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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY

### WITH INDEXES

(Supplement 128)

MAY 1974

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

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NASA SP-7011 (128)

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

## (Supplement 128)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1974 in

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

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 282 reports, articles and other documents announced during April 1974 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.

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## TYPICAL CITATION AND ABSTRACT FROM STAR

NASA SPONSORED DOCUMENT

AVAILABLE ON MICROFICHE

NASA ACCESSION NUMBER

N74-10092*# Minnesota Univ., Minneapolis. Space Science Center.

CORPORATE SOURCE

TITLE

ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE

AUTHOR

Irving J. Pflug Jun. 1972 81 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Grant NGL-24-005-160)

REPORT NUMBER

(NASA-CR-135980; SAPR-8) Avail: NTIS HC $6.25 CSCL 06M

AVAILABILITY SOURCE

The survival of Bacillus subtilis var. niger spores suspended in solutions of sucrose and glycerol at calculated water activities and varying temperatures was studied. The overall results indicated that as the water activity of the liquid decreased from .99 to .85, the heat resistance of the spores increased. The nature of the substance controlling the water activity, and the history of the spores prior to treatment also had an affect on their heat resistance. G.G.

COSATI CODE

## TYPICAL CITATION AND ABSTRACT FROM IAA

NASA SPONSORSHIP

AIAA ACCESSION NUMBER

A74-10117 * Acute metabolic and physiologic response of goats to narcosis. C. L. Schatte (Colorado State University, Fort Collins, Colo.) and P. B. Bennett (Royal Naval Physiological Laboratory, Alverstoke, Hants., England). *Aerospace Medicine*, vol. 44, Oct. 1973, p. 1101-1105. 12 refs. Grant No. NGR-06-002-075.

AUTHOR

TITLE

AUTHOR'S AFFILIATION

Assessment of the metabolic consequences of exposure to elevated partial pressures of nitrogen and helium under normobaric and hyperbaric conditions in goats. The results include the finding that hyperbaric nitrogen causes and increase in metabolic rate and a general decrease in blood constituent levels which is interpreted as reflecting a shift toward fatty acid metabolism at the expense of carbohydrates. A similar but more pronounced pattern was observed with hyperbaric helium. M.V.E.

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# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 128)* MAY 1974

## IAA ENTRIES

**A74-19206 Chromatic substitution with stabilized images - Evidence for chromatic-specific pattern processing in the human visual system.** M. P. Cosgrove, G. A. Kohl, M. J. Schmidt, and D. R. Brown (Purdue University, West Lafayette, Ind.). *Vision Research*, vol. 14, Jan. 1974, p. 23-29. 30 refs. Grant No. NIH-HD-00909.

**A74-19207 Disparity masking with ambiguous random-dot stereograms.** N. Long and R. Over (Queensland, University, St. Lucia, Queensland, Australia). *Vision Research*, vol. 14, Jan. 1974, p. 31-34. 7 refs.

Perceived depth was studied when an ambiguous stereopair (containing both crossed and uncrossed disparity) was viewed following exposure to an unambiguous stereopair (containing either crossed or uncrossed disparity). The 'depth marker' effect (with the ambiguous figure seen in the same depth plane as the immediately preceding unambiguous figure) reported by Julesz (1964) was not replicated. Instead the ambiguous figure appeared near following exposure to uncrossed disparity and far after inspection of crossed disparity. This bias in depth judgments is attributed to disparity-selective masking of a component within a compound stereospatial display. (Author)

**A74-19208 Spatio-temporal interaction between visual colour mechanisms.** D. H. Foster and I. I. M. Idris (Imperial College of Science and Technology, London, England). *Vision Research*, vol. 14, Jan. 1974, p. 35-39. 26 refs.

Interaction between Stiles color mechanisms, pi sub 1, pi sub 4, and pi sub 3, is examined in the case of a certain discrete-stimulus apparent-movement effect. It is found that this effect is exhibited between different as well as the same pi mechanisms, and moreover, that it has the same temporal-frequency dependence in each case. (Author)

**A74-19209 The colour specificity of spatial adaptation Red-blue interactions.** C. R. Sharpe (McGill University, Montreal, Canada). *Vision Research*, vol. 14, Jan. 1974, p. 41-51. 32 refs. Research supported by McGill University.

Results obtained from psychophysical experiments have shown that spatially adapting to a sinusoidal grating of one color can significantly elevate the contrast threshold of another test grating of a different color. This effect occurs even when the luminance of the adapting pattern is too low to excite the color channel responsible for detecting the test grating. It is proposed that this cross-color spatial adaptation is the aftereffect of prolonged inhibition between spatial pattern detectors. Cross-color spatial adaptation was found to be interocularly transferred to a significantly greater extent than same-color adaptation, suggesting that the former occurs at a more central stage in the visual pathway. Both same-color and cross-color spatial adaptation were found to be spatial frequency specific. It is proposed that spatial frequency tuning curves determined by cross-color spatial adaptation represent the extent of inhibitory input to the detectors responsible for detecting the test gratings, from those detectors stimulated by the adapting grating. (Author)

**A74-19210 Psychophysical studies of monkey vision. I - Macaque luminosity and color vision tests.** R. L. de Valois, H. C. Morgan (California, University, Berkeley, Calif.), M. C. Polson (Colorado, University, Boulder, Colo.), W. R. Mead (Indiana University, Bloomington, Ind.), and E. M. Hull (State University, Buffalo, N.Y.). *Vision Research*, vol. 14, Jan. 1974, p. 53-67. 16 refs. NSF Grant No. GB-12303; Grant No. PHS-EY-0014.

Macaque monkeys and normal human observers were tested on the same apparatus for the presence of a Purkinje shift, and for spectral sensitivity under scotopic and photopic conditions. The flicker fusion point for different lights was used as a measure of visual sensitivity in these tests and the testing procedure was a four-alternative forced choice. The results show that macaque monkeys and normal human observers show a rod-cone break at the same flicker frequency, and are very similar in both relative and absolute scotopic and photopic sensitivity. Macaque monkeys, normal human observers and color-defective human observers were also tested under identical conditions in several measures of color vision. (Author)

**A74-19211 Psychophysical studies of monkey vision. II - Squirrel monkey wavelength and saturation discrimination.** R. L. de Valois and H. C. Morgan (California, University, Berkeley, Calif.). *Vision Research*, vol. 14, Jan. 1974, p. 69-73. 7 refs. NSF Grant No. GB-12303; Grant No. PHS-EY-00014.

Squirrel monkeys (Saimiri sciureus) were tested in four-choice discrimination experiments to determine their wavelength and saturation discrimination ability. Their wavelength discrimination curve had only a single minimum, in the region of 480 nm, and the discrimination performance was far poorer than that of macaque monkeys tested under identical conditions. The saturation discrimination tests indicated that the whole spectrum is more desaturated for squirrel monkeys than for macaques, and that the least saturated region is about 500 nm rather than 570 nm. There is, however, no neutral point. These results, plus their depressed photopic sensitivity to long wavelengths, support the classification of squirrel monkeys as severely protanomalous trichromats. (Author)

**A74-19212 Psychophysical studies of monkey vision. III - Spatial luminance contrast sensitivity tests of macaque and human observers.** R. L. de Valois, H. Morgan (California, University, Berkeley, Calif.), and D. M. Snodderly (Retina Foundation, Boston, Mass.). *Vision Research*, vol. 14, Jan. 1974, p. 75-81. 14 refs. NSF Grant No. GB-12303; Grant No. PHS-EY-00014.

The detectability of luminance modulated gratings of different spatial frequencies was determined at five different adaptation levels for three macaque monkeys and five normal human observers. The human and macaque observers gave results which were identical in form and similar in absolute values. Both species showed optimal contrast sensitivity in the middle spatial frequency range of about

3-5 c/dec with both low and high frequency attenuation, at high light levels. Contrast sensitivity to high frequencies dropped rapidly as adaptation levels were lowered, with a resulting shift in peak sensitivity to lower spatial frequencies. At the lowest adaptation level studied, neither macaque nor human observers showed any low frequency attenaution in the spatial luminance contrast senstivity function. (Author)

**A74-19213 Effects of inducer duration and separation on test threshold.** R. S. L. Young, R. E. Cole (Hawaii, University, Honolulu, Hawaii), and A. L. Diamond (Simon Fraser University, Burnaby, British Columbia, Canada). *Vision Research*, vol. 14, Jan. 1974, p. 83-87. 23 refs. Grant No. PHS-NS-06890.

The effects of inducer duration on adjacent test thresholds were assessed in a simultaneous contrast experiment. The test and inducer were 1 min dia light flashes and were foveally viewed by the subjects under dark-adaptation conditions. The results of three subjects show that the effectiveness of an inducer flash (1.56 log mL luminance) to raise test threshold is a function of its duration as well as its separation from the test. Test threshold was raised as the duration of the inducer flash increased from 5 to 35 msec or a separation decreased from 40.8 to 6.8 min of visual angle. (Author)

**A74-19214 Evoked potential indications of colour blindness.** D. Regan (Keele, University, Keele, Staffs., England) and H. Spekreijse (Amsterdam, University, Amsterdam, Netherlands). *Vision Research*, vol. 14, Jan. 1974, p. 89-95. 28 refs. Research supported by the Medical Research Council.

Description of experimental evidence showing that evoked potentials elicited by changing the chromatic contrast of a two-colored visual pattern can give clear indications of color blindness. The appearance of a pattern of equiluminant red and green checks evokes brain potentials in normal subjects, but the amplitudes of a deuteranopic subject's responses attenuate sharply when the brightnesses of the red and green checks are made equal. Pattern reversal responses can be generated in the deuteranope (but not in the normal subject) by changing the relative brightness of adjacent equiluminant red and green checks. T.M.

**A74-19215 Transformations of waveform under which incremental visual thresholds are invariant.** C. Rashbass (Institute of Psychiatry, London, England). *Vision Research*, vol. 14, Jan. 1974, p. 97-99. Research supported by the Medical Research Council and Bethlem Royal and Maudsley Hospitals Research Fund.

**A74-19216 Foveal spatial sensitization with stabilized vision.** U. Tulunay-Keesey (Wisconsin, University, Madison, Wis.) and A. Vassilev (B'lgarska Akademiia na Naukite, Fiziologicheski Institut, Sofia, Bulgaria). *Vision Research*, vol. 14, Jan. 1974, p. 101-105. 27 refs. Grant No. NIH-EY-00308.

Foveal increment threshold of a small test flash presented briefly against concentric adapting fields of various sizes was measured. Parallel experiments with unstabilized and stabilized images were carried out. The results obtained under either viewing condition confirmed that illumination of the area adjacent to the tested one lowers its senstivity, and the light falling further away has the opposite, sensitizing, effect. The magnitude of sensitization was smaller with stabilized vision. It is suggested that foveal sensitization is mediated by both 'sustained' and 'transient' systems in normal vision and primarily by 'sustained' when the images are stabilized on the retina. (Author)

**A74-19217 Head orientation and meridional variations in acuity.** P. Lennie (Cambridge University, Cambridge, England). *Vision Research*, vol. 14, Jan. 1974, p. 107-111. 29 refs.

Contrast sensitivity was measured for sinusoidal gratings in different retinal orientations. Oblique gratings of high spatial-frequency are less resolvable than vertical ones. This conforms earlier results and is attributed to properties of orientation-sensitive cortical neurons. The advantage of retinally vertical over oblique gratings persists when the head is tilted and does not change during the next half hour. It is concluded that the properties of orientation-sensitive neurons are not significantly altered in the short term. (Author)

**A74-19218 Optical generation of phase-reversing sine-wave gratings for evoked response stimulation.** R. Jones (Ohio State University, Columbus, Ohio). *Vision Research*, vol. 14, Jan. 1974, p. 125-127. 5 refs.

**A74-19252 * Conditioned suppression, punishment, and aversion.** D. W. Orme-Johnson (Texas, University, El Paso, Tex.) and M. Yarczower (Bryn Mawr College, Bryn Mawr, Pa.). *Journal of the Experimental Analysis of Behavior*, vol. 21, Jan. 1974, p. 57-74. 15 refs. Grant No. NGR-39-018-002.

The aversive action of visual stimuli was studied in two groups of pigeons which received response-contingent or noncontingent electric shocks in cages with translucent response keys. Presentation of grain for 3 sec, contingent on key pecking, was the visual stimulus associated with conditioned punishment or suppression. The responses of the pigeons in three different experiments are compared. V.Z.

**A74-19253 * Handwriting as an operant.** F. A. Gonzalez and M. B. Waller (North Carolina, University, Chapel Hill, N.C.). *Journal of the Experimental Analysis of Behavior*, vol. 21, Jan. 1974, p. 165-175. 27 refs. Grants No. PHS-MH-07534; No. NGL-34-003-040.

Description of a writing console which was used for monitoring handwriting behavior. The main feature of the console is a translucent Plexiglass paddle, pivoted on a thin bronze tube, with its top flat surface providing the writing surface. The console was used in experiments on two subjects under various schedules of monetary reinforcement for handwriting. The results suggest that handwriting is an effective approach to the analysis of human behavior. V.Z.

**A74-19264 Power deposition in a spherical model of man exposed to 1-20-MHz electromagnetic fields.** J. C. Lin, A. W. Guy (Washington, University, Seattle, Wash.), and C. C. Johnson (Utah, University, Salt Lake City, Utah). *(Institute of Electrical and Electronics Engineers, International Microwave Symposium, University of Colorado, Boulder, Colo., June 4-6, 1973.) IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-21, Dec. 1973, p. 791-797. 12 refs. Department of Health, Education and Welfare Grant No. 16-P-5618/0-11; Contract No. F41609-73-C-0002; Grant No. NIH-GM-16436.

**A74-19267 Rate effects in isolated hearts induced by microwave irradiation.** J. L. Lords, C. H. Durney, A. M. Borg, and C. E. Tinney (Utah, University, Salt Lake City, Utah). *IEEE Transactions on Microwave Theory and Techniques*, vol. MTT-21, Dec. 1973, p. 834-836. Research supported by the University of Utah and U.S. Navy.

Continuous 960-MHz microwave irradiation of isolated poikilothermic hearts in Ringer's solution causes bradycardia, in contrast to the tachycardia usually produced by generalized heating. The effect appears to occur only over a narrow power range in the neighborhood of an estimated 3 mW absorbed by the heart. It is hypothesized that the bradycardia is produced by stimulation of the nerve remnants in the heart. (Author)

**A74-19447 # Water provision for spacecraft crews (Vodoobespechenie ekipazhei kosmicheskikh korablei).** S. V. Chizhov and Iu. E. Siniak. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 24), 1973. 267 p. 443 refs. In Russian.

The crucial biotechnological function of providing spacecraft crews with water is discussed in this monograph. Aspects associated with water consumption norms, drinking water conservation, the chemical composition of moisture-containing life-activity products of man, and wastes of biological systems are reviewed. Special attention is given to water regeneration by physicochemical methods, as well as

to techniques for the decontamination and mineralization of the regenerated water. Results of toxicological evaluation are presented for water regenerated by various physicochemical methods. M.V.E.

**A74-19461 Natural history of severe proximal coronary artery disease as documented by coronary cineangiography.** J. S. Webster (Mercy Hospital, Charlotte, N.C.), C. Moberg, and G. Rincon (Cleveland Clinic Foundation and Cleveland Clinic Educational Foundation, Cleveland, Ohio). *American Journal of Cardiology*, vol. 33, Feb. 1974, p. 195-200. 8 refs.

**A74-19472 # Biotelemetric research on cardiovascular straining factors occurring during air transport.** A. Adamache, V. Ionescu, and R. Vrancianu (Academia de Stiinte Medicale, Bucharest, Rumania). *Istituto Internazionale delle Comunicazioni, Convegno Internazionale delle Comunicazioni, 21st, Genoa, Italy, Oct. 8-13, 1973, Paper.* 15 p. 9 refs.

A biotelemetric follow up (with recording of the cardiothoracic tele-electrorheographic hybrid curve) of the cardiohemodynamic reactions of 12 pilots during 40 hours training flight on passenger aircraft with nonairconditioned cabins have been studied in comparison with the cardiovascular data obtained in the laboratory by the simple and double Master's two-step test. In studying sixteen types of data (on the basis from the hybrid curve) at fourteen different moments of flight, a larger percentage extent of the systolic phenomena (active phase of the cycle) and a relative shortening of the diastolic period (recovery phase) were observed, which were more accentuated during power increase, takeoff, descent and landing, than has been recorded in laboratory exercise tests. These results prove that changes could occur even in situations where no extreme factors interfere (acceleration, hypoxia, and hypobarism). (Author)

**A74-19572 The analysis and simulation of the human thermoregulatory control system.** R. I. Kitney (Imperial College of Science and Technology, London, England). *Medical and Biological Engineering*, vol. 12, Jan. 1974, p. 57-65. 9 refs. Research supported by the Medical Research Council of England.

The paper describes a study into one aspect of the thermoregulatory control system in man. An analysis of this control system led to the hypothesis that thermoregulation in humans is achieved by two basic control systems that act as first and second lines of defence and that influence each other. Available physiological information has been utilized in a digital computer simulation of the vasomotor activity associated with the first stage of human thermal control. In exploring features of the model it has been shown that the incorporation of on-off control allows two key aspects of the control system associated with thermal vasomotor activity to be duplicated: (1) the spontaneous fluctuations in digit blood flows; (2) the ability of a thermally induced disturbance to entrain these spontaneous fluctuations. It has also been possible to illustrate driving frequency dependence of the entrainment phenomenon both in the physical system, by physiological experimentation, and in the computer model. (Author)

**A74-19628 Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings (Konferencja na Temat Zwalczania Halasu, 3rd, Warsaw, Poland, November 5-8, 1973, Materialy).** Conference sponsored by the Polska Akademia Nauk and Polskie Towarzystwo Akustyczne. Warsaw, Polska Akademia Nauk, 1973. 373 p. In Polish, German, and English.

Experimental and theoretical studies of noise and vibration are described in papers dealing with adverse biological effects, methods of isolation and damping, procedures for measurement and analysis, and special problems arising in particular industries. Topics considered include noise attenuation in jet engine test facilities, statistical studies of noise distribution at airports, calibration of acoustic and audiometric equipment, transfer of vibrations through human extremities, effects of noise and vibration on the human organism, self-excited pressure fluctuations in gas ducts, axisymmetric components of turbulence produced by a jet source, and characteristics of noise sources and distributions in various industrial environments. T.M.

**A74-19630 # Protection of the hearing organ - Current status, requirements, and possibilities (Ochrona narzadu sluchu-stan aktualny, potrzeby mozliwosci).** H. Czarnecki and W. Wasala (Wojskowa Akademia Medyczna, Warsaw, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 69-73. In Polish.

Measures currently used to safeguard the hearing of personnel exposed to noisy industrial environments are described and critically evaluated in terms of intrinsic drawbacks and enforcement problems. Topics considered include compliance with hearing safety standards, medical selection and periodic examination of personnel exposed to noise, use of personal protective gear such as ear plugs, coordination among medical authorities and industrial management, and standardized definition of hearing damage levels. T.M.

**A74-19632 # The course of an acute functional disturbance of the inner ear in electrophysiological studies (Przebieg ostrego zaburzenia czynnosci ucha wewnetrznego w badaniach elektrofizjologicznych).** W. Jankowski and Z. Ziemski (Akademia Medyczna, Wroclaw, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 139-142. In Polish.

**A74-19633 # Techniques for protecting man against vibration (Technika ochrony antywibracyjnej czlowieka).** S. Jaworski (Centralny Instytut Ochrony Pracy, Warsaw, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 143-147. In Polish.

Transfer of mechanical vibrations through the arms and feet of humans is examined by discussing peaks appearing on transmission curves corresponding to different positions of the extremities. Contributions from resonance effects and from individual links in the extremities are identified, and the effectiveness of elastic hand isolation and of special soles on shoes is evaluated by explaining their influence on the shape of transmission curves. T.M.

**A74-19634 # Changes in the physiological reactions of an organism exposed to noise and vibrations (Zmiany reakcji fizjologicznych organizmu narazonego na wibracje i halas).** D. Koradecka (Centralny Instytut Ochrony Pracy, Warsaw, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 159-161. In Polish.

Effects of exposure to noise and vibration on sensory threshold curves for perception of vibrations are described along with the influence of noise and vibration on the human cardiovascular system. In a discussion of additional environmental factors acting in conjunction with vibration, it is shown that the influence of ambient temperature on the response of the human cardiovascular system to vibration is more pronounced in normal individuals than in persons habitually exposed to a vibration environment. T.M.

**A74-19636 # Use of electronic digital computers /EDC/ for diagnosis of prolonged acoustic injury (Zastosowanie elektronicznych maszyn cyfrowych /EMC/ w diagnostyce przewleklego urazu akustycznego).** A. Lepkowski, Z. Swierczynski, and P. Gembala (Slaska Akademia Medyczna, Zabrze, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 184-187. In Polish.

**A74-19639 # The effectiveness of noise attenuation by hearing safeguards - Measurement methods and selection criteria (Skutecznosc tlumienia dzwiekow przez ochronniki sluchu - Metody pomiaru oraz kryteria doboru).** D. Trynskowska (Centralny Instytut Ochrony Pracy, Warsaw, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 310-314. 7 refs. In Polish.

**A74-19649 Effects of continuous work and sleep loss in the reduction and recovery of work efficiency.** B. B. Morgan, Jr. (Louisville, University, Louisville, Ky.). *American Industrial Hygiene Association Journal*, vol. 35, Jan. 1974, p. 13-20. 21 refs. Grants No. DAHC19-69-C-0009; No. DA-ARO(D)-31-124-71-G109. Project THEMIS.

The synthetic-work technique has been employed in a series of investigations designed to determine (1) the extent to which performance efficiency is degraded during extended periods of continuous work, and (2) the amount of sleep necessary for the recovery of performance from the effects of continuous work and sleep loss. The results of these studies indicate that 36, 44, and 48 hr of continuous work and sleep loss result in decrements in over-all work efficiency of approximately 15, 20, and 35% respectively. Following 36 hr of continuous work, it was found that 12 hr of sleep is sufficient for complete (100%) recovery of performance, but complete recovery is not provided by 2 (58% recovery), 3 (53% recovery), or 4 (73% recovery) hr of sleep. It also has been indicated that the time course of recovery is different following different durations of continuous work and subsequent sleep. (Author)

**A74-19712 Genetic differences in the ventilatory response to inhaled CO2.** W. W. Arkinstall, K. Nirmel, V. Klissouras, and J. Milic-Emili (McGill University, Montreal, Canada). *Journal of Applied Physiology*, vol. 36, Jan. 1974, p. 6-11. 22 refs. Research supported by the Medical Research Council of Canada.

The ventilatory response to CO2 was studied in 17 sets of monozygous (MZ) and 13 sets of dizygous (DZ) twins. The intrapair differences between the MZ and DZ twins were used to estimate the contribution of heredity to the interindividual variability in ventilatory response to CO2. There was no significant difference between the MZ intrapair variance and DZ intrapair variance for the ventilatory response to CO2 expressed either in liters/min per mm Hg or in VC/min per mm Hg. There was a significant difference between the MZ and DZ intrapair variances when the tidal volume was compared at three end-tidal CO2 partial pressure levels (55, 60, and 65 mm Hg). The intrapair variance of the breathing frequency was significantly different only at 65 mm Hg. (Author)

**A74-19713 Sweat rate and concentration of chloride in hand and body sweat in desert walks - Male and female.** M. K. Yousef (Desert Research Institute, Boulder City, Nev.) and D. B. Dill (Nevada, University, Las Vegas, Nev.). *Journal of Applied Physiology*, vol. 36, Jan. 1974, p. 82-85. 12 refs. Research supported by the Nevada Heart Association; NSF Grant No. GB-35281; Grant No. NIH-HD-05625.

The rate of sweating from hand and from body and the concentration of chloride in sweat were studied in desert walks at 100 m/min in seven males and four females. Hand temperature either was high in hands exposed to the sun or low in hands immersed in ice water. Volume of hand sweat was measured using rubber gloves. Mean values for volume of hand sweat and for Cl concentration were about the same at the same hand temperature for right and left hands. In a saturated environment, volume of hand sweat and Cl concentration were higher in sweat collected from hot hands than in sweat from cold hands. This relationship was independent of sex and age. (Author)

**A74-19714 Use of arterial PO2 to study convective and diffusive gas mixing in the lungs.** L. R. Johnson and H. D. Van Liew (New York, State University, Buffalo, N.Y.). *Journal of Applied Physiology*, vol. 36, Jan. 1974, p. 91-97. 26 refs. Contract No. N00014-68-A-0216. NR Project 101-722.

During ventilation, O2 is transported through the lung gas by convective, diffusive, and cardiac mixing. To investigate the relative importance of each, anesthetized paralyzed dogs were anesthetized with mixtures of 40% O2 in He or N2 while a fast-responding, Clark-type O2 electrode, exposed to a constant flow of blood from a common carotid artery, provided a continuous record of O2 arterial pressure. Because O2 arterial pressure fell 14% more rapidly during a breath hold on N2 than on He, it is concluded that a diffusion limitation to O2 transport exists in the lung gas in the absence of the convection due to ventilation. When convection was included by resuming ventilation, the washin of O2, as judged by the rate of rise of O2 arterial pressure, was 13% faster with N2 than with He. Switching from He to N2 during the breath hold resulted in an even faster washin, and the opposite switch produced the slowest O2 washin of all. (Author)

**A74-19715 Respiratory mechanics in the unanesthetized dog.** D. J. Gillespie and R. E. Hyatt (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Journal of Applied Physiology*, vol. 36, Jan. 1974, p. 98-102. 34 refs. Grants No. NIH-HL-14593; No. NIH-HL-12229.

Six mongrel dogs were trained to lie quietly in a body plethysmograph in the prone, supine, and right lateral decubitus positions. All dogs had chronic tracheostomies and were trained to swallow an esophageal balloon. With the dog awake, respiratory mechanics were measured. Although there was variability among dogs, individual dogs evidenced relatively consistent behavior within and between days. Mean functional residual capacity corrected for body weight was higher in the prone posture (53.6 ml/kg) than in either the supine (48.1 ml/kg) or the lateral (47.7 ml/kg) position. Static compliances of the lung, chest wall, and total system were not influenced by posture. However, in the supine posture, static retractive force of the lung was lower than in the prone or the lateral position. Dynamic lung compliance and pulmonary resistance averaged 0.097 liter/cm H2O and 1.30 cm H2O/liter per sec, respectively, in the prone position. (Author)

**A74-19716 Cardiac function during rest and supine cycling examined with a new noninvasive technique /CED/.** H. Galbo and P.-E. Paulev (Copenhagen, University, Copenhagen, Denmark). *Journal of Applied Physiology*, vol. 36, Jan. 1974, p. 113-117. 26 refs. Research supported by the Landsforeningen Til Hjertesygdommenes Bekampelse and Laegevidenskabelige Forskningsrad.

A new standardized, ultrasound cardiographic technique was evaluated in six healthy subjects during rest and during graded cycling in the supine position, by comparison to the CO2 rebreathing method. The epicardial displacement of an easily recognized area of the posterior wall of the left ventricle was recorded, thereby providing the total displacement per heartbeat and, by on line differentiation, also the displacement velocity. The stroke volume was found to increase from 39 to 116% of the resting, individual values during supine cycling at 150, 300, 450, 600, 750, and 900 kpm/min. The size of the total displacement per heartbeat increased linearly with stroke volume. The four subjects with the largest maximal oxygen uptake per weight unit had the largest increment in the peak velocity of shortening per heart rate increment. The subjects with largest increments in the total displacement per heartbeat during supine cycling also had the largest increments in the peak velocity of relaxation per heart rate increment. (Author)

**A74-19717 A comparison of some methods for measuring total respiratory resistance.** N. A. Bergman and C. L. Waltemath (Oregon, University, Portland, Ore.). *Journal of Applied Physiology*, vol. 36, Jan. 1974, p. 131-134. 14 refs. Research supported by the Medical Research Foundation of Oregon.

Total respiratory resistance was measured sequentially using three different methods in six healthy anesthetized, paralyzed, artificially ventilated subjects. Recordings obtained were analyzed

with five different techniques. There were significant systematic differences among mean values for resistance derived from the various techniques. Resistance was lowest when measured from recordings of flow, pressure, and volume, and highest when derived from passive exhalation data. A forced oscillation method gave intermediate results. All methods detected a significant increase in resistance when an external resistor was placed in series with the respiratory system. It was concluded that the isovolume technique for analysis of flow-pressure-volume data provided inferior sensitivity for detection of changes in resistance. With this exception, all methods evaluated are equally appropriate for measurement of resistance in anesthetized or otherwise apneic subjects. (Author)

**A74-19725 Coccidioidomycosis and fitness for flight duty (Coccidioidomykose und Verwendung im Flugdienst).** V. Grouls (Pathologisches Institut, Bonn, West Germany), K. Weigel (Neurochirurgische Universitätsklinik, Freiburg im Breisgau, West Germany), and G. Apel (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift*, vol. 18, Jan. 1974, p. 20-23. 14 refs. In German.

The southwestern states of the U.S. are considered the main endemic areas of coccidioidomycosis. Of 680 Bundeswehr pilots who had stayed in this region, 5.3% showed a positive coccidioidin reaction and 3.7% a positive histoplasmin skin test. Highly endemic areas are the air force bases at Luke, Arizona (average duration of stay of the pilots 348 days) and San Antonio, Texas (104 days). In two pilots radiologically calcified solitary foci were still recognizable two or nine years after coccidioidomycosis. Criteria for the assessment of the fitness for flying after terminated acute coccidioidomycosis are presented. In the case of a positive result of the skin test, serological tests and identification of the causative organism must follow, because only they will permit statements on the degree of activity of the disease. (Author)

**A74-19775 # Interaction of cortical evoked potentials during elaboration of a conditioned reflex (O vzaimodeistvii korkovykh vyzvannykh potentsialov pri vyrabotke uslovnogo refleksa).** D. A. Ignat'ev, S. V. Karnup, I. O. Muradova, and M. N. Zhadin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino-na-Oke, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 213, Nov. 11, 1973, p. 490, 491. 7 refs. In Russian.

**A74-19776 # A mechanism of formation of cortex evoked potential multiplication in response to a light stimulus (Mekhanizm formirovaniia mul'tiplikatsii vyzvannogo potentsiala kory na svetovoi razdrazhitel').** G. N. Makarenko (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 213, Nov. 11, 1973, p. 492-495. 10 refs. In Russian.

Study of the dependence of the phenomenon of multiplication on changes in the functional state of the cerebral cortex of rabbits. The changes investigated were induced by potassium chloride, cooling, polarization by a dc current, and strychnine. It is shown that a reversible functional occlusion of the visual cortex by cooling or by the application of potassium chloride leads to an unambiguous change in the repeated rhythmic oscillations in the evoked potential in response to light. After several minutes, the number of repeated oscillations begins to decrease simultaneously both in the cortex and in the subcortical structures of the ipsilateral hemisphere until they vanish. The experiments on polarization of the cerebral cortex by a dc current showed that anodization causes suppression of repeated slow oscillations simultaneously both in the cortex and in the subcortical formations in the ipsilateral hemisphere, while polarization by a cathode causes the number of oscillations to increase. The application of a 1% solution of strychnine to the visual cortex facilitates the phenomenon of multiplication simultaneously in the cortex and in the subcortical structures predominantly on the side where the application occurs. A.B.K.

**A74-19796 A study of the periocular projections towards the frontal cortex in Papio papio.** C. Menini, J. Catier, E. Carlier, and G. Charmasson (CNRS, Institut de Neurophysiologie et de Psychophysiologie, Marseille, France). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Feb. 1974, p. 163-170. 26 refs.

A study of the cortical projections from the periocular and facial skin was carried out on photosensitive and nonphotosensitive baboons (Papio papio). In a photosensitive Papio papio, intermittent light stimulation at 25/sec induces myoclonus and EEG signs of epilepsy. The periocular afferents project to a large cortical territory, including the pariental cortex and a large part of the frontal lobe. Responses of maximal amplitude were observed in the region of the precentral sulcus. The latencies of the responses in the frontal area were longer than in the parietal area; however, intracortical records exclude the possibility that these frontal responses were due to simple diffusion from the specific territory, in particular because ablation of the specific area for the face did not suppress frontal responses to periocular stimulation. It is not yet possible to conclude whether frontal periocular projections are involved or not in the facilitation of photic epilepsy through tactile stimulation of the periocular zone of Papio papio. T.M.

**A74-19797 Further considerations of the regional responses to photic stimulation as shown by epoch averaging.** S. M. Peacock, Jr. and R. C. Conroy (Eastern Pennsylvania Psychiatric Institute, Philadelphia, Pa.). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Feb. 1974, p. 171-178. 13 refs.

Using latency, amplitude, and waveform comparisons, a study has been conducted with human subjects to determine the extent to which orbital and peri-orbital potentials contribute to averaged activity recorded from the scalp in response to repetitive photic stimulation. It was found that the activity recorded from the infra-orbital ridge when compared to that recorded from the scalp, although frequently very similar, was for the most part, so divergent with respect to latency, amplitude, and waveforms as to preclude significant scalp contamination under these conditions. However, considerable contamination of the infra-orbital site by cerebral potentials was seen to occur. T.M.

**A74-19798 * Human auditory evoked potentials. I - Evaluation of components.** T. W. Picton, S. A. Hillyard, H. I. Krausz, and R. Galambos (California, University, La Jolla, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Feb. 1974, p. 179-190. 58 refs. Research supported by the Medical Research Council of Canada, Sloan Foundation, and NASA; Grant No. PHS-NS-10482-01.

Fifteen distinct components can be identified in the scalp recorded average evoked potential to an abrupt auditory stimulus. The early components occurring in the first 8 msec after a stimulus represent the activation of the cochlea and the auditory nuclei of the brainstem. The middle latency components occurring between 8 and 50 msec after the stimulus probably represent activation of both auditory thalamus and cortex but can be seriously contaminated by concurrent scalp muscle reflex potentials. The longer latency components occurring between 50 and 300 msec after the stimulus are maximally recorded over fronto-central scalp regions and seem to represent widespread activation of frontal cortex. T.M.

**A74-19799 * Human auditory evoked potentials. II - Effects of attention.** T. W. Picton and S. A. Hillyard (California, University, La Jolla, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 36, Feb. 1974, p. 191-200. 48 refs. Research supported by the Medical Research Council of Canada, Sloan Foundation, and NASA; Grant No. PHS-NS-10482-01.

Attention directed toward auditory stimuli, in order to detect an occasional fainter 'signal' stimulus, caused a substantial increase in the N1 (83 msec) and P2 (161 msec) components of the auditory evoked potential without any change in preceding components. This evidence shows that human auditory attention is not mediated by a peripheral gating mechanism. The evoked response to the detected signal stimulus also contained a large P3 (450 msec) wave that was topographically distinct from the preceding components. This late

positive wave could also be recorded in response to a detected omitted stimulus in a regular train and therefore seemed to index a stimulus-independent perceptual decision process. T.M.

**A74-19800** **Nocturnal sleep in squirrel monkeys.** P. M. Adams and E. S. Barratt (Texas, University, Galveston, Tex.). *Electroencephalography and Clinical Neurophysiology,* vol. 36, Feb. 1974, p. 201-204. 13 refs. Navy-supported research.

The nocturnal sleep records of three squirrel monkeys over 12-hr sessions were examined for seven consecutive nights. The sleep records were described in terms of the percentage of time in each of the stages of awake, stages 1,2,3-4, and REM. The mean percent time spent in sleep was 82.4% of the recording period. The average amount of % REM sleep was 22.9% with a total NREM of 58.8%. The presence of 3-4 (slow wave) sleep was largely restricted to the first half of the nightly session with REM sleep the dominant stage in the second half of the night. Comparison of the sleep of the squirrel monkey with other primates higher on the phylogenetic scale indicated the squirrel monkey would serve as an excellent representative for the study of primate sleep-wakefulness. T.M.

**A74-19825 #** **Terrestrial echo of solar storms (Zemnoe ekho solnechnykh bur').** A. L. Chizhevskii. Moscow, Izdatel'stvo Mysl', 1973, 356 p. 379 refs. In Russian.

This book analyses the effects of solar activity cycles on the climatic, geophysical, and biological processes on earth in the context of medical geography and epidemiology. Particular attention is given to the relation between solar activity phases and the outbreaks of epidemics on earth in the past. Extensive statistical data are used to corroborate the existence of such relations. The role of certain solar radiations in creating pathogenic conditions on earth is supported by quoting a large amount of available mortality data. Various theories concerning the nature of these phenomena are considered. Some unorthodox views challenging present conventional epidemiology are advanced, attributing to solar radiation an important role in terrestrial epidemiology. V.Z.

**A74-19896 #** **Subjective estimation of nighttime sleep period duration under conditions of delta-sleep deprivation during the first three cycles of sleep (Sub'ektivnaia otsenka dlitel'nosti periodov nochnogo sna v usloviiakh deprivatsii del'ta-sna v pervykh trekh tsiklakh).** V. P. Danilin (Akademiia Nauk SSSR, Laboratoriia Problem Upravleniia Funktsiiami v Organizme Cheloveka i Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 213, Dec. 1, 1973, p. 990-992. 6 refs. In Russian.

Electroencephalograms were taken continuously on 15 healthy male subjects who were to give their subjective estimations of the length of their preceding and subsequent sleep after being awaked during the first three phases of their delta-sleep. It is concluded that the mental activities and memories of the subjects were not affected when they were awaked at various phases of their nightly sleep. V.Z.

**A74-19900** **Crew seats in transport aircraft.** F. H. Hawkins (KLM - Royal Dutch Airlines, Schiphol Airport, Netherlands). *Shell Aviation News,* no. 418, 1973, p. 14-21. 17 refs.

Discussion of the state of the art in aircraft pilot seat designs and development with attention to the physiological aspects and relatively slow progress of this technology. A listing of seat parameters and features which are associated with poor seat designs is included. Suggestions are given for seat design optimization. The seat features considered include lumbar support, thigh support, seat pan contours, cushions and fabric, seat armrests, seat recline, seat bottom and headrest, and seat base, footrests, and controls. V.Z.

**A74-20051 #** **Effectiveness of sympathetic constriction impulses in skin and skeletal muscle areas during static work (Ob effektivnosti realizatsii simpaticheskoi konstriktornoi impul'satsii v basseine kozhi i skeletnykh myshts vo vremia statiticheskoi raboty).** A. V. Vitols and Ia. V. Skards (Ministerstvo Zdravookhraneniia LSSR, Latviiskii Nauchono-Issledovatel'skii Institut Eksperimental'noi i Klinicheskoi Meditsiny, Riga, Latvian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Nov. 1973, p. 1656-1662. 20 refs. In Russian.

**A74-20052 #** **The significance of inhibitory interaction for the impulse responses of central auditory neurons to sound signals (Znachenie tormoznogo vzaimodeistviia v formirovanii impul'snoi reaktsii tsentral'nykh slukhovykh neironov na zvukovoi signal).** I. A. Vartanian (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii and Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Nov. 1973, p. 1683-1691. 25 refs. In Russian.

**A74-20053 #** **Cardiovascular responses to electric stimulation of fastigial nuclei (Serdechno-sosudistye reaktsii pri elektricheskoi stimuliatsii fastigial'nykh iader).** M. I. Gurevich and A. I. Vyshatina (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Nov. 1973, p. 1715-1722. 40 refs. In Russian.

Experiments on anesthetized cats in which cardiovascular responses were evoked by electric stimulation of cerebellar nuclei showed that in most cases such responses were particularly well pronounced when the medial group of nuclei - fastigial nuclei - was the object of stimulation. The increase in arterial pressure with the amplitude and frequency of stimulation was largely linear but different for stimulation of different points of the cerebellum. Analysis of the effector structure of the responses showed that certain complex hemodynamic shifts associated with the changes in cardiac activity and regional vascular tonus were basically responsible for cardiovascular responses to stimulation. V.Z.

**A74-20054 #** **Role of arterial blood temperature in the thermoregulation system of man /Study on a numerical model/ (Rol' temperatury arterial'noi krovi v sisteme termoreguliatsii cheloveka /Issledovanie na tsifrovoi modeli/).** I. I. Ermakova (Akademiia Nauk Ukrainskoi SSR, Institut Kibernekiti, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Nov. 1973, p. 1729-1736. 16 refs. In Russian.

A mathematical model developed in the ALGOL computer language was applied to a study of processes which take place in the controlled portion of the human thermoregulation system. The model incorporated brain, head skin, internal organs, trunk muscles, trunk skin, extremity muscles, extremity skin, and blood as components of the thermoregulation system. The technique and the results of experiments conducted on the model are described, pointing out the important role of arterial blood in thermoregulation. V.Z.

**A74-20055 #** **Alteration of the sweat secretion function in a high temperature ambient medium (Izmenenie funktsii potootdeleniia v usloviiakh vysokikh temperatur okruzhaiushchei sredey).** A. N. Azhaev and O. A. Virovets. *Fiziologicheskii Zhurnal SSSR,* vol. 59, Nov. 1973, p. 1737-1741. 11 refs. In Russian.

Thermal chamber observations for 60 min at 40, 50, 60, or 80 C at 15 to 25% air humidity showed a substantial sweat secretion reduction in 157 experiments on 29 young male subjects wearing underwear and cotton overalls, or only shorts. Substantial accumulation of heat in their bodies at higher temperatures is interpreted as indication that tolerance of organism to overheating has been reached in the subjects. V.Z.

**A74-20056 #** **Some parameters of oxygen metabolism in the organism and tissues of animals during cold adaptation (O nekotorykh parametrakh kislorodnogo obmena v organizme i tkaniakh u zhivotnykh pri adaptatsii k kholodu).** L. A. Isaakian, L. S. Maslennikova, R. P. Ol'nianskaia, and G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 59, Nov. 1973, p. 1742-1749. 35 refs. In Russian.

**A74-20057 # Spatial correlation analysis of electroencephalograms in cases of spreading depression (Prostranstvennyi analiz korreliatsii elektroentsefalogrammy pri rasprostraniaiushcheisia depressii).** G. D. Kuznetsova, G. G. Shlyk, T. A. Korol'kova, and V. D. Trush (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Nov. 1973, p. 1750-1752. 9 refs. In Russian.

**A74-20058 # Voluntary physical strength enhancement under the action of additional evoked afferent stimuli (Povyshenie proizvol'noi sily pod deistviem dopolnitel'no vyzvannykh afferentnykh vliianii).** V. A. Mart'ianov and Iu. A. Koriak (Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Nov. 1973, p. 1756-1760. 15 refs. In Russian.

Electric stimuli were delivered to finger muscles and foot muscles and the strength of the muscles was measured on a dynamometer in 150 experiments on subjects whose elbow nerves or sural muscles were stimulated simultaneously. Stimulation enhanced the muscular strength by an average 23 to 28%. V.Z.

**A74-20059 # Device for tapping individual neurons of deep brain structures in man (Ustroistvo dlia otvedeniia aktivnosti otdel'nykh neironov glubokikh struktur mozga cheloveka).** S. N. Raeva, P. I. Maslov, and A. A. Kokarev (Akademiia Nauk SSSR, Institut Biofiziki, Pushchino-on-Oka; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Nov. 1973, p. 1761-1763. 11 refs. In Russian.

**A74-20100 Analog simulation for spatio-temporal characteristics of visual system.** S. H. Park and K. S. Kim (Yonsei University, Seoul, South Korea). In: Conference on Decision and Control, 4th and Symposium on Adaptive Processes, 12th, San Diego, Calif., December 5-7, 1973, Proceedings.
New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 512-515. 6 refs. Research supported by Yonsei University.

The function of visual system is analyzed on the basis of spatiotemporal characteristics based upon Enroth's model, the Broca-Sulzer phenomenon, and the Mach effect. In order to obtain the excitatory and inhibitory potential of intermediate cell layer in the retina, the exponential value was calculated on the basis of the physiological theory in neurological phenomena. To show the visual characteristics obtained by analog simulation for generating stimulus waveforms and analysis, the visual adaptation was recorded as electrical stimulation in the form of step functions. Furthermore, it is shown that there was a satisfactory agreement within experimental errors between the data obtained and the theoretical values. (Author)

**A74-20127 * Excitability changes in cat lateral geniculate cells during saccadic eye movements.** H. Noda and W. R. Adey (California, University, Los Angeles, Calif.). *Science*, vol. 183, Feb. 8, 1974, p.543-545. 36 refs. Grants No. NIH-1-R01-EY-01051-01A1; No. NGR-05-007-195; Contract No. F44620-70-C-0017.

**A74-20132 # Interrelation between the physics, chemistry and biology of basic cellular processes (Spivvidnoshennia fizichnogo, khimichnogo i biologichnogo v osnovnikh klitinnikh protsesakh).** Z. O. Sorokina (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 723-729. 49 refs. In Ukrainian.

The origin of the inhomogeneous distribution of inorganic ions between the cytoplasm and the medium surrounding the cell is discussed. Physical, chemical, and biological factors active in the mechanism which produces differences in the distribution of inorganic ions in cellular tissues are considered. V.Z.

**A74-20133 # Changes in gas composition and blood pH during the stimulation of the hypothalamus (Pro zmini gazovogo skladu i reaktsii krovi pri podrazhenni gipotalamusa).** P. D. Kharchenko, L. O. Smirnova, and V. O. Tsibenko (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 738-747. 19 refs. In Ukrainian.

Blood oxygen and carbon dioxide contents and blood pH were determined in anesthetized dogs during and following electric stimulation of the anterior and lateral portions of the ventral hypothalamus. In most cases, the oxygen content and pH were higher and the carbon dioxide content was lower in arterial and venous blood after stimulation. The changes persisted for 30 to 90 min following stimulation. V.Z.

**A74-20134 # Morphological fundamentals of pathways for drainage of cerebrospinal fluid from intermeningeal regions of the human brain (Morfologichne obgruntuvannia shliakhiv vidtikannia tserebrospinal'noi ridini z mizhobolonkovikh prostoriv golovnogo mozku liudini).** A. A. Arkhipovich (Kiivs'kii Medichnii Institut, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 769-776. 20 refs. In Ukrainian.

**A74-20135 # Comparative evaluation of some physical loads used in experiments (Porivnial'na kharakteristika deiakikh fizichnikh navantazhen', zastosovanikh v eksperimenti).** M. O. Kvitnits'kii, T. M. Kucherenko, I. S. Kriksunova, and M. F. Sotnits'kii (Kam'ianets'-Podil's'kii Pedagogichnii Institut, Kamenets Podolski, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 796-799. 18 refs. In Ukrainian.

Discussion of the physiological and biochemical shifts in rats which were kept swimming or running in dry and underwater tread stands. The shifts were greater after running on underwater stands than on dry stands. V.Z.

**A74-20136 # Oxygen pressure in blood under hypoxia and during adaptation to hypoxia (Napruzhennia kisniu krovi pri gipoksii ta adaptatsii do nestachi kisniu).** V. Ia. Berezovs'kii (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 800-805. 22 refs. In Ukrainian.

Arterial and venous oxygen pressures were measured in dogs and cats which inhaled hypoxic gas mixtures at normal pressure or air at altitudes of 2.2, 3.2, 4.2, and 5.2 km above sea level. Venous oxygen pressure was more stable under hypoxia than arterial oxygen pressure. The mechanism of adaptation to hypoxia is discussed. V.Z.

**A74-20137 # Gas exchange control in the lung (Do pitannia pro upravlinnia protsesom gazoobminu v legeniakh).** A. G. Misiura (Akademiia Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 813-818. 35 refs. In Ukrainian.

A mathematical description is given to the gas exchange process in the lungs, with particular attention to physical processes which take place in the lung during a respiratory cycle. A system of equations is given to describe the steady and transient mass transfer of oxygen, carbon dioxide and nitrogen in respiratory pathways. V.Z.

**A74-20138 # Allotransplantation during hibernation (Alotransplantatsiia pri zimovii spliachtsi).** I. M. Red'ko (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Nov.-Dec. 1973, p. 834-837. 47 refs. In Ukrainian.

Skin patches of 5 x 6 cm were transplanted from marmota bobac females to the backs of 28 hibernating and 16 waking marmota bobac males. Skin grafts were more successful in hibernating animals than in waking animals. The cause of this is seen in the weakening of immunological activity during hibernation. V.Z.

**A74-20142 # Determination of the hazardous current under hot climate conditions (K voprosu opredeleniia porazhaiushchego toka v usloviiakh zharkogo klimata).** V. I. Shutskii, Kh. M. Usmanov, and M. Ia. Khakel (Tadzhikskii Politekhnicheskii Institut, Dyushambe, Tadzhik SSR). *Akademiia Nauk Tadzhikskoi SSR, Doklady*, vol. 16, no. 9, 1973, p. 81-83. 5 refs. In Russian.

Statistics of electrical traumatism in humans in the Tadzhik SSR

is reviewed, showing that most lethal cases occur in hot weather time and are caused by relatively low voltage. A formula is proposed for the lower fibrillation current threshold. The formula gives threshold values which are close to those recommended by experts in industrial accident prevention. V.Z.

**A74-20172 Interpretation of the serum enzyme changes following cardiac catheterization and coronary angiography.** R. A. Chahine (U.S. Veterans Administration Hospital, Houston, Tex.), L. M. Eber, and A. A. Kattus (California, University, Los Angeles, Calif.). *American Heart Journal*, vol. 87, Feb. 1974, p. 170-174. 9 refs. Research supported by the Reschke-Binnay Memorial Research Fund.

Serum glutamic oxaloacetic transminase, creatine phosphokinase, and lactic dehydrogenase were determined before and 24 hours after cardiac catheterization and coronary angiography in patients with coronary artery disease or with valvular heart disease. The subjects were given intramuscular premedications, or oral premedications, or none. The results suggest that the serum enzymes are a valuable adjunct to the diagnosis of acute myocardial infarction by coronary arteriography. V.Z

**A74-20173 A 12-lead patient cable for electrocardiographic exercise testing.** I. M. Grais, D. E. Campbell (Cincinnati, University, Cincinnati, Ohio), and R. J. Adolph (Cincinnati General Hospital, Cincinnati, Ohio). *American Heart Journal*, vol. 87, Feb. 1974, p. 203-208. 7 refs. Research supported by the Southwestern Ohio Heart Association; Grants No. PHS-HE-6307; No. PHS-HE-5445.

**A74-20174 The effect of acute pulmonary artery obstruction on the dog electrocardiogram.** K. Rasmussen and K. Michelsen (Rikshospitalet, Oslo, Norway). *American Heart Journal*, vol. 87, Feb. 1974, p. 209-216. 27 refs. Research supported by the Norwegian Council for Cardiovascular Disease.

Acute pulmonary artery obstruction was induced in ten dogs by inflating a balloon at the end of a double lumen catheter introduced into the pulmonary artery. The ECG was recorded by means of the axial lead system. Significant and generally uniform changes in QRS, T, and ST segments were observed in all dogs when the obstruction reached a level elevating the right ventricular systolic pressure to above 40 mm Hg. The most important changes were a counterclockwise rotation of the total QRS loop in the horizontal plane, a large reduction of Lead Z amplitude, and a superior rightward shift of the ST and maximal T vectors. The changes occurred within a few beats after balloon inflation, were stable during constant obstruction, and disappeared rapidly when the balloon was deflated. A close relation was observed between the degree of ECG changes and that of pulmonary artery obstruction. V.Z.

**A74-20251 # Structural organization principles of the space-time code of short-term verbal memory (Printsipy organizatsii struktury prostranstvenno-vremennogo koda kratkosrochnoi verbal'noi pamiati).** N. P. Bekhtereva, P. V. Bundzen, V. D. Kaidel, and E. E. David (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR; Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1785-1802. 40 refs. In Russian.

Neurophysiological correlates of short-term verbal memory are investigated, and it is shown that, at the level of deep human-brain structures, the neurodynamic code of verbal signals may be expressed by multicellular-activity patterns reflecting acoustic word characteristics, as well as by patterns whose space-time microstructure is determined by the specific properties of the associative-logical processing of verbal signals. It is also found that the hierarchically organized verbal memory system performs information and control functions. M.V.E.

**A74-20252 # A structural systems approach to the analysis of processes in functional reorganization of neuronal populations (Strukturno-sistemnyi podkhod k analizu protsessov funktsional'noi reorganizatsii neironnykh populiatsii).** P. V. Bundzen, Iu. L. Gogolitsyn, E. E. David, A. S. Kaplunovskii, and P. D. Perepelkin (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR; Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1803-1810. 23 refs. In Russian.

**A74-20253 # Cortical-subcortical organization of the cerebral systems providing for readiness to action in man (K voprosu o korkovo-podkorkovoi organizatsii mozgovykh sistem obespecheniia gotovnosti k deistviiu u cheloveka).** V. A. Iliukhina and Iu. V. Khon (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1811-1824. 29 refs. In Russian.

Simultaneous multichannel CNV (E-wave) recordings from the scalp and from various subcortical formations are shown to indicate that cerebral provisions for readiness to act in man are performed by cortical-subcortical systems. A subcortical CNV equivalent is found in neuroglia cell populations within the optic thalamus nucleus, striopallidal system, and in some other subcortical formations. Apparent changes in the structural and functional organization of cerebral systems providing for readiness to action are shown to be possible as a function of observation and CNV-formation conditions. M.V.E.

**A74-20254 # Diurnal cycle of partial oxygen pressure variations in the deep human brain structures (Dinamika pO2 v glubokikh strukturakh mozga cheloveka v protsesse sutochnoi periodiki).** V. I. Sokolova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1825-1831. 23 refs. In Russian.

Investigation of the level and amplitude of diurnal partial-oxygen-pressure variations in the deep cerebral formations of nonepileptiform-hyperkinesia patients with long-term intracerebral electrodes implanted for therapeutic and diagnostic purposes. The results obtained suggest that the nuclei of the optic thalamus play an active role in inducing natural sleep in man. M.V.E.

**A74-20255 # Mechanisms of the calorigenic effect of noradrenaline on the skeletal musculature (O mekhanizmakh kalorigennogo deistviia noradrenalina na skeletnuiu muskulaturu).** K. P. Ivanov, E. Ia. Tkachenko, M. A. Iakimenko, and A. M. Tumanova (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk; Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1883-1888. 8 refs. In Russian.

**A74-20256 # Voluntary control of respiration and obligatory level of pulmonary ventilation (Proizvol'noe upravlenie dykhaniem i obligatnyi uroven' legochnoi ventiliatsii).** I. S. Breslav, A. M. Shmeleva, and N. N. Kariev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1898-1904. 15 refs. In Russian.

Healthy young subjects, whose respiratory and gas-metabolism parameters were investigated at various prescribed volumes of pulmonary ventilation, were found capable of maintaining the pulmonary ventilation level at twice its normal value, though not without pronounced hypocapnia. Much less tolerable proved to be any attempt to maintain even a moderately subnormal pulmonary ventilation level. M.V.E.

**A74-20257 # Significance of transient electrical resistance in pulse electroplethysmography (Znachenie perekhodnogo elektricheskogo soprotivleniia pri pul'sovoi elektropletizmografii).** I. A. Litoshko, A. M. Rafikov (I Leningradskii Meditsinskii Institut, Leningrad, USSR), and A. I. Naumenko. *Fiziologicheskii Zhurnal SSSR*, vol. 59, Dec. 1973, p. 1905-1907. In Russian.

**A74-20273 # Changes of mast cells in the subcutaneous loose connective tissue of mice after laser irradiation (Izmenenie tuchnykh kletok v podkozhnoi rykhloi soedinitel'noi tkani myshei**

**posle oblucheniia opticheskim kvantovym generatorom-lazerom).** N. V. Tsyganova (Kazanskii Meditsinskii Institut, Kazan, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 76, Dec. 1973, p. 29-32. 11 refs. In Russian.

**A74-20329 # Geomagnetic activity and cardiovascular disease (Geomagnitnaia aktivnost' i serdechno-sosudistye zabolevaniia).** N. A. Katsiashvili, I. M. Zaalishvili, G. A. Ushveridze, V. G. Tsitlanadze, and R. K. Gogibedashvili (Akademiia Nauk Gruzinskoi SSR, Institut Geofiziki; Institut Kurortologii i Fizioterapii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Oct. 1973, p. 81-83. 9 refs. In Russian.

Geomagnetic activity effects on the incidence and course of cardiovascular diseases are investigated using the K-index data and magnetic-storm observations of the geophysical observatory of Dusheti in conjunction with the records of the Tbilisi first-aid station spanning the period from 1960 to 1970. A significant correlation is brought to light that confirms the operation of such effects. M.V.E.

**A74-20331 # Study of functional nerve connections between the proreal gyrus and the limbic system (Izuchenie funktsional'nykh nervnykh sviazei mezhdu proreal'noi izvilinoi i limbicheskoi sistemoi).** O. K. Akhmetelashvili and T. K. Ioseliani. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Oct. 1973, p. 157-160. 7 refs. In Georgian, with abstract in English.

**A74-20332 # ATP effects on myocardium ultrastructure during hypoxia (Vliianie ATF na ul'trastrukturu miokarde pri kislorodnoi nedostatochnosti).** M. A. Kurnosenko (Akademiia Nauk Gruzinskoi SSR, Institut Eksperimental'noi Morfologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 72, Oct. 1973, p. 201-204. In Russian.

Data on myocardium ultrastructure alterations in various stages of hypoxia are compared with alterations caused by the administration of ATP. The results obtained show that ATP injection into animals during hypoxia protects the myocardium from destructive alterations. M.V.E.

**A74-20339 # Histochemical characteristic of the chromatin of the retina cell nuclei of mammals and the chromatin alterations under different illumination conditions (Gistokhimicheskaia kharakteristika khromatina iader kletok setchatki glaza mlekopitaiushchikh i ego izmenenii pri razlichnykh rezhimakh osveshcheniia).** S. A. Shabadash (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 213, Nov. 21, 1973, p. 714-717. 14 refs. In Russian.

**A74-20340 # Influence of convulsive activity evoked by stimulation of the amygdaloid complex on the cerebral integrative activity (Vliianie sudorozhnoi aktivnosti, vyzvannoi razdrazheniem mindalevidnogo kompleksa, na integrativnuiu deiatel'nost mozga).** V. A. Makarov and P. V. Mel'nichuk (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 213, Nov. 21, 1973, p. 749-752. 11 refs. In Russian.

**A74-20366 # Use of pilot trainer in physiological evaluation of the effectiveness of high-altitude gear (Ispol'zovanie pilotazhnogo trenazhera v tseliakh fiziologicheskoi otsenki effektivnosti vysotnogo snariazheniia).** I. V. Maksimov, I. N. Cherniakov, and S. S. Al'miashev. *Voenno-Meditsinskii Zhurnal*, Nov. 1973, p. 56-59. In Russian.

**A74-20367 # Effect of ionizing radiation on drugs (Vliianie ioniziruiushchei radiatsii na lekarstvennye sredstva).** L. D. Riabykh, B. A. Chakchir, and S. A. Grachev. *Voenno-Meditsinskii Zhurnal*, Nov. 1973, p. 84-86. 9 refs. In Russian.

Radiation sensitivity of various groups of medical preparations and drugs is discussed by reviewing the available literature on the subject. Hormones, alkaloids, antibiotics, and anesthetics are covered in solid form, in solutions, and sealed vials. Radiation damage thresholds are indicated for some groups of medicines. V.Z.

**A74-20398 Sleep disorders (Les troubles du sommeil).** W. C. Dement and C. Guilleminault (Stanford University, Stanford, Calif.). *La Recherche*, vol. 5, Feb. 1974, p. 120-129. 24 refs. In French.

The nature, functions, and time requirements of sleep, and the nature and causes of dreams are discussed in the light of some of the multidisciplinary concerted research conducted by psychologists, physicists, chemists, physicians, and physiologists in the course of the last 15 years. The EEG, ECG, and EMG techniques used as investigation tools are reviewed, along with the characteristics of normal sleep and the phenomena of the jet-lag insomnia syndrome. The pathology of certain states of vigilance is then discussed, and the addictive nature of 95% of all sleep-inducing drugs presently used is pointed out. Special attention is given to instances of respiratory trouble during sleep, including apnea, and to cases of narcolepsy and cataplexy. M.V.E.

**A74-20519 # The electrocardiogram and vectorcardiogram of ectopic ventricular beats.** A. Castellanos, Jr., A. S. Ghafour, N. Pastis, R. J. Myerburg, and B. V. Berkovits (Miami, University, Coral Gables; U.S. Veterans Administration Hospital, Miami, Fla.; Harvard University, Boston, Mass.). *Acta Cardiologica*, vol. 28, no. 6, 1973, p. 562-575. 15 refs.

The electrocardiograms and vectorcardiograms of patients with spontaneous ectopic ventricular beats were compared with those induced by pacing from specific ventricular sites. A marked resemblance between the extrasystolic recordings and those obtained by stimulation of the posteroinferior ventricular wall was observed. It is theorized that the electrically-induced and natural ventricular beats have arisen in equivalent areas of the heart. V.Z.

**A74-20520 # Automatic analysis of electrocardiograms and vectorcardiograms on a computer /20,019 records/ (Progression de l'analyse automatique de l'électro- et du vectocardiogramme par ordinateur /20.019 tracés/).** J. Enderle and M. Telerman (Hôpital Universitaire Brugmann, Brussels, Belgium). *Acta Cardiologica*, vol. 28, no. 6, 1973, p. 576-592. 8 refs. In French.

Computer analysis data covering a total of 20,019 ECG and VCG recordings on 13,359 random patients were compared with cardiologists' opinions within the frameworks of the Pordy program for EVG and the Mayo-Smith program for VCG. The percentage of disagreements decreased steadily with the improvement of the hardware and/or software in the Pordy program. The percentage of disagreements was 30 per cent in the less accurate Smith program. V.Z.

**A74-20551 Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972, Proceedings.** Symposium sponsored by the Polska Akademia Nauk. *Artificial Satellites*, vol. 8, Nov. 1973. 221 p. In English and Russian.

Topics discussed include the hypoxic reaction regulatory system in humans, the effect of hypodynamia on rat muscle fitness, the use and transmission of rheographic data concerning pilots exposed to hyperthermal conditions, the calorigenic effect of adrenaline in immobilized rats, the effect of space flight factors on oxygen tension dynamics, adaptive reactions of the organism to oxygen deficiency, changes in the ambient gas medium on resistance to acute hypoxia, the effect of X-ray irradiation of rats on nucleic acid synthesis and cell damage, the use of cysteamine to reduce the radiosensitivity of proton-irradiated DNA, the effect of chronic gamma irradiation on changes in the glucose level and lipid concentration in rats, the effect of irradiation on the concentration of P material in the rat brain, and biochemical disorders caused by irradiation of the guinea pig. A.B.K.

**A74-20552 # Analysis of the oxygen cycle in the regulatory system of the hypoxic reaction in humans with the aid of an analog computer model (Analiz kislorodnogo okruga reguliatornoi sistemy gipoksicheskoi reaktsii cheloveka s pomoshch'iu modeli v analogovoi vychislitel'noi mashine).** J. Cmiral, J. Dvorak, and M. Moravek. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 7-26. 14 refs. In Russian.

**A74-20553 # Electrophysiological and morphological studies of the effect of hypodynamia on the functional ability of muscles (Elektrofiziologicheskie i morfologicheskie issledovaniia vliianiia gipodinamii na funktsional'nuiu sposobnost' myshts).** S. Baranski, Z. Edelwejn, W. Stodolnik-Baranska, and Z. Sarol. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 27-35. 10 refs. In Russian.

**A74-20554 # Some results of medical tests performed during the flight of the scientific orbital station 'Saliut' (Nekotorye rezul'taty meditsinskikh issledovanii vypolnennykh vo vremia poleta nauchnoi orbital'noi stantsii 'Saliut').** N. Gurovskii, N. Rudnyi, L. Kakurin, and A. Egorov. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 37-53. In Russian.

The flight lasted more than 23 days. The total radiation doses of individual crew members were not above 1.26 rads, with the composition of the cabin atmosphere close to that of the atmosphere. A total of about 2950 cal was taken daily by the astronauts in hot food. EKG, seismocardiogram, pneumogram, heart beat, and other physiological indices were recorded two times a day. The physical and mental capacities of the crew members were not affected adversely during the flight. V.Z.

**A74-20555 # Development of methods of using and transmitting rheographic data under conditions where the organism is subjected to changes in the ambient air medium (Razrabotka metodov ispol'zovaniia i peredachi reograficheskoi informatsii primenennoi v usloviakh vliianiia na organizm faktorov var'iruiushchei vozdushnoi sredy).** G. Benetato, A. Adamake, R. Vrynachanu, V. Ionesku, and S. Kananeu. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 55-60. In Russian.

**A74-20556 # Effect of gas media with different oxygen contents on hemostasis in experiments with animals (Deistvie gazovoi sredy s razlichnym soderzhaniem kisloroda na gemostaz v opyte na zhivotnykh).** L. Palos, E. Nemeshanski, D. Vankhedi, D. Blashke, A. Kosmovich, T. Ris, and I. Pete. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 61-68. 12 refs. In Russian.

Rats kept at 1.5 torr in pure oxygen for 24 h suffered severe pulmonary enema, hydrothorax, ascites, and lung hemorrhage. All rats died in 48 h. Similar disorders developed by the third day in rats that kept inhaling pure oxygen at atmospheric pressure. V.Z.

**A74-20557 # Practical and theoretical aspects of the action of a modified gas medium on the organism (Prakticheskie i teoreticheskie aspekty problemy deistviia na organizm faktorov izmenennoi gazovoi sredy).** P. Gramenitskii. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 69-74. In Russian.

Studies of the effect of modified gas environments on the organism are reviewed in the context of space medicine with special attention to the microclimate in spacecraft. Pure oxygen media as used in the U.S.A. and modified-atmosphere media as used in the USSR are evaluated from technical and medical points of view. The disadvantages of both approaches are indicated. An alternative approach is considered which provides for small cyclic fluctuations of oxygen and carbon dioxide partial pressures in ambient air. V.Z.

**A74-20558 # Calorigenic effect of adrenaline in rats under conditions of restricted motor activity (Kalorigennoe deistvie adrenalide u krys v ustoviiakh ogranichennoi dvigatel'noi aktivnosti).** L. Tomaszewska, H. Kaciuba-Uscilko, and S. Kozlowski. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 75-80. 10 refs. In Russian.

**A74-20559 # Oxygen tension dynamics in brain tissue during the action of space flight factors on the organism (Dinamika napriazheniia kisloroda v tkaniakh mozga pri deistvii na organizm faktorov kosmicheskogo poleta).** E. Kovalenko and A. Riazhskii. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 81-86. In Russian.

**A74-20560 # Special features of adaptive reactions of the organism to oxygen deficiency in human subjects with different levels of acclimatization to hypoxia (Osobennosti adaptivnykh reaktsii organizma na nedostatok kisloroda u lits s razlichnym urovnem akklimatizatsii k gipoksii).** N. Agadzhanian. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 87-91. In Russian.

**A74-20561 # Characteristics of a caloric nystagmus in healthy humans (K kharakteristiki kalorichesskogo nistagma u zdorovykh lits).** D. Bodo, V. Baranova, E. Matsnev, and I. Iakovleva. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 93-97. In Russian.

Electronystagmography was performed on 107 healthy subjects, 20 to 40 years of age, during successive calorization of the labyrinth by the Fitzgerald-Hallipika method (1942). Statistical analysis of the results showed the presence of asymmetry in the reflex activity of the labyrinths in most subjects. V.Z.

**A74-20562 # Effect of changes in the gas environment and operator activity on resistance to acute hypoxia /reserve time at an altitude of 7500 m/ (Vliianie izmenennoi gazovoi sredy i operatorskoi deiatel'nosti na perenosimost' ostroi gipoksii /rezervnoe vremia na vysote 7.500 m/).** R. Bloszvzynski, L. Golec, N. Agadzhanian, and A. Sergienko. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 99-104. 15 refs. In Russian.

**A74-20563 # Regional blood circulation characteristics under gravitation forces (Osobennosti regionarnogo krovoobrashcheniia pri gravitatsionnykh vozdeistviiakh).** Kh. Iarullin, T. Krupina, and T. Vasil'eva. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 105-110. 5 refs. In Russian.

**A74-20564 # Chromosome aberrations in lymphocytes as a biological indicator of radiation which takes into account the dose-effect curve under in-vitro radiation conditions (Khromosomnye aberratsii v limfotsitakh kak biologicheskii pokazatel' oblucheniia s osobym uchetom krivoi doza-effekt v usloviiakh oblucheniia in vitro).** J. Liniecki and A. Bajerska. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 111-134. 48 refs. In Russian.

Papers dealing with the effects of radiation exposures on chromosome aberrations are reviewed with particular attention to such aberrations in peripheral lymphocytes as a measure of radiation damage. Parameters of lymphocyte radiation damage determined in vitro and in vivo are compared and curves of radiation damage vs

radiation doses are discussed. Further studies in this direction under strictly controlled conditions are urged for the development of more advanced radiation damage simulation techniques. V.Z.

**A74-20565 # Pathophysiological indications for search of new prophylactic and therapeutic methods for radiation sickness and the radiation safety problems of space flight (Patofiziologicheskie predposylki dlia poiska novykh sredstv profilaktiki i terapii luchevoi bolezni i voprosy radiatsionnoi bezopastnosti kosmicheskikh poletov).** V. Rogozkin. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 135-150. 38 refs. In Russian.

Review of papers dealing with prophylaxis and therapy of radiation sickness. Particular attention is given to the effectiveness of available radioprotectors, to the testing of new radiation protection techniques, to radiation simulation models for brief and extended space flights, and to the pharmocology and tolerance characteristics of chemical and biological means of protection in extremal radiation conditions. V.Z.

**A74-20566 # Estimation of nucleic acid synthesis and radiation damage of nuclear structures in regenerating hepatic cells of rats during X-ray irradiation in the Go phase (K otsenke sinteza nukleinovykh kislot i luchevykh povrezholenii iadernykh struktur v kletkakh regeneriruiushchei pechenii krys prirentgenoobluchenii ikh v faze Go).** V. Varters, L. Sabo, L. Got, and N. Ia. Savchenko. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 151-158. 14 refs. In Russian.

**A74-20567 # Study of the effects of X-ray irradiation on the intensity of biosynthesis of nucleic acids in regenerating rat liver, using tagged precursors (Issledovanie effektov Rentgenovskogo obluchenii na intensivnost' biosinteza nukleinovykh kislot v regeneriruiushchei pecheni krys s ispol'zovaniem mechennykh predshestvennikov).** L. Gut, V. Varters, L. Sabo, and N. Ia. Savchenko. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 159-164. 10 refs. In Russian.

**A74-20568 # Inactivation of the transforming activity of DNA by irradiation with different LET (Inaktivatsiia transformiruiushchei aktivnosti DNK vozdeistviem izluchenii s razlichnymi LPE).** K. Gunther, R. Gruno, M. Hartwig, H. Abel, G. Erzgreber, K. Eihorn, and I. Kerner. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 165-177. 14 refs. In Russian.

Various Bacillus subtilis strains were used as DNA carriers in a study of the inactivation of DNA transforming activity by bombardment with alpha particles, protons, C and N nuclei and by X-raying. A transformation model developed by the authors is described. The molecular biology and genetic characteristics of Bacillus subtilis are studied by using this model. The efficiency of the switch model of transformations is confirmed. It is shown that the inactivation of transformations caused by irradiation is linked to damage and breaks in DNA molecules. V.Z.

**A74-20569 # Effect of cysteamine on the radiosensitivity of transforming DNA subjected in vitro and in vivo to the action of 645-MeV protons (Vliianie tsisteamina na luchechuvstvitel'nost transformuiushchei DNK pri vozdeistvii protonami 645 MEV in vitro i in vivo).** M. Minikova, I. Ryzhov, T. Mashinskaia, and E. Krasavin. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 179-184. In Russian.

**A74-20570 # Inactivation of bacteriophages by irradiation with different LET (Inaktivatsiia bakteriofagov izlucheniem s razlichnymi LPE).** H. Abel, G. Erzgreber, and E. Tolkendorf. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 185-190. 6 refs. In Russian.

Two varieties of bacteriophages (T prime and T second) were bombarded with light nuclei and heavy ions in bouillon with and without radioprotector (cysteine). The nature of inactivation of bacteriophages by bombardment is discussed with attention to the role of enzymes in the bacteriophage recovery process. V.Z.

**A74-20571 # Dynamics of changes in the glucose level in the blood and of the lipid concentration in the serum and tissues of rats after chronic exposure to small doses of gamma irradiation (Dinamika izmenenii gliukozy v krovi i lipidov v syrovorotke i tkaniakh krys posle kontinual'nogo gamma-obluchenii malymi dozami).** E. Alersova, I. Alers, A. Sedlakova, Z. Malatova, U. Poulikova, and M. Praslicka. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 191-195. 9 refs. In Russian.

**A74-20572 # Results of clinicobiochemical investigations of dogs subjected to chronic gamma-radiation (Rezul'taty kliniko-biokhimicheskikh issledovanii sobak podvergnutykh khronicheskomu gamma-oblucheniiu).** A. Akhunov and B. Markelov. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 197-204. 6 refs. In Russian.

Clinical, hematological, physiological, immunological and biochemical observations and tests were conducted on a group of 186 dogs which were exposed to total gamma ray doses of 106, 312, 610, 625, and 950 r from a cobalt-60 source over a period of five years. Anomalous protein, carbohydrate and lipoid metabolism was observed in a number of cases. Death of some dogs during the period was attributed to natural causes. V.Z.

**A74-20573 # Studies of changes in the P substance level in the brain of irradiated rats (Issledovaniia izmenenii soderzhanii veshchestva P v mozgu obluchenykh krys).** J. Mackowiak and K. Wisniewski. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 205-210. 16 refs. In Russian.

**A74-20574 # Studies of certain biochemical disorders and the barium chloride sensitivity of the small intestine of the irradiated guinea pig (Issledovaniia nekotorykh biokhimicheskikh narushenii, a takzhe reaktsii na khlorid bariia tonkoi kishki obluchennoi morskoi svinki).** K. Wisniewski and T. Piekarska. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 211-221. 9 refs. In Russian.

**A74-20575 # Respiratory metabolism and radiosensitivity of rats (K voprosu respiratsionnogo obmena i radiochuvstvitel'nosti krys).** L. Noval, J. Filip, B. Gosek, and I. Kolacny. *(Polska Akademia Nauk, Symposium on Cosmic Biology and Medicine, Warsaw, Poland, June 12-17, 1972.) Artificial Satellites,* vol. 8, Nov. 1973, p. 223-229. 5 refs. In Russian.

Respiratory metabolism was studied in 246 rats, 7 to 9 weeks old, which were exposed to radioactivity doses of 750 r during different seasons of the year. Survival rates of the rats are given vs their age, season, oxygen uptake and carbon dioxide release. A relation is established between the survival rates and respiratory metabolic activity. V.Z.

**A74-20580 # Hydrodynamic modeling of the inner ear (Gidrodinamicheskoe modelirovanie vnutrennego ukha).** L. A. Soroka (Akademiia Nauk SSSR, Akusticheskii Institut, Moscow, USSR). *Akusticheskii Zhurnal,* vol. 19, Nov.-Dec. 1973, p. 885-890. 8 refs. In Russian.

The results of a theoretical and experimental investigation of a hydrodynamic cochlear model are discussed. The selection of similarity criteria for such models is examined, and the influence of viscosity of the cochlea is assessed. V.P.

**A74-20583 # Personal equations and errors in visual magnitude estimates of meteors.** J. Stohl (Slovenska Akademia Vied, Astronomicky Ustav, Bratislava, Czechoslovakia) and P. M. Millman (National Research Council, Ottawa, Canada). *Astronomical Institutes of Czechoslovakia, Bulletin,* vol. 24, no. 6, 1973, p. 321-330. 10 refs.

The visual magnitude estimates by teams of meteor observers at the Springhill Meteor Observatory, Canada, and at the Skalnate Pleso Observatory, Czechoslovakia, have been analyzed to determine the nature and the extent of the personal errors involved. Two personal coefficients for a visual meteor observer have been established; one which depends on the nature of the magnitude distribution recorded by the observer, and one which represents the shift of the observer's mean magnitude from some standard mean. Only observing periods with good weather conditions were chosen for analysis, and these involved a total of 7548 individual magnitude estimates. Results of this analysis indicate that the probable error for a single magnitude estimate by an experienced observer for a meteor seen near the center of the field of view is in the range from plus or minus 0.30 to plus or minus 0.35 magnitude and that, for similar atmospheric conditions, the mean magnitude Skalnate Pleso minus mean magnitude Springhill equals 0.5 magnitude. (Author)

**A74-20594 Structural response of vertebrate photoreceptor membranes to light.** W. T. Mason, R. S. Fager, and E. W. Abrahamson (Case-Western-Reserve University, Cleveland, Ohio). *Nature,* vol. 247, Jan. 25, 1974, p. 188-191. 16 refs. NIH-supported research.

A distinct structural response in disk membranes from frog retinal rod outer segment was found to be directly proportional to exposure to light in experiments with several preparations of the retina from dark adapted frogs. Translocation of rhodopsin from the intradisk hydrophilic surface to the internal hydrophobic phase of the membrane was observed. The results are consistent with the view that the rhodopsin molecules are located on the internal intradisk hydrophilic surface of the disk membrane. V.Z.

**A74-20625 # Aerospace medicine for medical practice (Flugmedizin für die ärztliche Praxis).** B. H. C. Müller (Fédération Aéronautique Internationale, Paris, France). Bad Godesberg, Kirschbaum Verlag, 1973. 319 p. 258 refs. In German. $18.70.

The problems and facts of aerospace medicine are considered. An introduction to the problems of aerospace medicine is presented for the medical expert of this field, giving attention to basic physical information concerning the atmosphere of the earth and its temperature, the physiological effect of oxygen deficiency, questions of respiration, effects of low air pressure, questions of altitude tolerance, radiation problems, acceleration effects, and air sickness. Questions of German air legislation are discussed together with the legal position of the medical expert in aerospace medicine, the organization for the conduction of medical examinations of pilots, the regulations for the medical examination, and the equipment to be used in the medical examination. G.R.

**A74-20668 # Mathematical model of the neural impulse formation process and computer analysis of the model (Matematicheskaia model' protsessa vozniknoveniia nervnogo impul'sa i ee issledovanie na AVM).** Ia. B. Kadymov and Kh. T. Bairamov (Azerbaidzhanskii Politekhnicheskii Institut, Baku, Azerbaidzhan SSR). *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady,* vol. 29, no. 4, 1973, p. 14-17. 8 refs. In Russian.

**A74-20699 Handbook of perception. Volume 3 - Biology of perceptual systems.** Edited by E. C. Carterette and M. P. Friedman (California University, Los Angeles, Calif.). New York, Academic Press, Inc., 1973. 531 p.

Energy, transducers, and sensory discrimination are discussed together with neuronal properties, integration in nervous systems, primordial sense organs, the evolution of sensory systems, behavioral embryology, ethology, genetic control, and object recognition. Other topics considered include chemoreception, tasting and smelling, cutaneous mechanoreceptors, tactual perception of texture, the spatial senses, orientation and motion in space, temperature reception, vision, and audition. G.R.

**A74-20700 Energy, transducers, and sensory discrimination.** T. D. M. Roberts (Glasgow, University, Glasgow, Scotland). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 1-20. 20 refs.

Questions of sensory experience are examined, taking into account the function of a sense organ, aspects of sensory discrimination, and the kinds of information required. Receptors are discussed together with stimuli and responses. Attention is given to the stimulus-response relationship, a simple mechanoreceptor, the notion of impulse frequency, static and dynamic components in the response, ambiguities in signalling stimulus intensity, and problems regarding the mathematical prediction of responses. G.R.

**A74-20701 Neuronal properties.** C. F. Stevens (Washington, University, Seattle, Wash.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 21-38. 21 refs.

A vast complex of information processing circuits formed by interconnecting networks of nerve cells are contained in the human nervous system. A description is given of the properties of the individual components from which these neural circuits are constructed. Particular attention is given to certain features believed to be most important in neuronal information processing. Aspects of the structural basis for nervous system functioning are discussed together with the nerve impulse, the synaptic function, neural integration, encoding information, and special properties. G.R.

**A74-20702 Integration in nervous systems.** G. A. Horridge (Australian National University, Canberra, Australia). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 39-62. 49 refs.

Questions of coding are considered along with synapses, aspects of integration, fields of sensitivity, convergence and complex fields, physiological pathways and anatomic connections, and reflexes. Other subjects examined include Eccles' explanatory contribution, details of anatomy, the splintering field, centrally determined sequences, computers as models of brains, circuits of restricted locality, and the constancy of synaptic connections. G.R.

**A74-20703 Primordial sense organs and the evolution of sensory systems.** L. Kruger and B. E. Stein (California, University, Los Angeles, Calif.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 63-87. 93 refs. Grants No. PHS-EY-571; No. PHS-NS-5685; No. PHS-LM-26401.

The problem of evolutionary status is considered together with the variety of sense organs, taking into account coding, specialization, photosensitivity, and excitation and inhibition. Primitive 'eyes' are discussed along with questions of the specialization in vertebrates, the vertebrate central nervous system, mammalian evolutionary trends, the cerebral cortex, and aspects of neural organization and perception. G.R.

**A74-20704 Genetic control.** K. B. Thomas (California, State University, Northridge, Calif.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 139-155. 100 refs.

The objectives and methods of behavior-genetic analysis are considered, taking into account dual control of behavior by genes and environment, genotypes as variables in animal experiments, human behavior genetics, the population specificity of genetic statements, and single-gene methods. Details regarding research findings are also discussed, giving attention to responses to light and

visual patterns, responses to sound, reponses to chemical stimuli, responses to gravity, and other sensory and sensory-motor responses. G.R.

**A74-20705** **Object recognition.** N. S. Sutherland (Sussex, University, Brighton, Sussex, England). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 157-185. 87 refs. Research supported by the Science Research Council.

Some of the known facts concerning object recognition are reviewed. Attention is given to problems regarding absolute versus relative properties, discriminability and confusions, rotation and symmetry, segmentation and grouping, perceptual learning, and cross modality transfer. Theories of pattern processing are also discussed, taking into account random neural networks, template matching, recognition by features, encoding theories, analysis by synthesis, structural descriptions, and picture processing by machine. G.R.

**A74-20706** **Chemoreception.** B. M. Wenzel (California, University, Los Angeles, Calif.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 187-206. 57 refs. Grant No. NIH-70-2063.

The term 'chemoreception' implies transduction of any type of chemical stimulating energy into nervous impulses. The discussion is restricted to the conventional categories of taste and smell, those chemoreceptive routes which are characterized by specialized receptors in specific receptor sites, the mouth and nose. The morphology of chemoreceptors is considered, giving attention to conditions in insects and vertebrates. Questions of electrophysiology are also explored. G.R.

**A74-20707** **Tasting and smelling.** B. M. Wenzel (California, University, Los Angeles, Calif.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 207-218. 50 refs. Grant No. NIH-70-2063.

Gustatory and olfactory effects on several aspects of vertebrate behavior are explored, giving attention to sensitivity, preferences, dietary and metabolic factors, and chemical communication and pheromones. Much of insect society may well be under the influence of chemical signals. Pheromones have been defined as substances which are secreted to the outside of an individual and received by a second individual of the same species, in which they release a specific action, for example, a definite behavioural or developmental process. G.R.

**A74-20708** **Cutaneous mechanoreceptors.** P. R. Burgess (Utah, University, Salt Lake City, Utah). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 219-249. 65 refs.

The criteria for the classification of cutaneous mechanoreceptive neurons are discussed, giving attention to the transmissive and the receptive portion of a neuron. The mechanoreceptors in hairy skin are examined, taking into account receptors detecting position and velocity, receptors detecting velocity, and receptors detecting transients. Mechanoreceptors in the glabrous skin of cats and primates are also considered along with mechanoreceptors associated with sinus hairs, teeth, and claws. The receptor classification proposed in the review assumes that mechanoreceptors are specialized to detect different modes of mechanical stimulation. G.R.

**A74-20709** **Tactual perception of texture.** M. M. Taylor (Toronto, University, Downsview, Ontario, Canada), S. J. Lederman (Toronto, University, Toronto, Canada), and R. H. Gibson (Guelph, University, Guelph, Canada). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 251-272. 37 refs.

The perception of texture by touch is examined initially by reviewing past experiments dealing with sensations of roughness and vibration. The perceptual qualities of active and passive touch are distinguished, and current trends of research on roughness perception are summarized. A proposed model of texture perception defines the transducer function involved in the interaction between the skin and an object surface. Three basic feedback loops participating in the control and information flow are included in the model. T.M.

**A74-20710** **The spatial senses.** I. P. Howard (York University, Toronto, Canada). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 273-290. 36 refs.

A variety of mechanisms has evolved to enable animals to localize distant sources of vibration. Sound localization by the skin is utilized by aquatic animals and land-living invertebrates equipped with special tactile organs. In vertebrates the evolution of the cochlea extended the frequency range of their vibratory sense. Attention is given to binaural cues, the cocktail party effect, the precedence effect, monaural cues, the neurology of auditory localization, and aspects of echolocation. Other senses considered include joint receptors, muscle spindles, and tendon organs. Details of the vestibular system are discussed, taking into account the vestibular canals, the utricles, and the vestibular pathways. G.R.

**A74-20711** **Orientation and motion in space.** I. P. Howard (York University, Toronto, Canada). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 291-315. 75 refs.

Gravitational orientation, egocentric orientation, geographic orientation, and sensori-motor coordination of man in space are considered. The body vertical, the visual vertical, the tilt aftereffect, and visual polarity are discussed as ingredients of the body schema. The topics also include eye movements and the sense of direction, the liability of elements of the visual motor system, and adjustment of visual motor control. It is concluded that the motions of a human in space are rarely chaotic even though his sense organs are mounted on mobile parts of the body. Complex invariants which control orientation in space are noted. V.Z.

**A74-20712** **Temperature reception.** H. Hensel (Marburg, Universität, Marburg an der Lahn, West Germany). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 317-325. 23 refs.

This chapter treats the subjects of thermal sensations (the structure of temperature sensation, 'cold and warm spots,' and the adequate and inadequate stimuli), of the neurophysiology of thermoreception (receptive fields, function of thermoreceptors, and inadequate stimulation of thermoreceptors). Various approaches to thermoreception are examined and compared. V.P.

**A74-20713** **Vision.** I. Abramov (Brooklyn College, Brooklyn, N.Y.) and J. Gordon (Hunter College; Rockefeller University, New York, N.Y.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 327-357. 60 refs. NSF Grant No. GB-6540; Grant No. PHS-EY-00188.

Mechanisms by which light energy is transduced into neural messages are described together with the fundamental aspects of the code used to transmit visual information. Attention is given to the absorption of light by the photopigments in the retina's photoreceptors, the synaptic organization of the vertebrate retina, the major components of the visual pathways through the central nervous system, gross electrical potentials and unit responses in the retina, cortical response patterns, and the superior colliculus. T.M.

**A74-20714** **Seeing.** I. Abramov (Brooklyn College, Brooklyn, N.Y.) and J. Gordon (Hunter College; Rockefeller University, New York, N.Y.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 359-406. 103 refs.

Discussion of approaches to psychophysical measurement of the spatial modulation transfer function of the visual system. The topics

include the spectral sensitivity, wave length discrimination capacity, and adaptation of the visual system; channel on which color vision is based; properties of photopigments; temporal factors of vision, spatial factors of vision, and physiological correlates of vision. Also considered are visual aftereffects, lateral inhibition, and edge effects. V.Z.

**A74-20715** **Hearing - Central neural mechanisms.** B. Masterton (Florida State University, Tallahassee, Fla.) and I. T. Diamond (Duke University, Durham, N.C.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 407-448. 81 refs.

The discussion is confined to animals that possess a cochlea, i.e., land vertebrates or tetrapods. Emphasis is placed on the contribution of the central nervous system rather than the contribution of the ear itself. The origin and evolution of the auditory system is described first, and the sources of selective pressure on hearing and the evolution of sound reception second. This leads to the conclusion that detection of brief sounds and their localization provides a chief and continuing source for solution. Current ideas of the contribution of the various structures of the central auditory system to sound detection and localization are reviewed. F.R.L.

**A74-20716** **Audition.** D. B. Webster (New York University, Bronx, N.Y.). In: Handbook of perception. Volume 3 - Biology of perceptual systems. New York, Academic Press, Inc., 1973, p. 449-482. 96 refs.

Nonmammalian auditory systems are considered, giving attention to the properties of sound, the hair cell, the diversity of sound transforming apparatuses, and the diversity of the inner ear and the auditory brain. Mammalian auditory systems are also discussed, taking into account the external ear, the middle ear, the cochlea, and the central auditory system. It is pointed out that the one structure common to all vertebrate hearing organs is the hair cell. The structures surrounding the hair cells vary significantly among vertebrates. The ultrastructural morphology, bioelectric potentials, and biochemical characteristics of the inner ear all suggest that physical stimulation initiates chemical changes in the hair cell and that a chemical synapse exists between the hair cell and the afferent nerve endings. G.R.

**A74-20750** **The whiplash injury of the cervical spine - Recognition and diagnosis (Schleuderverletzung der Halswirbelsäule - Erkennung und Begutachtung).** H. Erdmann (BG-Unfallkrankenhaus, Frankfurt am Main, West Germany). Stuttgart, Hippokrates Verlag GmbH (Die Wirbelsäule in Forschung und Praxis. Volume 56), 1973. 181 p. 150 refs. In German. $18.80.

The definition of the whiplash injury is considered together with questions of nomenclature and the features which are characteristic for this injury. The types of accidents which can produce whiplash injuries are discussed together with the clinical appearance of a new injury, the roentgenological appearance of a new injury, and the characteristics of the following healing process. Methods of physical examination are described along with roentgenological investigative techniques and problems of diagnosis. Attention is given to general principles which have to be taken into account during the diagnosis and specific sources of diagnosis errors. G.R.

**A74-20824** **Total simulation - A near future goal.** W. P. Moran (American Airlines, Inc., New York, N.Y.). *Shell Aviation News*, no. 420, 1973, p. 8-11.

Progress in flight simulation technology is evaluated as a contributor to the good safety record of large, fast, and complex aircraft. Effective simulator uses are discussed by phases of a corporate jet simulator training program. The ATA and IATA goal of total simulation in airline flying training is believed to be within the reach. Transfer to total simulation is, however, conditional on the effective use and manipulation of the simulator. V.Z.

**A74-20914** # **Methods of analysor function investigations in physiologico-hygienic studies (Metodiki izucheniia funktsii analizatorov pri fiziologo-gigiemicheskikh issledovaniiakh).** A. I. Vozhzhova. Leningrad, Izdatel'stvo Meditsina, 1973. 229 p. 204 refs. In Russian.

Techniques for studying the functions of the auditory, vestibular, motor, cutaneous, visual, and olfactory analysors are described. Experimental assemblies, instruments, charts for recording subjective otorhinolaryngologocal responses, and standards used in tests are covered. A number of test circuits designed by the author are included. Tests results are given for some typical investigations of the analysors. Attention is given to the effects of ambient media on the functions of the analysors. Hygiene evaluation of ambient media is also provided. An extensive bibliography is appended. V.Z.

**A74-20949** **System safety and human factors - Some necessary relationships.** E.-S. Brown (Texas Instruments, Inc., Dallas, Tex.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 197-200. 6 refs.

The analysis of man-machine interactions is an important factor in any human factors or safety program. The general objective of the analysis effort is usually to identify and describe selected interactions prior to taking corrective, preventive, creative, or other supporting actions. An element of increasing importance to the human factors domain is human error, including reliability of task performance. Questions of safety labeling are also discussed together with approaches for supporting the equipment design process to improve personnel and equipment safety. G.R.

**A74-20963** **Human reliability in man-machine interactions.** R. L. Huston and A. M. Strauss (Cincinnati, University, Cincinnati, Ohio). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 329-334. 11 refs.

New concepts are presented that provide a framework for coordinating the methods and ideas in use among system reliability engineers with the techniques and theories of behavioral scientists. Sociomechanical analysis, simple examples of which are described, is shown to be readily applicable to man-man interaction (sociological system) problems, and multilateral interactions, such as man-machine-management-government-public interactions. The achievement of optimum man-machine interaction may be aided by the proposed methods. Pertinent analytical results include the findings that: (1) man's productivity does not become optimal until some time after machine maintenance; (2) his productivity is optimal midways between maintenance operations; and (3) following a machine breakdown, man's productivity does not attain the pre-breakdown level even after repairs have been made. M.V.E.

**A74-20964** **An activity model for predicting the reliability of human performance.** O. Celinski and M. Master (Ottawa, University, Ottawa, Canada). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 340-348. 9 refs.

A model of human activity is considered, whose describing equation is conceptually simple and affords flexibility in the mathematical formulation of the motive and workload functions. This makes it possible to use the model for simulating most activities which might be of interest in reliability considerations. A general conclusion deduced from the model is that the reliability of human performance depends primarily on the motive associated with the activity under consideration, and on the motive dominance distribution within the time available for the activity. The workload of the activity is of secondary importance. M.V.E.

**A74-20977** **Reducing maintenance error by human engineering techniques.** R. L. Street (Texas A & M University, Texarkana, Tex.). In: Annual Reliability and Maintainability Sympo-

sium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 469-471. 5 refs.

An attempt is made to lay a foundation of understanding of the nature of maintenance errors and their importance to systems effectiveness, with indication of approaches available to systems designers who wish to make the effort to reduce maintenance errors. Four phases are discussed: human error in general (its nature and importance); categories of human error in systems design; types and causes of maintenance errors; and methods of reducing maintenance errors. F.R.L.

**A74-21013 Microbiological standards for frozen foods.** M. D. Appleman (Southern California, University, Los Angeles, Calif.), M. D. Appleman, Jr. (Southern California Permanente Medical Group, Bellflower, Calif.), and M. D. Appleman. In: Cryogens and gases: Testing methods and standards development; Proceedings of the Symposium, Los Angeles, Calif., June 25-30, 1972. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 3-11. 16 refs.

Factors predetermining quality and safety of frozen food products are discussed along with different types of standards. Attention is drawn to the fact that microbiological standards for frozen foods must be studied thoroughly prior to establishment. The sources and methods of transmission of diseases through the agency of frozen foods and methods of evaluating and minimizing risk are clarified. The inherent inconvenience and danger of establishing microbiological standards for foods without careful evaluative techniques are explained. The impact of microbiological standards for foods upon incipient or frank spoilage is discussed. T.M.

**A74-21023 Echocardiographic findings in discrete subvalvular aortic stenosis.** R. L. Popp, J. F. Silverman, J. W. French, E. B. Stinson, and D. C. Harrison (Stanford University, Stanford, Calif.). *Circulation*, vol. 49, Feb. 1974, p. 226-231. 12 refs. Research supported by the Bay Area Heart Research Association; Grants No. NIH-HL-5709; No. NIH-HL-5866; No. NIH-1-K04-HL-70439; No. NIH-HL-14174.

Echographic features of three patients with discrete subvalvular aortic stenosis are presented. These include a narrowed area of the left ventricular outflow tract just below the aortic valve cusps in all cases. A high-intensity but thin echo was seen in the high left ventricular outflow tract at the level of the mitral annulus in one patient with a subaortic diaphragm. In one of the three patients abnormality of aortic cusp motion was suggested as well. (Author)

**A74-21024 Sound pressure correlates of the second heart sound - An intracardiac sound study.** J. A. Shaver (Pittsburgh, University, Pittsburgh, Pa.), R. A. Nadolny, J. D. O'Toole, M. E. Thompson, P. S. Reddy, D. F. Leon, and E. I. Curtiss (Pittsburgh, University; Presbyterian-University Hospital, Pittsburgh, Pa.). *Circulation*, vol. 49, Feb. 1974, p. 316-325. 35 refs. Grant No. NIH-2-T12-HE-05678-07.

The sound pressure correlates of the second heart sound were studied in 22 patients during diagnostic cardiac catheterization. In 12 patients having normal pulmonary vascular resistance, pulmonic closure sound was coincident with the incisura of the pulmonary artery pressure curve which in turn was separated from the right ventricular pressure trace by an interval denoted 'hangout.' The duration of this interval varied (33-89 msec), was independent of pulmonary artery pressure or resistance, and was felt to be primarily a reflection of the capacitance of the pulmonary vascular tree. Awareness of the existence of the hangout interval and its hemodynamic determinants offers a reasonable mechanism to explain the audible expiratory splitting of the second heart sound found in patients with idiopathic dilatation of the pulmonary artery following atrial septal defect repair. In nine patients with elevated pulmonary vascular resistance approaching systemic levels, the absolute value of the hangout interval was markedly reduced (15-28 msec) consistent with the decrease in capacitance of the pulmonary vascular bed and the increased pulmonary vascular resistance known to occur in pulmonary hypertension. T.M.

**A74-21025 * Microbiological profiles of four Apollo spacecraft.** J. R. Puleo, G. S. Oxborrow, N. D. Fields, C. M. Herring, and L. S. Smith (Center for Disease Control, Cape Canaveral, Fla.). *Applied Microbiology*, vol. 26, Dec. 1973, p. 838-845. 25 refs. NASA Order W-13062.

The levels and types of microorganisms on various components of four Apollo spacecraft were determined and compared. Although the results showed that the majority of microorganisms isolated were those considered to be indigenous to humans, an increase in organisms associated with soil and dust was noted with each successive Apollo spacecraft. M.V.E.

**A74-21045 * Membrane permeability and the loss of germination factor from Neurospora crassa at low water activities.** G. Charlang and N. H. Horowitz (California Institute of Technology, Pasadena, Calif.). *Journal of Bacteriology*, vol. 117, Jan. 1974, p. 261-264. 19 refs. Grant No. NGR-05-002-121.

Neurospora crassa conidia incubating in buffer at low water activities release a germination-essential component as well as 260-nm absorbing and ninhydrin-positive materials, regardless of whether an electrolyte or nonelectrolyte is used to reduce water activity. Chloroform and antibiotics known to increase cell-membrane permeability have a similar effect. This suggests that membrane damage occurs in media of low water activity and that an increase in permeability is responsible for the release of cellular components. The damage caused in media of low water activity is nonlethal in most cases, and the conidia recover when transferred to nutrient medium. (Author)

**A74-21047 The cardiac rhythms: A systematic approach to interpretation.** R. E. Phillips (Phelps Memorial Hospital, North Tarrytown; New York Hospital; Montefiore Hospital Medical Center, New York, N.Y.) and M. K. Feeney (Columbia Hospital School of Nursing, New York, N.Y.; St. Luke's Hospital, Milwaukee, Wis.). Philadelphia, Pa., W. B. Saunders Co., 1973. 361 p. $12.

A plan is given for acquiring skill in the electrocardiographic interpretation of the heartbeat. The subject is introduced on an elementary level and developed to an intermediate degree of complexity. The text has been integrated into a stylized pictorial frame of reference with a step-by-step exposition of the basic determinants of heart rate and rhythm. The heartbeat, the electrocardiogram, and the sinus node are first discussed. Attention is then given to the atria, the atrioventricular node, the atrioventricular junction, the bundles, the ventricles, the electronic pacemaker, and the cardiac drugs. F.R.L.

**A74-21074 The role of optical expansion patterns in locomotor control.** I. R. Johnston, G. R. White, and R. W. Cumming (Melbourne, University, Melbourne; Monash University, Clayton, Victoria, Australia). *American Journal of Psychology*, vol. 86, June 1973, p. 311-324. 22 refs. Research supported by the Department of Civil Aviation and Department of Supply of Australia.

Patterns of optical expansion during approach to a surface were simulated, and 20 men were asked to locate the focus of that expansion under different conditions. Errors were less when the pattern was framed and when the visual field was small. Further, the subjects located the focus with any real confidence and accuracy only at the fastest expansion rate (i.e., .5 sec before theoretical surface impact), which casts doubt on Gibson's hypothesis of the importance of the focus of expansion in locomotor control. T.M.

**A74-21075 A rebound illusion in visual tracking.** A. Mack, R. Fendrich, and S. Sirigatti (New School for Social Research, New York, N.Y.). *American Journal of Psychology*, vol. 86, June 1973, p. 425-434. 14 refs.

If a target moving at a constant velocity and tracked by the eyes comes to an abrupt stop, it appears to rebound sharply backward. The results reported indicate that the illusion is caused by an unmonitored overshoot of the target by the eyes, which suggests that

position information during tracking is derived from efferent signals rather than from proprioceptive feedback from the extraocular muscles. (Author)

**A74-21127 Dependence of the dynamic behaviour of the human pupil system on the input signal.** G. J. van der Wildt and M. A. Bouman (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). *Optica Acta,* vol. 21, Jan. 1974, p. 59-74. 15 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

This paper deals with measurements of the pupillary response to several kinds of input signals such as sinusoidal modulated light intensity, flashes, noise and frequency-modulated flicker light. The results are compared with one another. This turns out that the dynamic behavior of the pupillary response to continuous input signals (sinusoidal, random) differs slightly from the behavior of the response to flashes, while the shape of the response to frequency-modulated flicker light is quite different and resembles the far-to-near response of the pupil system. (Author)

**A74-21156 * Ontogenesis of receptive fields in the rabbit striate cortex.** L. H. Mathers, K. L. Chow, P. D. Spear, and P. Grobstein (Stanford University, Stanford, Calif.). *Experimental Brain Research,* vol. 19, Jan. 22, 1974, p. 20-35. 34 refs. Grants No. NIH-NS-18512; No. NIH-EY-00691; No. NGR-05-020-435.

The development of receptive fields in rabbit pups was investigated by measuring their responses to various light stimuli and to electric shock delivered to the optic nerve head. The pups ranged in age from three to twenty-five days, allowing correlation of findings with maturation. The data, classified according to relation with symmetric or asymmetric field types, strongly suggest that retina maturation is the key factor in the rate of development in central visual pathways, and that central synaptic connections are made before the onset of retinal activity. P.T.H.

**A74-21164 Twenty-four-hour rhythms of rectal temperature in humans - Effects of sleep-interruptions and of test-sessions.** J. Aschoff, U. Gerecke, H. Giedke (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andrechs, West Germany), and M. Fatranska (Slovenska Akademia Vied, Endo-Krinologicky Ustav, Bratislava, Czechoslovakia). *Pflügers Archiv,* vol. 346, no. 3, 1974, p. 215-222. 16 refs.

**A74-21224 Mechanisms of stimulation of light-sensitive cells (Mechanismen der Erregung von Lichtsinneszellen).** H. Stieve (Kernforschungsanlage Jülich GmbH, Institut für Neurobiologie, Jülich, West Germany). *Naturwissenschaftliche Rundschau,* vol. 27, Feb. 1974, p. 45-56. 84 refs. In German.

The state of the art in studies of mechanisms controlling the activity of light-sensitive cells of the eye is reviewed in the context of molecular biology. The topics include the structure of a light-sensitive cell, rhodopsin as the vision perceptive dye, the membrane potential of a light-sensitive cell, and the role of calcium in the conductivity of the cell membrane. V.Z.

**A74-21235 Survival at extreme altitude - Protective effect of increased hemoglobin-oxygen affinity.** J. W. Eaton, T. D. Skelton, and E. Berger (Minnesota, University, Minneapolis, Minn.). *Science,* vol. 183, Feb. 22, 1974, p. 743, 744. 12 refs. Grants No. NIH-HL-15169-9; No. NIH-AM-15730.

Decreased hemoglobin-oxygen affinity is thought to be of adaptive value to humans and nonindigenous animals at high altitude. To test this, hemoglobin-oxygen affinity was modified by carbamoylation of hemoglobin in rats. Exposure of control (low oxygen affinity) and experimental (high oxygen affinity) animals to a pressure equivalent to high altitude revealed that increased, rather than decreased, hemoglobin-oxygen affinity will permit survival at greatly reduced environmental oxygen pressures. (Author)

**A74-21325 # The perception of motion in vehicle simulators (Bewegungswahrnehmung in Fahrzeugsimulatoren).** G. Tiesler. Meckenheim, Gesellschaft zur Förderung der astrophysikalischen Forschung (Forschungsbericht, No. 12), 1973. 96 p. 126 refs. In German. $3.65.

The physiological foundations regarding position and motion perception are discussed together with studies of the perception threshold for position and motion, motion simulators, and special systems of motion. Questions of the combination of sight and motion simulation are considered along with cybernetic aspects, taking into account control processes and information processing. An examination of the pertinent literature shows that in the field of physiology studies regarding the perception of motion are mainly concerned with rotational motions. The perception thresholds in the case of rotational accelerations have been determined under widely differing conditions. G.R.

**A74-21334 Interactive modeling as a forcing function for research in the physiology of human performance.** N. C. Miller and R. F. Walters (California, University, Davis, Calif.). *Simulation,* vol. 22, Jan. 1974, p. 1-13. 50 refs.

Physiological models are frequently designed to study a single-organ system or to investigate the differences in response of alternative representations of the same system. In this study, an interactive model portrays the human circulatory, thermoregulatory, and energy-exchange systems as an intercoupled set and serves as a means of communication between members of an interdisciplinary research team. The assumptions necessary to couple these systems are described, as are the research team's techniques for using the model. The goal is to develop the model to the point of accurately simulating the real-world behavior of the coupled systems in normal human beings and in those with certain diseases. T.M.

**A74-21339 The effect of communications and traffic situation displays on pilots awareness of traffic in the terminal area.** D. Melanson, R. E. Curry, J. D. Howell, and M. E. Connelly (MIT, Cambridge, Mass.). In: International Conference on Cybernetics and Society, Boston, Mass., November 5-7, 1973, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 126-131. 8 refs.

Experienced airline and military pilots participated in a factorial design to evaluate two types of communication (discrete address, party line) and two types of displays (airborne traffic situation display, TSD, and no TSD). A stop action quiz was used to evaluate their knowledge of other aircraft's position variables. Significant differences were detected between conditions. Workload, measured by a spare capacity side task, showed a main effect of displays and a display/communication interaction. The data are summarized by plotteng each display/communication configuration in the plane defined by information and workload index. A limited number of blunders by other aircraft were included with a significant improvement in blunder detection attributed to the TSD. T.M.

**A74-21350 * A specific response to toxic cadmium levels in red kidney bean embryos.** I. Imai and S. M. Siegel (Hawaii, University, Honolulu, Hawaii). *Physiologia Plantarum,* vol. 29, 1973, p. 118-120. 7 refs. Grant No. NGL-12-001-042.

**A74-21352 * The calculation of proportional counter energy deposition spectra from experimental data. II - Very small energy losses and high energy delta rays.** N. A. Baily and J. E. Steigerwalt (California, University, La Jolla, Calif.). *Radiation Research,* vol. 56, Nov. 1973, p. 213-221. 9 refs. Grant No. NGL-05-009-103.

**A74-21353 * Frequency distributions of energy deposition by 44 MeV protons at bone-soft tissue interfaces.** N. A. Baily, J. E. Steigerwalt, and J. W. Hilbert (California, University, La Jolla, Calif.). *Radiation Research,* vol. 56, Nov. 1973, p. 205-212. 7 refs. Grant No. NGL-05-009-103.

**A74-21400 *** **Temporal perception in obese and normal-weight subjects - A test of the stimulus-binding hypothesis.** R. M. Stutz, J. S. Warm, and W. A. Woods (Cincinnati, University, Cincinnati, Ohio). *Psychonomic Society, Bulletin,* vol. 3, Jan. 1974, p. 23, 24. 14 refs. NSF Grant No. GB-27654; Grant No. NGL-36-004-014.

**A74-21494** **Behavior of naive subjects during rapid decompression from 8,000 to 30,000 feet.** G. W. Hoffler, H. S. Turner, R. L. Wick, Jr., and C. E. Billings (Ohio State University, Columbus, Ohio). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 117-122. 18 refs. Contract No. F33657-68-C-0045.

Eighty naive subjects were exposed to simulated emergency rapid decompressions from 8000 to 30,000 ft in an altitude chamber to learn (1) what behavior can be expected of air passengers and (2) how optimal protection may be achieved with manually obtained continuous flow oxygen equipment. Variations in the behavioral responses of passengers will significantly alter the theoretical protection of any oxygen equipment. Face-shaped masks appear to provide some amelioration of adverse responses, while explicit donning instructions, often given only perfunctory attention, are advantageous and may be critical. (Author)

**A74-21495** **Behavior of naive subjects during decompression - An evaluation of automatically presented passenger oxygen equipment.** D. M. Chisholm, C. E. Billings, and R. Bason (Ohio State University, Columbus, Ohio). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 123-127. 23 refs.

**A74-21496** **Evaluation of performance using the Gedye task.** C. E. Billings (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 128-131. 6 refs. Research supported by the Link Foundation, Helicopter Minit-Men, and Ohio State University.

This report describes studies of a complex psychomotor task designed for assessment of performance and state of consciousness at high altitude. Baseline learning curves were obtained from five subjects at sea level and at 8000 ft. The results indicate that, while initial learning of the task is rapid, there are long-term trends indicative of further improvement in performance. More rapid learning of particular permutations was observed when subjects breathed oxygen at 8000 ft than when air was breathed. (Author)

**A74-21497** **Protection afforded by phased dilution oxygen equipment following rapid decompression - Performance aspects.** C. E. Billings (Ohio State University, Columbus, Ohio) and J. Ernsting (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 132-134. 9 refs. Research supported by the Link Foundation, Helicopter Minit-Men, and Ohio State University.

**A74-21498 #** **An investigation of human information processing during whole-body vibration.** R. W. Shoenberger (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 143-153. 42 refs.

Three experiments were conducted, using vertical vibration of seated subjects, in an attempt to separate mechanical interference effects on peripheral processes from generalized stress effects on central processes. Two of the experiments investigated the effects of vibration intensity and the size of the visually displayed task materials, during short-duration exposures (3-1/3 min). The intercept of the reaction time function increased significantly as the intensity of vibration increased. Interference with the input of visual information was responsible for this effect, since it only occurred with the smallest of the three display sizes used. In the third experiment, the largest display was used to eliminate visual interference, and the vibration exposure was lengthened to 41 min to increase the possibility of generalized stress effects. Under these conditions no significant effects were produced on performance of the task. These experiments indicate that performance of the type represented by this task is susceptible to mechanical interference with peripheral processes, but is essentially immune to any central processing effects from the general stress of the vibration. (Author)

**A74-21499 * #** **Funduscopic alterations in the rhesus monkey induced by exposure to heavy ions /0+8/ 250 MeV/nucleon.** F. N. Beckman, C. H. Bonney, and D. M. Hunter (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 154-160. 20 refs. NASA Order T-64131; AF Project 7757.

A heavy-ion, high-energy beam has been extracted from the Lawrence Radiation Laboratory Bevatron, making controlled exposure of biological systems feasible, and a series of experiments have been undertaken to determine the possible deleterious effects of such irradiation upon the primate retina. The left eyes of 54 rhesus monkeys have been exposed to accelerated 0+8 (250 MeV/nucleon). Beam flux ranged from 1.3 x 10 to the 7th particles/ sq cm (171 rads) to 5.9 x 10 to the 8th particles/sq cm (7740 rads). Fundus photography was performed immediately prior to and immediately following exposure, at 24 to 48 hours postexposure and at 1, 2, and 5 weeks postexposure. Punctate hemorrhages of the retina were visible at 1.3 x 10 to the 7th particles/sq cm (171 rads), the lowest exposure level utilized in this study. Acute radiation retinopathy, consisting of geographic retinal hemorrhage and ischemic necrosis of the retina, was not seen until total flux reached 7.7 x 10 to the 7th particles/sq cm (1000 rads). (Author)

**A74-21500** **Prediction of pilot performance in the F-4 aircraft.** R. H. Shannon and W. L. Waag (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 167-170. 7 refs.

In previous investigations, attempts were made to isolate the most critical skills and procedures within each stage of replacement air group (RAG) training in the F-4 aircraft. For each of the stages analyzed, a few items were selected on the basis that they could discriminate among replacement pilots according to their final RAG grade. On the basis of these isolated skills, two fleet evaluation questionnaires were developed to be used by operational F-4 squadron commanders. Data obtained from these two forms were used as the criterion measures in this investigation. Selected test scores and flight grades from undergraduate pilot training were used as potential predictors. These were related to the criteria in a series of correlational and regression analyses. A number of significant relationships were obtained among the performance measures. Such results indicated that the method used in developing the rating form to be a feasible one. Implications are discussed in terms of potential use for actual assignment of aviators to RAG training in the F-4 aircraft. (Author)

**A74-21501** **Respiratory signs and ultrasonic detection of bubbles in hamsters with severe decompression sickness.** W. D. Ulrich and R. M. Fine (U.S. Naval Medical Research Institute, Bethesda, Md.). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 171-175. 14 refs. Navy Task M4306,01-1010BXK9.

**A74-21502 *** **Plasma fluid and blood constituent shifts during heat exposure in resting men.** W. van Beaumont, H. L. Young, and J. E. Greenleaf (St. Louis University, St. Louis, Mo.; NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, Calif.). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 176-181. 23 refs. Grant No. NGR-26-006-039.

**A74-21503** **Psycho-social studies in general aviation. I - Personality profile of male pilots.** J. R. Novello (Michigan, University, Ann Arbor, Mich.) and Z. I. Youssef (Eastern Michigan University, Ypsilanti, Mich.). *Aerospace Medicine,* vol. 45, Feb. 1974, p. 185-188. 22 refs.

**A74-21504** **Ergonomic aspects of crew seats in transport aircraft.** F. Hawkins (KLM - Royal Dutch Airlines, Amsterdam, Netherlands). *Aerospace Medicine*, vol. 45, Feb. 1974, p. 196-203. 16 refs.

Evidence suggests that the incidence of low backpain amongst aircrew is abnormally high, and so the question of seat design may be of particular significance. Although progress has been slow, there have been some design advances recently, and the future now looks more promising. The fact that commercial airlines such as BOAC, Air France, Swissair, SAS, KLM, and so on, find it necessary to carry out modifications and development work at their own cost on seats already installed in their aircraft also points to inadequate original design. (Author)

**A74-21505** **Facing air passengers' medical problems while on board.** R. Iglesias, M. Gonzalez Cortes, and C. Almanza (National Medical Center, Mexico City, Mexico). *Aerospace Medicine*, vol. 45, Feb. 1974, p. 204-206. 6 refs.

Airplane travel in general does not appreciably affect the physiology of the healthy individual; but in certain patients the slight hypoxia of the cabin, the changes of barometric pressure, the emotional stress of the trip, the crossing of turbulent zones, the change in climate and time zones, the arrival in high-altitude cities can lead to the worsening of previous medical problems. Suggestions are presented for adequate management of medical problems occurring in flight. (Author)

**A74-21506** **Basis for an instrument to predict blackout tolerance.** N. C. Miller and J. F. Green (California, University, Davis, Calif.). *Aerospace Medicine*, vol. 45, Feb. 1974, p. 207-208. 5 refs. Contract No. F44620-72-C-01.

We present a mathematical model which can be used as a basis for a physical device which could be used as an instrument to predict blackout tolerance. The instrument could be used as a student training aid or in an operational situation as an instrument to warn of coming visual degradation. (Author)

**A74-21507** **Physiological responses to one- and two-leg exercise breathing air and 45% oxygen.** C. T. M. Davies and A. J. Sargeant (London School of Hygiene and Tropical Medicine, London, England). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 142-148. 29 refs.

Physiological responses to one- and two-leg exercise breathing air and 45% oxygen were studied on five healthy male subjects. The results showed that, although ventilation rate for a given carbon dioxide output was marginally increased in one- compared with two-leg exercise, oxygen intake for a given light to moderate work load was identical in both forms of exercise. However, during heavy one-leg exercise there was a small (about 5%) decline in 'apparent' mechanical efficiency. These relationships were unaffected by an increase in the concentration of inspired oxygen. F.R.L.

**A74-21508** **Cardiac output during exercise in sea-level residents at sea level and high altitude.** J. A. Vogel, L. H. Hartley, J. C. Cruz, and R. P. Hogan (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Universidad Peruana, Lima, Peru). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 169-172. 15 refs.

The cardiovascular responses to submaximal and maximal exercise were studied in four subjects native to sea level in order to evaluate the role of cardiac output in the sustained reduction of maximal oxygen intake while sojourning at high altitude. The studies were performed at sea level and again after relocation to an altitude of 4350 m. Cardiac output (dye dilution), arterial blood pressure, oxygen uptake, and blood gases were measured during upright bicycle ergometer exercise. It is concluded that the reduced stroke volume and heart rate are responsible for the sustained reduction in maximal oxygen uptake when the arterial O2 content has normalized. Increased vascular resistance may be the responsible factor for the stroke volume reduction. F.R.L.

**A74-21509** **Cardiac output during exercise in altitude natives at sea level and high altitude.** J. A. Vogel, L. H. Hartley, and J. C. Cruz (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Universidad Peruana, Lima, Peru). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 173-176. 12 refs.

The cardiovascular responses to submaximal and maximal exercise were studied in eight subjects who were native to an altitude of 4350 m in order to determine adaptive changes to hypoxia which occur in the cardiovascular system. At sea level, cardiac output was the same, heart rate was less, and stroke volume was greater at rest and during submaximal work than was observed at altitude. Maximal cardiac output and O2 uptake values at high altitude were similar to values which would be expected of normal subjects exercising at sea level. The data suggest that the cardiovascular system contributes importantly in the adaptation of the high-altitude native to the hypoxic environment. F.R.L.

**A74-21510** **Metabolic and cardiorespiratory responses to long-term work under hypoxic conditions.** B. M. McManus, S. M. Horvath, N. Bolduan, and J. C. Miller (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 177-182. 31 refs. Grant No. AF-AFOSR-73-2455.

The investigation was conducted in order to better define the role of the cardiorespiratory system and the metabolic requirements during long term submaximal work under acute hypoxic conditions. Young males rested for 2 hr and worked at 30% of sea level maximum oxygen intake for 2 hr on separate occasions on a bicycle in a hypobaric chamber at sea level and a simulated altitude of 3060 m. Oxygen uptake was similar during work at sea level and altitude, rising progressively throughout the work period. Ventilation, respiratory exchange ratio, and excess CO2 were greater during work at altitude than at sea level. Catecholamine excretion was elevated by work but was not affected by hypoxia. F.R.L.

**A74-21511** **Adaptations in man's adrenal function in response to acute cold stress.** J. E. Wilkerson, P. B. Raven, N. W. Bolduan, and S. M. Horvath (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 183-189. 45 refs. Grant No. AF-AFOSR-73-2455.

This study was undertaken to determine the time courses of the responses of the primary sympathicoadrenal hormones in man exposed to varying degrees of cold stress. Plasma cortisol, plasma and urinary epinephrine and norepinephrine, hemoglobin, total plasma proteins, and hematocrits were measured sequentially in two nude, young adult males during 2-hr exposures to ambient temperatures of 28, 25, 20, 15, 10, and 5 C. Because of increased circulating levels of cortisol, epinephrine and norepinephrine, it was concluded that sympathicoadrenal function in unacclimatized males was markedly altered during acute exposures to low ambient temperatures (equal to or less than 15 C). These responses were evident in all parts of the sympathicoadrenal system. F.R.L.

**A74-21512 *** **Cardiovascular response to apneic immersion in cool and warm water.** L. Folinsbee (California, University, Davis, Calif.). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 226-232. 35 refs. Grant No. NGR-05-004-026.

The influence of prior exposure to cool water and the influence of lung volume on the responses to breath holding were examined. The bradycardia and vasoconstriction that occur during breath-hold diving in man are apparently the resultant of stimuli from apnea, relative expansion of the thorax, lung volume, esophageal pressure, face immersion, and thermal receptor stimulation. It is concluded that the bradycardia and vasoconstriction associated with breath holding during body immersion are not attenuated by a preexisting bradycardia and vasoconstriction due to cold. F.R.L.

**A74-21513 *** **A reevaluation of the interrupter technique for airway resistance measurement.** A. C. Jackson, H. T. Milhorn, Jr., and J. R. Norman (Mississippi, University, Jackson, Miss.). *Journal of Applied Physiology*, vol. 36, Feb. 1974, p. 264-268. 15 refs. Grants No. NIH-HE-11678; No. NGR-25-002-018.

An attempt was made to obtain a better insight into the actual transient response of airway opening pressure (Pao) following rapid occlusion. With this knowledge it was hoped to be able to clarify the reason for the overestimations found by other investigators, and possibly to obtain a more accurate method of estimating alveolar pressure just prior to interruption. This would result in an improved method for estimating airway resistance. Use of an extrapolation method was found to provide an improved correlation between resistances determined by the interruptor technique and those found by the plethysmograph in normal subjects. F.R.L.

**A74-21572 Temporal integration of disparity information in stereoscopic perception.** K. I. Beverley and D. Regan (Keele, University, Keele, Staffs., England). *Experimental Brain Research,* vol. 19, Jan. 31, 1974, p. 228-232. 16 refs. Research supported by the Medical Research Council and Science Research Council.

The data reported were obtained with a method which makes it possible to study the integration of binocular disparity information in the absence of monocular cues to either disparity change or to the instant at which disparity changes. In the experiments retinal disparity was varied to generate the illusion that a target moved in depth. The stimulus was a pattern of black dots randomly-arranged on a brightly illuminated square. G.R.

**A74-21621 * Angiotensinase activity of dipeptidyl aminopeptidase I /cathepsin C/ of rat liver.** J. K. McDonald, B. B. Zeitman, P. X. Callahan, and S. Ellis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Journal of Biological Chemistry,* vol. 249, Jan. 10, 1974, p. 234-240. 52 refs.

**A74-21646 * Effects of halothane on left ventricular function and distribution of regional blood flow in dogs and primates.** S. F. Vatner and N. T. Smith (Harvard University; Peter Bent Brigham Hospital; Children's Hospital Medical Center, Boston, Mass.; California, University, San Diego, Calif.). *Circulation Research,* vol. 34, Feb. 1974, p. 155-167. 44 refs. Research supported by the American Heart Association and NASA; Grants No. PHS-HL-15416; No. PHS-HL-12373.

**A74-21822 # Morphofunctional aspects of the restoration of retinotectal connections in the frog during regeneration of the optic nerve (Morfo-funktsional'nye osobennosti vosstanovleniia retinotektal'nykh sviazei u liagushki pri regeneratsii zritel'nogo nerva).** V. M. Vinogradova, V. A. Bastakov, L. N. D'iachkova, and Iu. B. Manteifel' (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Neirofiziologiia,* vol. 5, Nov.-Dec. 1973, p. 611-620. 18 refs. In Russian.

**A74-21823 # Transmission of descending activity, evoked through prolonged stimulation of pyramids and the red nucleus, by certain groups of spinal interneurons (Peredacha nekotorymi gruppami spinal'nykh interneironov niskhodiashchei aktivnosti, vyzvannoi dlitel'noi stimuliatsiei piramid i krasnogo iadra).** A. I. Kostiukov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia,* vol. 5, Nov.-Dec. 1973, p. 644-653. 19 refs. In Russian.

**A74-21857 Instructions and the A and E effects in judgments of the vertical.** S. M. Ebenholtz and W. Shebilske (Wisconsin, University, Madison, Wis.). *American Journal of Psychology,* vol. 86, Sept. 1973, p. 601-612. 21 refs. Grant No. NIH-MH-13006-06.

A study was conducted to explore further the nature of certain compensatory processes in orientation perception. The study was concerned with the role of two types of instructions, 'apparent' and 'objective,' in judgments of the gravitational vertical with body tilt in the median plane. In an experiment two groups of eight subjects each were exposed to backward tilts of 0 and 75 deg in counterbalanced order. One group of subjects received apparent instructions; the other, objective instructions. Several variations to this procedure were introduced in a second experiment. G.R.

**A74-21942 Sport parachutism (Parachutisme sportif).** C. Douceur (Ecole Inter-Armées des Sports, Fontainebleau, Seine-et-Marne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 12, 3rd Quarter, 1973, p. 451-453. In French.

Sport parachutism has become a competitive sport, and two disciplines are actually practiced according to the rules of the Federation Aeronautique Internationale: precision landings and acrobatics. The first is practiced individually or in groups of three or four or even five parachutists, launched from altitudes varying from 800 to 1500 m. The goal sought is the contact between the foot of the competitor and a disk 10 cm in diameter occupying the center of a gravel target of 25 m radius. In the acrobatics test a start is made from an altitude of 2000 m, and the test consists in the execution of required figures (alternation of turns and back somersaults) which are timed and judged from the ground by video recording or simply by binoculars. F.R.L.

**A74-21943 Medical aspects of sport parachutism (Aspects médicaux du parachutisme sportif).** A. Leger (Ministère des Armées, Service de Santé de l'Armée de l'Air, Paris; Hôpital d'Instruction des Armées Bégin, Saint-Mandé, Val-de-Marne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 12, 3rd Quarter, 1973, p. 454-461. In French.

The medical aspects of sport parachutism are not negligible, since they find a direct application in three principal domains. These are the determination of aptitude criteria, medico-sporting surveillance, and the general amelioration of conditions of practice. Statistics of observed traumatisms in the course of practice of sport parachutism are cited, and attention is given to traumatisms of lower limbs, spinal lesions, lesions of the upper members and of the scapulohumeral belt, traumatisms of the cranium and the face, and mortality statistics. F.R.L.

**A74-21944 Traumatic physiopathology of the parachute jump (Physiopathologie traumatique du saut en parachute).** A. Leger (Ministère des Armées, Service de Santé de l'Armée de l'Air, Paris; Hôpital d'Instruction des Armées Bégin, Saint-Mandé, Val-de-Marne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 12, 3rd Quarter, 1973, p. 462-464. In French.

In a parachute jump four periods must be studied: from the abandonment of the aircraft to the opening of the parachute, the opening of the parachute, the descent with the parachute open, and the landing. In leaving the aircraft, there is danger of striking against it, or becoming entangled with it. In free fall, there is a possibility of two parachutists colliding with each other. A particular aspect of collisions in free fall is realized by the meeting of a parachutist whose parachute is not yet opened with a canopy already deployed. The dynamics and techniques of landing are discussed. F.R.L.

**A74-21945 Possibilities and interest of the utilization of certain external circulatory measurements in the study of problems posed by the aeronautical environment (Possibilités et intérêt de l'utilisation de certaines mesures circulatoires externes dans l'étude des problèmes posés par l'environnement aéronautique).** J. Demange and B. Vettes (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 12, 3rd Quarter, 1973, p. 466-468; Discussion, p. 468. 7 refs. In French.

**A74-21946 Methods of study of the effects of environmental constraints on the respiratory system of man (Methodes d'étude des effets des contraintes de l'environnement sur le système respiratoire de l'homme).** P. Varene and H. Vieillefond (Centre d'Essais en Vol, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 12, 3rd Quarter, 1973, p. 469-472; Discussion, p. 472. 5 refs. In French.

An attempt is made to clarify the main characteristics of studies pertaining to the effects of environmental stress imposed on the respiratory system of man and more generally on any study of applied physiology. Three aspects are discussed: the distinction between the two different aspects that characterize research and control or surveillance activities, the identity of fundamental and

applied physiology methods, and the particular details that show up in the use of fundamental physiology methods in physiology applied to the study of environmental stress effects. F.R.L.

**A74-21947 Evaluation of the cutaneous hydrous loss under the effect of a thermal stress (Evaluation de la déperdition hydrique cutanée sous l'effet d'une contrainte thermique).** J. Timbal and C. Boutelier, *Revue de Médecine Aéronautique et Spatiale*, vol. 12, 3rd Quarter, 1973, p. 473-477; Discussion, p. 477, 478. 25 refs. In French.

The continuous recording of weight loss of the subject is the method of reference for evaluation of water loss due to sweat evaporation. It makes it possible to determine the sweating delay and the time constant of sweating responsible for heat storage. The main interest of local methods of sweating measurement (colorants, collecting capsules, electrical resistance of the skin) is to permit a good determination of the moment when the sweating starts. In the absence of measurement, sweating can be predicted from mathematical models established from rules controlling heat exchanges and physiological reactions of man. F.R.L.

**A74-21948 Contribution of certain endocrinological methods of exploration in the study of stress factors in man (Apport de certaines méthodes d'exploration endocrinologique dans l'étude des facteurs de contrainte chez l'homme).** P. Pesquies and F. X. Galen. *Revue de Médecine Aéronautique et Spatiale*, vol. 12, 3rd Quarter, 1973, p. 479-483; Discussion, p. 483. 6 refs. In French.

The endocrinal exploration of man, in experimental conditions, is achieved by the analysis of dosage results of hormones or metabolites collected from blood or urine. These two methods of approach present certain disadvantages which may lead to error in the final results especially with urinary dosage. Static tests do not give full satisfaction, and it is suggested that dynamic tests are preferable, with determination of specific parameters such as dosage measurements or metabolic clearance. In human engineering it seems preferable to lean systematically toward techniques of dosage of hormones contained in saliva; these techniques are precise and atraumatic. F.R.L.

**A74-21949 Influence of certain environmental factors /hypoxia, staggering of time tables, sonic bang/ on the apprenticeship and the performance at different tests (Influence de certains facteurs d'environnement /hypoxie - décalage horaire - bang sonique/ sur l'apprentissage et la performance à différents tests).** G. Chatelier, P. Galban, M. Gouars, and M. Guillermin. *Revue de Médecine Aéronautique et Spatiale*, vol. 12, 3rd Quarter, 1973, p. 484-487. In French.

**A74-21950 Limits of the animal model in environmental stress (Limites du modèle animal dans l'étude des contraintes de l'environnement).** M. J. Klein, C. L. Milhaud, and C. F. Nogues. *Revue de Médecine Aéronautique et Spatiale*, vol. 12, 3rd Quarter, 1973, p. 488-491; Discussion, p. 491, 492. 9 refs. In French.

Experimentation of the effects of stress factors on man is supplemented by animal experimentation in the initial studies of global appreciation of relations between a given environment and life, and in the precision phase of physiopathological determination of effects of factors related to this environment. Transfer of results obtained from the animal is rendered delicate because of anatomical, physiological, and behavioral differences that distinguish man. For a more accurate transposition, the search for an ideal, unique model must be abandoned on behalf of a model 'in mosaic.' The specific problems of the animal model underline the necessity for a discipline plurality aspect in the study of effects of environmental stress. F.R.L.

**A74-21951 Collection by questionnaire of behavioral data in an ergonomic perspective (Recueil par questionnaire des données du comportement dans une perspective ergonomique).** J. Bremond (Ministère des Armées, Service de Santé des Armées, Saint-Cyr-l'Ecole, Yvelines, France). *(Colloque sur les Méthodes d'Analyse des Effets sur l'Homme des Contraintes de l'Environnement, Saint-Mandé, Val-de-Marne, France, Jan. 26, 1973.) Revue de Médecine Aéronautique et Spatiale*, vol. 12, 3rd Quarter, 1973, p. 493-498; Discussion, p. 498. 15 refs. In French.

Questionnaires are an indirect manual method of data gathering in ergonomics. They may come in various forms: more or less standardized interviews, critical incidents, rating scales, opinion, or attitude questionnaires. Some examples are given concerning a study of an air defense information processing system dealing with pilot workload, aircraft noise disturbance around airports, and fatigue. Emphasis is placed on the necessity for a procedure of validation which must be rigorous since psychological and physical environmental aspects intervene. F.R.L.

**A74-21974 Effect of VCG sensitivity to dipole content in detecting infarctional changes.** N. C. Flowers, J. C. Johnson, and L. G. Horan (Georgia, Medical College; U.S. Veterans Administration Hospital, Augusta, Ga.). *Journal of Electrocardiology*, vol. 7, Feb. 1974, p. 1-8. 15 refs. Grant No. NIH-HE-11667.

Three propositions are examined. In the first, the moment of the cardiac equivalent dipole is a physical standard by which the vector-cardiographic (VCG) record can be judged. For brevity the VCG display of this moment has been termed the 'true loop.' In the second, the clinically recorded VCG loop is different from the true loop because the VCG recording system performs three distinct alterations on the true loop. In the third, these alterations can be estimated or measured and their effect on specific diagnostic criteria for cardiac lesions can be evaluated. F.R.L.

**A74-21975 Quantitative comparison of exercise vector-cardiograms and findings at selective coronary arteriography.** C. A. Ascoop, C. A. Distelbrink, P. de Lang, and J. H. van Bemmel (St. Antonius' Hospital; Medisch-Fysisch Instituut TNO, Utrecht, Netherlands). *Journal of Electrocardiology*, vol. 7, Feb. 1974, p. 9-16. 15 refs. Research supported by the Netherlands Heart Foundation.

Selective coronary arteriography was used to classify the coronary heart disease status of the test subjects. The purpose of the study was to (1) compute a set of vectorcardiographic measurements to quantify the ST segment response in standardized exercise; (2) correlate these measurements with findings at coronary arteriography; and (3) compare results from computer analysis of the Frank-lead ECGs with those obtained by visual analysis of simultaneously recorded conventional bipolar exercise leads. F.R.L.

**A74-21993 Effects of low O2 and high CO2 on cardio-respiratory function in conscious resting dogs.** D. B. Jennings and J. Sparking (Queen's University, Kingston, Ontario, Canada). *American Journal of Physiology*, vol. 226, Feb. 1974, p. 431-438. 39 refs. Research supported by the Defence Research Board of Canada and Ontario Heart Foundation.

A study was conducted to compare cardiorespiratory patterns in conscious dogs breathing low-oxygen gas mixtures (with or without added carbon dioxide) with the results of an investigation conducted by Jennings et al. (1973) concerning the cardiorespiratory patterns in conscious dogs breathing air. When low-oxygen plus high carbon dioxide gas mixtures were inhaled by the dogs there was a decrease in cardiac output relative to ventilation within the range of ventilation of normal animals, but arterial blood pressure remained normal with regard to ventilation due to an increase in total peripheral resistance. G.R.

**A74-22118 * Biological activity of ionene polymers.** A. Rembaum (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Polymeric materials for unusual service conditions; Proceedings of the Conference, Moffett Field, Calif., November 29-December 1, 1972. New York, Wiley-Interscience, 1973, p. 299-317. 35 refs. Contract No. NAS7-100.

Ionene polymers are polyammonium salts with positive nitrogens in the backbone, resulting from the polycondensation of

diamines with dihalides or from the polycondensation of halo amines. The mechanism of formation of ionene polymers of different structures and their biological activity is reviewed. The antimicrobial and antifungal properties are compared with low molecular weight ammonium salts. Ionenes were found to combine with DNA by means of ionic bonds to yield similar complexes to those obtained with polyamines (spermine and spermidine). They also combine with nerve cell receptors and exercise a more powerful and longer duration ganglionic blocking action than their monomeric analogs. The antiheparin activity of ionenes and the thromboresistance of elastomeric ionene heparin coatings is described. The enhanced biological activity of ionenes as compared with low molecular weight compounds is attributed to a cooperative effect of a large number of positive charges on the polymeric chains. (Author)

**A74-22168 #** **Incremental threshold as obtained by the visually evoked cortical potential /VECP/.** E. Adachi-Usami (Max-Planck-Institut für physiologische und klinische Forschung, Bad Nauheim; Frankfurt, Universität, Frankfurt am Main, West Germany). *Ophthalmic Research,* vol. 6, no. 1, 1974, p. 55-63. 20 refs.

An attempt is made to measure incremental thresholds by means of the VECP and to compare these with sensory measurements in order to see if the measurement of incremental thresholds by the VECP provides additional information for the investigation of the visual system in man. It is concluded that the determination of incremental threshold is a useful means of separating scotopic and photopic activities of the visual system for physiological and clinical purposes. F.R.L.

**A74-22174** **The influence of stimulus movements on perception in parafoveal stabilized vision.** H. J. M. Gerrits and A. J. H. Vendrik (Nijmegen, University, Nijmegen, Netherlands). *Vision Research,* vol. 14, Feb. 1974, p. 175-180. 13 refs.

Normal involuntary eye movements known as drift, microsaccades, and tremor are essential in order to preserve an image on the retina. An experiment was designed in which a small stimulus was fixated over the area around the fovea. It was first moved in regular sinusoidal displacements at various frequencies in two directions, and then moved in Gaussian noise and binary noise displacement patterns. It is concluded that regularity or nonregularity is the key factor in the effectiveness of an eye movement in overcoming the habituality and consequent disappearance of an image. P.T.H.

**A74-22175** **Eye movements and the Pulfrich phenomenon.** B. J. Rogers, M. J. Steinbach, and H. Ono (York University, Downsview, Ontario, Canada). *Vision Research,* vol. 14, Feb. 1974, p. 181-185. 11 refs. National Research Council of Canada Grants No. A-7664; No. A-0296.

The path of a target oscillating in the fronto-parallel plane and differentially filtered to the two eyes appears elliptical in depth when the eyes fixate a stationary point. When the eyes track the target the path flattens out. Binocular records of eye movements indicate that the eyes follow the true physical path making only conjugate movements with no change in convergence. (Author)

**A74-22176** **Multidimensional echocardiography - An appraisal of its clinical usefulness.** J. Roelandt, F. E. Kloster, F. J. ten Cate, W. G. van Dorp, J. Honkoop, N. Bom, and P. G. Hugenholtz (Erasmus University, Rotterdam, Netherlands). *British Heart Journal,* vol. 36, Jan. 1974, p. 29-43. 30 refs.

Multiscan is a new concept in echocardiography providing instantaneous cross sections of the heart in motion without distortion. The examination technique and the present display and recording methods are described and discussed. Multiscan provides important anatomical and functional information in the noninvasive diagnosis of congenital malformations and of valvular heart disease. The size, shape, and overall function of the left ventricle can be assessed. Localized disorders of wall motion are also detected, making the instrument useful for the study and followup of patients with coronary artery disease. Quantitative measurements of cardiac dimensions and calculation of left ventricular volumes using the area-length method can be obtained. F.R.L.

**A74-22249 *** **Light flashes observed by astronauts on Apollo 11 through Apollo 17.** L. S. Pinsky, W. Z. Osborne (Houston, University; NASA, Johnson Space Center, Houston, Tex.), J. V. Bailey, R. E. Benson, and L. F. Thompson (NASA, Johnson Space Center, Houston, Tex.). *Science,* vol. 183, Mar. 8, 1974, p. 957-959. 9 refs.

The crew members on the last seven Apollo flights observed light flashes that are tentatively attributed to cosmic ray nuclei (atomic number equal to or greater than 6) penetrating the head and eyes of the observers. Analyses of the event rates for all missions has revealed an anomalously low rate for transearth coast observations with respect to translunar coast observations. (Author)

**A74-22257** **Intracellular potentials in the isolated human cornea.** H.-J. Lichey, F. Fischer, and M. Wiederholt (Berlin, Freie Universität, Berlin, West Germany). *Pflügers Archiv,* vol. 346, no. 4, 1974, p. 351-360. 26 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Intracellular potentials in the epithelium of the isolated human cornea were studied with 3M KCl-filled microelectrodes. The average potential profile increased slightly and reached a maximal value at a depth of about 40 microns from the epithelial surface. The maximal potentials of 27.4 plus or minus 1.5 mV in a closed chamber of the Ussing-Zerahn type 45.3 plus or minus 1.7 mV in an open chamber were constant up to 180 min after incubation. Using microelectrodes with high resistance the stromal potentials were close to 0 mV. Intracellular potentials were reduced by about 30% two hours after addition of .001M ouabain/liter or .001M acetazolamide/liter. A significant inhibition could be obtained 30 min after addition of the drugs. Ouabain in a dose of .00001M/liter showed no inhibitory effect. The data are consistent with the hypothesis of electrolyte transport systems (Na, Cl, HCO3, H) located in the epithelium of the human cornea. (Author)

**A74-22258** **A fast voltage clamp with automatic compensation for changes of extracellular resistivity.** U. Gebhardt (Saarland, Universität, Hamburg, West Germany). *Pflügers Archiv,* vol. 347, no. 1, 1974, p. 1-7. 12 refs. Research supported by the Deutsche Forschungsgemeinschaft.

**A74-22259** **Polarographic determination of the oxygen partial pressure field by Pt microelectrodes using the O2 field in front of a Pt macroelectrode as a model.** H. Baumgärtl, W. Grunewald, and D. W. Lübbers (Max-Planck-Institut für Systemphysiologie, Dortmund, West Germany). *Pflügers Archiv,* vol. 347, no. 1, 1974, p. 49-61. 19 refs.

**A74-22260** **Voltage noise, current noise and impedance in space clamped squid giant axon.** E. Wanke, L. J. DeFelice, and F. Conti (Laboratorio di Cibernetica e Biofisica, Genova, Italy). *Pflügers Archiv,* vol. 347, no. 1, 1974, p. 63-74. 19 refs. CNR-NSF-supported research.

The relationship between voltage noise at constant current and current noise at constant voltage across a linear electrical system is emphasized. In systems like the nerve membrane near its resting state, which show a complicated dependence of impedance on frequency in the range 1 to 1000 Hz, current noise and voltage noise are completely different. It is argued that current-noise measurements from well-isolated voltage clamped areas of healthy giant axons are most likely to yield information about elementary conductance mechanisms of the nerve membrane. F.R.L.

**A74-22261** **Some features of different motor units in human biceps brachii.** A. Gydikov and D. Kosarov (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria). *Pflügers Archiv*, vol. 347, no. 1, 1974, p. 74-88. 27 refs.

Use has been made of the method of selective leading-off of impulses from individual motor units at high isometric muscle tension, the maximum one including. Two types of motor units have been distinguished in m. biceps brachii in man on the basis of the dependence between the firing frequency and the level of the muscle tension. Characteristic of the first (tonic) type is the rise in the frequency at lower tensions and constant frequency at higher tensions. The second (phasic) type shows an approximately linear rise of the frequency with increase of tension. The tonic motor units are smaller in size, with lower threshold, they are less fatiguable and their transient pattern of firing depends on the rate of increase of tension. They contribute less to the growth of the muscle tension. The phasic motor units are bigger in size with higher threshold, more fatiguable, their transient pattern of firing does not depend on the rate of increase of tension. They contribute essentially to the growth of the muscle tension. (Author)

**A74-22337 #** **Transverse deformation coefficients of a compact bone tissue of man (Koeffitsienty poperechnoi deformatsii kompaktnoi kostnoi tkani cheloveka).** Iu. Zh. Saulgozis, I. V. Knets, and Kh. A. Ianson (Akademiia Nauk Latviiskoi SSR, Institut Mekhaniki Polimerov, Riga, Latvian SSR). *Mekhanika Polimerov*, Nov.-Dec. 1973, p. 1089-1100. 25 refs. In Russian.

Transverse deformation at 9 mm/sec was studied on a test machine under axial and hydrostatic loads in 72 samples of compact bone tissue of tibia of men who died shortly in accidents. Measurements of the transverse deformation coefficients in different cross section zones of samples indicated an orthotropy of the elastic properties of the bone tissue. A marked negative correlation was established between the transverse deformation coefficients and the oxyproline content in the tissue. A less pronounced negative correlation was also established between the volume deformation moduli and the hexamine content. V.Z.

**A74-22338 #** **Hardness of human tibias (Tverdost' bol'shebertsovykh kostei cheloveka).** Kh. A. Ianson, G. R. Bite, I. V. Knets, and Iu. Zh. Saulgozis (Akademiia Nauk Latviiskoi SSR, Institut Mekhaniki Polimerov; Nauchno-Issledovatel'skii Institut Travmatologii i Ortopedii, Riga, Latvian SSR). *Mekhanika Polimerov*, Nov.-Dec. 1973, p. 1101-1107. 35 refs. In Russian.

Study of the lengthwise and cross sectional hardness distributions in six different cross section zones of tibia from men who died in accidents. A correlation is established between the hardness on the one hand and the mechanical properties and chemical composition of the bone tissue, on the other. The results support a theory according to which each of the six zones of tibia has a specific function in the rheological adaptation of bones to physiological stresses. V.Z.

# STAR ENTRIES

**N74-15778*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**AUTOMATIC REAL-TIME PAIR-FEEDING SYSTEM FOR ANIMALS Patent**
Henry A. Leon, James P. Connolly, Maurice J. Hitchman, and John E. Humbert, inventors (to NASA) Issued 1 Jan. 1974 8 p Filed 30 Nov. 1971 Supersedes N72-21052 (10 - 12, p 1559)
(NASA-Case-ARC-10302-1; US-Patent-3,782,334; US-Patent-Appl-SN-203271; US-Patent-Class-119-54; US-Patent-Class-119-51R; US-Patent-Class-119-52AF; US-Patent-Class-119-51.13; US-Patent-Class-119-51.5; US-Patent-Class-221-265) Avail: US Patent Office CSCL 06C

A pair feeding method and apparatus are provided for experimental animals wherein the amount of food consumed is immediately delivered to a normal or control animal so that there is a qualitative, quantitative and chronological correctness in the pair feeding of the two animals. This feeding mechanism delivers precisely measured amounts of food to a feeder. Circuitry is provided between master and slave feeders so that there is virtually no chance of a malfunction of the feeding apparatus, causing erratic results. Recording equipment is also provided so that an hourly record is kept of food delivery.
Official Gazette of the U.S. Patent Office

**N74-15781*#** California Univ., Davis.
**PINEAL MECHANISM AND AVIAN PHOTOPERIODISM Final Technical Report**
L. Z. McFarland and W. O. Wilson 19 Jul. 1973 3 p refs (Grant NGR-05-004-028)
Avail: NTIS HC $3.00 CSCL 06C

The effects of pinealectomy and/or enucleation on bird photoperiodicity were studied by observing physiological and neural system responses to darkness regimes. Neither the presence of the eyes nor the pineal gland were found essential to gonadal maturation and function in quail. Accelerated sexual maturity in both sexes was observed after enucleation. Pinealectomy did not alter this response in males but caused delayed maturation in females. G.G.

**N74-15782*#** Techtran Corp., Glen Burnie, Md.
**THE EFFECT OF PEROXIDE OXIDATION OF MICROSOMAL LIPIDS ON THE SPECTRAL CHARACTERISTICS OF CYTOCHROME P-450**
V. V. Lyakhovich, I. B. Tsyrlov, V. M. Mishin, and O. A. Gromova Washington NASA Jan. 1974 8 p refs Transl. into ENGLISH from Biokhimiya (Moscow), v. 38, no. 5, 1973 p 897-900
(Contract NASw-2485)
(NASA-TT-F-15327) Avail: NTIS HC $3.00 CSCL 06C

The influence of activation of both enzymatic and non-enzymatic lipid peroxidation systems in the rat liver microsomal fraction on the spectral properties of cytochrome p-450 and on the hydrophobity of microsomal membranes was studied. It was shown that in the course of both types of peroxidation the degree of membranous hydrophobity greatly decreased, and as a result of this cytochrome p-450 was transformed into its inactive form -- cytochrome p-420. The conversion of cytochrome p-450 into p-420 and the decrease in ANS-fluorescence intensity were completely prevented in the presence of both EDTA and phenergan which simultaneously removed the lipoperoxidative effect. Author

**N74-15783*#** Kanner (Leo) Associates, Redwood City, Calif.
**EFFECT OF IMMOBILIZATION ON THE URINARY EXCRETION OF CALCIUM**
S. Syc and A. Wedrychowski Washington NASA Feb. 1974 10 p refs Transl. into ENGLISH from Polskie Arch. Med. Wewnetrznej (Warsaw), v. 35, 1965 p 1621-1625
(Contract NASw-2481)
(NASA-TT-F-15297) Avail: NTIS HC $3.00 CSCL 06P

Urinary calcium excretion was determined in 22 patients immobilized because of myocardial or pulmonary infarction and thromblophlebitis of the inferior extremities. Among the 18 subjects in whom the daily urinary calcium output was estimated at the beginning and toward the end of the immobilization period, the calcium excretion increased in 15 patients. In 10 cases the rise was more than 100%; during the first examination it was, on the average, 115 mg calcium per 24 hours, whereas after immobilization the value attained was 259 mg. The rise in the calcium output was more pronounced among subjects who had previously been very active. Following immobilization, the calcium level in the blood increased from a mean of 9.7 to 10.4 mg per 100 ml of serum. Author

**N74-15784*#** Kanner (Leo) Associates, Redwood City, Calif.
**MICROBIOLOGICAL INDICATORS OF STERILIZATION: GENERAL PRINCIPLES**
G. Spicher Washington NASA Feb. 1974 45 p refs Transl. into ENGLISH from Zentralbl. Bakteriol., Hygiene, Infektionskr., Abt. 1, Originale A (Stuttgart), v. 4, no. 224, 1973 p 527-553
(Contract NASw-2481)
(NASA-TT-F-15328) Avail: NTIS HC $4.25 CSCL 06M

A survey is presented of general properties of microbial indicators of sterilization and of principles involved in testing sterilization procedures with such indicators. Probability theory shows it to be preferable to characterize the resistance of microbial indicators by the duration of action or dose of the agent which causes either a 50% or 99% reduction of indicators showing viable organisms. The logarithmic shape of the death curves, limited efficacy of sterilization procedures and unknown resistance of adhering organisms make it impossible to achieve absolute sterilization by definition a freeing of the object of all viable orgainisms. Sterilization only yields an object which, with a certain probability (generally very high), does not harbor viable organisms which might constitute a risk. Different indicators, showing ability of procedure to effect killing, are used for different objects and procedures. Author

**N74-15785#** Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). Biosciences Div.
**INVESTIGATION OF HEALTH PROBLEMS RELATED TO CANADIAN NORTHERN MILITARY OPERATIONS**
B. H. Sabiston and S. D. Livingstone Jul. 1973 20 p refs (DCIEM-899) Avail: NTIS HC $3.00

Some Canadian military operations dictate rapid deployment of mobile land elements from a temperate to a northern environment and the subsequent deployment of small bodies of troops on operational patrols. Under these conditions, it is paramount to the successful accomplishment of the mission that the individual be protected maximally against environmental hazards and that his health and wellbeing be maintained.
Author

**N74-15786*#** Kanner (Leo) Associates, Redwood City, Calif.
**INVESTIGATION OF STAPHYLOCOCCAL FIBRINOLYSIN**
G. Hentschel and H. Blobel Washington NASA Feb. 1974 15 p refs Transl. into ENGLISH from Zentr. Bakteriol., Parasitenk. Abt. 1. Orig. (Stuttgart), v. 206, Mar. 1968 p 193-201
(Contract NASw-2481)
(NASA-TT-F-15358) Avail: NTIS HC $3.00 CSCL 06M

The fibrinolysin activity of 1062 samples of staphylococcal cultures from human, bovine and canine infections was tested. Forty-two of the 790 bovine samples (5.3%), 40 of the 250 human samples (15%), and 11 of the 22 canine samples (50%)

were fibrinolysin positive. With the strongly fibrinolytic staphylococci, the coagulase reaction in the test tube was obscured by the action of fibrinolysin. Therefore, it is concluded that the coagulase reaction in the test tube was obscured by the action of fibrinolysin. Therefore, it is concluded that the coagulase slide test should be used in addition to the tube test to detect the coagulase reaction of strongly fibrinolytic streptococci. The method for preparation of enriched fibrinolysin is presented, whereby an 80-fold concentration has been achieved. Author

**N74-15787*#** Kanner (Leo) Associates, Redwood City, Calif.
**QUANTITATIVE DETERMINATION OF FIBRINOLYSIN IN STAPHYLOCOCCI WITH A FIBRINOGEN COAGULASE SOLUTION**
G. Hentschel and H. Blobel Washington NASA Feb. 1974 6 p refs Transl. into ENGLISH from Zentr. Bakteriol., Parasitenk. Abt. 1. Orig. (Stuttgart), v. 204, no. 3, 1967 p 322-324
(Contract NASw-2481)
(NASA-TT-F-15359) Avail: NTIS HC $3.00 CSCL 06M

A tube test for the quantitative determination of fibrinolysin was developed. The substrate was a 3% fibrinogen solution, which had been clotted by staphylococcal coagulase. The reactions were recorded after 3 hours at 37 C. Author

**N74-15788*#** Techtran Corp., Glen Burnie, Md.
**THE ROLE PLAYED BY PARADOXICAL SLEEP IN MEMORY RETENTION**
K. Leonhard and B. Roth Washington NASA Feb. 1974 16 p refs Transl. into ENGLISH from Weinzeit fur Nervenheilkunde, v. 30, 1972 p 46-57
(Contract NASw-2485)
(NASA-TT-F-15294) Avail: NTIS HC $3.00 CSCL 06P

Recent experimental investigations make it likely that the REM phases of sleep serve to keep the memory efficient. This seems to confirm the interpretation formulated regarding dreams. If experiences are to be retained in the memory, they must be activated from time to time. When awake we would renew only what seems to be logically important at the time; other experiences would be quickly forgotten. In dreams however, according to the laws of thought association and picture return, both of which are described in detail, everything that we have ever experienced returns. This seems to be due to an independent activity of the nervous system by which it maintains its function. Author

**N74-15789#** Defense Documentation Center, Alexandria, Va.
**MEDICAL PROBLEMS OF SPACE FLIGHT Bibliography, Jan. 1968 - Feb. 1973**
Oct. 1973 205 p refs
(AD-768800; DDC-TAS-73-58) Avail: NTIS CSCL 06/5

The bibliography contains references to reports pertinent to observing and measuring the various aspects of space medicine in a real or simulated space environment using men and laboratory animals. The indexes included are Corporate Author-Monitoring Agency, Subject and Personal Author. Author (GRA)

**N74-15790#** Kobe Univ. (Japan). Second Dept. of Physiology.
**STUDIES OF THE MAMMALIAN BRAIN FUNCTION IN VITRO Annual Report, Dec. 1970 - Dec. 1972**
Isamu Suda Dec. 1972 25 p
(Grant DA-CRD-AG-S92-544-67-G5)
(AD-768737; ARDG(EE)-J-293-7; AR-7) Avail: NTIS CSCL 06/16

Effects of long term (7 1/4 and 5 3/4 years) storage of the cat in frozen state at -20 C in vitro after employing a glycerol perfusion technique were investigated from modes of neuroelectrical activity and histological evidences. The following conclusions were obtained: Glycerol, even if administered via vascular systems, showed cryoprotective effects on the brain tissues as was the case of single cells; it was possible to preserve viability of nervous tissues against many years storage in frozen state; reperfusion for revival brought about enlargement of micro-clefts in tissues which might have been produced by thawing of long term frozen tissues. This may be a cause of bleeding and activity defect in the revived brain; integrated neuroelectrical activity such as brain waves and evoked potentials may be affected significantly by dissolution of functions resulted from disruption in tissues; individual nerve cell activity, on the contrary, may be preserved well essentially or augmented in activity by degenerative processes. Author (GRA)

**N74-15791#** Army Research Inst. of Environmental Medicine, Natick, Mass.
**ARMY RESEARCH AND DEVELOPMENT TECHNICAL REPORT Annual Progress Report, 1 Jul. 1972 - 30 Jun. 1973**
1 Jul. 1973 175 p refs
(DA Proj. 3A0-61101-A-91C; DA Proj. 3A0-61102-B-71R)
(AD-768715) Avail: NTIS CSCL 06/5

The research projects reported are as follows: An electrophysiologic study of prolonged hypoxia; historical analysis, development and distribution of military environmental medical information; neurophysiological investigations of the glucose dependency of the thermoregulatory center of the hypothalamus; disease susceptibility of soldiers in harsh environments; bioenergetics related to heavy physical work ability of the soldier; development of measures to assess the impace of environmental stresses on critical military performance; development and characterization of models to study acute mountain sickness and high altitude pulmonary edema in military operations. GRA

**N74-15792#** Army Edgewood Arsenal, Md.
**COLLECTION, DETECTION, IDENTIFICATION, AND QUANTITATION OF HUMAN EFFLUENTS**
Robert I. Ellin, Richard L. Farrand, Fred W. Oberst, Charles L. Crouse, Norman B. Billups, William S. Koon, Nelson P. Musselman, and Frederick R. Sidell Oct. 1973 26 p refs
(DA Proj. 1B0-25001-A-197)
(AD-768762; EA-TR-4779; EB-TR-73007) Avail: NTIS CSCL 06/1

In a previous study of methods and instrumentation for measuring trace amounts of the total effluvia from man, only 12 compounds were identified. In the present study, using refinements of the methods, over 135 effluents have been identified. Two to three times this number of compounds were observed in the sensitive gas chromatograph-mass spectrometer (GC-MS) analytical system, but could not be identified. A variety of organic structures are included among these effluents. In addition to alcohols and ketones, unsaturated, branched, cyclic and aromatic hydrocarbons, sulfhydryl and cyano and a variety of heterocyclic compounds were found. The most significant change in the method is the replacement of the cryogenic collection system with porous polymer collectors. The latter can be used to collect effluents at room temperature, to absorb more effluents in a shorter time, can be connected in parallel to the chamber, and can be cleaned and desorbed without using vacuum. (Modified author abstract) GRA

**N74-15793#** Naval Aerospace Medical Research Lab., Pensacola, Fla.
**DECISIONAL DIFFERENCES AMONG INDIVIDUALS: A SIGNAL DETECTION THEORY APPROACH Medical Research Progress Report no. 16**
Gerald M. Long and Jack B. Shelnutt 18 Jun. 1973 29 p refs
(MF51524004)
(AD-765732; NAMRL-1185) Avail: NTIS CSCL 05/10

The applicability of current theory and measures of risk-taking (R-T) to the understanding and selection of military aviators was investigated. The project consisted of three interrelated sections: (1) an extensive review and critique of the literature in R-T, (2) the development of an alternate measure emphasizing the decisional aspects of R-T, and (3) preliminary findings of a brief study employing proposed signal detection theory measure. On the basis of the R-T literature review, a number of serious weaknesses and difficulties in existing R-T measures were enumerated. Because of these problems, an attempt was made to determine an alternative measure which stressed the decisional aspects of the R-T situation. This involved the application of the signal detection theory framework to a psychophysical task of changing signal probabilities. The validity of this approach for

determining decisional differences among individuals was investigated in an auditory detection task of limited length. The results in general were favorable to this alternative approach to measuring meaningful individual differences along a statistical decision dimension. Author (GRA)

**N74-15794#** Memphis State Univ., Tenn. Dept. of Psychology.
**CONVENTIONAL AND HIGH FREQUENCY HEARING OF NAVAL AIRCREWMEN AS A FUNCTION OF NOISE EXPOSURE Final Report, May 1971 - Aug. 1973**
John L. Fletcher 31 Aug. 1973 48 p refs
(Contract N00014-71-C-0354; NR Proj. 197-002)
(AD-766085; HRL/2) Avail: NTIS CSCL 06/16

Conventional (.5, 1, 2, 3, 4, and 6 kHz) and high frequency (8, 9, 10, 11, 12, 13, 14, 15, 16, and 18 kHz) hearing was tested of US Navy aviators flying primarily prop, jet, or helicopter aircraft for varying amounts of hours. Results show a progressive decline in hearing as a function of number of hours flight time. They also reveal high frequency hearing to be most affected as well as earlier to deteriorate from noise exposure. These results suggest high frequency hearing testing could be of significant value in hearing conservation programs in early detection of loss and in evaluating effectiveness of hearing conservation measures. Author (GRA)

**N74-15795#** Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
**PRODUCTION SYSTEMS: MODELS OF CONTROL STRUCTURES**
Allen Newell May 1973 68 p refs
(Contract F44620-70-C-0107; Grant MH-07732; ARPA Order 827)
(AD-768990; AFOSR-73-1904TR) Avail: NTIS CSCL 05/10

An exposition is made of the potentiality of production systems as a model of the detailed control structure of humans. A detailed treatment is given of the elementary Sternberg reaction time experiments in binary classification as a means of exhibiting the uses of production systems. The investigation leads to a hypothesis for these experiments different from the usual one of exhaustive search, called the Decoding Hypothesis. Author (GRA)

**N74-15796#** North Carolina Univ., Chapel Hill. Auditory Research Lab.
**PSYCHOACOUSTIC AND ELECTROPHYSIOLOGIC STUDIES OF HEARING UNDER HYPERBARIC PRESSURE Summary Report, 1 Jun. 1970 - 31 May 1973**
William G. Thomas and Joseph C. Farmer (Duke Univ.) 1 Jun. 1973 62 p refs
(Contract N00014-67-A-0321-0005; NR Proj. 101-027; NR Proj. 309-020)
(AD-761212; UNC/ARL-73-1) Avail: NTIS CSCL 06/19

Work performed includes: calibration of laboratory standard type-L condenser microphones to a simulated depth of 990 feet (31 ATA); calibration of standard audiometric earphones to a simulated depth of 990 feet (31 ATA); and measurement of human auditory thresholds during deep, saturation dives in helium-air. Human threshold data were collected at numerous depths during compression and decompression for air conduction and bone conduction to a simulated depth of 990 feet (31 ATA). Electrophysiological measurements were recorded from experimental animals under similar conditions. (Modified author abstract) GRA

**N74-15797*#** Scientific Translation Service, Santa Barbara, Calif.
**HIGH ALTITUDE AND SPACE SUITS**
S. M. Alekseyev and S. P. Umanskiy Washington NASA Jan. 1974 491 p refs Transl. into ENGLISH of the book "Vysotnyye i Kosmicheskiye Skatandry" Moscow, Mashinostr., 1973 280 p
(Contract NASw-2483)
(NASA-TT-F-15165) Avail: NTIS HC $26.75 CSCL 06K

Domestic and foreign experiences derived in designing space suits for human high altitude and space flights are reported. The properties of the medium in which the flights take place, the physical flight factors and their influence upon the human body are discussed. The bases of the theory and method of designing space suit systems and parts are briefly presented. The book is designed for specialists working in the field of design, production, and testing of equipment for pilots and cosmonauts. It is also useful to the engineering-technical personnel working on the creation of life support systems for the crews of modern spacecraft. Author

**N74-15798*#** Techtran Corp., Glen Burnie, Md.
**LIVING ON ANOTHER PLANET**
B. Konovalov Washington NASA Jan. 1974 9 p Transl. into ENGLISH from Izv. (Moscow), 27 Oct. 1973 p 5
(Contract NASw-2485)
(NASA-TT-F-15262) Avail: NTIS HC $3.00 CSCL 06F

A six month evaluations of an artificial biosphere is reported. Some problems encountered in designing and operating the biosphere are described and the efficiency of chlorella and higher plants as oxygen producers and environmental purifiers is evaluated. Author

**N74-15799*#** McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
**GENERALIZED ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM COMPUTER PROGRAM (G189A) CONFIGURATION CONTROL Phase 1 Final Report, 2 Apr. - 31 Oct. 1973**
R. L. Blakely 31 Dec. 1973 49 p
(Contract NAS9-13404)
(NASA-CR-134182; MDC-G5084) Avail: NTIS HC $4.50 CSCL 06K

A G189A simulation of the shuttle orbiter EC/ISS was prepared and used to study payload support capabilities. Two master program libraries of the G189A computer program were prepared for the NASA/JSC computer system. Several new component subroutines were added to the G189A program library and many existing subroutines were revised to improve their capabilities. A number of special analyses were performed in support of a NASA/JSC shuttle orbiter EC/LSS payload support capability study. Author

**N74-15800#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**A HIGH RESOLUTION MEASUREMENT OF THE ANISOTROPIC MODULATION TRANSFER FUNCTION OF THE HUMAN VISUAL SYSTEM M.S. Thesis**
Roland David Guidry Jun. 1973 148 p refs
(AD-768344; GA/EE/73-1) Avail: NTIS CSCL 06/16

Apparatus and procedures were designed to measure differences in threshold perception of gratings for 12 grating orientations and 9 spatial frequencies (2.3 to 20.4 cycles per degree). Gratings were generated on an oscilloscope and rotated electronically at 15 degree increments using an image rotation device designed for this experiment. Fifteen subjects were tested using a multiple staircase paradigm: 12 staircases (one for each orientation) were run concurrently and randomly intermixed, with spatial frequency held constant. Results are presented as plots of contrast sensitivity versus grating orientation for each spatial frequency tested. Considerable variation occurred among the subjects, both in orientational preferences and experimental consistency. Three subjects were classified as meridional amblyopes, three as classics (equal acuity for horizontal and vertical gratings but lower acuity for oblique gratings), and the remainder as having slight or inconsistent orientational preferences (from one spatial frequency to another). (Modified author abstract) GRA

**N74-15801#** Army Aeromedical Research Lab., Fort Rucker, Ala.
**STUDY OF FLIGHT ENVIRONMENT EFFECTS ON HELICOPTER GUNNER**
Carl Larson (Drexel Univ.), Edward Wells (Drexel Univ.), and Burton H. Kaplan Jun. 1973 39 p refs
(AD-766224; USAARL-73-15) Avail: NTIS CSCL 06/19

Disorientation periods of a helicopter gunner in the conduct of his task during a planned flight profile were investigated through

the use of a computerized mathematical model of the vestibular system. Flight attitude and crewman seat change data were used as input to the model and crewman nystagmus rates and perceived angular sensations were predicted. These output data were then compared to actual onboard flight observations of crewman status and well being. The mathematical model was found to accurately predict periods of disorientation that coincided with those observed and were manifested by either excess nystagmus rates, perceived sensations of motion, or a combination of both. Rapid changes in seat angle were attributed as the primary cause of disorientation with vehicle attitude changes cross-coupled with seat angle changes, producing a secondary effect. Author (GRA)

**N74-15802#** Naval Postgraduate School, Monterey, Calif.
**A METHOD FOR DEVELOPING A CRITERION FOR COMBAT PERFORMANCE OF NAVAL AVIATORS M.S. Thesis**
Maurice Dudley Stanley, Jr. Jun. 1973 58 p refs
(AD-765679) Avail: NTIS CSCL 05/10

Current Naval aviator selection and screening procedures are based on the individual's statistical probability of completing flight training and do not determine the capability of the student to adapt to an operational environment. The resultant failure of some student aviators to complete the advanced stages of training and the ineffective performance of others in operational missions have caused a considerable financial loss and a lessening of combat readiness. A critical incident study, using 30 aviators who have combat experience, indicates that there are 10 categories of behavior which characterize effective and ineffective Naval aviators. Procedures to identify these categories early in flight training are discussed. Author (GRA)

**N74-15803#** California Univ., Irvine.
**BIOCYBERNETICS: AN INTERACTIVE MAN-MACHINE INTERFACE Annual Technical Report, 1 Jan. - 31 Dec. 1972**
R. F. Thompson and T. J. Teyler 23 Feb. 1973 122 p refs
(Contract DAHC15-72-C-0121; ARPA Order 1001)
(AD-756701) Avail: NTIS CSCL 05/8

The long range objective of this project is the development of an efficient and accurate man-machine interactive method, involving use of biofeedback control. The project deals with the capability of training a human subject to control and/or interact with complex electronic or mechanical systems. Basically the project involves the detection of bioelectrical phenomena that are analogs of ongoing cognitive processes and the use of these phenomena to control external events. The project also allows the system being controlled to communicate with the human operator in either a feedback or an interactive manner. GRA

**N74-15804#** Naval Postgraduate School, Monterey, Calif.
**THE COMBINED EFFECTS OF HEAT AND NOISE ON AUDIO VIGILANCE IN A SIMULATED HELICOPTER ENVIRONMENT M.S. Thesis**
James Loewen Eyre Sep. 1973 23 p refs
(AD-769750) Avail: NTIS CSCL 05/10

The purpose of this experiment was to determine the combined effect of heat and noise on subjects performing an audio vigilance task, simulating the conditions of a helicopter cockpit. The task was to correctly extract specific aircraft heading changes from tapes of random aircraft radio transmissions. Additionally, the subjects were required to track the light of a pursuit rotor to simulate manual demands of helo flight. Experimental conditions combined three fixed levels of temperature, and three fixed levels of recorded helicopter noise. An analysis of variance of the results indicated no significant effects of noise, temperature, or their interaction, even at the .75 level. (Modified author abstract) GRA

**N74-16303*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**FUNGI AND BACTERIA**
Glenn E. Daniels *In its* Terrest. Environ. (Climatic) Criteria Guidelines for Use in Aerospace Vehicle Develop., 1973 Rev. 5 Jul. 1973 2 p refs
CSCL 06M

Spacecraft equipment is usually protected from fungi and bacteria by incorporating a fungicide-bactericide in the material, by a fungicide-bactericide spray, or by reducing the relative humidity to a degree where growth will not take place. A unique method to protect delicate, expensive bearings in equipment was to maintain a pressure (with dry air or nitrogen) slightly above the outside atmosphere (few millibars) within the working parts of the equipment, thus preventing fungi from entering equipment. Author

**N74-16820*#** Techtran Corp., Glen Burnie, Md.
**RESISTANCE AND DISEASE. PROBLEMS OF GENERAL PATHOLOGY**
P. D. Gorizontov Washington NASA Feb. 1974 45 p Transl. into ENGLISH from Patol. Fiziol. Ekstremal'nykh Sostoyaniy, (Moscow), 1973 p 7-35
(Contract NASw-2485)
(NASA-TT-F-15314) Avail: NTIS HC $5.25 CSCL 06E

Resistance to disease is presented from the pathological viewpoint of the organism's reaction mechanisms, their regulation, stimulation, effect, reduced effectiveness and resultant change of effect. The role of stress is emphasized. General functional disturbances are dealt with in characterizing basic features of resistance and protection. Author

**N74-16821*#** Techtran Corp., Glen Burnie, Md.
**THE PATHOGENIC EFFECT OF ELECTRICAL CURRENT**
G. L. Frenkl, K. A. Azhibayev, I. K. Mishchenko, P. D. Gorizontov, ed., and N. N. Sirotinin, ed. Washington NASA Feb. 1974 27 p refs Transl. into ENGLISH from the book "Patologicheskaya Fiziologiya Ekstremal'nykh Sostoyaniy" Moscow, Meditsina Press, 1973 p 145-159
(Contract NASw-2485)
(NASA-TT-F-15319) Avail: NTIS HC $4.50 CSCL 06S

The history of study of injuries due to electric current is traced. The effect of physical parameters (current path, voltage, resistance, current strength) of the condition of the organism, and environmental factors on electrtrauma are investigated. Forms of death attributable to the effects of electric current are described. Treatment is devoted to electric shock and exogenic effects. Prophylaxis and therapy of electrotraumata are briefly considered. Author

**N74-16822*#** Linguistic Systems, Inc., Cambridge, Mass.
**EXPERIMENTAL RESTRAINT ULCER IN THE WHITE RAT. 3: STUDY AND ANALYSIS OF THE PART PLAYED BY CERTAIN PSYCHOLOGICAL FACTORS**
S. Bonfils, G. Liefooghe, X. Gelle, M. Dubrasquet, A. Lambling, and N. Enjolvy Washington NASA Feb. 1974 25 p refs Transl. into ENGLISH from Rev. Fr. Etud. Clin. Biol. (France), v. 5, 1960 p 571-581
(Contract NASw-2482)
(NASA-TT-F-15329) Avail: NTIS HC $4.25 CSCL 06C

Rats studied during restraint were found to go through three motor phases: continuous, uncontrolled agitation; paroxymal, intermittent agitation; and prolonged inertia. There was no correlation between the release reaction and the incidence of ulcers, mortality, or weight loss. It may be concluded that the release reaction is not the pathogenic stimulus in restraint and is not related to it. A quantitive assessment of the psychological stimulus imposed by enforced immobilization was attempted on 503 normal and 400 vagotomized rats, confined in five different volumes from 360 to 7350 ml. The smaller the restraint space, the more frequent the ulcers. There was a statistically significant difference between normal and vagotomized rats, the slope of the regression line being flatter in the latter. Author

**N74-16823*#** Techtran Corp., Glen Burnie, Md.
**CHANGE IN RESPIRATION OF RAT LIVER MITOCHONDRIA DURING PROLONGED HYPOKINESIS**
L. N. Grinberg Washington NASA Feb. 1974 9 p refs Transl. into ENGLISH from Vop. Med. Khim. (Moscow), v. 16, 1970 p 387-390
(Contract NASw-2485)
(NASA-TT-F-15386) Avail: NTIS HC $4.00 CSCL 06C

Limitation of movement of periods of 10 and 20 days did

not cause changes in the respiratory activity of rat liver mitochondria. Hypokinesis for a period of 30 days lead to an increase in mitochondrial respiration in the fourth state and into a decrease in the rate of respiration in the third state. A decrease in the magnitude of respiratory control was detected in the mitochondria under the influence of a 30-day long period of hypokinesis which was partially compensated for by the 60th day of the experiment. The magnitude of respiratory control after Chance-Williams was the most sensitive parameter which permitted estimates of change in the respiratory chain of mitochondira under the influence of hypokinesis. Author

**N74-16824*#** Techtran Corp., Glen Burnie, Md.
**CHANGES IN THE GAS METABOLISM, GAS HOMEOSTASIS AND TISSUE RESPIRATION IN THE RAT DURING PROLONGED HYPOLINESIS**
V. L. Popkov, E. S. Mailyan, Yu. S. Galushko, Ye. A. Kovalenko, Ye. I. Zaytseva, I. A. Nitochkina, L. V. Smulova, and A. V. Ryazhskiy Washington NASA Feb. 1974 11 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 56, no. 12, 1970 p 18-08-1812
(Contract NASw-2485)
(NASA-TT-F-15393) Avail: NTIS HC $4.00 CSCL 06C

Among the white rats kept in confining cages to limit motor activity of the animals, the overall gas metabolism and intratissue gas homeostasis did not significantly change over the course of the 60-day long experiment period. However, the intensity of respiration of certain tissues changed; in the liver it increased, in the myocardium it decreased. The physical working capacity underwent a five-fold decrease. The 60-day long period of hypokinesis caused retarded growth of the animals. Author

**N74-16825*#** Techtran Corp., Glen Burnie, Md.
**THE MECHANISM OF DEVELOPMENT OF AORTIC ANEURYSM IN RABBITS DURING LIMITATION OF THEIR MOBILITY**
V. V. Tyavokin Washington Feb. 1974 10 p refs Transl. into ENGLISH from Kardiologiya (USSR), v. 12, Sep. 1972 p 139-143
(Contract NASw-2485)
(NASA-TT-F-15397) Avail: NTIS HC $4.00 CSCL 06C

Twenty male rabbits of the chinchilla breed were divided into 6 groups and were tested for the development of aortic aneurysm under conditions of limited mobility. Aneurysms were successfully produced in regions where a ligature was applied to the aorta. Two sites for the application of the ligature were chosen: one in the thoracic region and one in the abdominal region. In the thoracic region aneurysms were successfully produced using both the ligature and natural constrictions by the animals' hiatus aorticus. The experiments confirmed that limited mobility in the application of constriction to the aorta produce aneurysms. This is in direct conflict with works published earlier to the effect that constriction alone and applied from the outside will not produce aneurysms. In the case of the abdominal ligature renal disorders are both a result and a contributing factor to the formation of abdominal aneurysm of the aorta. Author

**N74-16826#** Battelle-Northwest, Richland, Wash.
**PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1972 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH. VOLUME 2: PHYSICAL SCIENCES. PART 2: RADIOLOGICAL SCIENCES**
J. M. Nielsen et al Apr. 1973 125 p refs
(Contract AT(45-1)-1830)
(BNWL-1751-Pt-2) Avail: NTIS

The atmospheric concentrations of Pu238 Pu239 were measured in surface air samples collected at Richland, Washington from 1963 to 1972. The amount of SNAP-9A burnup Pu238 Pu239 present was calculated from the Pu238 concentrations and the Pu238/Pu239 ratios, assuming that the ratio in debris from nuclear weapons tests was 0.015. Calculations had indicated that the Pu238 Richland air from 1967 to 1971 came primarily from SNAP-9A. From 1967 to 1969 the concentrations of SNAP-9A plutonium at Richland had remained fairly constant, indicating that the Pu238 was being transferred across the equator into the Northern Hemisphere at a rate comparable to the rate at which Pu238 was being deposited on the earth's surface. The Pu 238 concentrations showed seasonal variations typical of radionuclides of stratospheric origin, so the transfer was probably taking place primarily in the stratosphere. Concentrations of SNAP-9A plutonium at Richland have decreased rapidly since that time. NSA

**N74-16827#** Defence Research Information Centre, Orpington (England).
**PHOTORESPIRATION AND THE PRIMARY REACTIONS OF PHOTOSYNTHESIS**
B. Loetsch Sep. 1973 21 p refs Transl. into ENGLISH from Ber. Deut. Bot. Ges. (Stuttgart), v. 2, no. 83, 1970 p 41-54
(DRIC-Trans-3293; BR30618) Avail: NTIS HC $4.25

Under suitable experimental conditions, it is possible to demonstrate a light-dependent carbon dioxide production (and oxygen consumption) in higher plants. This so-called photorespiration is not connected with mitochondrial respiration (which seems to be even inhibited in light), but is closely related to the primary reactions of photosynthesis. To clarify this connection with the light driven electron flow, a comparative biological demonstration of the much discussed two quantum scheme of photosynthesis was determined. As a result, it is not clear that an automatic coupling of the photochemical splitting of water (to produce reduction energy) with the non-cyclic photophosphorylation (to gain energy as ATP) has emerged in the course of biological evolution. Author (ESRO)

**N74-16828#** Defence Research Information Centre, Orpington (England).
**DEEP DIVING WITH SYNTHETIC MIXTURES OF GASES**
A. Zetterstroem Nov. 1973 22 p Transl. into ENGLISH from Tex. Tidsskr. (Stockholm), no. 75, 1945 p 173-178
(DRIC-Trans-3386; BR30684) Avail: NTIS HC $4.25

The eventual use of gas mixtures for diving is briefly outlined, and the advantages to be gained from such mixtures are discussed. The physiology of diving and the effects of the traditional gases - oxygen and nitrogen - are described. The possible use of different gases such as helium and hydrogen in combination with oxygen and/or nitrogen is discussed and the inherent problems together with tests are considered. ESRO

**N74-16829*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**ULTRASTRUCTURAL PATHOGENESIS OF LESIONS PRODUCED BY EXPOSURE TO OXYGEN DIFLUORIDE WITH CORRELATIVE LIGHT MICROSCOPY**
Gladys Harrison and William Mackenzie (AMRL, Wright-Patterson AFB, Ohio) Jul. 1973 56 p refs
(AF Proj. 6302)
(NASA-TM-X-69865; AD-770292; AMRL-TR-72-107) Avail: NTIS HC $6.00 CSCL 06T

The lungs of rats exposed to OF2 were examined by light and electron microscopy. The exposures were for 30 to 60 minutes to an average of 4.5 ppm OF2, the minimal lethal dose. Animals were sacrificed after 30 (group 1) and 60 minutes (group 2) exposure and 1 (group 3) and 2 (group 4) hours following 60 minutes exposure. Mild gross changes were observed in groups 3 and 4, but no light microscopic lesions were found. Alterations were noted in all four groups using electron microscopy. These were mostly indicative of fluid change and consisted of blebbing of the endothelial and epithelial layers of the alveolocapillary wall and rarification of the cytoplasm of these cells. The lamellar bodies of the Type II cells showed an increasing and consistent loss of matrix structure and density. These fine structural changes increased in quantity and severity as time of exposure or post-exposure period increased. (Modified author abstract) GRA

**N74-16830#** Naval Aerospace Medical Research Lab., Pensacola, Fla.
**EXPOSURE OF MAN TO MAGNETIC FIELDS ALTERNATING AT EXTREMELY LOW FREQUENCY**
Dietrich E. Beischer, James D. Grissett, and Robert E. Mitchell Jul. 1973 36 p refs
(AD-770140; NAMRL-1180) Avail: NTIS CSCL 06/18

Ten subjects were confined for periods up to 7 days and during this time were exposed to a low-intensity magnetic field (.0001 Wb/sq m at 45 Hz) for periods up to 24 hours. Five subjects were confined but were not exposed. A large battery of physiological and psychophysiological tests were given throughout the confinement period. No effects were seen that could be definitely linked with the magnetic field. The only changes that could be correlated with the time course of exposure to the ELF magnetic field were in serum triglycerides of blood samples drawn 14 hours after the evening meal. In nine of the ten exposed subjects, serum triglycerides reached a maximum value 24 to 48 hours after the ELF field exposure. Similar trends were not seen in any of the five control subjects. (Modified author abstract) GRA

**N74-16831#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
**RELATION BETWEEN DAILY NOISE EXPOSURE AND HEARING LOSS BASED ON THE EVALUATION OF 6,835 INDUSTRIAL NOISE EXPOSURE CASES Final Report**
William L. Baughn (Gen. Motors Corp., Anderson, Ind.) Jun. 1973 41 p refs Prepared in cooperation with EPA
(AD-767204; EPA-550-73-001-C) Avail: NTIS HC $3.00 CSCL 06/19

The percent of a population exhibits greater than certain specified audiometric hearing levels as a function of specified exposure levels and duration of exposures to those levels. Audiometric data from 6835 employees of an industrial plant were taken during the period from 1960 through 1965. The employees were selected only on the criterion that their noise exposures were reasonably well known. Hearing levels for each of three exposure conditions were obtained for the speech and the 4 kHz audiometric frequencies. The data are smoothed and hearing risk tables are presented. Author (GRA)

**N74-16832#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
**THE COMBINED EFFECTS OF VIBRATION, NOISE, AND EXPOSURE DURATION ON AUDITORY TEMPORARY THRESHOLD SHIFT Final Report, Jul. 1972 - Mar. 1973**
Henry C. Sommer Sep. 1973 20 p refs
(AF Proj. 7231)
(AD-770285; AMRL-TR-73-34) Avail: NTIS CSCL 06/19

To determine the combined effects of noise and vibration on auditory function, the temporary threshold shifts (TTS) of two groups of 10 subjects each were measured as a function of intensity and duration of exposure. Combined noise and vibration was presented to one group for 5 minutes and to the other for 20 minutes. Both groups were exposed to vibration in the Z axis at frequencies of 9 Mz and 18 Hz at intensity levels of 0.475 gz (peak) and 0.950 gz, respectively. Noise levels of 90 db and 100 db were presented simultaneously with the vibration. TTS was measured at post exposure recovery times of 0.5, 2.0, 5.0, 10.0, and 20.0 minutes. Although the mean difference was small (0.72 db), a significantly larger TTS was obtained at 9 Hz than 18 Hz vibration, and 100 db produced a larger TTS than 90 db. Significant differences in TTS were also obtained as a function of duration of exposure, and as a function of post exposure recovery time. (Modified author abstract) GRA

**N74-16833#** School of Aerospace Medicine, Brooks AFB, Tex.
**CORRELATION OF EYE-LEVEL BLOOD FLOW VELOCITY AND BLOOD PRESSURE DURING PLUS G SUB z ACCELERATION Final Report, Jul. 1972 - Jun. 1973**
Robert W. Krutz, Jr., S. A. Rositano, and R. E. Mancini Nov. 1973 8 p refs
(AF Proj. 7930)
(AD-770560; SAM-TR-73-36) Avail: NTIS CSCL 06/1

Eye-level blood flow and blood pressure changes were correlated on the USAFSAM human centrifuge during both rapid onset (ROR, 1G/sec) and gradual onset runs (GOR, 0.1 G/sec). A transcutaneous Doppler ultrasonic flowmeter was used to monitor temporal artery blood flow (Qta); direct blood pressure was obtained by cannulation of a radial artery and measured at eye level with a Statham P-37 miniature transducer. Eye-level mean blood pressure (Pa) decreased to 20 mm Hg and zero forward Qta occurred 6 sec (range 4-9 sec) prior to blackout in experienced centrifuge subjects during RORs. The same degree of correlation was not seen during GORs. Author (GRA)

**N74-16834#** Massachusetts Inst. of Tech., Cambridge. Lab. for Insulation Research.
**DIELECTRIC ANALYSIS OF BIOMATERIALS**
Arthur R. VonHippel, Alah H. Runck, and William B. Westphal Oct. 1973 26 p refs
(Contract N00014-67-A-0204-0053; NR Proj. 105-632)
(AD-769843; TR-13) Avail: NTIS CSCL 06/16

After introducing the frequency range and operating methods of dielectric analysis in general terms, the report reviews shortly the present state of knowledge about freezing injury, the role of water in living systems, the effects of dissolved ions, and the unique role of protons. Subsequently it shows that protons act quite differently than anticipated and that ions and molecules in frozen systems display surprising changes of action and unsuspected interactions as function of temperature. Studies on erythrocytes make clear that dielectric analysis can become a diagnostic tool for the measurement of cell permeability and changes of cell content. Methods and instrumentation for deep tumor therapy are proposed, based on the presently known dielectric characteristics of the human body. Author (GRA)

**N74-16835#** School of Aerospace Medicine, Brooks AFB, Tex.
**RETINAL BURN THRESHOLDS FOR EXPOSURE TO A FREQUENCY DOUBLED NEODYMIUM LASER Final Report, 4 Apr. - 5 Jun. 1973**
William D. Gibbons Nov. 1973 16 p refs
(AF Proj. 6301)
(AD-770561; SAM-TR-73-45) Avail: NTIS CSCL 06/18

The eyes of rhesus monkeys were exposed to the radiation from a frequency-doubled neodymium laser. Retinal damage was assessed with a fundus camera at one hour and 24 hours after exposure. The threshold for a 50% probability of damage (ED50) was determined from the data. The threshold for a single 15-nsec pulse using the one-hour lesion appearance criterion was determined to be 3.02 microjoules per pulse at the cornea. Author (GRA)

**N74-16836#** Defense Documentation Center, Alexandria, Va.
**MOTION SICKNESS Report Bibliography, Apr. 1942 - Jan. 1973**
Nov. 1973 152 p refs
(AD-769950/7GA) Avail: NTIS HC $4.75 CSCL 06/19

The references contain information pertinent to an understanding of the fundamental causes of motion sickness and an evaluation of the drugs used in prevention and treatment of air and sea sickness. The indexes included are Corporate Author-Monitoring Agency, Subject, Title, Personal Author and Contract Number. Author (GRA)

**N74-16837#** Frankford Arsenal, Philadelphia, Pa.
**CW NEODYMIUM OCULAR DAMAGE THRESHOLD STUDY. ONE-SECOND EXPOSURE DURATION Interim Report**
David J. Lund, Charles T. Carver, and William E. Zwicker Aug. 1973 16 p
(DA Proj. 1T0-61102-A-31C)
(AD-770404; FA-M73-25-1) Avail: NTIS CSCL 06/18

A continuous-wave neodymium laser, operating at 1.06 micron has been incorporated into an animal exposure facility to enable the determination of the threshold for damage to ocular tissue at this wavelength for a range of exposure durations. Using Rhesus monkeys, the damage threshold has been determined for 1-second exposure duration and minimal retinal spot size. Damage was produced at exposure levels above 42 millijoules total intraocular energy (TIE). The ED50 level was 56.4 millijoules TIE. Author (GRA)

**N74-16838*#** General Electric Co., Philadelphia, Pa. Valley Forge Space Center.
**DEVELOPMENT OF A HOUSEHOLD WASTE TREATMENT SUBSYSTEM, VOLUME 1 Final Report**

Thomas M. Gresko and Robert W. Murray Oct. 1973 68 p refs
(Contract NAS1-11770)
(NASA-CR-132342-Vol-1) Avail: NTIS HC $6.50 CSCL 06I

The domestic waste treatment subsystem was developed to process the daily liquid and non-metallic solid wastes provided by a family of four people. The subsystem was designed to be connected to the sewer line of a household which contained water conservation features. The system consisted of an evaporation technique to separate liquids from solids, an incineration technique for solids reduction, and a catalytic oxidizer for eliminating noxious gases from evaporation and incineration processes. All wastes were passed through a grinder which masticated the solids and deposited them in a settling tank. The liquids were transferred through a cleanable filter into a holding tank. From here the liquids were sprayed into an evaporator and a spray chamber where evaporation occurred. The resulting vapors were processed by catalytic oxidation. Water and latent energy were recovered in a combination evaporator/condenser heat exchanger. The solids were conveyed into an incinerator and reduced to ash while the incineration gases were passed through the catalytic oxidizer along with the processed water vapor. Author

**N74-16839*#** General Electric Co., Philadelphia, Pa.
**DOMESTIC WATER AND WASTE TREATMENT SUBSYSTEM, OPERATION AND MAINTENANCE MANUAL, VOLUME 2**
T. M. Gresko and R. W. Murray Oct. 1973 28 p
(Contract NAS1-11770)
(NASA-CR-132342-Vol-2) Avail: NTIS HC $4.50 CSCL 06I

The domestic water and waste treatment subsystem is designed to operate for a period of one year with maintenance. Subsystem operating instructions and maintenance procedures are listed along with a trouble shooting and component disassembly guide. Author

**N74-16840*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
**DEVELOPMENT AND FABRICATION OF HEAT-STERILIZABLE INHALATION THERAPY EQUIPMENT**
A. S. Irons 15 Jan. 1974 76 p refs
(Contract NAS7-100)
(NASA-CR-136832; JPL-TM-33-670) Avail: NTIS HC $7.00 CSCL 06L

The development of a completely heat sterilizable intermittent positive pressure breathing (IPPB) ventilator in an effort to reduce the number of hospital acquired infections is reported. After appropriate changes in materials and design were made, six prototype units were fabricated and were successfully field tested in local hospitals. Most components of the modified ventilators are compatible with existing machines. In all but a few instances, such as installation of bacteria-retentive filters and a modified venturi, the change over from non-heat-sterilizable to sterilizable units was accomplished by replacement of heat labile materials with heat stable materials. Author

**N74-16841*#** Scientific Translation Service, Santa Barbara, Calif.
**AN IMPROVED MECHANICAL PLETHYSMOGRAPH FOR THE HAND AND DISTAL FOREARM**
Sh. Figar Washington NASA Jan. 1974 8 p refs Transl. into ENGLISH from Physiol. Bohemoslov., (Czechslovakia), v. 8, 1959 p 75-78
(Contract NASw-2483)
(NASA-TT-F-15234) Avail: NTIS HC $4.00 CSCL 06L

A description is given of a mechanical hydraulic plethysmograph for the hand and distal forearm with a suitably shaped plethysmographic vessel placed in a water bath, which is at the same time a water supply reservoir with a calibration unit. Practically linear mechanical ink recording and a suitable means of sealing and immobilizing the extremity being tested are reported. Author

**N74-16842*#** Techtran Corp., Glen Burnie, Md.
**A SIMPLE DEVICE FOR COLLECTING BLOOD SAMPLES FROM SUBJECTS UNDERGOING ACCELERATION IN A CENTRIFUGE**
F. Rossangio Washington NASA Feb. 1974 6 p Transl. into ENGLISH from Riv. Med. Aeronaut. Spaz., (Italy) v. 28, Jan. - Mar. 1965 p 77-81
(Contract NASw-2485)
(NASA-TT-F-15387) Avail: NTIS HC $4.00 CSCL 06B

A device is reported for the appropriate collection of blood samples from subjects undergoing forces of acceleration. It consists of two collection units, each equipped with two syringes which permit the collection of two useful blood samples by means of a catheter located inside the circulatory system of the patient to be examined, while the centrifuge is in operation. The blood collection unit is calibrated to permit the gathering of samples of venous and arterial blood during operation of a centrifuge to 15 g. Author

**N74-16843*#** McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
**DESIGN DEVELOPMENT AND TEST: TWO-GAS ATMOSPHERE CONTROL SUBSYSTEM Final Report**
John K. Jackson 1 Feb. 1974 139 p refs
(Contract NAS9-12924)
(NASA-CR-134190; MDC-G4971) Avail: NTIS HC $10.00 CSCL 06K

An atmosphere control subsystem (ACS) was developed for NASA-IBJSC which is designed to measure the major atmospheric constituents in the manned cabin of the space shuttle orbiter and control the addition of oxygen and nitrogen to maintain the partial pressures of these gases within very close limits. The ACS includes a mass spectrometer sensor (MSS) which analyzes the atmosphere of a shuttle vehicle pressurized cabin, and an electronic control assembly (ECA). The MSS was built and tested to meet the requirements for flight equipment for the M-171 Metabolic Analyzer experiment for the Skylab flight program. The instrument analyzes an atmospheric gas sample and produces continuous 0-5 vdc analog signals proportional to the partial pressures of $H_2$, $O_2$, $N_2$, $H_2O$, $CO_2$ and total hydrocarbons having a m/e ratio between 50 and 120. It accepts signals from the MSS proportional to the partial pressures of $N_2$ and $O_2$ and controls the supply of these gases to the closed cabin. Author

**N74-16844*#** ILC Industries, Inc., Dover, Del.
**DEVELOPMENT OF EMERGENCY INTRAVEHICULAR SPACESUIT (EIS) ASSEMBLY Final Report**
17 Oct. 1973 95 p
(Contract NAS9-12995)
(NASA-CR-134191; ER-852-29) Avail: NTIS HC $7.75 CSCL 06Q

A program was undertaken to develop and test two prototype pressure suits to operate at pressures up to 413 mm Hg (8.0 PSIG). The units were designated Emergency Intravehicular Spacesuits (EIS). Performance requirements, design evolution, testing performed, problems encountered, and final EIS configuration are reported. Author

**N74-16845*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
**ROBOT ARM DYNAMICS AND CONTROL**
A. K. Bejczy 15 Feb. 1974 156 p refs
(Contract NAS7-100)
(NASA-CR-136935; JPL-TM-33-669) Avail: NTIS HC $11.00 CSCL 05H

Variations in total inertia and gravity loads at the joint outputs are treated along with the relative importance of gravity and acceleration-generated reaction torques or forces versus inertia torques or forces. The relation between the dynamical state equations in explicit terms and servoing the manipulator is briefly discussed in the framework of state variable feedback control which also forms the basis of adaptive manipulator control. Exact state equations were determined for total inertia and gravity loads at the joint outputs as a function of joint variables, using the constant inertial and geometric parameters of the individual links defined in the respective link coordinate frames. The range

of maximum variations in total inertia and gravity loads at the joint outputs was calculated for both no load and load in the hand. The main result is the construction of a set of greatly simplified state equations which describe the total inertia and gravity load variations at the output of the six joints with an average error of less than 5%. Author

**N74-16846*#** Washington Univ., St. Louis, Mo. Communications Group.
**HOW TO MAKE THE FOURTH REVOLUTION: HUMAN FACTORS IN THE ADOPTION OF ELECTRONIC INSTRUCTIONAL AIDS**
Nicholas J. Demerath and Lois A. Daniels Dec. 1973 85 p refs
(Grant NGR-26-008-054)
(NASA-CR-136862; Memo-73/5) Avail: NTIS HC$7.25 CSCL 05E

The prospects and problems of getting higher education in the United States (high school and above) to more fully utilize electronic technologies are examined. Sociological, psychological, and political factors are analyzed to determine the feasibility of adopting electronic instructional techniques. Differences in organizations, attitudes, and customs of different kinds of students, teachers, administrators, and publics are crucial factors in innovation. S.K.W.

**N74-16847#** Defense Documentation Center, Alexandria, Va.
**ENVIRONMENTAL POLLUTION: NOISE POLLUTION-NOISE EFFECTS ON HUMAN PERFORMANCE Bibliography Report, Jan. 1971 - May 1973**
Nov. 1973 168 p refs
(AD-769900; DDC-TAS-73-69) Avail: NTIS CSCL 06/19

The bibliography is comprised of 111 citations of unclassified reports dealing with Environmental Pollution: Noise Pollution - Noise Effects on Human Performance in a series of bibliographies on Environmental Pollution. References deal primarily with effects of noise exposure on hearing, speech, communications and community/airport noise. Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract, and Report Number Indexes are included. Author (GRA)

**N74-16848#** Naval Postgraduate School, Monterey, Calif.
**THE EFFECT OF PROLONGED NON-FLYING PERIODS ON PILOT SKILL IN PERFORMANCE OF A SIMULATED CARRIER LANDING TASK M.S. Thesis**
Wayne Bruce Wilson Sep. 1973 42 p refs
(AD-769696) Avail: NTIS CSCL 05/9

An experiment was undertaken to determine if a significant loss of basic pilot skill occurs during prolonged non-flying periods. Current, one-year stagnant and two-year stagnant groups of jet qualified Naval Aviators were tested on a computer simulation of a carrier approach and landing. Performance by currency groupings was then analyzed. Test subjects were subsequently re-assigned to experience groups, according to total actual flight hours accrued by each pilot. Least experienced, intermediate and most experienced group performance was then compared. Significant variables and important parameters in retention of pilot skills are discussed. In light of the experimental results, some possible real-world implications and suggestions are made. Author (GRA)

**N74-16849#** School of Aerospace Medicine, Brooks AFB, Tex.
**BREATHING OXYGEN SYSTEMS: CONTAMINANTS IN OXYGEN DESORBED FROM FLUOMINE Progress Report, Nov. 1972 - Mar. 1973**
Leonard J. Luskus, Richard L. Miller, Herman J. Kilian, and Kenneth G. Ikels Nov. 1973 19 p refs
(AF Proj. 7164)
(AD-770020; SAM-TR-73-37) Avail: NTIS CSCL 06/11

Fluomine, bis (3-fluorosalicylaldehyde) ethylenediimine cobalt (II), is a metal chelate which reversibly absorbs oxygen and is of current interest in the Air Force's search for oxygen concentration systems to be used for generating aviator's breathing oxygen onboard aircraft. Oxygen from this chelate was evaluated for the degree of contamination by toxic substances arising via degradation of the chelate and/or impurities introduced into the chelate during preparation, handling, and storage. Specifically, Fluomine was repeatedly run through sorption-desorption cycles, and the product oxygen was analyzed for contamination using infrared spectroscopy, gas chromatography, and mass spectrometry. (Modified author abstract) GRA

**N74-16850#** Paul Sabaiter Univ., Toulouse (France). Lab. of Medical Biology.
**EFFECT OF AUTOGAMY ON CELLULAR SENSITIVITY TO NATURAL IONIZING RADIATION AND X-RAYS Final Scientific Report, 1 Jun. - 31 Oct. 1972**
H. Planel, J. P. Soleilhavoup, R. Tixador, F. Croute, and G. Richoilley 13 Apr. 1973 13 p refs
(Grant AF-AFOSR-4210-72; AF Proj. 9767)
(AD-761837; EOAR-TR-73-12) Avail: NTIS CSCL 06/18

It is shown that, after autogamy, there is a large decrease of radiosensitivity of Paramecium aurelia to natural ionizing radiations or to X-rays. These modifications come in addition to the well known physiological changes induced by conjugation or autogamy in Paramecium. The origin of these modifications cannot be determined. Nevertheless, nuclear reorganisation involved by autogamy may explain the modifications of chromosome number may result in large fluctuation of radiosensitivity in many species. New investigations are in progress to try to determine the mechanism involved in cellular response to natural ionizing radiation. (Modified author abstract) GRA

**N74-16851#** Naval Postgraduate School, Monterey, Calif.
**AN INVESTIGATION OF HUMAN MENTAL AND MOTOR RESPONSES TO HEAT STRESS M.S. Thesis**
Gilbert Wayne Bratschi Sep. 1973 36 p refs
(AD-769699) Avail: NTIS CSCL 06/19

An investigation into the physiological reactions of persons being artificially acclimatized to extreme heat conditions in an environmental chamber was conducted. While the subjects were being artificially acclimatized they performed low-skill tasks. Their performance was compared to that attained outside of the chamber after acclimatization. Parameters measured were pulse rate, oral temperature, decision making rate, time on target, and two different reaction times. Analysis of the extracted data indicated a correlation between the decision making task and the pursuit rotor task and showed that each of these was correlated with oral temperature. Also, results suggested that the process of artificial acclimatization had not adversely effected the abilities of the subjects to later perform in a normal environment. Author (GRA)

**N74-16852*#** Naval Aerospace Medical Research Lab., Pensacola, Fla.
**THRESHOLDS FOR THE PERCEPTION OF ANGULAR ACCELERATION AS INDICATED BY THE OCULOGYRAL ILLUSION**
Earl F. Miller, II and Ashton Graybiel 11 Jun. 1973 22 p refs
(NASA Order T-81633; NASA Order T-5904-B)
(NASA-CR-136927; AD-769268; NAMRL-1168) Avail: NTIS HC $4.25 CSCL 06/16

The oculogyral illusion may be perceived by a person passively exposed to angular acceleration as apparent motion (in the direction of turn) of visual objects that are fixed relative to him. The illusion has its genesis in the semicircular canals and a knowledge of cupuloendolymph mechanisms, the role of adaptation effects and the influence of secondary etiological factors are all essential for predicting its behavior under different stimulus conditions. Studies have shown that its perception under ideal test conditions yields lower threshold values than other canal response indicators; the manifestation of nystagmus, and the sensation and aftersensation of rotation. The thresholds of the illusion are so low that their measurement is limited by the precision of the rotating device. A highly sophisticated servo-controlled device, the Rotating Litter Chair (RLC), was developed expressly for determining with this indicator any changes in cupular thresholds of response that might occur during the prolonged weightless Skylab missions. The purpose of the report is to evaluate the RLC and a relatively short method for determining

the thresholds of perception of the illusion in a large sample of normal subjects and in four deaf persons with severe bilateral labyrinthine defects. GRA

**N74-16853#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
**AIR-TO-GROUND TARGET ACQUISITION WITH NIGHT VISION DEVICES**
S. MacLeod and R. L. Hilgendorf 1973 8 p refs Presented at the Annual Meeting of Society of, San Diego, Calif., 27-29 Aug. 1973
(AF Proj. 7184)
(AD-769345; AMRL-TR-73-87) Avail: NTIS CSCL 05/10

Three hand-held image intensifiers were studied. Two of these were passive visual aids (Starlight Scope and Uniscope) and one was an IR viewer (Find-R-Scope). These devices were evaluated in terms of number of targets (trucks, boats, village) recognized on a 1000:1 scale terrain model. Simulated air-to-ground views of 20 observers were provided as they circled the model at a simulated 520 MPH and 8500 ft slant range under a moonlight illumination level. Although all targets were visible through the devices when observers were shown when and where to look, almost no target recognition occurred when any of the aids were used in a search viewing-mode under the conditions of the study. Author (GRA)

**N74-16854#** Hughes Aircraft Co., Culver City, Calif. Engineering Equipment Div.
**OPTIMIZED OPTICAL LINK FOR HELMET MOUNTED DISPLAY Final Report**
Eric R. Fehr Sep. 1973 19 p ref
(Contract F33615-71-C-1673; AF Proj. 7184)
(AD-770307; HAC-P72-72; AMRL-TR-73-20) Avail: NTIS CSCL 05/5

An optimized optical link helmet mounted display (OOLHMD) system designed to satisfy requirements for a large-field-of-view, large-exit-pupil, high-resolution, helmet-mounted visually-coupled display device is described. The history and development of the basic concept is traced, and principal design considerations and requirements constituting the basis of the selected OOLHMD configuration are identified. Advantages and disadvantages of several alternative designs are also considered, and a comprehensive discussion of the benefits to be realized through use and application of the OOLHMD concept in lieu of displays permanently mounted within an aircraft cockpit is given. Author (GRA)

**N74-16855#** Douglas Aircraft Co., Inc., Long Beach, Calif.
**INVESTIGATION OF FLARE PATTERNS AS A MEANS OF OVERCOMING SPATIAL DISORIENTATION OCCURRING UNDER NIGHT STRIKE CONDITIONS Final Report, Oct. 1972 - Aug. 1973**
David M. Zamarin, Richard F. Gabriel, and L. Dean Rickerd Sep. 1973 115 p refs
(Contract F33615-73-C-4063; AF Proj. 7184)
(AD-770309; MDC-J6092; AMRL-TR-73-95) Avail: NTIS CSCL 05/5

Pilot interview data and analytic investigation indicated that the night attack environment was particularly hazardous with respect to spatial disorientation. Fifteen pilot subjects performed a tracking task representative of recovery from unusual attitudes while simultaneously being subjected to rotationally induced disorientation in a simulated cockpit. Motion pictures of geometric arrangements of flare patterns were presented for use as an orientation aid. Performance was evaluated against an attitude indicator and a no disorientation condition. In addition to tracking parameters, results were evaluated on the basis of pilot opinion, body reactions, eye movement recordings and perceptual tests. Results indicated that air-dropped flares arranged in a triangular pattern were effective in establishing attitude control under conditions of disorientation. (Modified author abstract) GRA

**N74-16856#** Naval Electronics Lab. Center, San Diego, Calif.
**NAVSHIPS DISPLAY ILLUMINATION DESIGN GUIDE. SECTION 2: HUMAN FACTORS Technical Document, Apr. 1972 - Jan. 1973**
Howard J. Heglin Jul. 1973 257 p refs
(AD-770478; NELC-TD-223) Avail: NTIS CSCL 05/5

Human factors guidelines are provided - supported by research data, tables, graphs, and charts - for general reference by designers concerned with display illumination. Consideration is given to trade-offs between ambient illumination, local illumination for design areas, and self-emanating and projected displays. Sample specification materials are included. Author (GRA)

**N74-16857#** Robotics, Inc., Elnora, N.Y.
**APPLYING FORCE FEEDBACK SERVOMECHANISM TECHNOLOGY TO MOBILITY PROBLEMS Final Report**
Ralph S. Mosher Aug. 1973 206 p refs
(Contract DAAE07-72-C-0109; DA Proj. 1T6-62601-A-045)
(AD-769952; TACOM-TR-11768; LL-144) Avail: NTIS CSCL 05/8

The report summarizes force feedback servomechanism research performed under the sponsorship of TACOM, and the advanced Project Research Agency, with the purpose of defining and exploring possible new approaches in the design of mobility aids. The fundamentals of manipulative man-machine control technology are reviewed. Factors contributing to effective bilateral servo design are discussed. Human factors related to force feedback controls are described. The development of a quadruped walking mechanism employing bilateral force feedback controls and spatial correspondence between operator controls and machine appendages is discussed in detail. A series of experiments with the quadruped test bed is described. (Modified author abstract) GRA

**N74-16858#** Naval Postgraduate School, Monterey, Calif.
**GRIP PRESSURE AS A MEASURE OF TASK DIFFICULTY IN COMPENSATORY TRACKING TASKS M.S. Thesis**
John Howard Hickok 28 Feb. 1974 50 p refs
(AD-769744) Avail: NTIS CSCL 05/10

The feasibility of utilizing the grip pressure exerted on a rigid control stick as a measure of tracking task difficulty was investigated. A device was engineered to measure grip pressure independent of control force. A hybrid computer was used to produce the tracking tasks necessary in the research and on-line data computation. Compensatory tracking tasks using specified controlled elements provided the difficulty levels, from easiest to most difficult. (Modified author abstract) GRA

**N74-16859#** Dayton Univ. Research Inst., Ohio.
**BONE STRENGTH AND IN-FLIGHT MECHANICAL STRESSES Annual Report, 15 May 1972 - 15 May 1973**
G. A. Graves and F. Noyes (AMRL, Wright-Patterson AFB, Ohio) 15 Jul. 1973 54 p refs
(Contract F44620-71-C-0083; AF Proj. 9777)
(AD-769969; AFOSR-73-1998TR; AR-2) Avail: NTIS CSCL 06/12

Sixteen ceramic samples were implanted in mature rhesus monkeys for periods of 105, 130, and 150 days. The sixteen samples consisted of four groups, each group containing a different amount of phosphorus to determine the effect of compositional variations on the ceramic microstructure, its behavior in a physiological environment and the response of the surrounding bone and soft tissue to the varying composition and/or pore structure. In addition, implant studies in rabbits have shown no biochemical effects due to the presence of the ceramic. Investigations have shown that both composition and pore structure are extremely important in the in-vivo behavior of the ceramic relative to bone ingrowth and resorbtion. (Modified author abstract) GRA

**N74-16860#** Brain Systems International, Inc., Waban, Mass.
**COLORED FILTERS AS FACTORS IN IMPROVING HUMAN VISUAL ACUITY Final Report**
Whitman A. Richards Sep. 1973 55 p refs
(Contract F33615-72-C-1342; AF Proj. 7183)
(AD-770310; BSI-01083; AMRL-TR-73-100) Avail: NTIS CSCL 05/10

When a yellow (minus blue) is placed before an observer's eyes most observers report an increase in brightness of the field viewed. This brightness increase occurs even though the radiant energy reaching the retinae is reduced. The magnitude of the effect is about 25% for filters customarily used for yellow goggles, and is restricted to photopic viewing conditions. This study examines the possibility that there may be a correlated improvement in acuity when the brightness of the field is enhanced by introducing yellow filters. (Modified author abstract) GRA

**N74-16861#** Institute of Environmental Medicine and Physiology, Seattle, Wash.

**INSTRUCTION MANUAL FOR THE IEMP DOPPLER ULTRASONIC PRECORDIAL BLOOD BUBBLE DETECTOR Final Report, 1 Nov. 1971 - 31 Dec. 1972**

Merrill P. Spencer, David C. Johanson, and Howard F. Clarke
15 Feb. 1973 49 p refs
(Contract-N00014-72-C-0095)
(AD-765369) Avail: NTIS CSCL 06/2

A report is presented detailing the operation of a 5 MHz Doppler ultrasonic bubble detector developed for use in detection of venous gas emboli formed in the blood of divers during decompression as well as for monitoring craniotomies, cardiopulmonary bypass equipment and other medical procedures where there is danger of aeroembolism. A precordial sensor employing 1/2 inch square resonant transmitting and receiving crystals separated by 2 cm and focused 2-7 cm retrosternal is emloyed for the detection of all gas emboli returning in the veins to the right heart and lungs, the precordial sensor being positioned to the left of the midsternal border over the pulmonary artery and right ventricle. Author (GRA)

**N74-16862#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**TARGET VIGILANCE EFFECTS FROM VISUAL OBSTRUCTIONS IMPOSED BY HELMET-MOUNTED DISPLAY HARDWARE Final Report**

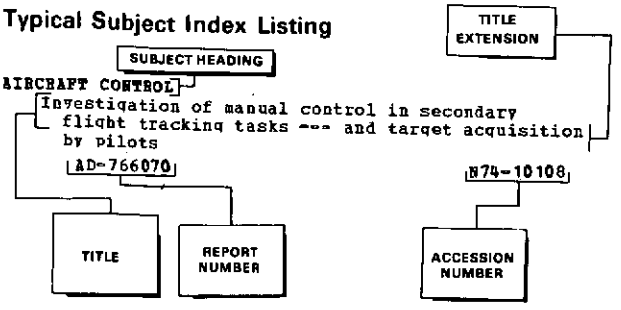
L. Ralph Chason, Jock C. H. Schwank, and Richard L. Hughes
Aug. 1973 42 p refs
(AF Proj.-7184)
(AD-770297; AMRL-TR-73-17) Avail: NTIS CSCL 05/10

The response times to and correct identification of target stimuli superimposed on panoramic scenes were measured under conditions of restriction and nonrestriction of peripheral vision. Twenty-five male subjects were assigned randomly to experimental conditions and required to search for target stimuli under simulated visual flight conditions of varying color and terrain features. A simulated helmet-mounted device was used to restrict peripheral vision. The data are viewed as supporting the position that the intrusion of a helmet-mounted device into a pilot's field of view can result in a significant decrement to his target vigilance performance. Possible implications in human engineering design and subsequent research efforts are discussed. (Modified author abstract) GRA

# Subject Index



## Typical Subject Index Listing




The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, a title extension is added, separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

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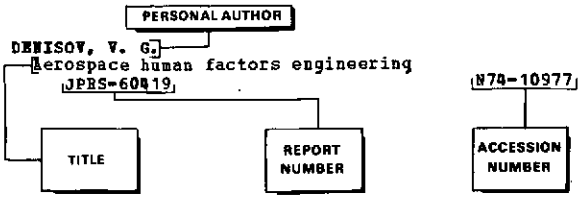
# Personal Author Index



## Typical Personal Author Index Listing




The title of the document is used to provide the user with a brief description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

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NASA-Langley, 1974