WITH A COOLING PAD
R. J. Leo, A. Shitzer, J. C. Chato, and B. A. Hertig Jun. 1971 83 p refs
(Grant NGR-14-005-103)
(NASA-CR-127523; ME-TR-286) Avail: NTIS HC $6.25 CSCL 06P

An analytical and experimental study was done on the performance of cooling pads attached to a human thigh. Each cooling pad consisted of a long, water cooled tube formed into a serpentine shape with uniform spacing between the parallel sections. The analytical work developed a cylindrical model for the human thigh. The transient times predicted by this model ranged from 25 to 80 minutes, which is reasonably close to the experimental results. Calculated and measured steady state temperature profiles were in fair agreement. The transient times associated with a change from a high metabolic rate of 1800 Btu/hr (528 w) to a low level of 300 Btu/hr (88 w), were found to be about 120 minutes. A change from 300 Btu/hr (264 w) to 300 Btu/hr (88 w) resulted in 90 to 100 minute transients. However, the transient times for a change in metabolic rate in the opposite direction from 300 Btu/hr (88 w) to 1800 Btu/hr (528 w) were 40 to 60 minutes. Author

N72-27085# Illinois Univ., Savoy. Aviation Research Lab.
PILOTAGE ERROR IN AREA NAVIGATION: PERFORMANCE OF INSTRUMENT PILOTS USING SYMBOLIC DISPLAYS Final Report, 1 Apr. 1970 - 31 Mar. 1971
Richard S. Jensen, Richard J. Vanderkolk, Patrick Fitzhenry, Donald J. Rose, and Stanley N. Roscoe May 1971 181 p refs
(Contract DOT-FA70WA-2322)
(AD-739309; ARL-71-11/FAA-71-1; FAA-RD-71-31) Avail: NTIS CSCL 05/10

Pilotage errors in area navigation were measured both in flight and in a flight simulation laboratory. Experimental procedures were designed to test instrument pilots under relatively demanding flight situations representative of IFR terminal area and final approach operations. Experimental display variables include linear versus angular steering error indications, steering error scale factor, and integrated versus separated presentations of heading and course deviation. Although the data are preliminary, steering error magnitudes were generally consistent with those assumed in Advisory Circular AC 90-45 provided an appropriate scale factor is used. Relatively frequent procedural blunders occurred in the operation of currently typical RNAV controls. Pilot performances in the simulator were comparable to those observed under similar task conditions in flight, thereby supporting the use of the simulator in more systematic studies of display, control, and procedural variables in area navigation.
Author (GRA)

N72-27086# School of Aerospace Medicine, Brooks AFB, Tex.
BIOACOUSTIC NOISE PROBLEMS DURING OPERATION OF C-7A CARIBOU AIRCRAFT Final Report, Jun. - Nov. 1970
Donald C. Gasaway Dec. 1971 25 p refs
(AF Proj. 7755)
(AD-738627; SAM-TR-71-12) Avail: NTIS CSCL 06/19

Noise environments within the DeHavilland C-7A Caribou during various phases of ground and airborne operation are illustrated and described. Noise profiles are provided to identify and describe exposures to noise encountered by unprotected personnel at different occupied locations in the C-7A during takeoff, climb, and cruise. Features of aeromedical significance are also identified and discussed. Author (GRA)

N72-27087# School of Aerospace Medicine, Brooks AFB, Tex.
HAZARD STUDY OF SIX HELIUM-NEON LASER BORESIGHTS Final Report
William A. Fife and Melvin B. Dobbs Feb. 1972 13 p

(AF Proj. 7784)
(AD-738629; SAM-TR-72-5) Avail: NTIS CSCL 06/18

Six helium-neon laser boresights at US Air Force bases in the continental United States were surveyed to determine their output power. The study indicated the measured output power of these devices to be significantly below their rated output power of 1.3 mW. The measured output power ranged from 0.97 to 0.14 mW. The laser boresights surveyed do not constitute eye hazards as defined in AFM 161-8 (C1), 27 September 1971. Author (GRA)

N72-27088# Navy Experimental Diving Unit, Washington, D.C.
REVIEW AND ANALYSIS OF CASES OF DECOMPRESSION SICKNESS OCCURRING UNDER PRESSURE Final Report
James K. Summitt and Thomas E. Berghage 1 Dec. 1971 54 p refs
(AD-737700; NEDU-RR-12-71) Avail: NTIS CSCL 06/19

The increased frequency of decompression sickness occurring while the diver is still under pressure necessitates establishment of a standardized procedure to treat those cases which are beyond the scope of currently accepted treatment tables. Helium diving accident and treatment data were analyzed to evaluate the therapeutic adequacy of the treatment procedures that have been used for treating the helium diver stricken while under pressure; to delineate precipitant factors which may be important in the etiology or treatment of decompression sickness occurring under pressure during helium dives; to extract from the data any parameters which appeared to be related to a more adequate or effective treatment profile; and, finally, to outline treatment procedures which could be used in the management of decompression sickness occurring under pressure. Author (GRA)

N72-27089# Texas Technological Univ., Lubbock.
MONITORING PERFORMANCE ACROSS SENSE MODES: AN INDIVIDUAL DIFFERENCES APPROACH
Dolores M. Tyler, Wayne L. Waag, and Charles G. Halcomb Jan. 1972 31 p refs
(Contract DAAD05-69-C-0102)
(AD-737735) Avail: NTIS CSCL 05/10

The investigation attempted to equate task difficulty across sense modes on an individual basis. The critical dimension for the detection task used in the investigation was stimulus duration. For each subject, stimulus durations were obtained for both visual and auditory presentation which resulted in similar detection rates. These uniquely determined values were then defined as signals in a later monitoring task. Author (GRA)

N72-27090# Whittaker Corp., Waltham, Mass. Space Sciences Div.
DEVELOPMENTS IN MODELLING VISUAL-VESTIBULAR INTERACTIONS Final Report
Laurence R. Young Nov. 1971 93 p refs
(Contract F33615-69-C-1425; AF Proj. 7231)
(AD-737795; AMRL-TR-71-14) Avail: NTIS CSCL 06/19

An earlier report described a physical analog of the human vestibular system, which simulated nystagmic eye movements and subjective sensation of motion based on sensed motion of the head. This report reviews a number of possible extensions to this model--emphasizing the complex interactions among visual, otolith, and canal stimuli. Models are discussed for semicircular canals and otoliths, the vestibulo-ocular reflex, optokinetic and galvanic stimulation of eye movements, counterrolling, visual-vestibular interaction and pursuit eye movements. Author (GRA)

N72-27091# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
AN AUTOMATED, SIX-CHANNEL, DISCRETE-SAMPLE ELECTROLYTE ANALYZER Final Report, Oct. 1969 - Aug. 1970
George E. Westlake and Wendell R. Peters Jan. 1972 22 p Submitted for publication
(AF Proj. 7996)
(AD-737568; SAM-TR-72-1) Avail: NTIS CSCL 06/12

A six-channel discrete-sample analyzer (the RPT-720) capable of analyzing clinical specimens at the rate of 120 samples per hour is described. The machine is designed for an electrolyte battery consisting of sodium, potassium, chloride, bicarbonate, calcium, and phosphate. The machine uses ultramicro quantities of serum averaging around 29 microliters of sample per test. The basic principle of operation is use of a peristaltic pump to transfer sample and reagents from the sample turntable to the reaction turntable. Author (GRA)

N72-27092# Naval Ship Research and Development Center, Bethesda, Md.
THE POSITION OF EARDRUM RUPTURE AND HEARING LOSS IN THE SCALE OF INJURIES FROM NUCLEAR BLAST
Joseph Gesswein and Paul Corrao Feb. 1972 36 p refs
(AD-737643; NSRDC-3789) Avail: NTIS CSCL 06/5

The scanty data available on human eardrum rupture from blast pressure suggest a normal distribution of rupture about a median overpressure of 15 psi. More abundant data are available on blast-induced eardrum rupture in animals, but their value is limited because of the lack of scaling laws. Consequently, predictions for human injury stem from clinical experiences. As an injury mode to shipboard personnel, eardrum rupture will be of secondary importance to other blast-induced injuries. In fact, rupture itself may be beneficial to the individual by preventing damage to the middle ear. However, hearing loss associated with blast pressure or rupture itself will compromise normal voice communication. Although ear protection is advisable, it should be made available only in conjunction with protection against other blast effects. Author (GRA)

N72-27093# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THE EFFECTS OF HIGH INTENSITY NOISE ON HUMAN EQUILIBRIUM
C. Stanley Harris and Henning E. vonGierke Dec. 1971 24 p refs Presented at Aerospace Medical Assoc. Meeting, Washington, D. C., Apr. 1967
(AF Proj. 7231)
(AD-737826; AMRL-TR-67-41) Avail: NTIS CSCL 06/19

Five experiments were conducted on the effects of broadband, high intensity noise on human equilibrium. The ability of subject to balance on narrow rails was measured during exposure to the noise and immediately after termination of the noise. Four different noise conditions were used in each experiment: control, 120, 130, and 140 dB (re. 0.0002 dyne/sq cm). In the first experiment subjects wore earmuffs and earplugs; in the second, only earplugs were worn; and in the third experiment, subjects wore earplugs and one earmuff to produce an asymmetrical exposure. At an ambient level of 140 dB, a detrimental effect was obtained in all three experiments. At lower intensities of noise, there were performance decrements only for the asymmetrical exposure. In the remaining two experiments, conducted after termination of the noise, detrimental effects were obtained for asymmetrical auditory exposure but not for equal auditory exposure. The results of these experiments are interpreted as a possible quantitative demonstration of the direct effect of high intensity noise on the vestibular system. Author (GRA)

N72-27094# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
ANALYSIS OF THE VESTIBULO-OCULAR COUNTERROLL

REFLEX IN PRIMATES Final Report
A. M. Junker, C. R. Replogle, K. A. Smiles, R. D. Brown, and R. Wheeler Nov. 1971 18 p refs
(AF Proj. 7222)
(AD-737828; AMRL-TR-71-59) Avail: NTIS CSCL 06/19

The vestibulo-ocular reflex manifested by counterroll was used to determine the response dynamics of the vestibular system and alterations in these dynamics subsequent to -Gx exposure. Six rhesus monkeys were tested before and after acceleration exposure to determine if significant changes had occurred in the vestibulo-ocular counterroll reflex. The tests consisted of constant speed rotation, pendular oscillations and multiple sine wave oscillations about the subject's cyclopean axis. Ocular counterroll was recorded using a linear resolver mechanically fixed to the monkey's eyeball. The data collected were analyzed by use of the Fast Fourier Transform. This work demonstrates that there is no significant decrease in the system gain with inputs up to 1Hz; the observed phase lag can be accounted for by a time delay of approximately 0.2 seconds, and there is no significant response alteration caused by acceleration loading up to 75 -Gx. Author (GRA)

N72-27095# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
A STUDY OF THE EFFECTS OF ILLUMINATION AND NOISE ON SIMPLE MOTOR PERFORMANCE M.S. Thesis
Carol A. Gardinier 1971 32 p refs
(AD-739474) Avail: NTIS CSCL 05/10

The paper investigates the effects of two environmental parameters, illumination and noise, on human performance. While many single-factor studies have been made on both illumination and noise, relatively little research has been done to determine multi-factor environmental effects on performance. Studies of the combined effects of various environmental factors would be useful to both government and industry in the maintenance area, such as for obtaining accurate estimates for maintenance task times and repair times. In an organization as large as the Army, for example, this could result in a significant cost reduction. In this study, subjects performed a manual task under four conditions of illumination and noise. The results are reported. GRA

N72-27096# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
A DYNAMIC ANALYSIS OF THE ARM COMPLEX SUBJECTED TO AN EXTERNAL LOAD M.S. Thesis
John S. Bezner May 1971 72 p refs
(AD-739478) Avail: NTIS CSCL 06/2

The purpose of the paper is to investigate the action of the hand, arm, and shoulder complex when that complex is required to perform a definite task. The motion under study is that motion encountered when the human operator is required to turn a crank. The cranking motion is in a horizontal plane which passes through the shoulder joint. The subject is required to keep the arm in this plane of motion throughout the task performance. The moments and forces to which the arm mechanism is subjected are then analytically evaluated.
Author (GRA)

N72-27097# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
THE EFFECTS OF COMBINED ENVIRONMENTAL FACTORS ON HUMAN PERFORMANCE OF A MANUAL TASK: NOISE AND TEMPERATURE M.S. Thesis
Robert P. Lewis May 1971 37 p refs Sponsored by the Army
(AD-739432) Avail: NTIS CSCL 05/10

The effects of two environmental factors, noise and temperature, upon human performance of a simple, well-learned manual dexterity task were examined. The experimental design was a 2x2 factorial, using twelve subjects. The data obtained from scores on a Purdue Pegboard task were analyzed in a randomized block, by means of an analysis of variance. Results indicated that temperature had a significant effect on performance, while noise and the temperature x noise interaction did not.
Author (GRA)

N72-27098# Naval Air Development Center, Johnsville, Pa. Crew Systems Dept.
SOME EFFECTS OF CBRF3 INHALATION AND EPINEPHRINE CHALLENGE ON CERTAIN MYOCARDIAL METABOLITE LEVELS Interim Report
Richard A. Rhoden 30 Dec. 1971 61 p refs
(AD-739699; NADC-CS-7114) Avail: NTIS CSCL 06/20

Bromotrifluoromethane (CBrF3) would have considerable potential as a closed environment fire extinguishing agent, except for its membership in that large group of hydrocarbons capable of precipitating irregular heart action when inhaled by persons with elevated levels of blood epinephrine. These experiments were an effort to determine whether myocardial metabolism was impaired in male Wistar rats breathing 79/21 CBrF3/O2 and challenged with 1-epinephrine in what would ordinarily constitute sub-toxic dosages. CNS effects were the major observations in rats exposed to both CBrF3 and epinephrine; all control rats survived without apparent effect. The general picture was consistent with the CBrF3 induction of respiratory depression and hypoxia. Author (GRA)

N72-27099 Office of Naval Research, Arlington, Va.
NAVAL RESEARCH REVIEWS, VOLUME 25, NO. 3
William J. Lescure, ed. Mar. 1972 33 p refs
Avail: SOD $0.20

Developments in deep sea diving, and studies of lightning triggered by man are presented.

N72-27100 Office of Naval Research, Arlington, Va.
THE NAVY AND THE CHALLENGE OF DEEP DIVING
Carl O. Holmquist *In its* Naval Res. Rev., Vol. 25, no. 2 Mar. 1972 p 1-14 Repr. from Underwater Mag., v. 1, no. 3

The developme t of deep sea diving technology is reviewed. Topics discussed include: scuba, Sealab experiments, decompression sickness, inert gas narcosis, gas density and viscosity, body heat loss, hydrostatic pressure effects, fluid breathing, life support technology, and functional support of divers. F.O.S.

N72-27102* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
LIQUID WASTE FEED SYSTEM Patent
John B. Hall, Jr., Yi Tung, and Lavern E. Winn, inventors (to NASA) Issued 20 Jun. 1972 6 p Filed 15 Jan. 1970

(NASA-Case-LAR-10365-1; US-Patent-3,670,890;
US-Patent-Appl-SN-3151; US-Patent-Class-210-104;
US-Patent-Class-210-103; US-Patent-Class-210-110;
US-Patent-Class-210-137) Avail: US Patent Office CSCL 13B

A pressurized liquid waste tank feeds liquid waste into liquid waste processing equipment. The processed liquid is pumped into an accumulator tank which has an actuator that opens and closes microswitches as the accumulator tank is filled and emptied. These microswitches control solenoid valves which are located in the lines feeding the liquid waste processing equipment, the accumulator tank and the collecting tank. An electrical circuit ties together the switches and valves in a manner such that sufficient waste liquid is automatically maintained in the liquid waste processing equipment to give optimum system performance in a zero gravity environment.
Official Gazette of the U.S. Patent Office

N72-27103* Baylor Univ., Houston, Tex. Coll. of Medicine.
COMPRESSIBLE BIOMEDICAL ELECTRODE Patent.
James D. Frost, Jr., inventor (to NASA) Issued 13 Jun. 1972 5 p Filed 5 Nov. 1970
p 727) Sponsored by NASA
(NASA-Case-MSC-13648; US-Patent-3,669,110; US-Patent-Appl-SN-87222; US-Patent-Class-128-2.1E; US-Patent-Class-128-417; US-Patent-Class-128-DIG.4) Avail: US Patent Office CSCL 06B

An electrode is reported which incorporates a silicone rubber sponge immediately adjacent to a chlorided silver disk carried in a silicone rubber base. The electrode is covered with a thin leak-proof vinyl coating for storing electrolyte solution from the point of manufacture. The sponge rubber holds the electrolyte until it is required at the time of usage. A force on the exterior causes the electrolyte to moisten the skin to provide good ohmic contact with the subject.

Official Gazette of the U.S. Patent Office

N72-27104*# North American Rockwell Corp., Downey, Calif. Space Div.
A STUDY OF HUMAN PERFORMANCE IN A ROTATING ENVIRONMENT
J. A. Green, J. L. Peacock, and A. P. Holm [1971] 236 p refs (Contract NAS1-9711)
(NASA-CR-111866; SD-70-456) Avail: NTIS HC $14.00 CSCL 05E

Consideration is given to the lack of sufficient data relative to the response of man to the attendant oculovestibular stimulations induced by multi-directional movement of an individual within the rotating environment to provide the required design criteria. This was done to determine the overall impact of artificial gravity simulations on potential design configurations and crew operational procedures. Gross locomotion and fine motor performance were evaluated. Results indicate that crew orientation, rotational rates, vehicle design configurations, and operational procedures may be used to reduce the severity of the adverse effects of the Coriolis and cross-coupled angular accelerations acting on masses moving within a rotating environment. Results further indicate that crew selection, motivation, and short-term exposures to the rotating environment may be important considerations for future crew indoctrination and training programs. Author

N72-27105# Civil Aeromedical Inst., Oklahoma City, Okla.
METHODOLOGY IN THE MEASUREMENT OF COMPLEX HUMAN PERFORMANCE: TWO-DIMENSIONAL COMPENSATORY TRACKING
Alan E. Jennings, W. Dean Chiles, and Georgetta West May 1972 14 p refs
(FAA-AM-72-21) Avail: NTIS HC $3.00

Nineteen subjects were tested on two successive days on a complex performance device designed to measure functions of relevance to aircrew performance; included were measures of monitoring, information processing, pattern discrimination, and group problem solving. The effects of a perceptualmotor tracking task were evaluated by measuring performance with and without concurrent tracking during five different task combinations and in a tracking-alone condition. The tracking task was shown to be reliable both when performed by itself and when performed concurrently with other tasks. The tracking task was also shown to be sensitive to work load effects from the other tasks and to impose a significant effect on some of the other tasks. The findings also suggest that a composite score based on all concurrently performed tasks may have unique value and sensitivity under some conditions. Author

N72-27106*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SECOND CONFERENCE ON PORTABLE LIFE SUPPORT SYSTEMS
Washington 1972 350 p refs Conf. held at Moffett Field, Calif., 11-13 May 1971
(NASA-SP-302) Avail: NTIS HC $6.00 CSCL 06K

Portable life support systems considered include breathing apparatus, oxygen generating and circulating equipment, thermoregulating diving suits, pressure suits and environmental control systems.

N72-27107* Bureau of Mines, Pittsburgh, Pa.
PORTABLE BREATHING APPARATUS FOR COAL MINES
Robert W. VanDolah *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 1-4 refs

CSCL 06K

The state of the art in portable oxygen breathing equipment is reported. Considered are self-containing as well as chemically generating oxygen sources and their effectiveness and limitations in mine rescue operations. G.G.

N72-27108* Naval Ship Systems Command, Washington, D.C.
DESIGN CONSIDERATIONS FOR DIVERS' BREATHING GAS SYSTEMS
O. R. Hansen *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 5-30 refs

CSCL 06K

Some of the design methods used to establish the gas storage, mixing, and transfer requirements for existing deep dive systems are discussed. Gas mixing systems appear essential to provide the low oxygen concentration mixtures within the converging tolerance range dictated by applications to increasing depths. Time related use of gas together with the performance of the gas transfer system insures a reasonable time frame for systems application. Author

N72-27109* Hamilton Standard, Windsor Locks, Conn. Space Systems Dept.
APOLLO PLSS: ENVIRONMENTAL CONTROL OF THE SMALLEST MANNED SPACE VEHICLE
John C. Beggs and Fred H. Goodwin *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 31-48
CSCL 06K

The production of a portable life support system (PLSS) and associated backup equipment for supporting an astronaut working outside of the lunar module (LM) either in space or on the lunar surface is reported. Described are the system, the philosophy behind its design, basic requirements imposed on the system, and some of the evolutionary processes that led to the present configuration. Author

N72-27110* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO PORTABLE LIFE SUPPORT SYSTEM PERFORMANCE REPORT
Maurice A. Carson *In its* Second Conf. on Portable Life Support Systems 1972 p 49-67 refs

CSCL 06K

The performance of the Apollo portable life support system (PLSS) on actual lunar missions is discussed. Both subjective comments by the crewmen and recorded telemetry data are evaluated although emphasis is on the telemetry data. Because the most important information yielded by the PLSS deals with determination of crewman metabolic rates, these data and their interpretation are explained in detail. System requirements are

compared with actual performance, and the effect of performance margins on mission planning are described. Mission preparation testing is described to demonstrate how the mission readiness of the PLSS and the crewmen in verified, and to show how the PLSS and the crewmen are calibrated for mission evaluation.
Author

N72-27111* Navy Clothing and Textile Research Unit, Natick, Mass.
NAVY-DEVELOPED LIFE SUPPORT SYSTEMS FOR FULLY ENCLOSED PROTECTIVE SUITS
G. M. Orner and N. F. Audet *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 69-80 refs
CSCL 06K

The development and performance of an environmental control unit capable of supporting a man in an impermeable suit at ambient temperatures up to 140 F for periods of up to two hrs is reported. The basic suit operation consists of cooling by wet ice contained in a suitcase. The system is designed to circulate and cool the air within the suit, to remove excess moisture and carbon dioxide, and to maintain a safe oxygen level. G.G.

N72-27112* Westinghouse Electric Corp., Annapolis, Md. Ocean Research and Engineering Center.
A CHLORATE CANDLE/LITHIUM HYDROXIDE PERSONAL BREATHING APPARATUS
Frank E. Martin *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 81-99 refs
CSCL 06K

A portable coal mine rescue and survival equipment is reported that consists of a chlorate candle with a lithium hydroxide carbon-dioxide absorbent for oxygen generation, a breathing bag and tubing to conduct breathing to and from the man. A plastic hood incorporating a mouth piece for communication provides also eye protection and prevents inhalation through the nose. Manned testing of a prototype system demonstrated the feasibility of this closed circuit no-maintenance breathing apparatus that provides for good voice communication. G.G.

N72-27113* Hamilton Standard, Windsor Locks, Conn.
ADVANCED EXTRAVEHICULAR PROTECTIVE SYSTEMS
James G. Sutton, Philip F. Heimlich, and Edward H. Tepper *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 101-137
CSCL 06K

New technologies are identified and recommended for developing a regenerative portable life support system that provides protection for extravehicular human activities during long duration missions on orbiting space stations, potential lunar bases, and possible Mars landings. Parametric subsystems analyses consider: thermal control, carbon dioxide control, oxygen supply, power supply, contaminant control, humidity control, prime movers, and automatic temperature control. G.G.

N72-27114* Vought Missiles and Space Co., Dallas, Tex.
REGENERABLE THERMAL CONTROL AND CARBON DIOXIDE CONTROL TECHNIQUES FOR USE IN ADVANCED EXTRAVEHICULAR PROTECTIVE SYSTEMS
J. L. Williams, R. J. Copeland, and B. W. Nebbon *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 139-157 refs
CSCL 06K

The most promising closed CO2 control concept identified by this study is the solid pellet, Mg(OH2)2 system. Two promising approaches to closed thermal control were identified. The AHS system uses modular fusible heat sinks, with a contingency evaporative mode, to allow maximum EVA mobility. The AHS/refrigerator top-off subsystem requires an umbilical to minimize expendables, but less EVA time is used to operate the system, since there is no requirement to change modules. Both of these subsystems are thought to be practical solutions to the problem of providing closed heat rejection for an EVA system.
Author

N72-27115* Westinghouse Electric Corp., Annapolis, Md. Ocean Research and Engineering Center.
A PORTABLE LIFE SUPPORT SYSTEM FOR USE IN MINES
Sanford S. Zeller *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 159-166 refs
CSCL 06K

The portable life support system described in this paper represents a potential increase in the probability of survival for miners who are trapped underground by a fire or explosion. The habitability and life support capability of the prototype shelter have proved excellent. Development of survival chamber life support systems for wide use in coal mines is definitely within the capabilities of current technology. Author

N72-27116* Battelle Memorial Inst., Columbus, Ohio.
SEMICLOSED-CIRCUIT ATMOSPHERE CONTROL IN A PORTABLE RECOMPRESSION CHAMBER
Peter S. Riegel and Don W. Caudy *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 167-182 refs
(Contract N00014-70-C-0072)
CSCL 06K

A small portable recompression chamber is described that can be used both to treat a diver for decompression sickness or to transport him to a larger chamber complex. The device can be operated in either open circuit or semiclosed circuit atmospheres, permits two way conversation between patient and attendant, and uses an air injector for circulation of the chamber atmosphere. G.G.

N72-27117* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
SKYLAB ASTRONAUT LIFE SUPPORT ASSEMBLY
J. Travis Brown *In its* Second Conf. on Portable Life Support Systems 1972 p 183-201
18-05)
CSCL 06K

A comparative study was performed to define an optimum portable life support system for suited operations inside and outside the Skylab Program. Emphasis was placed on utilization of qualified equipment, modified versions of qualified equipment, and new systems made up to state-of-the-art components. Outlined are the mission constraints, operational modes, and evaluation ground rules by which the Skylab portable life support system was selected and the resulting design. Author

N72-27118* General Electric Co., Philadelphia, Pa.
ADVANCED DEEP SEA DIVING EQUIPMENT
William A. Danesi *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 203-216 ref
CSCL 06K

Design requirements are generated for a deep sea heavy

duty diving system to equip salvage divers with equipment and tools that permit work of the same quality and in times approaching that done on the surface. The system consists of a helmet, a recirculator for removing carbon dioxide, and the diver's dress. The diver controls the inlet flow by the recirculatory control valve and is able to change closed cycle operation to open cycle if malfunction occurs. Proper function of the scrubber in the recirculator minimizes temperature and humidity effects as it filters the returning air. G.G.

N72-27119* Navy Experimental Diving Unit, Washington, D.C.
OPERATION AND TESTING OF MARK 10 MOD 3 UNDERWATER BREATHING APPARATUS
William I. Milwee, Jr. *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems

CSCL 06K

Performance tests on a closed circuit, mixed gas underwater breathing apparatus are reported. The equipment is designed to provide a minimum diving duration of four hours at 1500 ft below sea surface; it senses oxygen partial pressure in the breathing gas mix and controls oxygen content of the breathing gas within narrow limits about a preset value. The breathing circuit subsystem provides respirable gas to the diver and removes carbon dioxide and moisture from the expired gas. Test results indicate undesirable variations in oxygen partial pressure with oxygen addition and insufficient carbon dioxide absorption. G.G.

N72-27120* Navy Experimental Diving Unit, Washington, D.C.
THERMAL PROTECTION OF DIVERS
Patrick F. Dowland (Royal Navy) *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 229-235 refs
CSCL 06K

Various diving suit-heating element combinations are evaluated in an effort to achieve a diving capability to depths of 1000 ft in water temperatures down to 29 F. Wet suits, dry suits and suits made of incompressible material are reported, and suit heat replacement by circulation of hot water with heating by cemented electrical elements is described. G.G.

N72-27121* National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
A FLIGHT-RATED LIQUID-COOLED GARMENT FOR USE WITHIN A FULL-PRESSURE SUIT
Richard Carpenter and William R. Winter *In its* Second Conf. on Portable Life Support Systems refs

CSCL 06K

A flight rated liquid cooled garment system for use inside a full pressure suit has been designed, fabricated, and tested. High temperature tests with this system have indicated that heat is absorbed at a rate decreasing from 224 kg-cal/hr to 143 kg-cal/hr over a 40-min period. The first 30 min are very comfortable; thereafter a gradual heat load builds that results in mild sweating at the end of the 40-min period. In flight tests during hot weather when this cooling system was worn under a regulation flight suit, the pilot reported that temperatures were comfortable and that the garment prevented sweating. Author

N72-27122* TRW Systems Group, Redondo Beach, Calif.
POTENTIAL TECHNIQUES AND DEVELOPMENT ACTIVITIES IN DIVER SUIT HEATING
A. P. Shlosinger *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 247-256 refs

CSCL 06K

A prototype compact reactor suitable for combustion of propane with oxygen under shallow as well as submerged deep submergence diving conditions is reported. The device is used to heat the circulating water in a water tube-type diving suit. G.G.

N72-27123* Mechanics Research, Inc., Los Angeles, Calif.
PORTABLE LIFE SUPPORT FOR INSTRUMENTATION OF AN OFFSHORE PLATFORM
Michael M. Mull and Clarkson L. Coffin *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 257-264
CSCL 06K

A compressor was used to supply air through a nylon hose to the offshore platform field engineer working at the bottom of the piling. Air quality in the pile was sampled periodically for carbon dioxide, carbon monoxide, hydrogen sulfide, and combustible gases by an universal tester and an explosion meter. G.G.

N72-27124* Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
REMOVAL OF METABOLIC HEAT FROM MAN WORKING IN A PROTECTIVE SUIT
Avraham Shitzer, John C. Chato, and Bruce A. Hertig *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 265-281 refs

(Grant NGR-14-005-103)
CSCL 06K

A water cooled garment was constructed and used to study the characteristics of independent regional cooling of the body in contrast to the current practice of uniform cooling. The cooling pads in the garment were grouped to provide independent control of water inlet temperatures and flow rates to six regions: head, upper torso, lower torso, arms, thighs, and lower legs. Experiments with and without the cooling suit were conducted with five test subjects standing and walking on a treadmill on selected schedules. Steady state and, to a lesser extent, transient characteristics were obtained. Author

N72-27125* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A LIQUID COOLED GARMENT TEMPERATURE CONTROLLER BASED ON SWEAT RATE
Alan B. Chambers and James Blackaby *In its* Second Conf. on Portable Life Support Systems 1972 p 283-287 refs

CSCL 06K

An automatic controller for liquid cooled space suits is reported that utilizes human sweat rate as the primary input signal. The controller is so designed that the coolant inlet temperature is inversely proportional to the subject's latent heat loss as evidenced by evaporative water loss. G.G.

N72-27126* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECT OF NECK WARMING AND COOLING ON THERMAL COMFORT
Bill A. Williams and Alan B. Chambers *In its* Second Conf. on Portable Life Support Systems 1972 p 289-294 refs

CSCL 06K

The potential use of local neck cooling in an area superficial to the cerebral arteries was evaluated by circulating cold or hot water through two copper disks held firmly against the neck. Subjective responses indicated that neck cooling improves the thermal comfort in a hot environment. G.G.

N72-27127* Safety in Mines Research Establishment, Sheffield /England/.
TOLERANCE TO EXTERNAL BREATHING RESISTANCE WITH PARTICULAR REFERENCE TO HIGH INSPIRATORY RESISTANCE
R. A. Bentley, O. G. Griffin, R. G. Love, D. C. F. Muir, and K. F. Sweetland *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 295-303 refs

CSCL 06K

The ability of men to exercise while breathing through graded inspiratory resistances was studied in order to define acceptable respiratory mouthpiece assembly standards. Experimental results with subjects wearing breathing masks and walking for 30 min on treadmills were used to calculate expiratory work rates. It is concluded that the airflow must be appropriate to the upper limit of minute ventilation likely to be encountered in the men wearing the apparatus. G.G.

N72-27128* Harvard Univ., Cambridge, Mass. School of Public Health.
RESPIRATORY PROTECTIVE DEVICE DESIGN USING CONTROL SYSTEM TECHNIQUES
William A. Burgess and Donald Yankovich (MIT) *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems p 305-314
CSCL 06K

The feasibility of a control system analysis approach to provide a design base for respiratory protective devices is considered. A system design approach requires that all functions and components of the system be mathematically identified in a model of the RPD. The mathematical notations describe the operation of the components as closely as possible. The individual component mathematical descriptions are then combined to describe the complete RPD. Finally, analysis of the mathematical notation by control system theory is used to derive compensating component values that force the system to operate in a stable and predictable manner. Author

N72-27129* International Business Machines Corp., Gaithersburg, Md. Federal Systems Div.
BREATHING METABOLIC SIMULATOR
R. G. Bartlett, C. M. Hendricks, and W. B. Morison *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 315-324 refs

CSCL 06K

The development of a breathing metabolic simulator (BMS) is reported. This BMS simulates all of the breathing and metabolic parameters required for complete evaluation and test of life support and resuscitation equipment. It is also useful for calibrating and validating mechanical and gaseous pulmonary function test procedures. Breathing rate, breathing depth, breath velocity contour, oxygen uptake, and carbon dioxide release are all variable over wide ranges simulating conditions from sleep to hard work with respiratory exchange ratios covering the range from hypoventilation. In addition, all of these parameters are remotely controllable to facilitate use of the device in hostile or remote environments. The exhaled breath is also maintained at body temperature and a high humidity. The simulation is accurate to the extent of having a variable functional residual capacity independent of other parameters. Author

N72-27130* Safety in Mines Research Establishment, Sheffield /England/.
INFLUENCE OF FACEMASK DESIGN ON OPERATIONAL PERFORMANCE
O. G. Griffin and D. J. Longson *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 325-333 refs
CSCL 06K

Spirometric measurements of oxygen volume and determination of the amount of argon in exhaled breath are used to analyze facemask design efficiency during treadmill walking tests with subjects carrying plastic hoods filled with argon. Facemask leakage measurements established the better performance of a pneumatic seal type mask in comparison with plain seal type masks. Author

N72-27131* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CATALYZED SODIUM CHLORATE CANDLES
C. W. Malich and T. Wydeven *In its* Second Conf. on Portable Life Support Systems 1972 p 335-345 refs

CSCL 06K

The catalytic effect of cobalt powder on chlorate decomposition has been confirmed. Catalysis is enhanced by oxidation of the metal during burning. Catalysts other than cobalt compounds should also be effective; the complete elimination of fuel has shown that the oxidation of cobalt during decomposition is not a vital factor in the improved performance of catalyzed candles. Author

N72-27132* Mechanics Research, Inc., Los Angeles, Calif.
AN EMERGENCY SURVIVAL SUIT
Daniel L. Curtis *In* NASA. Ames Res. Center Second Conf. on Portable Life Support Systems 1972 p 347-350

CSCL 06K

A thermally insulative inflatable garment designed specifically as a lightweight low storage volume emergency suit for subzero weather survival is reported. Testing confirms that the inflatable suit design satisfies the objectives for a subject standing at rest with environmental temperatures down to -450 F if the garment is inflated with Freon. G.G.

N72-27133* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
AN ALTITUDE CHAMBER RESCUE ENSEMBLE
Russell P. Lloyd *In its* Second Conf. on Portable Life Support Systems 1972 p 351-358

CSCL 06K

Altitude chamber tests accomplished with the astronaut crews in the spacecraft at a simulated altitude of above 200,000 ft requires that a rescue team be provided in the event of an accident in the spacecraft. The rescue crew is stationed in an airlock maintained at an altitude of 18,000 ft. A protective ensemble provides the rescue crew with life support capabilities, communications, and protection in the event of an emergency. In the event of an emergency, repressurization of the chamber is initiated; as the chamber descends, the airlock ascends and the two meet at 25,000 ft. This phase of the emergency repressurization takes less than 30 sec. Author

N72-27134# National Research Council of Canada, Ottawa (Ontario).
MULTICHANNEL BIOELECTRIC CONTROL OF THE MOVEMENTS OF HUMANS IN NORMAL AND PATHOLOGICAL CONDITIONS
L. S. Aleev and S. G. Bunimovich 1972 10 p refs Transl. into ENGLISH from Proc. of Congr. of the German Cybernetics Soc., Munich, 23-26 Apr. 1968
(NRC-TT-1552) Avail: NTIS HC $3.00

A bioelectric control system, the myolon, simulating certain human neuromuscular motions was developed and tested. The system is based on the multichannel principle utilizing the laws governing the change of mean value of the summary neuromyogram. The control system is designed to record the motion algorithms on a magnetic storage device, derive control signals from the storage device, and derive control signals directly from the donor. The use of the device in training athletes and treating motor function disturbances is discussed. E.H.W.

N72-27135# Technology Service Corp., Santa Monica, Calif.
STRUCTURAL LANGUAGES AND BIOMEDICAL SIGNAL ANALYSIS USING INTERACTIVE GRAPHICS
W. S. Meisel and D. C. Collins Mar. 1972 9 p refs Presented at Biomed. Symp., San Diego, Calif., 2-4 Feb. 1972
(Contract F44620-71-C-0093; AF Proj. 9749)
(AD-739258; AFOSR-72-0616TR) Avail: NTIS CSCL 06/2

The analysis of biological waveforms by computer or by special-purpose hardware can reduce the burden on trained medical manpower, make mass screening of a population more tenable, and allows the automatic analysis of large quantities of research data. Waveforms generated in electrocardiography, phonocardiography, vectorcardiography, cardiac output recording, oxygen consumption recording, electroencephalography, electromyography, and in similar applications are candidates for analysis. A characteristic of many biomedical waveforms in such applications is that many of the features by which classes of waveforms, e.g., abnormal vs. normal EKG's, are distinguished, are generally expressed by fuzzy descriptions of structural details. In EKG analysis, one hears reference to, for example: a depressed S-T segment; an inverted T wave; increased duration of the QRS interval; late onset of the intrinsicoid deflection. It is the intent of this paper to describe a generalized approach to obtaining a quantitative measure of the degree of existence of such a characteristic in a given waveform. Such measures have a clear interpretation and can be used in a heuristic or linguistic program. They are continuous by continuously measured features which can be used alone or in combination with more abstract features in statistical pattern recognition algorithms.
Author (GRA)

N72-27136# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
TECHNIQUES FOR MEASUREMENT OF CENTERS OF GRAVITY M.S. Thesis
Raymond Paul Rhode May 1971 54 p refs Sponsored by Army
(AD-739439) Avail: NTIS CSCL 05/5

A device which would measure and record the position of the projection of the center of gravity in the horizontal plane is proposed. A generalized design of such a device is presented. The proposed system uses strain gage rings as sensing elements and either an analog computer or an analog to digital converter as a recording element. An additional device which would allow the calculation of centers of gravity from a series of three static measurements is also presented. Author (GRA)

N72-27137# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
PSYCHOPHYSIOLOGICAL MEASUREMENTS APPLIED TO MAINTAINABILITY EVALUATION OF EQUIPMENT DESIGN M.S. Thesis
Billy R. Schulze May 1971 50 p refs Sponsored by Army
(AD-739437) Avail: NTIS CSCL 05/5

The paper presents a proposal for using psychophysiological measurements to aid in evaluating equipment designs from the human factors engineering viewpoint. As a preliminary step in examining the feasibility of applying this method, an experiment was conducted to determine if man's reaction to task difficulty as affected by equipment design features is reflected in psychophysiological indices. Subjects were presented with two similar maintenance type tasks to be performed on differently designed pieces of equipment. One task involved equipment which obviously facilitated ease of maintenance. The other task involved equipment which is difficult to maintain. Various psychophysiological measurements were taken of the subjects as these presentations were made. It was found that a majority of the measured indices were higher during the hard task than during the easy task. However, these differences were not significant at the significance level selected for use in the statistical analysis. Author (GRA)

N72-27138# Applied Psychological Services, Wayne, Pa. Science Center.
MODIFICATION OF THE SIEGEL-WOLF OPERATOR SIMULATOR MODEL FOR ON-LINE EXPERIMENTATION Final Report, Jun. 1968 - Sep. 1969
Arthur I. Siegel, J. Jay Wolf, M. A. Fischl, William Miehle, and Gerald P. Chubb Jun. 1971 117 p refs
(Contract F33615-68-C-1647; AF Proj. 7184)
(AD-737798; AMRL-TR-71-80) Avail: NTIS CSCL 05/10

The primary effort was to modify the existing Siegel-Wolf operator simulation model to allow dynamic interaction with an experimental subject performing on-line in some sort of pseudoreal time environment. The Siegel-Wolf model is capable of simulating task performance by a one or two-man crew to determine the impact human factors have on systems effectiveness and mission success. The BUIC III (Back Up Interceptor Control System for SAGE) active tracking task was used in this work as a representative environment. The other three phases of the effort dealt with the conceptual aspects of the model. Variables known to contribute to performance, but which were not incorporated into the model, were considered to determine their possible contribution to enhancing the model's predictive validity.
Author (GRA)

N72-27139# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
INVESTIGATION OF STIMULUS-SIGNAL AMPLITUDE AND FREQUENCY VARIATION IN VIBROTACTILE COMMUNICATION M.S. Thesis
Charles E. Slyker May 1971 62 p refs Sponsored by Army
(AD-739433) Avail: NTIS CSCL 05/5

An electromechanical transducer was modified for use as a vibrotactile stimulus. Response time to the vibrotactile stimulus was measured experimentally at various levels of stimulus-signal amplitude and frequency. Stimulus-signal amplitude levels ranged from 0.1 to 1.6 mm and frequency levels ranged from 30 to 800 Hz. Experimental results indicate that response time to the vibrotactile stimulus quickens with increasing amplitude and frequency and further that response time appears to be converging to an optimum over the range tested. Author (GRA)

N72-27140# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
SYMPOSIUM ON BIODYNAMIC MODELS AND THEIR APPLICATIONS
Dec. 1971 965 p refs Symp. held at Dayton, Ohio, 26-28 Oct. 1970
(AD-739501; AMRL-TR-71-29) Avail: NTIS CSCL 06/2

The Symposium on Biodynamics Models and Their Applications took place in Dayton, Ohio, on 26-28 October 1970 under the sponsorship of the National Academy of Sciences - National Research Council, Committee on Hearing, Bioacoustics, and Biomechanics; the National Aeronautics and Space Administration; and the Aerospace Medical Research Laboratory, Aerospace Medical Division, United States Air Force. Most technical areas discussed included application of biodynamic

models for the establishment of environmental exposure limits, models for interpretation of animal, dummy, and operational experiments, mechanical characterization of living tissue and isolated organs, models to describe man:s response to impact, blast, and acoustic energy, and performance in biodynamic environments. Author (GRA)

N72-27882 Joint Publications Research Service, Arlington, Va.
FOR A RENDEZVOUS IN ORBIT
E. Anisimov *In its* Docking Training and Telemetry 11 Jul. 1972 p 1-7

The use of specialized and multipurpose simulators is discussed in connection with developing the skill of cosmonauts in spacecraft docking. Author

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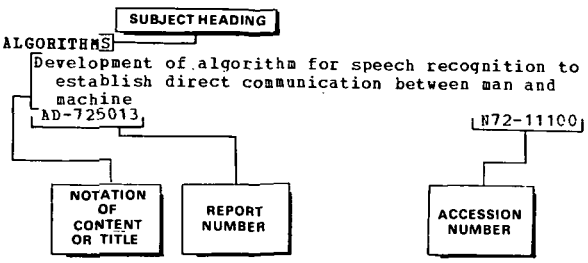

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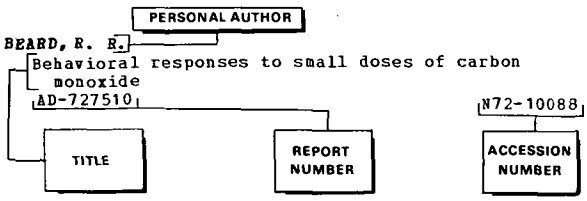

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