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**AEROSPACE MEDICINE
AND BIOLOGY**

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 119)

SEPTEMBER 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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IAA (A-10000 Series) A73-30961—A73-34072

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 119)

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 August 1973 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 213 reports, articles and other documents announced during August 1973 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1973 Supplements.

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GENERAL AVAILABILITY

All publications abstracted in this bibliography are available to the public through the sources as indicated in the *STAR Entries* and *IAA Entries* sections. It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

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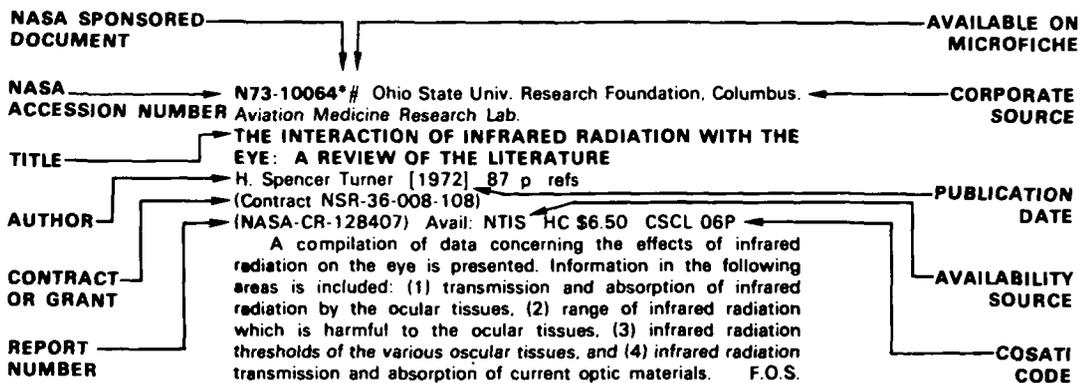
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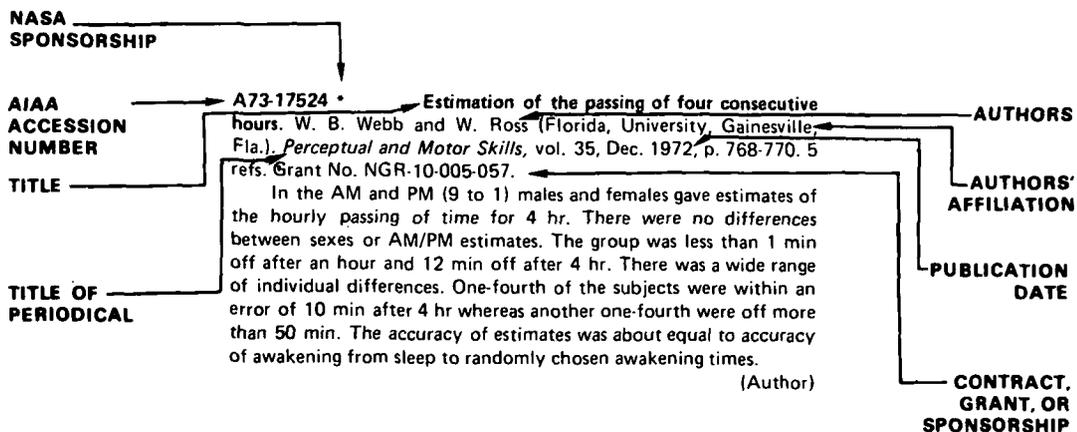
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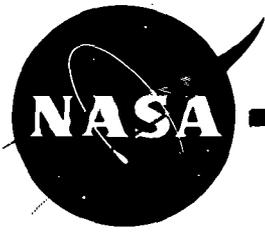
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TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY



A Continuing Bibliography (Suppl. 119) SEPTEMBER 1973

IAA ENTRIES

A73-30999 # Binocular color resolution capability of the eyes as a function of the characteristics of vision during anisometropia (Binokuliarnaiia tsvetorazlichitel'naia sposobnost' glaz v zavisimosti ot kharaktera zreniia pri anizometrii). K. G. Seidov (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Fiziologii, Baku, Azerbaidzhan SSR). *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, vol. 28, no. 8, 1972, p. 57-60. 9 refs. In Russian.

A73-31017 Brightness contrast and evoked potentials. D. Regan (Keele, University, Keele, Staffs., England) and W. Richards (MIT, Cambridge, Mass.). *Optical Society of America, Journal*, vol. 63, May 1973, p. 606-611. 27 refs. Research supported by the Medical Research Council; Contract No. F44620-69-C-0108.

The amplitude of the evoked potential (EP) generated by an oscillating checkerboard pattern remains constant, even though the brightness contrast of the checks may be significantly altered by changing fixation distance without altering retinal subtense. On the other hand, when the pattern is slightly blurred, the brightness contrast of small checks is changed only slightly, whereas the EP undergoes marked attenuation. Such a double dissociation between brightness effects and the EP shows that steady-state EP amplitude may be a very poor measure of brightness contrast, at least when the sensations are considerably above threshold. For suprathreshold stimuli, check size may also affect brightness contrast and the steady-state EP amplitude in different ways. (Author)

A73-31018 Normal fixation of eccentric targets. R. V. Sansbury, A. A. Skavenski, G. M. Haddad, and R. M. Steinman (Maryland, University, College Park, Md.). *Optical Society of America, Journal*, vol. 63, May 1973, p. 612-614. 9 refs. Grant No. NIH-EY-00325.

Experiments were performed to determine fixation stability and the eye-movement pattern when the visual error signal is generated in the peripheral retina. The contact-lens optical-lever technique was used to record two-dimensional eye movements on 35-mm infrared film. Two subjects attempted to maintain fixation at the center of a disk, at the center of two- and four-disk arrays, or to maintain the same eye position after the disk was removed from view. Both subjects showed better fixation ability with any of the visible targets than they showed in complete darkness. The target array influenced the fixation eye-movement pattern. F.R.L.

A73-31019 Threshold and suprathreshold perceptual color differences. R. F. Witzel, R. W. Burnham (Eastman Kodak Research Laboratories, Rochester, N.Y.), and J. W. Onley. *Optical Society of America, Journal*, vol. 63, May 1973, p. 615-625. 16 refs.

A73-31095 Towards jet indoctrination. P. Terry (Oxford Air Training School, Oxford, England). *Shell Aviation News*, no. 416, 1973, p. 20-23.

A Jet Procedures Trainer has been in operation at the Oxford Air Training School in the UK for a number of years. The machine is based on the Comet aircraft. Most of the time on the Jet Procedures Trainer has been used for jet transition training. Problems in the case of a transition of pilots of straight wing, propeller driven aircraft to swept wing jets are examined, giving attention to aspects of pilot instruction, selection procedures for ensuring the maintenance of pilot standards, and the correction of outdated training concepts. Specific problems which can be rectified with the aid of the Jet Procedures Trainer are related to basic swept wing jet aircraft theory, crew cooperation, altimeter setting procedures, and the revision of basic procedures. G.R.

A73-31126 Ventilatory responses to transient hypoxia and hypercapnia in man. N. H. Edelman, P. E. Epstein, S. Lahiri, and N. S. Cherniack (Pennsylvania, University, Philadelphia, Pa.). *Respiration Physiology*, vol. 17, Apr. 1973, p. 302-314. 23 refs. Grants No. NIH-HL-08805-09; No. PHS-HE-12962-01.

The difference in time course of response between peripheral chemoreceptors and receptors of the central nervous system to changes in arterial blood gas tensions suggests that, in intact human subjects, ventilatory responses to rapidly changing transient stimuli will reflect the activity of peripheral chemoreceptors rather than that of central receptors, while responses to steady-state stimuli will reflect the activity of both. This idea is used as the basis for assessing the contribution of the peripheral arterial chemoreceptors to the ventilatory response to acute hypoxia and hypercapnia in un-anesthetized man. The techniques used are an extension of those originally described by Dejourns et al. (1958). F.R.L.

A73-31127 Effect of body temperature on ventilatory transients at start and end of exercise in man. H. Vejby-Christensen and E. S. Petersen (Aarhus, University, Aarhus, Denmark). *Respiration Physiology*, vol. 17, Apr. 1973, p. 315-324. 17 refs. Research supported by the Danish Medical Research Council.

A73-31128 Bulk elastic properties of excised lungs and the effect of a transpulmonary pressure gradient. D. H. Glaister, R. C. Schroter, M. F. Sudlow, and J. Milic-Emili (RAF, Institute of Aviation Medicine, Farnborough, Hants.; Imperial College of Science and Technology, London, England). *Respiration Physiology*, vol. 17, Apr. 1973, p. 347-364. 18 refs.

A73-31129 **Transpulmonary pressure gradient and ventilation distribution in excised lungs.** D. H. Glaister, R. C. Schroter, M. F. Sudlow, and J. Milic-Emili (RAF, Institute of Aviation Medicine, Farnborough, Hants.; Imperial College of Science and Technology, London, England). *Respiration Physiology*, vol. 17, Apr. 1973, p. 365-385. 12 refs.

The results of experiments designed to study the distribution of ventilation in an excised lung preparation (isolated dog lungs and lobes, and whole monkey lungs) using boluses of radioactive xenon-133 gas introduced at various lung volumes are described. The effect of a gradient of transpulmonary pressure on this distribution is investigated and results are explained in terms of previously observed variations of the elastic properties of the lungs (authors, 1973). The effect of inverting the lungs in the fluidized bed on the pattern of ventilation is also investigated. F.R.L.

A73-31158 # **Formation of conditioned responses to symbolic stimulations in healthy individuals of different age (Utvorenna umovnikh reaktsii na simvolichni podrazniki u zdorovikh liudei riznogo viku).** E. A. Rushkevich and I. D. Golova (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 147-152. In Ukrainian.

Forty-three healthy individuals ranging in age from 12 to 94 years were tested for speech motor conditioned responses to simple-logic formulas in statements involving logic operations of negation, conjunction, disjunction, and implication. Sixteen-year old, secondary-school pupils and some individuals in the 18-30-year-old group came out on top. In the age group of 31 to 40, the number of inadequate responses becomes substantial and grows further with advancing age. M.V.E.

A73-31159 # **Analysis of evoked, initially electronegative potentials (Do analizu viklikanikh potentsialiv z pochatkovoiu elektronegativnistiu).** V. A. Gmiria and T. V. Vasechko (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 171-177. 27 refs. In Ukrainian.

Primary responses, with initially positive or negative polarity in electrical potential, arising as a result of adequate auditory zone stimulations were investigated by means of local cooling, mechanical trauma, and potential recording. The observed variations in reaction regeneration as a function of increasing stimulation rhythm are discussed. M.V.E.

A73-31160 # **Effects of vagotomy on the impulse activity of respiratory neurons (Vpliv vagotomii na impul'snu aktivnist' dikhal'nikh neironiv).** T. L. Zhigailo and A. A. Nuridzhanova (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 178-181. 12 refs. In Ukrainian.

In experiments on cats under chloralose-nembutal narcosis, the effects of bilateral vagotomy on the impulse activity of bulbar respiratory neurons were studied. Among all the investigated quantitative impulse activity indices of bulbar respiratory neurons following vagotomy, the distribution character of interimpulse intervals along the volley path is the most stable. M.V.E.

A73-31161 # **The role of carotid sinuses in the regulation of hemodynamics during motor activity (Pro rol' karotidnikh sinusiv u reguliatsii gemodinamiki pri rukhovii aktivnosti).** M. I. Gurevich, M. V. Il'chevich, T. Mansurov, and Iu. P. Bidzilia (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR; Andizhans'kii Pedagogichnii Institut, Andizhan, Uzbek SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 182-188. 29 refs. In Ukrainian.

A73-31162 # **Reactivity and certain metabolic indices during prolonged sustenance of animals in artificial nutrient conditions (Reaktivnist' i deiaiki pokazniki obminu rechovin pri trivalomu utrimanni tvarin na shtuchnikh kharchovikh rezhimakh).** L. I. Starushenko (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii; Kiiv's'kii Institut Gigieni Kharchuvannia, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 211-218. 17 refs. In Ukrainian.

A73-31163 # **Aspects of air flow to the olfactory region of the human nose (Do pitannia pro rukh povitria do niukhovoi oblasti nosa liudini).** B. V. Shevrigin (Tsentral'nyi Institut Vdoskonalennia Likariv, Moscow, USSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 247-249. 7 refs. In Ukrainian.

The mechanism of air flow to the olfactory region was examined in 200 healthy subjects and in 300 patients (with various pathological nasal states) over a protracted period beginning in 1967 and employing various experimental techniques. The results obtained are used to describe patterns and degrees of air movement in nasal passages during inhalation and exhalation. It is concluded that air reaches the olfactory region not only in forced inhalation (sniffing) and not only by slow diffusion but also by ordinary nasal breathing both in exhalation and inhalation. T.M.

A73-31164 # **Age peculiarities of whole-blood transketolase activity in healthy persons (Vikovi osoblivosti aktivnosti transketolazi tsil'noi krovi u zdorovikh osib).** P. M. Karabun and A. G. Smirnov (Kiiv's'kii Institut Endokrinologii i Obminu Rechovin, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 252-254. 9 refs. In Ukrainian.

A73-31165 # **Fibrinolytic activity of urine in healthy persons (Fibrinolitchna aktivnist' sechi u zdorovikh osib).** G. O. Belits'ka (Kiiv's'kii Medichnii Institut, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 254-256. 8 refs. In Ukrainian.

A73-31166 # **Influence of ribonuclease on changes in the membrane potential of muscle fibers evoked by stimulation of the sympathetic nerve (Vpliv ribonukleazi na zmini membrannogo potentsialiu m'iazovikh volokon, viklikani stimulatsieiu simpatic'hogo nerva).** I. V. Frol'kis (Kiiv's'kii Medichnii Institut; Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 256, 257. In Ukrainian.

A73-31167 # **Procedure for recording the rate of pressure changes in heart cavities (Do metodiki reestratsii shvidkosti zmin tisku v porozhninakh sertsia).** O. O. Moibenko and D. O. Golov (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, Mar.-Apr. 1973, p. 258-260. 18 refs. In Ukrainian.

Description of catheter probes, strain-gauge sensors, and signal processing electronics (amplifiers and differentiators) used to record rates of pressure changes in heart ventricles. The equipment described has an overall uniform frequency response to 150 Hz. A strip-chart recorder is used to plot the measurements, and sample records show pressure curves in the left ventricle of a dog as measured without opening the chest cavity. T.M.

A73-31168 # **A simplified method of calculating thermidilution curves (Sproshchena metodika rozrakhunku krivoi termidilutsii).** Iu. P. Bidzilia (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19,

Mar.-Apr. 1973, p. 260-262. In Ukrainian.

When calculating blood minute volume by the thermodilution method, it is proposed that the area bounded by the ascending segment of the temperature-time curve should be determined according to a formula obtained by integration of this segment of the curve. Comparison with calculations by other methods indicates an accuracy improvement of 0.9 percent of the area bounded by the curve. T.M.

A73-31169 # Changes in the quantity of overall sulfhydryl groups in the blood of persons coming in contact with microwave radiation sources (Izmenenie kolichestva obshchikh sul'fgidril'nykh grupp v krovi u lits, kontaktiruiushchikh s generatorami SVCh izlucheni). F. A. Kolesnik and N. A. Komogortseva. *Voenna-Meditsinskii Zhurnal*, Mar. 1973, p. 63, 64. In Russian.

A73-31170 # The combined influence of microwave radiation and an adverse climate on the organism (Kombinirovannoe vliianie SVCh polia i neblagopriiatnogo mikroklimata na organizm). V. A. Zhuravlev. *Voenna-Meditsinskii Zhurnal*, Mar. 1973, p. 64-67. In Russian.

Rats were daily subjected to one hour of 10-cm electromagnetic irradiation (5 mW/sq cm) followed by one hour of exposure to air temperature of 40 C at 22 to 25% relative humidity over a period of 60 days. Results indicate that the combination of microwave radiation with adverse climatic conditions produces evident functional changes in the organism and also increases the level of dystrophic changes of certain organs. This is demonstrated by increased erythrocyte and hemoglobin levels and by reduced catalase activity and blood viscosity. T.M.

A73-31171 # Disturbances of the pilot's efficiency (O naru-sheniakh rabotosposobnosti letchika). A. M. Pivovskii. *Voenna-Meditsinskii Zhurnal*, Mar. 1973, p. 70-73. In Russian.

Causes of partially reduced pilot efficiency as well as total loss of the capacity to perform required functions are examined in an attempt to distinguish factors which could be recognized and handled in advance by professional services of the flight surgeon from those factors over which the flight surgeon exercises no direct control (failure to follow regulations or equipment malfunction). Attention is given to the coordination of tasks and division of responsibility between flight surgeons and other executive personnel for the purpose of developing appropriate methods of diagnosing medical factors and documenting case histories. T.M.

A73-31172 # Special physical training of pilots as a prophylactic measure against obesity (Spetsial'naia fizicheskaia trenirovka letchikov kak sredstvo profilaktiki ozhireniia). B. V. Evstaf'ev. *Voenna-Meditsinskii Zhurnal*, Mar. 1973, p. 74-76. In Russian.

Description of a three-month experiment designed to study the effects of special dynamic and isometric exercises on the physical condition of a group of overweight pilots (average age in the group was 36). The set of exercises was specialized in the sense (1) of improving physical resistance to adverse factors of prolonged flights and (2) of safeguarding the health of subjects requiring a higher level of medical supervision in exercise. Results of training revealed a marked improvement of physical status, and recommendations are given for conducting training sessions with isolated groups of individuals tending to obesity. T.M.

A73-31173 # Vein wall changes as the main cause of acute disturbance of blood circulation in the Vena centralis retinae system (Izmenenie venoznoi stenki kak osnovnaia prichina ostrogo narusheniia krovoobrashcheniia v sisteme tsentral'noi veny setchatki). A. A. Triakov. *Voenna-Meditsinskii Zhurnal*, Mar. 1973, p. 78-80. In Russian.

A73-31174 # Investigation of the influence of biologically active substances on the permeability of the skin (Izuchenie vliianiia biologicheskii aktivnykh veshchestv na pronitsaemost' kozhi). V. A. Bandarin, V. G. Kolb, and V. S. Ulashchik (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady*, vol. 17, Mar. 1973, p. 283-285. 7 refs. In Russian.

It is shown that the effect of biologically active substances on the ionophoretic permeability of the skin depends both on the pharmacological activity of these substances and on the physicochemical parameters of the ions introduced. Acetylcholine and urotropin are shown to increase the ionophoretic permeability of the skin for simple ions, whereas novocain and chlorethyl have no effect on permeability. V.P.

A73-31343 Energy balance during moderate exercise at altitude. P. Varene, C. Jacquemin, J. Durand, and J. Raynaud (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne; Centre Chirurgical Marie Lannelongue, Paris, France; Instituto Boliviano de Biología de Altura, La Paz, Bolivia). *Journal of Applied Physiology*, vol. 34, May 1973, p. 633-638. 21 refs. Research supported by the Service de la Coopération Technique and Délégation Générale à la Recherche Scientifique et Technique.

The purpose of this study was to determine the effects of chronic hypoxia on heat exchange mechanisms during exercise in acclimatized and unacclimatized subjects at altitude. Core temperature increased by the same increment at the end of exercise in all subjects, whereas mean skin temperature rose in subjects in their own environment and decreased in unacclimatized subjects. The energy balance was calculated by partitioned calorimetry. The body stored heat during entire exercise in each case; radiant plus convective heat loss rate was lower and evaporative loss rate higher for lowlanders when relocated at altitude than at sea level. Thermoregulatory mechanisms were unaffected at altitude by either relative work load or barometric pressure. However, the relative part played by heat-dissipating mechanisms was different. (Author)

A73-31344 Sustained human skin and muscle vasoconstriction with reduced baroreceptor activity. L. B. Rowell, C. R. Wyss, and G. L. Brengelmann (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 34, May 1973, p. 639-643. 28 refs. Grant No. NIH-RR-37.

To determine whether reduced baroreceptor stimulation causes sustained cutaneous vasoconstriction, seven men were exposed to lower body negative pressure (LBNP) in a three-part experiment. Part I: total forearm blood flow (FBF) was simultaneously measured by plethysmography in both arms during supine rest followed by 7-8 min of LBNP at -30 mm Hg and -50 mm Hg. FBF in the two arms tracked each other closely throughout. Part II: the above procedure was repeated after skin circulation was arrested in one arm by epinephrine iontophoresis which reduced FBF in that arm by 50%. FBF in both arms fell by the same percentage during LBNP, but absolute flow decrease in the treated arm was half that of the control. Thus, skin and muscle contributed equally to total FBF reduction. Part III: using the same protocol, muscle blood flow was measured in one arm using antipyrine/1-125 clearance. Results indicated that 50% of the decrease in FBF was in muscle. We conclude that reduced baroreceptor stimulation can elicit sustained cutaneous vasoconstriction in man. (Author)

A73-31345 Assessment of left heart function by non-invasive exercise test in normal subjects. B. Ayotte, H. Bogren, E. Carlsson, and M. McIlroy (California, University, San Francisco, Calif.). *Journal of Applied Physiology*, vol. 34, May 1973, p. 644-649. 16 refs. Grant No. NIH-HL-6285.

An objective, noninvasive measurement of circulation time - a resaturation curve - has been combined with a noninvasive rebreathing measurement of cardiac output to study cardiac function during

exercise. From indicator-dilution theory, it is possible, from the results of these two measurements, to calculate a central blood volume, a left heart mixing volume, and a clearance fraction (a reflection of left ventricular ejection fraction). This paper reports the results of calculations in 16 normal subjects using these two techniques during a standardized exercise test. (Author)

A73-31346 Cyclical variations in FRC and other respiratory variables in resting man. M. P. Hlastala, B. Wranne, and C. J. Lenfant (Washington, University, Seattle, Wash.; National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *Journal of Applied Physiology*, vol. 34, May 1973, p. 670-676. 16 refs. Grants No. PHS-HE-12174; No. PHS-HE-05819.

Breath-to-breath changes in functional residual capacity (FRC), oxygen uptake, carbon dioxide release, tidal volume, respiratory period, alveolar gas tension, and heart rate were monitored in resting recumbent male subjects. Primary frequencies of oscillation were determined by visual analysis of raw data, autocorrelation, and power spectral analysis. FRC showed an oscillating pattern with from two to seven predominant frequencies. The major oscillation had a period varying between 8.3 and 28 min from subject to subject with an amplitude varying from 42 to 176 ml. Other major oscillations were present at higher frequencies with lower amplitudes. Oscillations in the other parameters were less marked and with less distinct frequencies. (Author)

A73-31347 * Plasma electrolytes, pH, and ECG during and after exhaustive exercise. N. Coester, J. C. Elliott, and U. C. Luft (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.). *Journal of Applied Physiology*, vol. 34, May 1973, p. 677-682. 24 refs. Contract No. NAS9-7009.

Ten men worked on a bicycle ergometer at increasing work loads to exhaustion in 15 min. Each performed one test breathing air and another with added CO₂ in random sequence. ECG was recorded during exercise and for 30 min of recovery. Arterial samples for blood gases, pH, and electrolytes were drawn at rest, in the last minute of exercise and at 1, 4, 10, 20, and 30 min thereafter. A striking increase in the amplitude of T and P waves was observed reaching a maximum in the first 2 min after exercise. All electrolytes measured were increased at the end of exercise, most markedly potassium (60%) and phosphorus (53%). Potassium dropped faster than all others to below resting values in 4 min coinciding with the lowest levels in plasma bicarbonate. ECG alterations were not closely related in time with any single factor such as potassium, but appeared to reflect an interaction of the transient mineral and acid-base imbalance during and immediately following exhaustive exercise. (Author)

A73-31348 Computer simulation of gas exchange in human lungs. D. A. Scrimshire, P. J. Tomlin, and R. A. Ethridge (University of Aston; Birmingham, University, Birmingham, England). *Journal of Applied Physiology*, vol. 34, May 1973, p. 687-696. 21 refs. Research supported by the United Birmingham Hospitals Endowment Fund and Science Research Council of England.

The limitations of the classical ventilation-perfusion equations are discussed, and an alternative description of gas exchange in the lungs is proposed in the form of a computer model based on morphometric data. The model is used to simulate both steady-state and nonsteady-state gas exchange at various levels of cardiac output, ventilation, and respiratory rate. Information is presented regarding the dependence of nitrogen washout curves upon the composition of the eluting gases. (Author)

A73-31371 Electrophysiological evidence that abnormal early visual experience can modify the human brain. R. D. Freeman and L. N. Thibos (California, University, Berkeley, Calif.). *Science*,

vol. 180, May 25, 1973, p. 876-878. 47 refs.

Visual resolution in humans is nearly equal for vertically and horizontally oriented detail, but for some subjects there is a substantial difference in resolving power for these orientations. Although subjects who exhibit this difference invariably have ocular astigmatism, optical explanations of the effect can be ruled out. Direct evidence has been found for an electrophysiological correlate to the psychophysical finding. Subjects who have reduced resolution for a pattern of a particular orientation also show a decreased evoked potential response elicited by a target of the same orientation. The results are consistent with the hypothesis that a deficiency of specific features in the early visual input can alter the organization of the visual pathways. (Author)

A73-31375 # Engineering psychology in aviation and astronautics (Inzhenernaia psikhologiya v aviatsii i kosmonavtike). V. G. Denisov and V. F. Onishchenko. Moscow, Izdatel'stvo Mashinostroenie, 1972. 315 p. 95 refs. In Russian.

Some aspects of the man-machine interaction under various flight conditions are discussed. Some of the newest experimental flight-control data are generalized and are analyzed from the point of view of engineering psychology. The changes in the psychophysiological indices of the human operator in his adaptation to the machine are examined. The principal theoretical problems of the man-machine system in aviation are formulated, and possible approaches to their solution are discussed. V.P.

A73-31390 # Serotonin content in various parts of the brain during hibernation and awakening (Soderzhanie serotoninina v razlichnykh otdelakh golovnogo mozga vo vremia zimnei spiachki i probuzhdeniia). N. N. Kudriavtseva and N. K. Popova (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 75, Apr. 1973, p. 44-47. 11 refs. In Russian.

An increase in serotonin level in the metencephalon and the hippocampus is shown to accompany the hibernation of *Citellus major erythrogenus*. During hibernation serotonin content remains high in the hippocampus. After awakening, it drops not only in the hippocampus, but also in the metencephalon, diencephalon, and mesencephalon. M.V.E.

A73-31391 # Characteristics of the narcotic action of hexenal in combination with aminothiol-series radioprotective drugs in irradiated animals (Osobennosti proiavlennii narkoticheskogo deistviia geksenalu v sochetanii s radioprotektorami aminotiolovogo riada v obluchennykh zhivotnykh). Z. F. Loskutova and P. P. Saksonov. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 75, Apr. 1973, p. 59, 60. 6 refs. In Russian.

A73-31392 # Study of myocardial antigen localization using the immunofluorescence method (Izuchenie lokalizatsii antigenov miokarda metodom immunofluoresentsii). G. A. Ugriumova and N. A. Borodiuk (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 75, Apr. 1973, p. 70-73. 20 refs. In Russian.

Investigation by the immunofluorescence method of the localization of myocardial antigens, earlier detected by immunodiffusion methods. Of the two antigens detected and investigated, one was found to be localized in the myocardial sarcolemma in the species of animals studied as well as in man, whereas the other was thus found only in primates. M.V.E.

A73-31393 # Histochemical investigation of some energy metabolism characteristics in a rat heart after acute fatigue (Gistokhimicheskoe issledovanie nekotorykh pokazatelei energeticheskogo obmena v serdtse krysy posle ostrogo utomleniia). N. I. Koval'skaia (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten'*

Ekspperimental'noi Biologii i Meditsiny, vol. 75, Apr. 1973, p. 109-113. 21 refs. In Russian.

A73-31394 # Technique for measuring the vessel blood pressure in long continued experiments (Metodika izmereniia kroviannogo davleniia v sosudakh v khronicheskoi opyte). N. V. Bekauri, S. Kh. Bogorad, L. I. Kolosova, and O. N. Fadeeva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Ekspperimental'noi Biologii i Meditsiny*, vol. 75, Apr. 1973, p. 119-121. In Russian.

Description of a device for measuring the vessel blood pressure in experiments of long duration. The device consists of an implanted blood pressure transducer, placed about a blood vessel without impairing the vessel wall integrity, as well as of a stabilized ac current generator, and a recorder. Positive results have been obtained in tests upon animals using an experimental version of the device. M.V.E.

A73-31501 # Microbiological investigations in space flights (Mikrobiologicheskie issledovaniia v kosmicheskikh poletakh). A. A. Lukin and G. P. Parfenov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 3-13. 42 refs. In Russian.

International literature survey on microbiological space research published during the period from 1930 to 1970. The results of experiments performed on high-altitude balloons, rockets, and satellites are included. Weightlessness is shown to exert no significant effect on the growth, development, and mutagenesis of microorganisms. The contradictions presented by some experimental findings are discussed. Tasks for future research are outlined. M.V.E.

A73-31502 # Investigation of some blood characteristics in albino rats subjected to 60-day hypokinesia (Issledovanie nekotorykh pokazatelei krovi u belykh krysh, nakhodiashchikhsia v usloviakh 60-sutochnoi gipokinezii). P. V. Vasil'ev, N. N. Uglova, A. I. Volozhin, and V. E. Potkin. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 13-17. 12 refs. In Russian.

A73-31503 # Protein and nucleic acid contents in animal tissues under hypokinesia (Soderzhanie belka i nukleinovyykh kislot v tkaniakh zhivotnykh pri gipokinezii). I. V. Fedorov and I. F. Shurova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 17-21. 15 refs. In Russian.

Protein, DNA and RNA were determined in the liver, kidneys, heart, brain and skeletal muscles of 88 rats, kept without motion constraints, or confined in small cages for 15, 30 or 60 days under motion constraints. The diverse variations of protein, DNA and RNA contents due to hypokinesia are discussed. Termination of growth and loss of weight in experimental rats are linked primarily to alterations in muscle tissues, with the reduction of weight in internal organs being a secondary factor. V.Z.

A73-31504 # Functional condition of skeletal muscles in rats under lasting movement constraints /up to 120 days/ (O funktsional'nom sostoianii skeletnykh myshits krysh pri dlitel'nom ogranichenii podvizhnosti /do 120 sutok/). V. S. Oganov and A. N. Potapov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 22-26. 21 refs. In Russian.

A73-31505 # Effect of prolonged hypokinesia on certain energy transfer characteristics in skeletal muscles and some internal organs (Vliianie dlitel'noi gipokinezii na nekotorye pokazateli energeticheskogo obmena v skeletnoi myshitse i v nekotorykh vnutrennikh organakh). N. P. Rassolova, A. N. Potapov, I. M. Sapelkina, and I. I. Grebennikova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 26-33. 19 refs. In Russian.

A73-31506 # Cerebellar responses of animals under varied rotation conditions in a centrifuge (Reaktsii mozghechka pri razlichnykh rezhimakh vrashcheniia zhivotnykh na tseftrifuge). L. D. Klimovskaia and N. P. Smirnova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 33-37. 11 refs. In Russian.

Investigation of the possibility to modify the cerebellar responses in rats to centripetal accelerations under varied rotation velocity and duration conditions. The results indicate no cumulation of acceleration effects nor cerebellar adaptation in response to variations in the rotation conditions. M.V.E.

A73-31507 # Asymmetry of otolith responses in fish (Ob asimetrii otolitovykh reaktsii u ryb). G. I. Samarin and B. B. Egorov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 37-40. 15 refs. In Russian.

In experiments performed on nine adult pikes, the eye tonic movement in response to displacements of the statolith of the left and right utriculus (called the otolith reaction) was studied. A statistically significant asymmetry of the sensitivity of the otolith receptors was established. This asymmetry of the otolith apparatus may constitute one of the factors causing vestibular disturbances in astronauts during space flights. M.V.E.

A73-31508 # Study of the effect of increased oxygen concentration on the metabolism of *Chlorella* (Issledovanie vliianiia povyshennykh konsentratsii kisloroda na metabolizm Khlorelly). G. I. Meleshko, A. A. Antonian, A. I. Kazakhov, and E. K. Lebedeva. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 41-44. 13 refs. In Russian.

The intensity of *Chlorella* photosynthesis is shown to depend linearly on the oxygen concentration in the atmosphere. Over the oxygen content range from 5 to 50%, an increase in oxygen concentration by 5% decreases the photosynthesis intensity on average by 15% of the initial value. M.V.E.

A73-31509 # Effect of antiradiation drugs on the functional condition of the vestibular analyzer (Vliianie radiozashchitnykh veshchestv na funktsional'noe sostoianie vestibuliarnogo analizatora). L. N. Suslova, V. I. Efimov, L. N. Kornilova, P. I. Kumets, and A. A. Losev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 45-48. 9 refs. In Russian.

In used test doses, ambratine, mexamine, and amitetravite antiradiation drugs produced no negative effect on the state of the vestibular analyzer and induced no vestibular stability decrease in animals and humans. The use of vestibular reactions is recommended for assessing the effect of antiradiation drugs on living organisms. M.V.E.

A73-31510 # Effect of steady magnetic fields up to 4,500 Oe on the mitotic activity of the corneal epithelium in mice (O vliianii postoiannykh magnitnykh polei do 4500 ersted na mitoticheskuu aktivnost' epiteliia rogovitsy myshei). G. V. Galaktionova and A. D. Strzhizhovskii. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 49-51. In Russian.

A73-31511 # Effect of protein quality in the diet of rats on their tolerance to severe hypoxia (Vliianie kachestva belka v ratsione krysh na perenosimost' imi ostroi gipoksii). V. I. Fofanov, N. A. Agadzhanian, G. I. Kozinets, and A. V. Sergienko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 51-55. 13 refs. In Russian.

Investigation of the interrelation of the protein quality in the diet of rats and their tolerance to severe hypoxia. Animal protein deficiency in the diet is found to decrease substantially the altitude tolerance in sexually immature animals. M.V.E.

A73-31512 # Dynamic katathermometer for measuring the cooling effect of an ambient medium (Dinamicheskii katatermometr dlia izmereniia okhlazhdaiushchego vliianiia vneshnei sredy). L. Novak and Ia. Chesnek (Ceskoslovenska Akademie Ved, Biofizikalni Ustav, Brno, Czechoslovakia). (*Mezhdunarodnyi Biofizicheskii Kongress, 4th, Moscow, USSR, Aug. 7-14, 1972.*) *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 56-60. 6 refs. In Russian.

Description of an electric katathermometer designed to provide fast, continuous, and accurate measurements of the cooling effect of an ambient medium. The instrument consists of a sensing element, a control unit that maintains the sensor surface temperature within narrow variation limits, and a power source. Presented results demonstrate the suitability of the instrument for measuring the environmental cooling effect in a metabolic chamber ventilated at different rates and for recording continuously the effect of minor and varied air motions on the output of a homothermal system.

M.V.E.

A73-31513 # Changes in cardiac activity and in the latter's phase structure during decompression of the lower half of the body (Izmerenie serdechnoi deiatel'nosti i ee fazovoi struktury pri dekompressii nizhnei poloviny tela). V. G. Voloshin and L. Ia. Divina. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 60-65. 13 refs. In Russian.

Study of the phase structure of the cardiac cycle during exposure of test subjects to lower body negative pressures of 40, 50, and 80 mm Hg. Increases in the heart rate, myocardial tension and systolic indices, and isometric contraction periods were observed, along with decreases in the ejection phase of the mechanical systole. These changes are discussed in relation to the lower body decompression amount.

M.V.E.

A73-31514 # Retinal vessel reactions and intraocular tension in humans staying in a horizontal position for 120 days (Reaktsii sosudov setchatki glaza i vnutriglaznoe davlenie pri 120-sutochnom prebyvanii cheloveka v gorizonta'nom polozhenii). M. P. Kuz'min. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 65-69. 12 refs. In Russian.

A73-31515 # Ways of enhancing the efficiency of physical exercise (Puti povysheniia effektivnosti fizicheskoi trenirovki). V. A. Tishler, V. V. Bazhanov, N. I. Gof'tsman, L. S. Aleev, S. G. Bunimovich, and B. Ia. Shpichinetskii. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 69-74. 8 refs. In Russian.

Existing physical exercises for astronauts in space flight suffer from the drawback of not accurately straining all the muscle systems in a manner that would reflect their normal usage in the presence of gravity. The present work explores the possibility of recording sensory inputs normally experienced during earthbound activity for subsequent use in stimulating astronauts to evoke coordinated motor and sensory responses closely approximating normal gravity conditions. Measures discussed include presentation of sound-track moving-picture scenes synchronized with electric stimuli of muscles recorded on magnetic tape. Preliminary experiments are outlined.

T.M.

A73-31516 # Influence of stimulation of the vestibular analyzer under conditions of hypoxia on certain functions of the visual analyzer (Vliianie razdrzheniia vestibuliarnogo analizatora v usloviakh gipoksii na nekotorye funktsii zritel'nogo analizatora). S. S. Markarian, N. T. Drozdova, and I. A. Sidel'nikov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 75-78. 6 refs. In Russian.

Visual acuity and field of view were measured in human control subjects exposed to Coriolis forces and in human test subjects exposed to the combined effects of Coriolis forces and hypoxia

(breathing with a 10.5% oxygen mixture equivalent to 5000-m altitude). Observations of eye surfaces and photography of the fundus oculi were conducted immediately after exposure to the test conditions. Hemodynamic changes observed in retinal vessels are described together with other visual disturbances particularly aggravated by hypoxic hypoxia during motion sickness.

T.M.

A73-31517 # Study of lymphocyte chromosome aberrations in human peripheral blood under in vitro exposures to 645-MeV protons and X-rays (Issledovanie khromosomnykh aberratsii v limfotsitakh perifericheskoi krovi cheloveka pri vozdeistvii in vitro protonami s energiei 645 MEV i Rentgenovskimi luchami). N. I. Ryzhov, A. M. Totseva, R. D. Govorun, T. S. Maliutina, and V. N. Gerasimenko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 79-83. 9 refs. In Russian.

A73-31518 # Calculation of a Coriolis acceleration acting on semicircular canal receptors of man in rotating systems (Raschet uskoreniia koriolis, deistvuiushchego na retseptory polukruzhnykh kanalov cheloveka vo vrashch'aiushchikhsia sistemakh). I. Iu. Sarkisov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 84-86. 9 refs. In Russian.

A73-31519 # Influence of restricted motor activity on the resistance of animals to acute action of carbon monoxide (Vliianie ogranicheniia dvigatel'noi aktivnosti zhivotnykh na ikh ustoiichivost' k ostromu vozdeistviiu okisi ugleroda). B. I. Abidin, V. I. Belkin, L. T. Poddubnaia, and G. D. Iukhnovskii. *Kosmicheskaiia Biologiia i Meditsina*, vol. 7, Mar.-Apr. 1973, p. 86-88. 11 refs. In Russian.

Effects of prolonged hypokinesia on resistance to carbon monoxide exposure were studied with male rats confined for 3, 15, and 30 days in special cages restricting movement. Control rats were kept in normal laboratory conditions. Hypokinesia increased oxygen uptake by 16% as compared to the control rats. Exposure to a 3.75 ml/l concentration of carbon monoxide for 45 min produced no deaths in the control group. Two of the eight rats exposed to a 3-day confinement perished after 40 and 43 min, and seven in each of the eight-rat groups exposed to 15- and 30-day confinements perished after 12 to 15 min.

T.M.

A73-31549 * The calculation of proportional counter energy-deposition spectra from experimental data. J. E. Steigerwalt and N. A. Baily (California, University, La Jolla, Calif.). *Radiation Research*, vol. 53, Jan. 1973, p. 1-14. 17 refs. Grant No. NGL-05-009-103.

The experimental approach considered requires the measurement of energy-absorption distributions for a set of pathlengths which define a biological volume. A suitable folding procedure is necessary to produce composite energy-absorption distributions. The investigation is concerned with the quality of the prediction of energy-deposition distributions, taking into account distributions measured with a proportional counter.

G.R.

A73-31623 # Some compensatory adjustment reactions of the blood circulation system in pulmonary pathology (Deiaki kompensatorno-pristosuval'ni reaktsii aparatu krovoobigu pri legenevii patologii). G. G. Gorovenko, B. M. Brusilovskii, L. I. Zhukovskii, and V. A. Tsurul'nikov. *Akademiia Nauk Ukrain's'koi RSR, Visnik*, vol. 37, Mar. 1973, p. 29-32. 31 refs. In Ukrainian.

A73-31749 Does one sleep to forget or to remember (Dort-on pour oublier ou pour se souvenir). J. Foret. *La Recherche*, vol. 4, May 1973, p. 490-492. In French.

Many publications have for several years affirmed that, in man

at least, it is slow sleep which would be most effective for fixation of the memory, and that paradoxal sleep plays no role in this process. Recordings of light and paradoxal sleep are displayed graphically and are discussed extensively. There are three very different states in the course of a normal day: waking, sleep, and paradoxal sleep. The latter, the state in which dreams occur, is a period of intense cerebral activity. F.R.L.

A73-31799 # Technique for recording muscle biopotentials by means of implanted electrodes (Do metodiki vidvedennia biopotentsialiv m'iaziv za dopomogoiu vzhivlenikh elektrodov). V. S. Kotok and V. F. Moroz (Akademiia Nauk Ukrain'skoi RSR, Institut Zoologii, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrain'skoi RSR, Dopovid, Seriya B - Geologiya, Geofizika, Khimiia i Biologiya*, vol. 35, Mar. 1973, p. 277-279. 5 refs. In Ukrainian.

Description of a device for improving the technique of obtaining biopotentials from electrodes implanted in the extremity muscles of animals. The device consists essentially of a connector acting as a link between the wires coming from the implanted electrodes and the wires leading from the connector to the biopotential amplifier. M.V.E.

A73-31823 # Biology and physics (Biologiya i fizika). A. V. Vol'kenshtein (Akademiia Nauk SSSR, Institut Molekuliarnoi Biologii, USSR). *Uspekhi Fizicheskikh Nauk*, vol. 109, Mar. 1973, p. 499-515. 61 refs. In Russian.

Discussion of the present state of molecular biology against a background of modern theoretical physics. The topics include physical interpretations of ontogenesis and phylogenesis, Eugen's theory of the prebiological evolution of macromolecules, and a model of prebiological and biological evolution proposed by Kuhn (1972). V.Z.

A73-31824 # Biological order, structure and instabilities (Biologicheskii poriadok, struktura i neustoiichivost'). I. Prigogine (Bruxelles, Université Libre, Brussels, Belgium) and G. Nicolis (Texas, University, Austin, Tex.). (*Quarterly Reviews of Biophysics*, vol. 4, no. 2, 3, 1971.) *Uspekhi Fizicheskikh Nauk*, vol. 109, Mar. 1973, p. 517-544. 53 refs. In Russian. (Translation).

A translation of a review which appeared in Quarterly Review of Biophysics in 1971, covering the thermodynamics of irreversible biological processes, chemical instabilities in homogeneous media, localized dissipative structures in inhomogeneous media, and experimental demonstrations of the existence of dissipative structures. The topics also include the state of living systems in terms of the second law of thermodynamics; randomness and order in biological systems; hierarchic organization of structures; stability analysis of dissipative structures; instabilities in organic and enzymatic reactions; and future trends in molecular biology. V.Z.

A73-31825 # Molecular self-organization and the early stages of evolution (Molekuliarnaia samoorganizatsiia i rannie stadii evoliutsii). M. Eigen (Max-Planck-Institut für biophysikalische Chemie, Göttingen, West Germany). (*Quarterly Reviews of Biophysics*, vol. 4, no. 2, 3, 1971.) *Uspekhi Fizicheskikh Nauk*, vol. 109, Mar. 1973, p. 545-589. 53 refs. In Russian. (Translation).

A translation of a review which appeared in Quarterly Review of Biophysics in 1971, covering the phenomenological theory of selection, limitations of the deterministic theory of selection, and their applications to self-organized biological systems. The topics also include instructive properties on the molecular level; conditions and substances active in selection; a phenomenological equation and selection equilibrium and kinetics; true self-instruction, complementary instruction and cyclical catalysis; and a self-reproducing hyper-cycle with a coded catalytic function. V.Z.

A73-31875 # Correlational inter-relationships between the neuroendocrinal system and the genotype in the formation of protective reactions of the organism (O korrelativnykh vzaimootnosheniakh mezhdou neuro-endokrinnoi sistemoi i genotipom v formirovanii zashchitnykh reakttsii organizma). P. I. Shchukin (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaja*, Mar.-Apr. 1973, p. 196-209. 101 refs. In Russian.

A73-31922 Relative rates of arterial lactate and oxygen-deficit accumulation in hypoxic dogs. S. M. Cain (Alabama, University, Birmingham, Ala.). *American Journal of Physiology*, vol. 224, May 1973, p. 1190-1194. 5 refs. Grant No. NIH-HE-14693.

A73-31923 Transductal fluxes of Na, K, and water in the human eccrine sweat gland. J. Mangos (Wisconsin, University, Madison, Wis.). *American Journal of Physiology*, vol. 224, May 1973, p. 1235-1240. 11 refs. Research supported by the National Cystic Fibrosis Research Foundation; Grant No. NIH-AM-6365.

The bidirectional fluxes of Na, the net influx of K, and the net fluxes of water were studied in the human sweat duct in vitro by free-flow microperfusion with sweat resembling the primary secretory fluid and by microanalysis of the fluid samples obtained. Full-thickness skin explants were mounted in a specially designed chamber and single sweat ducts were perfused. The transductal water fluxes were small. Opposing changes in perfusion rates, net Na reabsorption, and calculated Na back-diffusion resulted in constant values of total Na reabsorption. Net K influx was a small fraction of Na reabsorption at the three perfusion rates. Addition of ouabain to the bath medium decreased both the Na reabsorption and K influx. F.R.L.

A73-31996 Assessment of left ventricular performance in man - Instantaneous tension-velocity-length relations obtained with the aid of an electromagnetic velocity catheter in the ascending aorta. K. L. Peterson, J. B. Uther, R. Shabetai, and E. Braunwald (California, University, San Diego, Calif.). *Circulation*, vol. 47, May 1973, p. 924-935. 22 refs. Grant No. PHS-HL-12373; Contract No. PHS-PH-43-68-1332-7.

A73-31997 Echocardiographic detection of regional myocardial infarction - An experimental study. R. E. Kerber and F. M. Abboud (Iowa, University; U.S. Veterans Administration Hospital, Iowa City, Iowa). *Circulation*, vol. 47, May 1973, p. 997-1005. 17 refs. Research supported by the Iowa Heart Association; Grant No. NIH-HL-14388.

The possibility was considered that changes in the motion of one area of infarcted myocardium may not correlate well with changes in overall ventricular performance. It was tried to determine if localized areas of infarction would produce specific alterations in the normal left ventricular posterior wall echocardiogram. It was also investigated whether such alterations, if present, affected the use of posterior wall velocity as an index of ventricular performance. G.R.

A73-31999 Calculation of temperature distribution in the human body. C. E. Huckaba, L. W. Hansen, J. A. Downey, and R. C. Darling (Columbia University, New York, N.Y.). *AIChE Journal*, vol. 19, May 1973, p. 527-532. 15 refs.

An improved procedure is presented for the calculation of detailed steady-state temperature distributions throughout the human body. The efficacy of the proposed computation procedure is demonstrated by comparison of calculated and experimental results for seven studies conducted on four subjects. Core temperatures were

predicted within plus or minus 0.2 C and deviations for individual skin temperatures generally were within plus or minus 0.5 C.

(Author)

A73-32044 Anthropotechnical investigation of an above-ground indication and of an artificial horizon with preindication in connection with the manual control of VTOL aircraft (Anthropotechnische Untersuchung einer Übergrundanzeige und eines künstlichen Horizonts mit Voranzeige zur manuellen Regelung von VTOL-Flugzeugen). D. Dey (Berlin, Technische Universität, Berlin, West Germany) and G. Johannsen (Forschungsinstitut für Anthropotechnik, Meckenheim, West Germany). *Zeitschrift für Flugwissenschaften*, vol. 21, Apr. 1973, p. 140-145. 10 refs. In German.

A73-32059 Work, rest and safety in the air. T. Nicholson. *New Scientist*, vol. 58, May 17, 1973, p. 404-407.

The airline pilot has to cope with irregular and often long hours of duty superimposed on time zone changes, and he has to carry out the most exacting part of his work at the end of each flight. It must be assumed that his performance in the flying task will be degraded by severe sleep disturbance, but it is not known to what extent his sleep/wakefulness pattern can be disturbed before his operational effectiveness is impaired. The main problem appears to be one of sleep disturbance rather than sleep deficit. Naps play a very important part in the overall balance of sleep and wakefulness. Though there is little evidence from official accident investigations that aircrew fatigue has been a factor in flight safety, it is considered that the problems which aircrew have to cope with during the approach and landing, often into international airports, need attention. F.R.L.

A73-32173 # The acute inhalation toxicology of chlorine pentafluoride. K. I. Darmer, Jr., C. C. Haun, and J. D. MacEwen (SysteMed Corp., Dayton, Ohio). *American Industrial Hygiene Association Journal*, vol. 33, Oct. 1972, p. 661-668. 12 refs. Contract No. F33615-70-C-1046.

The acute toxicity of exposure of rats, mice, dogs, and monkeys to the fluorinated oxidizer chlorine pentafluoride for 15, 30, and 60 min has been studied. The LC(sub 50) values for each species and each chosen time limit are presented with 95% confidence limits, and the associated pathology resulting from the exposures is discussed. Chlorine pentafluoride was found to be far less toxic than OF2, about two to three times as toxic as ClF3, and almost exactly ten times as toxic as HF. T.M.

A73-32185 * Circaseptan [7-day] oviposition rhythm and growth of Spring Tail, *Folsomia candida* /Collembola: Isotomidae/. Y. Chiba (Yamaguchi University, Yamaguchi, Japan), L. K. Cutkomp (Minnesota, University, St. Paul, Minn.), and F. Halberg (Minnesota, University, Minneapolis, Minn.). *Journal of Interdisciplinary Cycle Research*, vol. 4, Mar. 1973, p. 59-66. 21 refs. Research supported by the U.S. Department of Agriculture; Grants No. PHS-5-K6-GM-13981; No. NGR-24-005-006.

A73-32225 * Simulation of a steady-state integrated human thermal system. F. T. Hsu, L. T. Fan, and C. L. Hwang (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). *Computers in Biology and Medicine*, vol. 2, 1972, p. 59-79. 10 refs. Grant No. NGR-17-001-034; Contract No. F44620-68-0020. Project THEMIS.

The mathematical model of an integrated human thermal system is formulated. The system consists of an external thermal regulation device on the human body. The purpose of the device (a network of cooling tubes held in contact with the surface of the skin) is to maintain the human body in a state of thermoneutrality. The device is controlled by varying the inlet coolant temperature and coolant

mass flow rate. The differential equations of the model are approximated by a set of algebraic equations which result from the application of the explicit forward finite difference method to the differential equations. The integrated human thermal system is simulated for a variety of combinations of the inlet coolant temperature, coolant mass flow rate, and metabolic rates. (Author)

A73-32286 Mechanisms of secretion of neurohypophysial hormones - Cellular and subcellular aspects (Mécanismes de sécrétion des hormones neurohypophysaires - Aspects cellulaires et subcellulaires). J. J. Dreifuss (Genève, Université, Geneva, Switzerland). *Journal de Physiologie*, vol. 67, May 1973, p. 5 A-52 A. 218 refs. In French.

Following a brief review of the genesis of the concept of endocrine-function nerve cells, the electrophysiological and pharmacological properties of hypothalamic neurons are described which produce, store, transport, and secrete neurohypophysial hormones. Major attention is given to a resumé of recent experimental data which are cited in favor of the thesis that the hormonal secretion effects itself directly, by a process known under the name of exocytosis, starting from subcellular organelles contained in the supraoptic and paraventricular cells, i.e., the neurosecretion granules. These granules contain vasopressin or oxytocin and, in equimolar concentration with the hormones, some specific proteins (Chauvet et al., 1960). F.R.L.

A73-32287 Anatomico-functional bases of cerebello-cerebral interrelations (Bases anatomico-fonctionnelles des interrelations cérébello-cérébrales). P. Angaut (Institut National de la Santé et de la Recherche Médicale; CNRS, Marseille, France). *Journal de Physiologie*, vol. 67, May 1973, p. 53 A-116 A. 317 refs. In French.

It appears certain that each of the large cerebellar regions, and not only that of the hemispheres, exerts an influence on the sensorimotor cortex across the cerebello-thalamo-cortical path. A certain correspondence emerges between cerebellar areas and cortical areas. The cerebral cortex, in its turn, is the origin of several paths of influence on the cerebellum. The organization of reciprocal relations between cerebellum and cerebral cortex shows itself to be much more complex than hitherto thought. These anatomical paths are described, and what is known of their functional organization is discussed. F.R.L.

A73-32288 Intervention of cerebello-cortical and cortico-cerebellar paths in the organization and regulation of movement (Intervention des voies cérébello-corticales et cortico-cérébelleuses dans l'organisation et la régulation du mouvement). J. Massion (CNRS, Département de Neurophysiologie Générale, Marseille, France). *Journal de Physiologie*, vol. 67, May 1973, p. 117 A-170 A. 224 refs. In French.

From the study of the pathology and phylogenesis a general view concerning the driving motor functions in which the cerebellum participates emerges. An attempt is made to show the new orientations brought to light recently in the function of the cerebellum, making use of other sectors of nervous physiology, experimental psychology, and the cybernetics of concepts little used up to now in the study of the cerebellum. In the analysis two main headings are used, the first concerning the facilitative tonic action of the cerebellum. The second, under the heading 'cerebellum and movement,' attempts to define the most phasic or dynamic mechanism which could be put in play during the starting and the execution of movements. F.R.L.

A73-32357 # Model concept concerning some control principles of the human organism. III - Seasonal adaptation (Modellvorstellung über einige Regulationsprinzipien des menschlichen Organismus. III - Jahreszeitliche Adaptation). L. Klinker and D.

Weiss (Meteorologischer Dienst, Forschungsinstitut für Bioklimatologie, Heiligendamm, East Germany). *Zeitschrift für Meteorologie*, vol. 23, no. 5-6, 1972, p. 170-173. 17 refs. In German.

The system of the human diurnal cycle goes through a stable phase at the beginning of the year. The length of the performance phase is about 12 hours. The effects of an increase in the stimulation intensity of daylight with the advancing seasonal cycle are considered, giving attention to the damping mechanism in the human control cycle. A performance maximum is reached during the summer months. G.R.

A73-32394 Self-estimates of distractibility as related to performance decrement on a task requiring sustained attention. R. I. Thackray, K. N. Jones, and R. M. Touchstone (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Ergonomics*, vol. 16, Mar. 1973, p. 141-152. 25 refs.

In the present study, 50 subjects performed a monotonous, but perceptually demanding task, for approximately 30 minutes without rest. It was found that high-distractibility subjects (as determined from a questionnaire administered prior to the experiment) showed increasing lapses of attention during performance, while low-distractibility subjects failed to show any evidence of a decline in attention. Significant changes were obtained for respiration, respiration-period variability, heart-rate variability, and skin conductance during the task period, but the magnitude of these changes did not differ among the two distractibility groups. (Author)

A73-32395 A comparison of visual, auditory, and cutaneous tracking displays when divided attention is required to a cross-adaptive loading task. T. R. Schori (South Dakota, University, Vermillion, S. Dak.). *Ergonomics*, vol. 16, Mar. 1973, p. 153-158. 10 refs.

A73-32396 The effects of core temperature elevation and thermal sensation on performance. M. F. Allnutt and J. R. Allan (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Ergonomics*, vol. 16, Mar. 1973, p. 189-196. 14 refs.

A liquid-condition suit was used to obtain a state of raised body temperature in conjunction with skin temperatures compatible with sensations of thermal comfort. This condition produced a similar increase in speed of performance on a high-level reasoning test which has been found in previous experiments, but no decrement in score. Head cooling was included as a separate variable but appeared to have no additional effects on the speed or level of performance. It is suggested that deep body temperature may determine the speed, and comfort the level, of performance and that the technique of differentially heating body core and skin should prove a useful tool for further research. (Author)

A73-32397 Optimal duration of endurance performance on the cycle ergometer in relation to maximal oxygen intake. F. I. Katch (Queens College, New York, N.Y.). *Ergonomics*, vol. 16, Mar. 1973, p. 227-235. 24 refs.

Maximal oxygen uptake was measured in 50 male college students using the step-increment method (the initial resistance was 2.5 kg at 60 rpm and was increased by 0.5 kg each 2 min until the subject could no longer turn the ergometer or when the rate fell to 40 to 50 rev/min). In contrast, the endurance performance test was of the steady-pace type in which all of the subjects began pedalling at the same initial rate of 69 pedal rpm at a work rate of 1656 kgm/min for 12 min. Although the rate of pedalling (and thus the work rate) declined as fatigue developed, the friction load remained constant at 24 kg throughout the test. Twelve endurance scores were established for purposes of correlating these results with maximal oxygen intake values. It was concluded that maximal oxygen intake does not

predict endurance performance effectively unless the performance is continued for at least 8 min under conditions of the present experiment. T.M.

A73-32417 # Methods of studying eye movements (Metody issledovaniia dvizhenii glaz). A. D. Vladimirov. Moscow, Izdatel'stvo Moskovskogo Universiteta (Neiropsikhologicheskie Issledovaniia, No. 5), 1972. 102 p. 84 refs. In Russian.

Description of the design, alignment, electronic circuitry, operational procedures, and typical applications of photoelectric and electrooculographic techniques for contactless measurement of voluntary and involuntary eye movements. Attention is given to (1) a photoelectric method for recording the horizontal component of eye movement simultaneously with the corresponding stimulus, (2) a photoelectric method of simultaneously recording both horizontal and vertical components and their temporal characteristics, providing CRT displays of sight trajectories, and (3) an electrooculographic method providing the same results as the second photoelectric method. Specialized auxiliary equipment to be used with these methods under laboratory conditions is also described. T.M.

A73-32546 # Intracardiac heart murmurs and sounds influenced by respiration. K. H. Günter and R. Böhm (Charité Hospital, Berlin, East Germany). *Acta Cardiologica*, vol. 28, no. 2, 1973, p. 111-123. 12 refs.

Results of an intracardiac phonocardiographic study of the effect of deep inspiration on right and left heart murmurs and on the heart sound components. The study was performed on 20 patients with various congenital and acquired heart diseases. It is found that both left and right heart murmurs may be increased by inspiration. In some instances, however, deep inspiration did not change the intracardiac murmurs, although pressure changes were observed. The time intervals between the first and second HF component of the first heart sound were not changed by respiration in each ventricle. Moreover, the second component of each ventricle did not coincide with the right ventricular pressure rise. Thus no relation between the intracardiac second component of the first heart sound and the tricuspid valve closure is revealed. A.B.K.

A73-32548 Relationship of physiological strain to change in heart rate during work in the heat. E. Kamon (Pittsburgh, University, Pittsburgh, Pa.). *American Industrial Hygiene Association Journal*, vol. 33, Nov. 1972, p. 701-708. 14 refs. Grant No. NIH-R01-OH-00308; Contract No. DA-49-193-MD-2580.

Data from experiments involving (1) intermittent cycling and load carrying in dry, neutral to hot, ambient temperature and (2) prolonged walking in hot humid environments were used for correlation analysis between measured values of heart rate, oxygen uptake, and rectal temperature. It is concluded that the rate of change rather than the absolute values of these parameters might provide a better guide for evaluation of strain, particularly when intermittent type of work is involved. T.M.

A73-32576 Principles of biological regulation: An introduction to feedback systems. R. W. Jones (Northwestern University, Evanston, Ill.). New York, Academic Press, Inc., 1973. 370 p. 162 refs. \$16.

An attempt is made to provide the life scientist with some understanding of control, regulatory, and feedback mechanisms in biological systems. The concepts introduced are related to the dynamic behavior of both individual biological processes and systems of processes that make up an organism. A further objective is the description of characteristics of biological feedback systems with emphasis on physical concepts. A study is made of the steady-state and dynamic properties of physical systems, emphasizing the changes resulting from the addition of feedback to an already existing system. The relevant behavior of linear systems is treated from the

standpoint of exponential and oscillatory modes of vibration, with particular attention being paid to sinusoidal signals, frequency spectra, and stability. Finally, the behavior of nonlinear systems is contrasted with that of linear systems. A.B.K.

A73-32583 # Investigation of the binary selectable control gain in the case of a positioning problem (Untersuchung der binär wählbaren Bediensignalverstärkung bei einer Positionierungsaufgabe). G. Rothbauer, W. Krüger, and W. Kruse. Meckenheim, Gesellschaft zur Förderung der astrophysikalischen Forschung (Forschungsbericht No. 8), 1972. 52 p. 14 refs. In German. \$3.10.

A device for selecting one of two different levels of control gain was built. The performance of 12 subjects under conditions involving the presence or absence of binary selectable control gain features in a O-order system was studied. It was found that a binary selectable control gain improved the accuracy and reliability of target designation without markedly affecting the workload. The performance obtained in the case of an employment of dots as display signals was superior to the results obtained with rectangles, taking into account the designation error as criterion. It is recommended to use the selectable control gain approach for the coarse and fine adjustment in a target designation problems. G.R.

A73-32600 * Histochemical correlates of changes in the primate brain associated with varying environmental light conditions. S. L. Manocha and A. A. Perachio (Emory University, Atlanta, Ga.). *Histochemie*, vol. 34, 1973, p. 217-225. 39 refs. Grants No. PHS-RR-00165; No. NGR-11-001-045.

A73-32617 Effect of a 5-day space flight on the cardiac dynamics during moderately severe physical work. V. M. Mikhailov, V. S. Georgievskii, V. V. Smyshliaeva, and S. L. Kantor. (*Kosmicheskie Issledovaniia*, vol. 10, Sept.-Oct. 1972, p. 778-782.) *Cosmic Research*, vol. 10, no. 5, Mar. 1973, p. 704-707. 12 refs. Translation.

A73-32650 * Survival of common bacteria in liquid culture under carbon dioxide at high temperatures. P. Molton, J. Williams (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.), and C. Ponnampuruma (Maryland, University, College Park, Md.). *Nature*, vol. 243, May 25, 1973, p. 242, 243.

A73-32655 A systems approach for the evaluation of protective helmets. S. C. Knapp (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 30-32.

It is said that a chain is only as strong as its weakest link. This analogous cliché is often applied to personal protective equipment, notably helmets. Studies of how the total helmet system performed in the ultimate experiment, an accident, demonstrate that the analogy is not valid. Fail-pass criteria for helmet systems based on component testing or evaluation is no longer acceptable. Examples discussed include materials that meet energy attenuating criteria but fail flammability tests, yet are not implicated in injury production when exposed to an actual thermal threat. This paper reviews some results of the Department of the Army Life Support Equipment Retrieval Program as it relates to helmets. Recommendations for realistic helmet evaluation are outlined in detail. (Author)

A73-32656 A comparison and analysis of head sizes of Navy aircrew to the standard anthropometric data. P. M. Shah (Sierra Engineering Co., Sierra Madre, Calif.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings. North Hol-

lywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 33-36.

A study is outlined which may help in improving future helmets. Previous studies have indicated that the shell plays a major role in achieving head protection objectives of the helmet. The shell and liner of a helmet primarily provide protection against impact, against penetration of sharp objects, and against abrasion. The fitting of the helmet and its weight play an important role in providing the required protection. By custom fitting helmets to each aviator, an attempt is made to achieve a perfect fit. Measurements are cited which indicate that all head dimensions of the present generation of aviators differ from the older generation of aviators. F.R.L.

A73-32657 U-2 and SR-71 Physiological Support Program. R. A. Lucchesi (USAF, Office of the Surgeon, Offutt AFB, Neb.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings.

North Hollywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 37, 38.

The mission of the U-2 and SR-71 Physiological Support Program is to provide physiological support to Strategic Reconnaissance Wings at home station, worldwide operating locations, and contingency operations. Physiological support technicians train U-2 and SR-71 aircrews in the physiological hazards associated with high-altitude and supersonic flights. This operation conducts indoctrination in the use and function of pressure suits, ejection seats, parachutes, and related survival and protective life support equipment. Highly skilled technicians provide maintenance, inspection, and testing of U-2 and SR-71 life support systems. They assist U-2 and SR-71 crew members in launching and recovery operations. U-2 and SR-71 crew members are given pre- and post-flight physical examinations by attending physicians and are provided with a controlled diet prior to flight and during long missions. (Author)

A73-32658 High density loading of multiple occupant flotation devices. E. B. McFadden, D. deSteiguer, and C. C. Snow (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 39-42.

The ditching at sea by commercial transport aircraft involves the deployment of large interiorly stowed life rafts in order to protect the survivors from immersion, exposure, and drowning. Most current jet aircraft are equipped with inflatable escape slides that are deployed externally at the exits. The Society of Automotive Engineers SAE S-9 Cabin Safety Committee sponsored a series of tests of prototype slide/rafts furnished by various manufacturers. These tests were designed to measure freeboard, buoyancy, and occupancy characteristics of various slide/raft configurations. Test exposure of young healthy subjects indicated they were capable of tolerating high and low density occupancy of life rafts for a period of eight hours without any detected physiological or performance decrements. F.R.L.

A73-32665 Some technical aspects of sea survival after ejection. J. Jewell. In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co., Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 67-69.

A study of Martin-Baker ejection reports shows that fatalities due to drowning are on the increase and now account for about 25% of all fatalities or almost 2% of all ejections. Reports of fatalities due to drowning often state that the pilot was seen struggling in the sea entangled in his parachute, or alternatively, survival was jeopardized because the pilot did not get into his life raft. A description is given

of a ballistic, single-hand operated release connector enabling the pilot to divest the parachute canopy. The release may also be operated when alighting on land to prevent the ejectee being dragged by his parachute and injured, or when the man is suspended by his parachute canopy being entangled in trees. A method of inflating the life raft automatically on entering the water is also described.

(Author)

A73-32671 Realistic evaluation of fabrics for thermal protective clothing. F. S. Knox, III (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 89-92. 12 refs.

A bioassay technique has been developed, and its employment in evaluating thermal underwear of a winter flight clothing system is described. In this evaluation, pigs were exposed to a calibrated flame source while protected by various fabric combinations. Evaluation of skin damage was made on both gross and microscopic levels. Results showed that the bioassay technique provides a consistent and realistic method of evaluating the performance of fabrics. The bioassay method is currently being applied to develop a mathematical model which will allow the data from physical sensors to be interpreted in terms of degree of skin damage. (Author)

A73-32672 The Ventilated Wet Suit for naval aircrewmembers. L. I. Weinstock (U.S. Navy, Crew Systems Div., Washington, D.C.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings.

North Hollywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 93-95.

The VWS (Ventilated Wet Suit) which was adopted by the Navy in April 1970 to replace its Mark-5A dry type anti-exposure assembly is at this writing 90% delivered to the Fleet. Initial outfitting of almost 17,000 VWS assemblies is anticipated for use in all Navy aircraft types by the winter of 1972-73. This paper discusses the background, development, and evaluation of the VWS and its adoption by the Navy as a new concept in anti-exposure protection for aircrewmembers. (Author)

A73-32675 Biomedical responses of parachutists to 110 through 175 knot IAS/ through-the-air tow by aircraft. D. H. Reid and J. T. Matsuo (U.S. Navy, Naval Aerospace Recovery Facility, El Centro, Calif.). In: Survival and Flight Equipment Association, Annual Symposium, 10th, Phoenix, Ariz., October 2-5, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co.; Canoga Park, Calif., Survival and Flight Equipment Association, 1972, p. 101.

Three volunteer subjects were towed through an airspeed profile of 110 through 175 kt indicated airspeed, the upper value being the maximum which could be tolerated by any subject. Under the conditions of the experiment, it was concluded that the maximum tolerable sustained tow airspeed that an operational ejectee could withstand without special protective equipment would be between 150 and 160 kt. Fatigue appeared to be the limiting factor in intentional, sustained aerial tow. F.R.L.

A73-32723 Biophysical hazards of microwave radiation. J. Frey (Cornell University, Ithaca, N.Y.). In: NEREM 72; Northeast Electronics Research and Engineering Meeting, Boston, Mass., October 30-November 3, 1972, Record. Part 1.

Newton, Mass., Institute of Electrical and Electronics Engineers, Inc., 1972, p. 136-139. 20 refs.

Factors affecting the absorption of microwave radiation by humans are identified, and the observed thermal effects of microwaves on man are described along with evidence for athermal effects.

The major noticeable physiological effects at CW power densities of 1 to 10 mW/sq cm and greater are thermal, with the greatest danger being to the eyes and testes. Various mechanisms proposed to explain athermal effects are briefly discussed together with the difficulties encountered in quantifying the physiological effects of microwaves. T.M.

A73-32804 * The application of aerospace technology to patient monitoring. H. Sandler, T. B. Fryer, S. A. Rositano, and R. D. Lee (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *IEEE Transactions on Biomedical Engineering*, vol. BME-20, May 1973, p. 189-194. 28 refs.

A73-32900 Differential velocity and time prediction of motion. K. A. Kimball, M. A. Hofmann, and R. O. Nossaman (U.S. Army, Washington, D.C.). *Perceptual and Motor Skills*, vol. 36, June 1973, pt. 1, p. 935-945. 10 refs.

This investigation examined the effects of differential target velocity, horizontal or vertical plane conditions, and air traffic controller experience on the estimation accuracy of intersection time of two converging targets. Performance accuracy on this task was not significantly affected by horizontal or vertical conditions or by air traffic controllers' experience. However, accuracy in magnitude and direction varied significantly as a function of cursor speed, with slower speeds producing the poorer performance. A differential effect for various speed combinations was also noted. Estimation accuracy on the slowest cursor speed when paired with the two faster speeds was decreased while accuracy on the intermediate speed was degraded when combined with either slower or faster speeds. Estimations on the fastest speed were not affected by differential pairings. (Author)

A73-33090 # A device for the continuous measurement of subjective changes (Ein Gerät zur kontinuierlichen Messung subjektiver Veränderungen). N. Birbaumer, W. Tunner, R. Hölzl, and L. Mittelstaedt (München, Universität, Munich, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 20, 2nd Quarter, 1973, p. 173-181. In German.

An apparatus for continuously recording changes of the fingerspan on a polygraph was constructed. Aspects of the practical application of the new device are discussed. Preliminary data concerning the precision of discrimination of fingerspan scaling are considered. A number of graphs showing the results obtained in a number of experiments are presented. G.R.

A73-33091 # Acquisition of signal concepts under conditions of aversion activation. I - Theoretical part and form interpretation test (Zum Erwerb von Signalkonzepten unter Aversionsaktivierung. I - Theoretischer Teil und Formdeuterversuch). U. Grau (München, Technische Universität, Munich, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 20, 2nd Quarter, 1973, p. 182-209. 72 refs. In German.

Experiments with animals in connection with the study of learning characteristics in cases involving aspects of hope or fear are considered. A learning-promoting effect of electric shocks could be observed when the shocks followed as a consequence of the wrong reactions. Twenty variations of four characteristics of a geometric pattern were successively presented to 72 university students, who were told to predict the following stimulus. Three of the four signal groups were succeeded by neutral stimuli, while the fourth constituted the signal for a painful stimulus. The correct reply in the case of 25 successive signal pictures was used as a learning criterion. G.R.

A73-33114 Polarcardiographic responses to maximal exercise and to changes in posture in healthy middle-aged men. R. A. Bruce, K. Nilson (Washington, University, Seattle, Wash.), Y.-B. Li, and G. E. Dower. *Journal of Electrocardiology*, vol. 6, no. 2, 1973, p. 91-96. 12 refs. Grant No. NIH-HE-13517-02.

Polarcardiography on a group of 30 middle-aged healthy men showed a decrease in PR, RT and QT intervals, an increase in P and ST magnitudes, and changes in PA latitudes of P and T, after physical exercises. Nonsystematic but clearly evident differences were also established between polarcardiograms taken in supine and sitting positions. V.Z.

A73-33115 **Waveform vector analysis of orthogonal electrocardiograms - Quantification and data reduction.** P. M. Rautaharju, J. Warren, and H. Wolf (Dalhousie University, Halifax, Nova Scotia, Canada). *Journal of Electrocardiology*, vol. 6, no. 2, 1973, p. 103-111. 17 refs. Research supported by the Nova Scotia Heart Foundation; Medical Research Council of Canada Grant No. MT-2228.

A73-33116 **Phase progression of the QRS complexes in electrocardiograms versus the inscribing directions of the QRS loops in vectorcardiograms.** T. Y. Lee. *Journal of Electrocardiology*, vol. 6, no. 2, 1973, p. 125-129. 5 refs.

A73-33130 # **A standard psychophysiological preparation for the study of environmental stress.** J. F. Lafferty, R. G. Edwards, E. P. McCutcheon, and D. F. McCoy (Kentucky, University, Lexington, Ky.). In: Realism in environmental testing and control; Proceedings of the Nineteenth Annual Technical Meeting, Anaheim, Calif., April 2-5, 1973. Mount Prospect, Ill., Institute of Environmental Sciences, 1973, p. 15-21. Contracts No. F33615-72-C-1112; No. F44620-69-C-0127.

Development of man-machine systems requires a theoretical model to evaluate equipment design and to provide a unified approach for assessing human performance limitations as a function of stress and time. Knowledge of the physiological mechanism underlying human performance characteristics is the principal element required to formulate such a model. The present paper describes a systematic approach to the investigation of these mechanisms (as a function of stress and performance decrement) through the development of a 'standard psychophysiological preparation' (SPP). The specific application considered involves investigation of the mechanisms underlying performance decrement induced by vibrations in low-altitude high-speed flight. Specifications are outlined for the instrumented subject, the performance tasks, the measured performance and physiological parameters, and the data analysis techniques. T.M.

A73-33132 # **Evaluating head protecting devices.** J. H. King (Royal Industries, Pasadena, Calif.). In: Realism in environmental testing and control; Proceedings of the Nineteenth Annual Technical Meeting, Anaheim, Calif., April 2-5, 1973. Mount Prospect, Ill., Institute of Environmental Sciences, 1973, p. 87-96. 22 refs.

Past research on head injuries suffered by humans as a result of acceleration and impact are reviewed, and the validity of head injury criteria based on these studies is evaluated. Factors influencing (1) the stresses applied to the skull and (2) the relative movement of the brain mass and skull are briefly explained, followed by a survey of civilian and military standards for protective helmets in the U.S. and in other countries. T.M.

A73-33154 **Biological rhythms and human performance.** Edited by W. P. Colquhoun (Sussex, University, Brighton, England). London and New York, Academic Press, 1971. 288 p. \$15.75.

Special methods for investigating the origin and nature of biological rhythms, waking-day and round-the-clock studies of circadian mental-efficiency variations, and sleep behavior as a biorhythm in the light of circadian and intrasleep aspects are among the topics covered in papers concerned with biological rhythms and

human performance. Other topics include experiments on performance as a function of temperament and time of day, investigation of possible connections of the temporal aspects of perceptual and motor performance with the alpha rhythm, and between-day fluctuations in industrial work rhythms.

M.V.E.

A73-33155 **The explanation and investigation of biological rhythms.** K. Oatley and B. C. Goodwin (Sussex, University, Brighton, England). In: Biological rhythms and human performance. London and New York, Academic Press, 1971, p. 1-38. 66 refs.

Examination of the essential nature of biological rhythms from a general point of view, and discussion of the biological function of some rhythms that affect human performance. Following the presentation of terms and definitions, the origin and nature of biological rhythms is reviewed in terms of the oscillatory behavior in open-system rhythms of intrinsic or extrinsic origin and from the viewpoint of biological stability dynamics. Timing, prediction of periodic events in the environment, and oscillation as part of control processes are then considered as functions of rhythms. Signal analysis and the identification of rhythms, linear frequency analysis, and entraining nonlinear oscillations are shown to be among the approaches that make it possible to identify rhythmicity and to investigate the basis of rhythms. M.V.E.

A73-33156 **Circadian variations in mental efficiency.** W. P. Colquhoun (Sussex, University, Brighton, England). In: Biological rhythms and human performance. London and New York, Academic Press, 1971, p. 39-107. 75 refs.

Discussion of circadian rhythms in human performance in the light of findings obtained from experimental investigations using controlled laboratory tasks adequately controlled for making sure that what is being measured is the genuine efficiency level of a subject at a particular time of day. The majority of these research findings fall into two groups: (1) those concerned with variations in performance throughout the normal 'waking day' - i.e., experiments in which the subject had his usual hours of sleep at his customary time, and (2) those in which efficiency has been observed 'round the clock' - i.e., experiments during which some at least of the measurements were taken in 'night' hours. The long-term aim of this research effort is to identify the fundamental determinants of circadian rhythms in human performance. M.V.E.

A73-33157 **Temperament and time of day.** M. J. F. Blake. In: Biological rhythms and human performance. London and New York, Academic Press, 1971, p. 109-148. 32 refs.

Description of the methods used and results obtained in a series of experiments designed to determine the differences in rhythms of both temperature and performance at different times of day as a function of the individual introversion-extraversion rating of each test subject. The results obtained suggest that: (1) introverts have higher arousal levels than extraverts in the morning; (2) there is a general increase in the level of arousal in both 'types' throughout the day; (3) the level of arousal increases at a higher rate in extraverts than in introverts with the result that (4) when an additional arousing factor is added to the task situation, the level of arousal in extraverts may be post-optimal for performance later in the day. M.V.E.

A73-33158 **Sleep behaviour as a biorhythm.** W. B. Webb (Florida, University, Gainesville, Fla.). In: Biological rhythms and human performance. London and New York, Academic Press, 1971, p. 149-177. 82 refs.

Review of EEG data visualizing the appearance of sleep across the circadian span, and attempt to define the role of sleep in the biorhythm tide. Defined by EEG changes, sleep is viewed simply as a response on the part of the organism, and a brief description of EEG

as a means of measuring sleep is presented. Intrasleep aspects and length of sleep are considered, along with such circadian aspects of sleep as temporal displacements and number of episodes. About the functions of sleep in the circadian process three hypotheses are proposed: (1) each species and/or individual within a species has a limited capacity to continue responding and a corollary requirement to not respond during a specified time period; (2) this nonresponse period is not randomly interjected into the circadian system, but rather is adaptively keyed to an animal's capacity and environment; and (3) sleep is a critical part of this limitation of responding. M.V.E.

A73-33159 **A periodic basis for perception and action.** A. J. Sanford (Dundee, University, Dundee, Scotland). In: *Biological rhythms and human performance*. London and New York, Academic Press, 1971, p. 179-209. 82 refs.

Possible connections between the alpha rhythm and the temporal aspects of perceptual and motor performance are explored. In the periodicity of electrical brain activity, the alpha rhythm stands out by its characteristic frequency of 10 Hz. In the light of reviewed experimental evidence, it is shown that under certain circumstances a relationship between observable alpha activity and performance is a reality. The strongest relationship appears to be that between alpha period and reaction time. The correlations of alpha frequency with reaction time have been used to postulate something analogous to a computer 'cycle time,' but there has been no real proof of this; it remains an intriguing possibility. M.V.E.

A73-33160 **Industrial work rhythms.** K. F. H. Murrell (University of Wales Institute of Science and Technology, Cardiff, Wales). In: *Biological rhythms and human performance*. London and New York, Academic Press, 1971, p. 241-272. 47 refs.

Results of industrial work rhythm studies, including laboratory research into work rhythms, obtained over the period from 1920 to 1969 are summarized and reviewed. Special attention is given to industrial-record and experimental studies of between-day fluctuations. M.V.E.

A73-33161 **Dynamic analyses of hybrid bio/mechanical networks with feedback characterization.** C. W. Stempin and D. N. Ghista (Indian Institute of Technology, Madras, India). *Franklin Institute, Journal*, vol. 295, June 1973, p. 437-450. 12 refs.

A73-33218 * **Residual visual function after brain wounds involving the central visual pathways in man.** E. Pöppel, R. Held, and D. Frost (MIT, Cambridge, Mass.). *Nature*, vol. 243, June 1, 1973, p. 295, 296. 16 refs. Research supported by the Deutsche Forschungsgemeinschaft, NIH, and NASA.

A73-33226 * **Effect of nitrite and nitrate on chlorophyll fluorescence in green algae.** E. Kessler and W. G. Zumft (Florida State University, Tallahassee, Fla.; Erlangen, Universität, Erlangen, West Germany). *Pflanta*, vol. 111, 1973, p. 41-46. 18 refs. Grant No. NGR-10-004-018; Contract No. AT(40-1)-2690.

A73-33375 **A new method for diagnosing myocardial damage in patients with normal electrocardiograms and vector cardiograms.** G. E. Seiden and C. Stahl (College Hospital, Bronx, N.Y.). *New York Academy of Sciences, Transactions, Series 2*, vol. 35, Apr. 1973, p. 283-303. 17 refs. Grant No. PHS-CD-00302-01-05.

Description of an electrical method of detecting myocardial damage in asymptomatic patients. A new method for diagnosing heart damage in the presence of normal electro- and vectorcardiograms is described which depends on the computer rendition of acceleration from the QRS vector loop in the direction of its velocity

and/or position vector. When this acceleration (termed tangential acceleration) is plotted against peripheral distance along the vector loop, higher-order acceleration components are demonstrated than when similar plots are made of normal subjects. A.B.K.

A73-33421 **Annual Scientific Meeting, Las Vegas, Nev., May 7-10, 1973, Preprints.** Meeting sponsored by the Aerospace Medical Association. Washington, D.C., Aerospace Medical Association, 1973. 316 p. Members, \$7.00; nonmembers, \$10.00.

Topics discussed include noise and vibration, thermal physiology, weightlessness and bed rest, rescue and survival, cardiopulmonary physiology, clinical medicine, air traffic controller and pilot performance, acceleration stress effects, injuries and accidents, hypoxia and other stresses, toxicology, electrocardiography, bioinstrumentation, motion sickness, oxygen toxicity, epidemiology of aircraft accidents, radiation physiology, pharmacology, decompression, lower body negative pressure stress, the desynchronization syndrome, stress physiology, bioengineering and biodynamics, color vision standards and testing, hyperbaric neurophysiology, and environmental physiology. A.B.K.

A73-33424 **Transmission of nerve pulses at the switching locations of the brain (Übertragung von Nervenimpulsen an den Schaltstellen des Gehirns).** H. Haas and L. Hösli (Neurologische Universitätsklinik, Basel, Switzerland). *Naturwissenschaftliche Rundschau*, vol. 26, June 1973, p. 237-241. 8 refs. In German.

The investigation of the basic processes of synaptic transmission on the neuron level has become possible because of the development of modern technical devices, including the electron microscope, microelectrode connections to single neurons, powerful electronic amplifiers, and efficient recording systems. The discovery of new biochemical and histochemical exploratory techniques is another important factor in the study of nerve pulse transmission. The synapse has a function of particular importance in the information transmission processes taking place in the brain. It has been found that chemical processes are involved which can be affected by chemical agents. G.R.

A73-33645 **System engineering aspects of the man-machine interface.** E. T. Parascos. In: *Annual Reliability and Maintainability Symposium*, Philadelphia, Pa., January 23-25, 1973, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 452-462. 10 refs.

A comparison is made here-in, between the early human factor approach and the current human factor approach with its emphasis on systems engineering. MIL-H-46855, Human Engineering Requirements for Military Systems, Equipments and Facilities, is reviewed. This specification looks like, acts like and in reality is a systems engineering specification. The following elements of MIL-H-46855 are illustrated: function and time line analysis, operation sequence diagrams, crew loading analysis, and symbols. Finally the results of applying these current Human Factor requirements on state of the art laser scanning and recording subsystems are discussed. (Author)

A73-33676 # **Impairment to hearing from exposure to noise.** K. D. Kryter (Stanford Research Institute, Menlo Park, Calif.). *Acoustical Society of America, Journal*, vol. 53, May 1973, p. 1211-1234; Discussion, p. 1235-1243; Reply, p. 1244-1252. 73 refs. Grant No. NIH-NS-07908-06.

It is found that methods commonly used in medicine for the evaluation of impairment to hearing and the relation of this impairment to noise exposure may lead to significant underestimates of the severity of noise-induced hearing impairment and overestimations of tolerable limits for exposure to noise. Criteria of acceptable degrees of hearing impairment for speech and a criterion of an acceptable percentage of people to suffer noise-induced impairment to hearing are suggested. Procedures are derived for calculating a

Speech Impairment Risk Percent (SIR) which represents damage effect on hearing of a wide variety of noise environments and which can be used for specifying noise exposure limits that would be rated as tolerable for the suggested, or for other, criteria. The proposed procedures appear to be valid, within the state of present knowledge, for daily continuous or intermittent exposures to steady-state or impulsive noises. (Author)

A73-33678 # **Damage-risk criteria - The trading relation between intensity and the number of nonreverberant impulses.** H. McRobert and W. D. Ward (Minnesota, University, Minneapolis, Minn.). (*Acoustical Society of America, Meeting, 83rd, Buffalo, N.Y., Apr. 18-21, 1972.*) *Acoustical Society of America, Journal*, vol. 53, May 1973, p. 1297-1300. 9 refs. Grant No. PHS-NS-04403.

Damage-risk was studied on a group of normal listeners who received nonreverberant acoustic pulses of different duration at peak levels with constant total energies. These results and other available data suggest that the correct trading relation for exposures to impulsive noise is a function of the degree of reverberation associated with the exposure. The incorrectness of damage-risk criteria given only in terms of pulse peak levels is pointed out. V.Z.

A73-33691 **Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.** Edited by G. B. Phillips and W. S. Miller (Becton, Dickinson Research Center, Research Triangle Park, N.C.). Durham, N.C., Duke University Press, 1973. 421 p. \$12.50.

A detailed account is given of the production, regulation, and use of sterile medical materials. Selected aspects of both classical and newer methods of achieving sterility are discussed, including heat, radiation, ethylene oxide, and formaldehyde. Newer concepts for sterilization, such as those represented by the combination of heat with radiation and the use of formaldehyde-liberating substances in carrier materials, are also presented. Particular attention is paid to modern-day methods of controlling sterilization processes and to methods of testing for contamination prior to sterilization. The impact of the presterilization contamination loading and its effects on the sterilization process are discussed, as well as modern methods of qualifying and internally controlling routine sterilization procedures in the manufacturing situation. Also included is information on methods of validating sterility, particularly on the use of microbial spores as indicators of sterility.

A.B.K.

A73-33692 **Biological indicators and the effectiveness of sterilization procedures.** T. J. Macek. In: *Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.* Durham, N.C., Duke University Press, 1973, p. 19-34. 50 refs.

A73-33694 **Formaldehyde gas as a sterilant.** J. J. Tulis (Becton, Dickinson Research Center, Research Triangle Park, N.C.). In: *Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.* Durham, N.C., Duke University Press, 1973, p. 209-238. 30 refs.

A73-33695 **Heat sterilization.** I. J. Pflug (Minnesota, University, Minneapolis, Minn.). In: *Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.* Durham, N.C., Duke University Press, 1973, p. 239-282. 34 refs.

Review of the mechanism of heat sterilization of microorganisms, and consideration of problems in the design and control of sterilization processes. A detailed study is made of the process of heat destruction of bacterial spores on the basis of both the simple logarithmic thermal destruction model and the Bigelow temperature coefficient model. Methods of determining the lethality of heat

sterilization processes are described. A statistical procedure is developed to determine the presence of nonsterile units in a large batch of units that have received a sterilization treatment. Problems of designing and monitoring sterilization processes are considered.

A.B.K.

A73-33696 * **The synergistic inactivation of biological systems by thermoradiation.** H. D. Sivinski, D. M. Garst, M. C. Reynolds, C. A. Trauth, Jr., R. E. Trujillo, and W. J. Whitfield (Sandia Laboratories, Albuquerque, N. Mex.). In: *Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.* Durham, N.C., Duke University Press, 1973, p. 305-335. NASA-AEC-supported research.

A73-33697 * **Sterilization technology in the United States space program.** L. B. Hall (NASA, Washington, D.C.). In: *Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.* Durham, N.C., Duke University Press, 1973, p. 337-342.

Review of a number of techniques that have been used to ensure sterilization of spacecraft. An approach based on a mathematical analysis of a planetary quarantine model is described which defines the limits of the probability of occurrence of undesirable events. The use of thermoradiation (a combination of both heat and gamma or X-radiation) to achieve sterilization at low temperatures and rates of radiation is discussed. Also considered is the use of a residual germicide such as paraformaldehyde and melamine formaldehyde on the treated surface to exert a lethal effect on organisms over a period of time. Finally, two techniques still under investigation are described - namely, the use of an ion plasma stream produced by an RF generator to kill and remove microorganisms, and the use of an unfocused carbon dioxide laser beam to sterilize microorganisms.

A.B.K.

A73-33698 **Monitoring for microbial flora.** M. S. Favero (U.S. Public Health Service, Center for Disease Control, Phoenix, Ariz.). In: *Industrial sterilization; Proceedings of the International Symposium, Amsterdam, Netherlands, September 1972.*

Durham, N.C., Duke University Press, 1973, p. 343-355. 18 refs.

A73-33900 * **Total lipid and sterol components of *Rhizopus arrhizus* - Identification and metabolism.** J. D. Weete, G. C. Lawler, and J. L. Laseter (Lunar Science Institute, Houston, Tex.; Louisiana State University, New Orleans, La.). *Archives of Biochemistry and Biophysics*, vol. 155, Apr. 1973, p. 411-419. 44 refs. Contracts No. NAS9-11339; No. NAS9-12622; No. NSR-09-051-001.

A73-33990 # **Nutritional circulation in the heart. IV - Effect of calcium chloride and potassium chloride on myocardial hemodynamics and clearance of rubidium-86.** A. R. Laddu, P. Somani, and H. F. Hardman (Wisconsin, Medical College, Milwaukee, Wis.). *Japanese Heart Journal*, vol. 14, Mar. 1973, p. 126-134. 30 refs. Grants No. PHS-HL-08311; No. PHS-HL-13589.

A73-33991 # **Effect of maximal work load on cardiac function.** T. Sugimoto, J. L. Allison, and A. C. Guyton (Mississippi University, Jackson, Miss.; Kanazawa University, Kanazawa, Japan). *Japanese Heart Journal*, vol. 14, Mar. 1973, p. 146-153. 6 refs.

The time course and mode of deterioration of the heart under prolonged maximal work load were studied in open-chest dogs, the hearts of which were loaded at maximal cardiac output while the aortic pressure was kept constant. During the period of loading, the maximal level of cardiac output that could be attained was relatively

stable for 30 min to 1 hour and then began to fall suddenly and rapidly. This terminal deterioration appeared to be caused by mechanical factors, possibly over-distention of the heart, rather than by fatigue of the muscle per se. (Author)

A73-34025 Space suit digest. *Spaceflight*, vol. 15, June 1973, p. 215-218.

Review of the development of the space suit, covering the design components of the Mercury, Gemini and Apollo space suits. Details are given on the glove and boot designs and support equipment. Detailed line-drawings of the Apollo Extravehicular Mobility Unit and the Apollo Suit Model A-7L are also included. V.Z.

A73-34038 Assessment of left ventricular dimensions and function by echocardiography. I. Belenkie, D. O. Nutter, D. W. Clark, D. B. McCraw, and A. E. Raizner (Emory University; Grady Memorial Hospital, Atlanta, Ga.). *American Journal of Cardiology*, vol. 31, June 1973, p. 755-762. 14 refs. Grants No. PHS-HL-05653; No. PHS-HL-05731.

Left ventricular dimensions and function indexes were measured in 40 patients with cardiac disease by both angiographic and echocardiographic techniques. Good correlation was obtained between echocardiographic and angiographic values in 18 patients with technically excellent studies obtained by both techniques. The left ventricular echogram appears to be an effective technique for the noninvasive determination of left ventricular dimensions and volume. Echocardiographic indexes of ventricular function, including percent shortening of internal diameter, mean shortening velocity of internal diameter, ejection fraction, percent thickening of posterior wall and mean posterior wall velocity, distinguished between groups of patients with normal and abnormal left ventricular function. However, a single echocardiographic or angiographic measurement does not appear to provide selective data for the accurate functional classification of most individual patients. (Author)

A73-34039 * Roentgenographic study of relative heart motion during vibration in water-immersed cats. D. J. Sass (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.). *Journal of Biomechanics*, vol. 6, May 1973, p. 219-225. 8 refs. Navy-NASA-supported research. Navy Task MR005,04-0037; NASA Order R-10.

STAR ENTRIES

N73-24101 National Lending Library for Science and Technology, Boston Spa (England).

VOICE AND HEARING IN THE SYSTEM OF ACOUSTIC ORIENTATION OF ANIMALS

V. D. Ilichev 12 Mar. 1973 24 p refs Transl. into ENGLISH from Zh. Obshch. Biol. (USSR), v. 32, no. 3, 1971 p 299-311 (NLL-DRIC-Trans-3056-(3623.66)) Avail: Natl. Lending Library, Boston Spa, Engl.: 2 NLL photocopy coupons

The general rules determining the interrelation of acoustic systems in various systematic groups and at various levels of evolution were examined. Functional characteristics of hearing and voice and the interrelation between them reveal clear changes in the following directions: (1) in the sphere of sound communication, more and more vital situations are involved, (2) the functional (dynamic) range is widened, and (3) the acoustic systems are universalized and their numbers are decreased. The interrelations of the voice and hearing are considered as a biological correlation of a special type, guaranteeing organismic, populational and biocenotic channels of interrelation. Author

N73-24102*# National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

PROCEEDINGS OF THE MICROBIAL RESPONSE TO SPACE ENVIRONMENT SYMPOSIUM

Gerald R. Taylor, ed. May 1973 192 p refs Symp. held at Houston, Tex., Sep. 1972 (NASA-TM-X-58103; MSC-07856) Avail: NTIS HC \$11.75 CSDL 06M

The synergistic relationships between microbial genetic alterations and space flight conditions are studied in laboratory space environment simulations and Apollo 16 flight experiment packages.

N73-24103* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

BACKGROUND AND GENERAL DESIGN OF THE MICROBIAL RESPONSE TO SPACE ENVIRONMENT EXPERIMENT (M191) SYSTEM

Gerald R. Taylor *In its Proc. of the Microbial Response to Space Environ. Symp.* May 1973 p 3-19 refs

CSDL 06M

Nine different species of organisms were exposed to space flight conditions during the Apollo 16 mission. Each test system was selected because it provided a quantitative method of evaluating some medically important phenomenon. The experiment design and each of the test systems are discussed. Author

N73-24106* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

INFECTIVITY AND EGG PRODUCTION OF NEMATOSPIROIDES DUBIUS AS AFFECTED BY SPACE FLIGHT AND ULTRAVIOLET IRRADIATION

Richard A. Long (Northrop Serv., Inc., Houston, Tex.), Walter L. Ellis (Northrop Serv., Inc., Houston, Tex.), and Gerald R. Taylor *In its Proc. of the Microbial Response to Space Environ. Symp.* May 1973 p 51-64 refs

CSDL 06M

Nematospiroides dubius was tested to determine the infective potential of the third stage larvae and the egg-production and egg-viability rates of the resulting adults after they are exposed to space flight and solar ultraviolet irradiation. The results are indicative that space-flown larvae exposed to solar ultraviolet irradiation were rendered noninfective in C57 mice, whereas flight control larvae that received no solar ultraviolet irradiation matured at the same rate as the ground control larvae. However, depressed egg viability was evident in the flight control larvae. Author

N73-24107* Scripps Clinic and Research Foundation, La Jolla, Calif.

EFFECTS OF SPACE ENVIRONMENT ON T-7 BACTERIOPHAGE AND SPORES OF BACILLUS SUBTILIS 168

John Spizizen and James E. Isherwood *In NASA, Johnson Space Center Proc. of the Microbial Response to Space Environ. Symp.* May 1973 p 65-85 ref

CSDL 06M

Two strains of *Bacillus subtilis* were exposed to components of the ultraviolet spectrum in space. Both strains possess multiple genetic markers, and one of the strains is defective in the ability to repair ultraviolet damage. The T-7 bacteriophage of *Escherichia coli* was also exposed to selected wavelengths and energy levels of ultraviolet light in space. Preliminary findings do not reveal anomalies in survival rates. Data are not yet available on detailed genetic analyses. Author

N73-24108* Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany).

EFFECTS OF SPACE VACUUM AND SOLAR ULTRAVIOLET IRRADIATION (254 NANOMETERS) ON THE COLONY FORMING ABILITY OF BACILLUS SUBTILIS SPORES

Horst Buecker, Gerda Horneck, and Helga Wollenhaupt *In NASA, Johnson Space Center Proc. of the Microbial Response to Space Environ. Symp.* May 1973 p 87-103 refs

CSDL 06M

Bacillus subtilis spores are highly resistant to harsh environments. Therefore, in the Apollo 16 Microbial Response to Space Environment Experiment (M191), these spores were exposed to space vacuum or solar ultraviolet irradiation, or both, to estimate the change of survival for terrestrial organisms in space. The survival of the spores was determined in terms of colony-forming ability. Comparison of the flight results with results of simulation experiments on earth applying high vacuum or ultraviolet irradiation, or both, revealed no remarkable difference. Simultaneous exposure to both these space factors resulted in a synergistic effect (that is, an ultraviolet supersensitivity). Therefore, the change of survival in space is assumed to depend on the degree of protection against solar ultraviolet irradiation. Author

N73-24109* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

POSTFLIGHT ANALYSES OF BACILLUS THURINGIENSIS ORGANISMS EXPOSED TO SPACE FLIGHT CONDITIONS

R. T. Wrenn (Northrop Serv., Inc., Houston, Tex.), R. C. Simmonds, and A. M. Heimpel (Agr. Dept., Beltsville, Md.) *In its Proc. of the Microbial Response to Space Environ. Symp.* May 1973 p 105-120 refs

CSDL 06M

Cultures of *B. thuringiensis* returned from space flight appeared to be normal to slightly affected adversely in their ability to produce three toxins that affect insects. In addition, it can be stated that *B. thuringiensis* spores are very resistant to ultraviolet irradiation at the individual wavelengths and energy

levels previously described. Full sunlight, however, does have a detrimental effect on the viability of *B. thuringiensis* spores.

Author

N73-24110* Eastern Michigan Univ., Ypsilanti, Mich.
MYCOLOGICAL STUDIES HOUSED IN THE APOLLO 16 MICROBIAL ECOLOGY EVALUATION DEVICE

Paul A. Volz /*n* NASA. Johnson Space Center Proc. of the Microbial Response to Space Environ. Symp. May 1973 p 121-135 refs
 CACL 06M

Survival, death, and phenotype count have yielded variation in the number of fungi recovered from the controls and the flight exposed cuvettes during preliminary analysis of postflight first phase data. Also the preliminary analysis was indicative that fungi exposed to specific space flight conditions demonstrated variable survival rates and phenotype counts. Specific space flight conditions included full light space exposure for *Chaetomium globosum*, exposure at 300- and 254-nanometer wavelengths for *Rhodotorula rubra*, full light and 280-nanometer wavelength exposure for *Trichophyton terrestre*, and 254-nanometer wavelength exposure for *Saccharomyces cerevisiae*. In general, phenotype counts for flight cuvettes and survival rates for control cuvettes were higher compared with the remaining cuvettes.

Author

N73-24111* Texas A&M Univ., College Station.
EFFECT OF SOLAR IRRADIATION ON EXTRACELLULAR ENZYMES OF AEROMONAS PROTEOLYTICA

Bill G. Foster /*n* NASA. Johnson Space Center Proc. of the Microbial Response to Space Environ. Symp. May 1973 p 137-151 refs
 CACL 06M

The bacterium *Aeromonas proteolytica* was selected for studying the effects of solar irradiation on extracellular enzymes because it produces an endopeptidase that is capable of degrading proteins and a hemolysin that is active in lysing human erythrocytes. Possible alterations in the rate of enzyme production in response to the test conditions are currently underway and are not available for this preliminary report. Completed viability studies are indicative that little difference exists among the survival curves derived for cells exposed to various components of ultraviolet irradiation in space.

Author

N73-24113* Northrop Services, Inc., Houston, Tex.
THE FERROXALATE ACTINOMETRY SYSTEM OF THE MICROBIAL RESPONSE TO SPACE ENVIRONMENT EXPERIMENT (M191)

Michael Parson /*n* NASA. Johnson Space Center Proc. of the Microbial Response to Space Environ. Symp. May 1973 p 169-178 refs
 CACL 06M

The fluid actinometry portion of the Microbial Response to Space Environment Experiment (M191) was designed for measurement of the solar energy that penetrates certain optical filter systems during exposure in space. Potassium ferrioxalate was used to measure energy at peak wavelengths of 254, 280, and 300 nanometers because of its high degree of sensitivity and its linear response to the middle ultraviolet regions. Author

N73-24114* San Francisco Univ., Calif.
THE HIGH ENERGY MULTICHARGED PARTICLE EXPOSURE OF THE MICROBIAL ECOLOGY EVALUATION DEVICE ON BOARD THE APOLLO 16 SPACECRAFT

Eugene V. Benton and Richard P. Henke /*n* NASA. Johnson Space Center Proc. of the Microbial Response to Space Environ. Symp. May 1973 p 179-189 refs

CACL 06M

The high energy multicharged cosmic-ray-particle exposure of the Microbial Ecology Evaluation Device package on board the Apollo 16 spacecraft was monitored using cellulose nitrate,

Lexan polycarbonate, nuclear emulsion, and silver chloride crystal nuclear-track detectors. The results of the analysis of these detectors include the measured particle fluences, the linear energy transfer spectra, and the integral atomic number spectrum of stopping particle density. The linear energy transfer spectrum is used to compute the fractional cell loss in human kidney (T1) cells caused by heavy particles. Because the Microbial Ecology Evaluation Device was better shielded, the high-energy multicharged particle exposure was less than that measured on the crew passive dosimeters.

Author

N73-24115* National Aeronautics and Space Administration.
 Lyndon B. Johnson Space Center, Houston, Tex.
THERMOLUMINESCENT DOSIMETRY FOR THE APOLLO 16 MICROBIAL RESPONSE TO SPACE ENVIRONMENT EXPERIMENT (M191)

Robert D. Brown (Kelsey-Seybold Clinic), Robert A. English (Kelsey-Seybold Clinic), and J. Vernon Bailey /*n* its Proc. of the Microbial Response to Space Environ. Symp. May 1973 p 191-197 refs
 CACL 06M

Lithium fluoride thermoluminescent chips were used to provide an integrated dose from the broad spectrum of ionizing radiation to the Microbial Response to Space Environment Experiment (M191). The chips were positioned in the flight hardware to provide data on ionizing radiation within specific volume segments. A uniform radiation dose of 4.8×0.001 plus or minus 2×0.0001 joule/kg resulted.

Author

N73-24116*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
QUARANTINE CONSTRAINTS AS APPLIED TO SATELLITES

A. R. Hoffman, W. Stavro, and C. C. Gonzalez Jun. 1973 15 p ref Presented at the Joint Open Meeting of the Panel on Planetary Quarantine and Working Group 5, 16th Plenary Meeting of COSPAR, Konstanz, West Germany, 23 May - 6 Jun. 1973 (Contract NAS7-100) (NASA-CR-132073; JPL-Paper-I.7.9) Avail: NTIS HC \$3.00
 CACL 06M

Plans for unmanned missions to planets beyond Mars in the 1970s include satellite encounters. Recently published observations of data for Titan, a satellite of Saturn, indicate that conditions may be hospitable for the growth of microorganisms. Therefore, the problem of satisfying possible quarantine constraints for outer planet satellites was investigated. This involved determining the probability of impacting a satellite of Jupiter or Saturn by a spacecraft for a planned satellite encounter during an outer planet mission. Mathematical procedures were formulated which determine the areas in the aim-plane that would result in trajectories that impact the satellite and provide a technique for numerically integrating the navigation error function over the impact area to obtain impact probabilities. The results indicate which of the planned spacecraft trajectory correction maneuvers are most critical in terms of satellite quarantine violation.

Author

N73-24117*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACECRAFT MICROBIAL BURDEN REDUCTION DUE TO ATMOSPHERIC ENTRY HEATING: JUPITER

C. C. Gonzalez, W. Jaworski, A. S. McDonald, and A. R. Hoffman Jun. 1973 15 p refs Presented at the Joint Open Meeting of the Panel on Planetary Quarantine and Working Group 5, 16th Plenary Meeting of COSPAR, Konstanz, West Germany, 23 May - 6 Jun. 1973 (Contract NAS7-100) (NASA-CR-132072; JPL-Paper-I.7.8) Avail: NTIS HC \$3.00
 CACL 06M

Planetary quarantine analyses performed for recent unmanned Mars and Venus missions assumed that the probability of contamination by a spacecraft given accidental impact was equivalent to one. However, in the case of the gaseous outer planets, the heat generated during the inadvertent entry of a spacecraft into the planetary atmosphere might be sufficient to cause significant microbial burden reduction. This could affect

navigation strategy by reducing the necessity for biasing the aim point away from the planets. An effort has been underway to develop the tools necessary to predict temperature histories for a typical spacecraft during inadvertent entry. In order that the results have general applicability, parametric analyses were performed. The thermal response of the spacecraft components and debris resulting from disintegration was determined. The temperature histories of small particles and composite materials, such as thermal blankets and an antenna, were given special attention. Guidelines are given to indicate the types of components and debris most likely to contain viable organisms, which could contaminate the lower layers of the Jovian atmosphere approximately one atmosphere of pressure. Author

N73-24118*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. **TERRESTRIAL QUARANTINE CONSIDERATIONS FOR UNMANNED SAMPLE RETURN MISSIONS**

A. R. Hoffman, W. Stavro, L. W. Miller, and D. M. Taylor Jun. 1973 15 p refs Presented at the Joint Open Meeting of the Panel on Planetary Quarantine and Working Group 5, 16th Plenary Meeting of COSPAR, Konstanz, West Germany, 23 May - 6 Jun. 1973

(Contract NAS7-100)

(NASA-CR-132071; JPL-Paper-1.7.7) Avail: NTIS HC \$3.00 CSCL 06M

For the purpose of understanding some of the possible implications of a terrestrial quarantine constraint on a mission and for developing a basic approach which can be used to demonstrate compliance beyond that developed for Apollo, a terrestrial quarantine study was performed. It is shown that some of the basic tools developed and used by the planetary quarantine community have applicability to terrestrial quarantine analysis. By using these tools, it is concluded that: (1) the method of biasing the earth aiming point when returning from the planet is necessary but, by itself, may not satisfy terrestrial quarantine constraints; and (2) spacecraft and container design significantly influence contamination transfer. Author

N73-24119*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.

SPECTRA OF NORMAL AND NUTRIENT-DEFICIENT MAIZE LEAVES

A. H. Al-Abbas, R. Barr, J. D. Hall, F. L. Crane, and M. F. Baumgardner 1973 19 p refs

(Grant NGL-15-005-112; Contract USDA-12-14-100-10292-(20); Grant NSF GB-5701; K6-21839; GM-01392) GM-01392)

(NASA-CR-132145; J-Paper-4839; LARS-111472) Avail: NTIS HC \$3.00 CSCL 02A

Reflectance, transmittance and absorbance spectra of normal and six types of nutrient-deficient (N, P, K, S, Mg, and Ca) maize (*Zea mays* L.) leaves were analyzed at 30 selected wavelengths from 500 to 2600 nm. The analysis of variance showed significant differences in reflectance, transmittance and absorbance in the visible wavelengths among leaf numbers 3, 4, and 5, among the seven treatments, and among the interactions of leaf number and treatments. In the infrared wavelengths only treatments produced significant differences. The chlorophyll content of leaves was reduced in all nutrient-deficient treatments. Percent moisture was increased in S-, Mg-, and N-deficiencies. Polynomial regression analysis of leaf thickness and leaf moisture content showed that these two variables were significantly and directly related. Leaves from the P- and Ca-deficient plants absorbed less energy in the near infrared than the normal plants; S-, Mg-, K-, and N-deficient leaves absorbed more than the normal. Both S- and N-deficient leaves had higher temperatures than normal maize leaves. Author

N73-24120# Joint Publications Research Service, Arlington, Va.

CRYOBIOLOGICAL STUDIES AND SPACE BIOLOGY PROBLEMS

L. K. Lozina-Lozinskiy 25 May 1973 28 p Transl. into ENGLISH

from Ocherki po Kriobiologii (Leningrad). 1972 p 238-260

(JPRS-59129) Avail: NTIS HC \$3.50

Cryobiological and space biological studies reported consider: temperature conditions beyond earth, anaerobic metabolism and cold tolerance, atmospheric pressure effects on cells and organisms at low temperatures, effects of radiation at low and ultralow temperatures, and effect of ionizing radiation on organism in frozen state. G.G.

N73-24121*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

LOUDNESS FUNCTION DERIVES FROM DATA ON ELECTRICAL DISCHARGE RATES IN AUDITORY NERVE FIBERS

Walton L. Howes Washington Jun. 1973 32 p refs

(NASA-TN-D-7297; E-7101) Avail: NTIS HC \$3.00 CSCL 06S

Judgments of the loudness of pure-tone sound stimuli yield a loudness function which relates perceived loudness to stimulus amplitude. A loudness function is derived from physical evidence alone without regard to human judgments. The resultant loudness function is $L = K(q - q_0)$, where L is loudness, q is effective sound pressure (specifically q_0 at the loudness threshold), and K is generally a weak function of the number of stimulated auditory nerve fibers. The predicted function is in agreement with loudness judgment data reported by Warren, which imply that, in the suprathreshold loudness regime, decreasing the sound-pressure level by 6 db results in halving the loudness. Author

N73-24122*# Houston Univ., Tex.

DEVELOPMENT OF GERM-FREE PLANTS AND TISSUE CULTURE Final Report

S. Venkateswaran Feb. 1973 191 p refs

(Contract NAS9-10947)

(NASA-CR-128947) Avail: NTIS HC \$11.75 CSCL 06C

The botanical program is reported for experiments performed at the Lunar Receiving Laboratory. Papers prepared during this program are listed. The studies reported include: tissues cultured on various mediums, nutritional studies, preparation of plant cultures for Apollo 15, and pine tissue cultures. F.O.S.

N73-24123*# Linguistic Systems, Inc., Cambridge, Mass.

THE USE OF ULTRA-FINE FIBER FILTER CLOTH FOR REMOVING BACTERIAL CONTAMINANTS FROM THE AIR

G. I. Podoprigora and M. M. Intizarov Washington NASA Jun. 1973 4 p Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. i Immunobiol. (Moscow), 1972 p 130-131

(Contract NASw-2482)

(NASA-TT-F-14940) Avail: NTIS HC \$3.00 CSCL 06M

Tests are described of a Russian domestically produced cloth with a fiber diameter of 0.5 to 1 micron. The test results indicate that the cloth is an effective filter material for gnotobiology and other scientific projects where bacterial contaminants must be removed from the air. Author

N73-24124*# Indiana State Univ., Terre Haute. Center for Neural Sciences.

INVESTIGATION OF THE NEUROLOGICAL CORRELATES OF INFORMATION RECEPTION Final Report, 1 Jan. 1965 - 31 Dec. 1971

31 Dec. 1971 28 p refs

(Grant NGR-15-003-007)

(NASA-CR-132047) Avail: NTIS HC #3.50 CSCL 06C

Animals trained to respond to a given pattern of electrical stimuli applied to pathways or centers of the auditory nervous system respond also to certain patterns of acoustic stimuli without additional training. Likewise, only certain electrical stimuli elicit responses after training to a given acoustic signal. In most instances, if a response has been learned to a given electrical stimulus applied to one center of the auditory nervous system, the same stimulus applied to another auditory center at either a higher or lower level will also elicit the response. This kind of

transfer of response does not take place when a stimulus is applied through electrodes implanted in neural tissue outside of the auditory system. Author

N73-24125# School of Aerospace Medicine, Brooks AFB, Tex. **EFFECTS OF HYPEROXIA ON HEME BIOSYNTHESIS Summary Report, 15 Aug. 1971 - 30 Apr. 1972**

Ann J. Roberts, Thomas F. Bobbitt, S. Richard Jaskanas, and Billy Richardson Feb. 1973 18 p refs (AD-756836; SAM-TR-73-2) Avail: NTIS CSCL 06/1

In vitro suspensions of chicken erythrocytes, rabbit reticulocytes, and rat bone marrow cells have been used to examine the effects of oxygen tension on heme synthesis. The data indicate that heme synthesis is maximal at 10% O₂ at approximately 745 torr (mm. Hg). Lesser O₂ levels (0%, 3%, 5%, and 7%) greatly reduce heme synthesis, while higher levels (20% and 100%) moderately reduce it. Hemoglobin (i.e., globin) synthesis, as measured by the incorporation of H³-leucine, is unaffected by O₂ tension. Although the synthesis of aminolevulinic acid (ALA) from glycine and succinate is considered the rate-limiting step in heme synthesis, the effects of O₂ on the incorporation of glycine-C14 and ALA-C14 into heme are similar. Since 10% O₂ at 745 torr approximates mean tissue PO₂ at sea level, the suppression of heme synthesis at O₂ levels greater than 10% may indicate the effect of hyperoxia on heme synthesis in the intact animal. (Author Modified Abstract) GRA

N73-24126# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PHYSICAL AND RADIOBIOLOGICAL INVESTIGATIONS ON ARTIFICIAL EARTH SATELLITES

E. E. Kovalyov and A. V. Kolomenskii 26 Dec. 1972 192 p refs Transl. into ENGLISH from the monograph "Fizicheskie i Radiobiologicheskie Issledovaniya Iskusstvennykh Sputnikakh Zem' Moscow, 1971 p 1-199 (AD-756771; FTD-HC-23-1143-72) Avail: NTIS CSCL 06/18

The monograph presents experimental materials obtained on Earth orbiting space ships and data from the literature, summarizing physical and biomedical research in space. Results of research concerning the radiation environment in orbits of Earth orbiting space ships are presented. The principles of calculation of permissible radiation doses are given and physical protection of space ships is discussed. Radiation dangers are evaluated, using the permissible levels of cosmic radiation for man and other bio-objects. Results are presented of experiments involving the study of combined effect of radiation and other factors of space flight on animals, higher and lower plants, unicellular organisms and simulated biochemical systems. Author (GRA)

N73-24127# Rensselaer Polytechnic Inst., Troy, N.Y. **HIGH ALTITUDE PULMONARY EDEMA Annual Progress Report, 1 May 1972 - 31 Jan. 1973**

Gerald Moss 13 Feb. 1973 49 p refs (Contract DADA17-72-C-2121) (AD-756940; APR-1) Avail: NTIS CSCL 06/5

A centrineurogenic etiology for the pulmonary changes of High Altitude Pulmonary Edema (HAPE) has been established. Respiratory hypoxia leads to the pathological pulmonary complex in unprotected beagles. These pulmonary changes are induced by isolated cerebral hypoxemia. The lungs do not develop this pattern during systemic, respiratory hypoxia, when the brain is perfused with autologous blood at normal oxygen saturation. Denervation of the left lung two months prior to isolated cerebral hypoxemia is protective of that lung, but not the normally innervated right lung, which develops the pathological complex. Directly monitored left atrial pressure ruled out heart failure as contributing to the pulmonary picture. Bilateral excision of the carotid bodies failed to alter the course of the lung complication. This confirms a direct effect of the cerebral hypoxia in the pathogenesis of the pulmonary sequence. The induction of HAPE by isolated cerebral hypoxemia is a universal, species independent phenomenon. This was reproduced in seven species of experimental animals, including primate (rhesus monkey). (Author Modified Abstract) GRA

N73-24128# Dayton Univ. Research Inst., Ohio.

A PROPOSED DISTRIBUTED PARAMETER MODEL FOR STUDYING THE EFFECTS OF ACCELERATION FORCES UPON THE ARTERIAL SYSTEM Final Technical Report, Feb. 1971 - Aug. 1972

Medhi Shirazi Jan. 1973 35 p refs (Contract F33615-71-C-1296; AF Proj. 7220) (AD-756530; URDI-TR-72-42; AMRL-TR-72-102) Avail: NTIS CSCL 06/19

A distributed parameter mathematical representation is obtained for the arterial system under stress resulting from headward acceleration. Assuming steady state conditions, solutions are obtained for the pressure and flow dynamics of the system in terms of the parameter distributions depicting the effects of viscous resistance, viscous inertance, compliance of the vessels and fluid outflow through the tubes. A computational scheme is proposed for determining the parameters of the system, based upon the difference between the measured system response under stress and the solution of the mathematical model. Author (GRA)

N73-24129# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.

ENGINEERING FOUNDATION CONFERENCE ON PATTERN INFORMATION PROCESSING

King-Sun Fu and Kendall Preston, Jr. 1972 81 p Conf. held at Warrenton, Va., 23-27 Feb. 1972 (Grant NSF GK-31955) (PB-214617/3) Avail: NTIS HC \$3.00 CSCL 06D

The major purposes of the conference were to assess the current position of the U.S. in this field, and to force a confrontation between the major areas of pattern information processing. These areas would include: robotics, biomedical pattern processing, picture processing, and remote sensing. It was concluded that: (1) There is a threat to U.S. technical leadership in pattern information processing by other countries. (2) Fundamental problems are shared by the major areas. (3) An Automation research council is needed to serve as an assembly point to integrate effort and enhance information transfer. Author (GRA)

N73-24130 Michigan Univ., Ann Arbor. **A CHARACTERIZATION OF THE VISIBILITY PROCESS AND ITS EFFECT ON SEARCH POLICIES** Ph.D. Thesis

Michael Leo Moore 1972 318 p Avail: Univ. Microfilms Order No. 72-29155

The problem is considered of characterizing the interaction between the detection and visibility processes in context of classical search theory. The work focuses on the study of search situations in which the target is not continuously visible to the searcher during the time period of the search. This intermittent visibility dimension occurs in many real world search processes, such as police patrols, medical screening, anti-submarine warfare, search for schools of fish aerial reconnaissance, and search for profitable research and development projects. Specifically, the problem considered is that of searching for a stationary target located in one of N regions. Models of different situations are developed. The following results are produced for each model: (1) an explicit description of optimal allocation policies and associated returns, (2) comparison of these policies and returns to those of the classical search theory, and (3) approximately optimal policies. It is shown that, under certain conditions, consideration of the visibility process leads to fundamentally different allocation policies. Dissert. Abstr.

N73-24131 Kansas State Univ., Manhattan. **SYSTEMS ANALYSIS OPTIMIZATION AND CONTROL OF LIFE SUPPORT SYSTEMS IN CONFINED SPACES** Ph.D. Thesis

Norman Custodio Pereira 1972 304 p Avail: Univ. Microfilms Order No. 72-28852

Two topics related to life support in confined spaces are studied. These are, the simultaneous control of temperature and humidity in a confined space, and the modeling of air flow and air quality in confined spaces. A pair of nonlinear differential

equations which describe the transient behavior of temperature and humidity in a confined space are derived and linearized about a desired steady state operating point. Classical control theory is then used with these linear equations in order to synthesize feedback controllers for the simultaneous control of temperature and humidity. Various aspects of steady state analysis and modeling with regard to the reduction of odor and toxic gases in confined spaces are also discussed. On the basis of an experimental analysis a refined analytical model is developed which takes into account both active and stagnant regions. It is shown how toxicity can tend to build up within the stagnant regions and also what effect such a build up can have on the overall confined space. Dissert. Abstr.

N73-24132*# Fairchild Republic Div., Farmingdale, N.Y. Republic Div.

PERSONAL HYGIENIC CONCERNS IN LONG TERM SPACE FLIGHT

2 May 1973 26 p refs

(Contract NAS9-12866)

(NASA-CR-128929) Avail: NTIS HC \$3.50 CSCL 061

Data from numerous experiments and hardware inventories were scanned for Skylab personal hygiene use. A computer program was formulated for predicting the degree of man's involvement with personal hygiene needs. A tabulation was kept for such events as water intake, frequency of urination and defecation, accidents or events requiring clean-up, methods of clean-up, microbiological environment and shower water contamination. G. G.

N73-24133*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BODY WATER COMPARTMENTS DURING BED REST: EVALUATION OF ANALYTICAL METHODS

H. L. Young, L. Juhos, B. L. Castle, J. Yusken, and J. E. Greenleaf
Washington May 1973 22 p refs

(NASA-TR-R-406; A-4656) Avail: NTIS HC \$3.00 CSCL 06P

Nine healthy young men were studied to determine the reproducibility and interchangeability of the use of radio-iodinated human serum albumin and Evans Blue dye for estimating plasma volume, sodium bromide for extracellular fluid volume, and deuterium oxide for total body water volume. All subjects were tested in a semibasal condition and allowed to rest for at least 30 min. after arriving at the laboratory. The results indicate that there was uniform distribution of I131 and Evans Blue dye 10 min. after injection and of NaBr and D2O 3 hours after oral ingestion; the buildup of residual tracer did not interfere appreciably with the measurement of either or Evans Blue spaces when they are administered at equal intervals, and the buildup of background tracer after ingestion of NaBr and D2O once per week for three consecutive weeks did not affect the accuracy of the measurement. It was found that I131 and Evans Blue may be used interchangeably for estimating plasma volume; for estimating bromide and D2O spaces, one 3-hour equilibrium blood sample gives results similar to the extrapolation of multiple samples. Author

N73-24134*# Systems Technology, Inc., Hawthorne, Calif.
VISUAL-MOTOR RESPONSE OF CREWMEN DURING A SIMULATED 90-DAY SPACE MISSION AS MEASURED BY THE CRITICAL TASK BATTERY

R. Wade Allen and Henry R. Jex Washington NASA May 1973 34 p refs

(Contract NAS2-6409)

(NASA-CR-2240) Avail: NTIS HC \$3.00 CSCL 05E

In order to test various components of a regenerative life support system and to obtain data on the physiological and psychological effects of long duration exposure to confinement in a space station atmosphere, four carefully screened young men were sealed in a space station simulator for 90 days and administered a tracking test battery. The battery included a clinical test (Critical Instability Task) designed to measure a subject's dynamic time delay, and a more conventional steady tracking

task, during which dynamic response (describing functions) and performance measures were obtained. Good correlation was noted between the clinical critical instability scores and more detailed tracking parameters such as dynamic time delay and gain-crossover frequency. The levels of each parameter span the range observed with professional pilots and astronaut candidates tested previously. The chamber environment caused no significant decrement on the average crewman's dynamic response behavior, and the subjects continued to improve slightly in their tracking skills during the 90-day confinement period. Author

N73-24135*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

HABITABILITY DATA HANDBOOK. VOLUME 2: ARCHITECTURE AND ENVIRONMENT. SUPPLEMENT 2.

May 1973 23 p

(NASA-TM-X-69322; MSC-03909-Vol-2-Suppl-2) Avail: NTIS HC \$3.25 CSCL 05E

The data presented in this supplement is directed primarily at a zero gravity environment with considerations for operations in a one-g environment. The data was obtained from simulated zero gravity testing in a neutral buoyancy environment. Author

N73-24136*# AirResearch Mfg. Co., Los Angeles, Calif.

OBJECTIVE TECHNIQUES FOR PSYCHOLOGICAL ASSESSMENT Final Report

E. Wortz, W. Hendrickson, and T. Ross 14 Mar. 1973 111 p refs

(Contract NAS9-12771)

(NASA-CR-128945; Rept-73-9045) Avail: NTIS HC \$7.75 CSCL 05E

A literature review and a pilot study are used to develop psychological assessment techniques for determining objectively the major aspects of the psychological state of an astronaut. Relationships between various performance and psychophysiological variables and between those aspects of attention necessary to engage successfully in various functions are considered in developing a paradigm to be used for collecting data in manned isolation chamber experiments. G.G.

N73-24137# Explosives Research and Development Establishment, Waltham Abbey (England).

THE EFFECT OF IGNITION OF SMALL QUANTITIES OF INITIATORS IN LABORATORY VESSELS OF GLASS AND POLYTHENE

S. Lamnevik, A. Bostroem (Res. Inst. of Natl. Defence, Sundbyberg, Sweden) et al Dec. 1972 19 p Transl. into ENGLISH from Swed. Rept. FOA-1-A-1452-40, Nov. 1968

(ERDE-Trans-1; FOA-1-A-1452-40) Avail: NTIS HC \$3.00

The sizes and distribution of splinters from the detonation of an initiator such as undextrinated lead azide in some normal laboratory vessels of glass and polythene have been investigated. Injuries to dummy hands were studied. Recommendations were made when working with initiators in the laboratory. ESRO

N73-24138# McDonnell Aircraft Co., St. Louis, Mo.

THE HIGH G APPROACH

P. V. Kulwicki and J. M. Sinnett 20 Feb. 1973 26 p

(Contract F33615-72-C-1574; AF Proj. 7184)

(AD-757216; MDC-A2169; AMRL-TR-73-27) Avail: NTIS CSCL 05/6

The High g Approach is an innovative approach to cockpit design which provides a unique match of pilot capabilities and airplane performance potential. The High g Approach provides an option for the pilot to think, command and control his aircraft at sustained load factor levels well above 7 G. The result, in the context of emerging fighter capability, is a dramatic increase in combat effectiveness and operational advantage. Author (GRA)

N73-24139# Michigan Univ., Ann Arbor. Inst. of Science and Technology.

EVALUATION OF HOLOGRAPHIC ELEMENTS IN A

HEADS-UP DISPLAY Final Report, 3 Apr. - 31 Oct. 1972
John N. Latta and Edwin B. Champagne Mar. 1973 45 p refs

(Contract N00123-72-C-1738)
(AD-758057; Rept-11057-3-F) Avail: NTIS CSCL 05/5

The report covers work on the application of a hologram optical element to a pilot's heads-up display. Two problem areas are addressed: the compensation of a wavelength shift in the hologram geometry from construction to reconstruction, and compensation of the effects of dispersion on the image in a hologram element system as a result of the spectral bandwidth of the illumination source. To examine these areas, a general vector formulation of hologram grating properties is developed. This permits the analysis of holograms recorded on either flat or curved surfaces. The wavelength shift correction of both the aberrations and first-order imaging properties of a hologram is accomplished by designing the construction geometry to offset the change in wavelength upon reconstruction. Applying these techniques to both the flat and curved surface geometries results in considerable performance improvement. (Author Modified Abstract) GRA

N73-24140# American Inst. for Research, Washington, D.C. HUMAN ENGINEERING GUIDE TO EQUIPMENT DESIGN (REVISED EDITION)

Harold P. VanCott, ed. and Robert G. Kinkade, ed. 1972 788 p refs Revised Sponsored in part by Army-Navy-Air Force Steering Comm.

(Contract N00014-70-C-0365)
(AD-758339; LC-72-600054) Avail: NTIS MF \$0.95; SOD HC \$8.00 CSCL 05/5

Contents: system and human engineering analyses; man as a system component; visual presentation of information; auditory and other sensory forms of information presentation; speech communication; man-machine dynamics data entry devices and procedures; design of controls; design of individual workplaces; design of multi-man-machine work areas; engineering anthropology; designing for maintainability; training system design; training device design; and human engineering tests and evaluation.

Author

N73-24141# Army Foreign Science and Technology Center, Charlottesville, Va. PARACHUTE OXYGEN APPARATUS

A. Seliverstov 21 Jun. 1972 7 p refs Transl. into ENGLISH from Krylya Rodiny (USSR), no. 4, 1969 p 29
(AD-756554; FSTC-HT-23-398-70) Avail: NTIS CSCL 06/11

The translation describes the KP-23 breathing apparatus used by parachutists. GRA

N73-24142# School of Aerospace Medicine, Brooks AFB, Tex. EFFECT OF LOW HUMIDITY ON HUMAN PERFORMANCE Final Report, Sep. 1971 - Mar. 1972

William F. Storm, Peter H. Henry, James F. Sanford, III, and James C. Noah Feb. 1973 18 p refs

(AD-756835; SAM-TR-73-3) Avail: NTIS CSCL 06/19

Human volunteers were trained to high levels of proficiency on three tasks involving various degrees of psychomotor and cognitive skills. Environments of 0.5-mm. water vapor pressure and/or simulated 8,000-ft barometric pressure had no adverse effects on performance during four 36-hou. chamber exposures. Systematic day-night variations were found for multidimensional Pursuit tracking skill and self-ratings of subjective fatigue.

Author (GRA)

N73-24143# Singer Co., Binghamton, N.Y. Simulation Products Div.

NAVAL PILOT TRAINING SYSTEM STUDY. VOLUME 1: BASIC REPORT Final Report

Harry W. Erickson, Duncan W. Simpson, Edward A. Stark, T. R.

Dailey, and Benjamin Schohan Orlando, Fla. Naval Training Equipment Center Dec. 1972 585 p refs Prepared in cooperation with N. Am. Aviation, Columbus, Ohio 3 Vol. (Contracts N61339-72-C-0049; N61339-72-C-0136) (AD-756638; NAVTRAEQUIPC-72-C-0049-1-Vol-1) Avail: NTIS HC \$10.50/set of 3 reports as AD-756638-set CSCL 05/9

The study defined a cost effective program for training Naval fixed-wing pilots during the 1974-1986 time frame. It identified requirements for the Undergraduate Pilot Training program anticipated for that period, and evaluated elements of the current program, and the education and training technologies for their ability to economically fulfill them. The behavior objectives of the future program were defined through the analysis of the flight tasks trained in the present program, likely to be relevant in the future. Major system elements having significant impact on the development of these objectives were identified, and recommendations developed for restructuring the program to reduce cost while maintaining current levels of pilot proficiency. (Author Modified Abstract) GRA

N73-24144# Singer Co., Binghamton, N.Y. Simulation Products Div.

NAVAL PILOT TRAINING SYSTEM STUDY. VOLUME 2: APPENDICES A, B, C, AND D. Final Report

Harry W. Erickson Orlando, Fla. Naval Training Equipment Center Dec. 1972 38 p refs Prepared in cooperation with N. Am. Aviation, Columbus, Ohio 3 Vol.

(Contracts N61339-72-C-0049; N61339-70-C-0136) (AD-756639; NAVTRAEQUIPC-72-C-0049-1-Vol-2) Avail: NTIS HC \$10.50/set of 3 reports as AD-756638-set CSCL 05/9

Contents: Current system definition; Discussion of training objectives; Recommendations; Costs. GRA

N73-24145# Singer Co., Binghamton, N.Y. Simulation Products Div.

NAVAL PILOT TRAINING SYSTEM STUDY. VOLUME 3: EXECUTIVE SUMMARY Final Report

Harry W. Erickson Orlando, Fla. Naval Training Equipment Center Dec. 1972 38 p refs Prepared in cooperation with N. Am. Aviation, Columbus, Ohio 3 Vol.

(Contracts N61339-72-C-0049; N61339-70-C-0136) (AD-756640; NAVTRAEQUIPC-72-C-0049-1-Vol-3) Avail: NTIS HC \$10.50/set of 3 reports as AD-756638-set CSCL 05/9

The study investigated the Naval Undergraduate Pilot (fixed-wing) Training (UPT) Program and produced recommendations for the modification of the program to reduce cost while maintaining the current level of graduate quality. The study analyzed the capabilities of elements of the current system, the pilot training requirements anticipated for the 1974-1986 time period, and capabilities within the pilot training state of the art for economically fulfilling those requirements. Six training system elements, selected for their discrete impact on system cost, training effectiveness and susceptibility to analysis and improvement were evaluated. Two criteria were established for the evaluation of each system element and for the selection of new or modified elements. They are training effectiveness and training cost. GRA

N73-24146# Naval Aerospace Medical Research Lab., Pensacola, Fla.

THE USE OF CONFIDENTIAL INSTRUCTOR RATINGS FOR THE PREDICTION OF SUCCESS IN NAVAL UNDERGRADUATE PILOT TRAINING

Wayne L. Waag, Richard H. Shannon, and Rosalie K. Ambler 7 Feb. 1973 19 p refs

(AD-757693; NAMRL-1175) Avail: NTIS CSCL 05/9

Previous investigations have reported significant relationships between confidential instructor ratings in early primary phase and later success in Naval flight training. Such ratings were found to increase significantly the validities derived solely from selection test scores. However, such findings do not guarantee

that confidential ratings would augment the validities derived from the combined array of selection and early training variables which are used in the current student pilot prediction system. The purpose of the present study was to determine whether such confidential ratings provided non-redundant information which would increase the predictive value of the present system. The results clearly indicated that confidential ratings obtained from primary flight instructors provided information relating to the student's probability of receiving his wings. Such ratings were found to significantly increase the predictive validities derived from the variables which are used currently in the student pilot prediction system. Such findings suggest that these confidential evaluations provide additional information beyond that which is reflected in the grades he assigns. It is recommended that confidential instructor ratings be implemented on a permanent basis in the presolo stage. The present student pilot prediction system should be revised to incorporate this information.

Author (GRA)

N73-24205 Ministry of Education and Sciences-Documentation Department, The Hague (Netherlands).

TRAINING OF PERSONNEL TO MAN THE VARIOUS PARTS OF AN INFORMATION CENTRE AND TO OPERATE VARIOUS KINDS OF SERVICE

W. F. DeRegt *In* AGARD Governmental Assistance for Tech. Inform. in Ind. and Simple Mechanization for Small Inform. Centres Mar. 1972 4 p

N73-25108 National Lending Library for Science and Technology, Boston Spa (England).

DECOMPRESSION DISORDERS AFTER EXPOSURE TO SAFE PRESSURE OR SAFE ALTITUDE

M. P. Yelinskii 12 Mar. 1973 9 p refs Transl. into ENGLISH from Zh. Voenna-Medit. (USSR), Jul. 1970 p 60-63 (NLL-DRIC-Trans-3035-(3623.66)) Avail: Natl. Lending Library, Boston Spa, Engl.: 1 NLL photocopy coupon

A sampling of tests is presented pertaining to decompression sickness and accompanying physiological effects resulting from pressure exposures of up to 2.25 absolute atmospheres. Particular note is made of the appearance of gas bubbles in the blood stream in terms of the specific gradients of pressure contributing to their appearance. Additional data is provided on human as well as animal subjects relative to cardiac function impairment, blood pressure, and variable rates of respiration. J.M.M.

N73-25109 National Lending Library for Science and Technology, Boston Spa (England).

METEOROLOGICAL CONDITIONS AND INFECTION OF THE UPPER RESPIRATORY TRACT IN CHILDREN

B. Dziadziuszko [1973] 5 p Transl. into ENGLISH from Gazeta Obs. Pihm (Warsaw), v. 24, no. 9, 1971 p 7-9 (NLL-M-22866-(5828.4F)) Avail: Natl. Lending Library, Boston Spa, Engl.: 1 NLL photocopy coupon

The influence of meteorological conditions on the seasonal variation in diseases of the upper respiratory tract and their increase in autumn and winter periods among children of one to four years was studied. Increasing morbidity in autumn and winter periods indicated the effects of large but brief fluctuations in atmospheric temperature and humidity in intensified infections of the upper respiratory tract. Author

N73-25110 Wisconsin Univ., Madison.
APPLICATION OF COLOR AND COLOR INFRARED AERIAL PHOTOGRAPHY TO DUTCH ELM DISEASE DETECTION
Ph.D. Thesis

Alan Ray Stevens 1972 164 p
Avail: Univ. Microfilms Order No. 72-23764

The feasibility of early and/or previsual detection of D.E.D. (Dutch elm disease) utilizing small format oblique color and color infrared photography taken from a light aircraft is discussed. Laboratory studies centered around the determination of spectral reflectance signatures for healthy elm leaves as well as for those at various stages of stress caused by D.E.D. Examination of pertinent literature showed that the basis for early and/or previsual

detection was the decrease in the near infrared reflected energy of a leaf during early stages of stress. In contrast, this study found this to be true only if the tree were infected early in the growing season. It was also found that the reflected infrared energy would decrease as the leaf dropped from its normal healthy angular orientation. A decrease in the near infrared energy was also found upon comparing spectral responses from a portion of an elm crown which was completely foliated to those responses for a portion through which one could see the background. Dissert. Abstr.

N73-25111*# Linguistic Systems, Inc., Cambridge, Mass.
EFFECT OF MONOCHROMATIC LIGHT ON BLOOD CONSTANTS

L. Castells, A. Alomar, and J. Reventos Washington NASA Jun. 1973 10 p refs Transl. into ENGLISH from Rev. Clin. Esp. (Madrid), v. 104, no. 1, 15 Jan. 1967 p 49-52 (Contract NASw-2482)

(NASA-TT-F-14941) Avail: NTIS HC \$3.00 CSCL 06P

The effect of monochromatic light on certain blood constants are studied, both in vivo and in vitro, by irradiating the blood by extracorporeal circulation. A dog's retina is also irradiated in vivo. An increase in eritrosedimentation rate and haemolysis is observed. The leucocytes are however decreased. The hyperglycaemia of pancreatctomized dogs is also decreased. Probably this effect is mediated through the hypothalamus in form of a Spectrum-retina-hormone reflex. Author

N73-25112*# George Washington Univ., Washington, D.C. Dept. of Medical and Public Affairs.

SCIENTIFIC PUBLICATIONS AND PRESENTATIONS RELATING TO PLANETARY QUARANTINE. VOLUME 5: THE 1972 SUPPLEMENT

Frank D. Bradley and Marcy R. Nadel Jun. 1973 53 p refs (Contract NSR-09-010-027)

(NASA-CR-131817; GWU-BSCP-73-14P-Vol-5-Suppl-6) Avail: NTIS HC \$4.75 CSCL 06M

The sixth annual supplement to the bibliography on planetary quarantine contains 191 references, an author index and a permuted title index. G.G.

N73-25113*# New Mexico Univ., Albuquerque. Dept. of Biology.

STUDY OF METHODS FOR THE IMPROVEMENT OF BACTERIAL TRANSPORT MEDIA Final Report

Roger L. Gardner and John Wm. Beakley 31 Mar. 1973 27 p refs

(Contract NAS9-12720)

(NASA-CR-128958) Avail: NTIS HC \$3.50 CSCL 06M

A series of 500 transport media recipes was tested for ability to hold pure cultures of *Streptococcus equisimilis*, *Corynebacterium equi*, *Neisseria perflava*, and *Haemophilus parainfluenzae* for 21 days. Stuart Medium Base with 0.4% agar was used as the control medium for this and the other experiments in the investigation. At the end of the holding period inoculated transport media were quantitatively assayed, and the control media were assayed immediately after inoculation. Three vials of each medium were inoculated with an organism, and each vial's medium was diluted and spread on duplicate plates. Assay media for this experiment included Brain Heart Infusion (BHI), Tryptic Soy Agar, and BHIA with 1% isovitalax enrichment. Author

N73-25114*# Baird-Atomic, Inc., Bedford, Mass.

A STUDY OF MARINE LUMINESCENCE SIGNATURES, PART 1 Final Report

Arthur W. Hornig and DeLyle Eastwood Mar. 1973 156 p refs

(Contract NAS2-6408)

(NASA-CR-114578) Avail: NTIS HC \$10.00 CSCL 08A

Fluorescent excitation and emission spectral data on chlorophyll and Gelbstoff in natural sea waters from the Atlantic, Gulf, and Pacific coasts show that algae particulates are totally absorbing over much of the near ultraviolet and visible spectra

and act approximately as quantum counters; plant pigments absorb energy and transfer a large portion to chlorophyll where some fraction is emitted as chlorophyll fluorescence. Gelbstoff data do not exhibit quantum counter action because of their low concentration. It is concluded that luminescence data of natural sea waters are useful in monitoring algal and Gelbstoff as well as pollutant concentrations. G.G.

N73-25116*# Baird-Atomic, Inc., Bedford, Mass.
COMPENDIUM OF MARINE LUMINESCENCE SIGNALS, PART 2 (APPENDIX C)

Arthur W. Hornig and DeLyle Eastwood Mar. 1973 227 p
 (Contract NAS2-6408)
 (NASA-CR-114579) Avail: NTIS HC \$13.50 CSCL 08A

Chlorophyll and Gelbstoff excitation and emission spectra of sea water samples are assembled according to geographic sites from the Atlantic and Gulf coasts, the west coast, and a location north of Hawaii. Data were taken by fluorescent spectrophotometer and include also laboratory algal cultures for comparison with the sea water samples. G.G.

N73-25116*# National Aeronautics and Space Administration, Washington, D.C.
FOURTH ALL-UNION CONFERENCE ON SPACE BIOLOGY AND MEDICINE

Jun. 1973 5 p Transl. into ENGLISH from Med. Gazeta (Moscow), 19 Jan. 1973 p 3, cols. 1-8
 (NASA-TT-F-14964) Avail: NTIS HC \$3.00 CSCL 06E

A brief summary is presented on topics discussed at the Space Biology and Medicine Conference. Data cover physiology, hemodynamic responses, neuroemotional stresses, radiobiology, medical problems resulting from space flight, and medical experiments conducted onboard spacecraft. E.H.W.

N73-25117# Lockheed Missiles and Space Co., Palo Alto, Calif.

FLUID FLOW IN A TUBE WITH DEFORMABLE WALL IN THE PRESENCE OF VALVES

I. M. Skobeleva [1973] 7 p refs Transl. into ENGLISH from Mekhan. Polimerov, Akad. Nauk Latv. SSR (Riga), no. 5, 1972 p 903-908

Avail: NTIS HC \$3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

The problem of viscous fluid flow in finite tube with valves at the ends is solved numerically for elastic wall properties varying periodically with time. Of primary concern is the case of blood flow in the veins along which valves are disposed to prevent a reverse current. A solution is constructed of a simple model problem describing a muscular pump under the assumption that the mechanical active muscle activity can be reduced to a given change in effective elasticity, and that the fluid flow is quasi-stationary. D.L.G.

N73-25118# Naval Submarine Medical Research Lab., Groton, Conn.

SPEECH DISCRIMINATION IN NOISE AND HEARING LOSS AT 3000 HERTZ Interim Report

Thomas Murray and Paul G. Lacroix 11 Jul. 1972 16 p refs (AD-752974; NAVSUBMEDRSCLAB-719; Rept-7; Rept-73-01201) Avail: NTIS HC \$3.00 CSCL 06/19

Navy personnel with normal hearing and with hearing losses at 3 kHz and above were evaluated on tests of speech discrimination in noise. Two tests were used, one previously designed for use in audiological clinics and one constructed at this laboratory with background noise similar to that found in the engine rooms of nuclear submarines. The results indicate that subjects with hearing losses at 3 kHz and above may score as much as 11 percent but more generally at least five percent below normals for a speech discrimination task in noise. For the two types of noise used in these tests, there was little or no difference in the general trend of test result. The correlation coefficients obtained between the pure tone audiometric findings and the speech discrimination task in noise were found to be

nonsignificant for the most part. From these results, it appears that hearing loss at 3 kHz reduces one's ability to discriminate speech in noise but this reduction is minor. Author

N73-25119*# Mayo Clinic, Rochester, Minn.
STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report

Erik L. Ritman and Earl H. Wood 1 Apr. 1973 28 p refs (Grant NGR-24-003-001)
 (NASA-CR-133212) Avail: NTIS HC \$3.50 CSCL 06S

The current status and application are described of the biplane video roentgen densitometry, videometry and video digitization systems. These techniques were developed, and continue to be developed for studies of the effects of gravitational and inertial forces on cardiovascular and respiratory dynamics in intact animals and man. Progress is reported in the field of lung dynamics and three-dimensional reconstruction of the dynamic thoracic contents from roentgen video images. It is anticipated that these data will provide added insight into the role of shape and internal spatial relationships (which is altered particularly by acceleration and position of the body) of these organs as an indication of their functional status. Author

N73-25120*# Colorado State Univ., Fort Collins.
[HYPOXIA, GAS NARCOSIS, AND METABOLIC RESPONSE TO ARGON AND NITROUS OXIDE] Semiannual Status Report

31 Oct. 1972 55 p refs
 (Grant NGR-06-002-075)

(NASA-CR-133214) Avail: NTIS HC \$4.75 CSCL 06E

Studies of the mechanism of inert gas influence on metabolism are reported. The studies reported include: metabolic response of hamsters to argon and nitrous oxide, membrane fatty acids and susceptibility to narcotic gas influence, narcosis-induced histotoxic hypoxia, biochemical study of inert gas narcosis, hypoxia-induced protection against cardiovascular deterioration in the weightless state, and acute metabolic and physiologic response of goats to narcosis. F.O.S.

N73-25121# Defence Research Information Centre, Orpington (England).

VOICE AND HEARING IN THE SYSTEM OF ACOUSTIC ORIENTATION OF ANIMALS

V. D. Ilichev Feb. 1973 23 p refs Transl. into ENGLISH from Zh. Obshchey Biologii (Moscow), v. 32, no. 3, 1971 p 299-311

(DRIC-Trans-3056; BR-30412) Avail: NTIS HC \$3.25

The general rules determining the interrelation of acoustic system in various systematic groups and at various levels of evolution were examined. The acoustic organs sometimes do not reveal homologous successions, and their evolution, from the structural point of view, bears a mosaic character. At the same time, functional characteristics of hearing and voice and the interrelation between them reveal clear changes in the following directions: (1) in the sphere of sound communication, more and more vital situations are involved; (2) the functional (dynamic) range is widened; and (3) the acoustic systems are universalized and their numbers and decreased. The interrelations of the voice and hearing are considered as a biological correlation of a special type, guaranteeing organismic, populational and biocoenotic channels of interrelation. Author (ESRO)

N73-25122# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

CHANGES IN THE DIURNAL VARIATION OF SIMULATED PILOT ACTIVITY AFTER TIME SHIFT DUE TO AIR TRAVEL THROUGH SEVERAL TIME ZONES Ph.D. Thesis - Bonn Univ. [DIE VERAENDERUNG TAGESZEITLICHER SCHWANKUNGEN SIMULIERTER FLIEGERISCHER TAETIGKEIT UNTER DEM EINFLUSS DER ZEITVERSCHIEBUNG NACH

FLUGREISEN UEBER MEHRERE ZEITZONEN]

Hermann Rehme 1973 83 p refs In GERMAN; ENGLISH summary
(DLR-FB-73-25) Avail: NTIS HC \$6.25; DFVLR, Porz: 24.80 DM

The 24-hour performance variation of 12 pilots, measured in a flight simulator, was compared with the performance variation on day 1, 3, 5, and 8 after air travel through 8 time zones from east to west (Germany - U.S.A.) and vice versa (return flight after a sojourn of 16 days in the U.S.A.). Conformity of the diurnal performance variation with the preflight values was found on day 3 to 5 after the west flight and on day 5 after the east flight. Therefore, a daily phase shift of 1 to 2 hours was observed. The 24-hour performance average showed a significant decrement of 8.5% only on the first day after the east flight, but not after the west flight. Author (ESRO)

N73-25123# Medical Coll. of Wisconsin, Milwaukee. Dept. of Environmental Medicine.

THE EFFECT OF CARBON MONOXIDE ON TIME PERCEPTION Final Report

Richard D. Stewart, Paul E. Newton, Michael J. Hosko, and Jack E. Peterson Jan. 1973 358 p refs
(PB-214651/2) Avail: NTIS HC \$6.00 CSCL 06T

Twenty-seven healthy, adult male and female volunteers were exposed to carbon monoxide at concentrations of 2, 50, 100, 200 and 500 ppm for periods up to 4-1/2 hours for the purpose of determining the effect of the gas upon time perception. These exposures, which resulted in a range of carboxyhemoglobin saturations up to 20 percent, produced no impairment in the ability of the subjects to perform the Beard-Wertheim Time Discrimination Test, to estimate ten or thirty second intervals, or to perform the Marquette Time Estimation Test. Author

N73-25124# Missouri Univ., Columbia.

MECHANISMS OF OXYGEN TOXICITY AT THE CELLULAR LEVEL

Olen R. Brown, Jack L. Stees, Tom Kobbermann, Stan Weaver, and Margaret Lu Jan. 1973 45 p refs
(Contract N00014-67-A-0287-0002; NR Proj. 136-756)
(AD-758725; TR-5) Avail: NTIS CSCL 06/20

The following areas of research are summarized: (1) Two types of pressure chambers were developed for exposure of bacteria and subcellular fractions to hyperbaric oxygen. (2) An electronic automated sampling device was developed to permit kinetic studies of biological transport as affected by hyperoxia. (3) The previously reported correlation between sensitivity to hyperoxia and radiation in bacteria was further studied. Evidence was presented that a small, but measurable amount of hyperoxic damage may occur through production of single-stranded breaks in DNA. (4) Surface SH groups on *E. coli* are oxidized at a rate of approximately 500 molecules per minute in 6 atm of oxygen, a condition which stops growth and respiration almost immediately. (5) Cellulose acetate membranes were discovered to inhibit growth of some strains of *E. coli*; the significance of this for water analysis and for experiments utilizing membranes in HPO studies was discussed. (6) Fatty acid synthetase from yeast was purified approximately 150-fold and its sensitivity to HPO was measured. (7) HPO produced reversible inhibition of respiration and transport of glucose and acetate. (Author Modified Abstract) GRA

N73-25125* National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.
UNDERWATER SPACE SUIT PRESSURE CONTROL REGULATOR Patent

Billy R. Aldrich, Charles R. Cooper, and John R. Rasquin, inventors (to NASA) Issued 13 Mar. 1973 7 p Filed 2 Nov. 1971 Supersedes N72-25124 (10 - 16, p 2113) Continuation-in-part of US Patent Appl. SN-869260, filed 24 Oct. 1969
(NASA-Case-MFS-20332-2; US-Patent-3,720,208; US-Patent-Appl-SN-195061; US-Patent-Class-128-142.5; US-Patent-Class-2-2.1A; US-Patent-Class-137-538; US-Patent-Appl-SN-869260) Avail: US Patent Office CSCL 06K

A device is reported for regulating the pneumatic pressure in a ventilated space suit relative to the pressure imposed on the suit when being worn by a person underwater to simulate space environment for testing and experimentation. A box unit located on the chest area of the suit comprises connections for suit air supply and return lines and carries a regulator valve that stabilizes the air pressure differential between the inside and outside of the suit. The valve and suit pressure is controlled by the suit occupant and the valve includes a mechanism for quickly dumping the suit pressure in case of emergency. Pressure monitoring and relief devices are also included in the box unit.

Official Gazette of the U.S. Patent Office

N73-25126*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

A STUDY OF THE THERMOREGULATORY CHARACTERISTICS OF A LIQUID-COOLED GARMENT WITH AUTOMATIC TEMPERATURE CONTROL BASED ON SWEAT RATE: EXPERIMENTAL INVESTIGATION AND BIOTHERMAL MAN-MODEL DEVELOPMENT

Alan B. Chambers, James R. Blackaby, and John B. Miles Washington Jun. 1973 71 p refs
(NASA-TN-D-7311; A-4686) Avail: NTIS HC \$3.00 CSCL 06Q

Experimental results for three subjects walking on a treadmill at exercise rates of up to 590 watts showed that thermal comfort could be maintained in a liquid cooled garment by using an automatic temperature controller based on sweat rate. The addition of head- and neck-cooling to an Apollo type liquid cooled garment increased its effectiveness and resulted in greater subjective comfort. The biothermal model of man developed in the second portion of the study utilized heat rates and exchange coefficients based on the experimental data, and included the cooling provisions of a liquid-cooled garment with automatic temperature control based on sweat rate. Simulation results were good approximations of the experimental results. Author

N73-25127# Beta Industries, Inc., Dayton, Ohio.

INFLATABLE RESTRAINT CONCEPT FOR GENERAL AVIATION AIRCRAFT Final Report, 1 Sep. 1971 - 1 Jul. 1972

Richard W. Carr and Norman S. Phillips May 1973 117 p refs
(Contract DOT-FA71NA-608)
(FAA-RD-73-3; FAA-NA-73-61) Avail: NTIS HC \$8.00

A program that investigated inflatable restraint design criteria and developed an airbag restraint system for use in a general aviation aircraft is presented. The program required three phases of effort which were (1) data collection, (2) establishment of design goals, and (3) concept development. The first phase consisted of collecting data on crash acceleration profiles, inflatable restraints, energy attenuation criteria, and airframe dimensions. With this information and available human tolerance data, it was possible to develop analytical models of the seated occupant and airbag restraint, which were used to determine the design goals for inflatable occupant restraints that could be used in general aviation aircraft. Once the design goals were established, airplane cabin dimensions and inflatable system performance specifications were used to develop an inflatable restraint concept for general aviation aircraft. Author

N73-25128# Naval Submarine Medical Center, Groton, Conn. Vision Branch.

IMPROVING DISTANCE ESTIMATION UNDER WATER: LONG-TERM EFFECTIVENESS OF TRAINING Interim Report

Steven H. Ferris 10 Jul. 1972 10 p refs
(AD-752979; NAVSUBMEDRSCHLAB-718; Rept-11; Rept-73-01205) Avail: NTIS HC \$3.00 CSCL 06/19

Due to both optical distortion and water turbidity, divers are usually inaccurate when they estimate distances under water. Previous studies have demonstrated that training with feedback improves judgment accuracy. The present study showed that the effect of training diminishes considerably during the nine

weeks following training. A more extensive training program is recommended for diving tasks in which distance estimation is important. Author

N73-25129# Naval Submarine Medical Research Lab., Groton, Conn.

MASKING AS AN INDICATOR OF NEURAL FATIGUE: A PRELIMINARY STUDY Interim Report

Saul M. Luria and Alma P. Ryan 23 May 1972 13 p refs (AD-752975; NAVSUBMEDRSCHLAB-709) Avail: NTIS HC \$3.00 CSCL 06/19

An attempt was made to determine if the basic neural phenomenon of masking could be used as an indicator of fatigue or stress in individual nervous systems. Results show that after prolonged viewing of a moving pattern, the apparent brightness of a moving line is reduced. As a result, the masking effectiveness of the moving line is also reduced. A reduction in the luminance of the moving line by an amount equal to the reduction in apparent brightness produced an equivalent reduction in masking effectiveness. Author

N73-25130*# Argonne National Lab., Ill. Chemical Engineering Div.

RESEARCH ON OXYGEN RECOVERY SYSTEMS FOR USE IN SPACE CAPSULES Progress Report, Feb. 1972 - Jan. 1973

J. R. Selman, R. K. Steunenberg, and E. J. Cairns Feb. 1973 52 p refs

(NASA Order A-70738-A)

(NASA-CR-114573; ANL-8018) Avail: NTIS HC \$4.75 CSCL 06K

An improved electrochemical process was investigated for the recovery of oxygen from the atmospheres of manned space capsules. The objective of the proposed system is to recover the oxygen from CO₂ with high efficiency and to recover the additional amount of oxygen from water that is required to provide a total oxygen makeup stream of about 2.0 lb/man-day. The carbon from the CO₂ must be converted into a readily disposable or usable form. The results are given of initial experiments with a porous stainless steel cathode in a LiCl-KCl electrolyte with small additions of oxide, carbonate, and hydroxide. Author

N73-25131*# Washington Univ., St. Louis, Mo. Center for Development Technology.

EARLY CHILDHOOD EDUCATION: STATUS TRENDS, AND ISSUES RELATED TO ELECTRONIC DELIVERY

Donna Rothenberg May 1973 121 p refs

(Grant NGL-26-008-054)

(NASA-CR-133028; Memo-73/2) Avail: NTIS HC \$8.25 CSCL 05E

The status of, and trends and issues within, early childhood education which are related to the possibilities of electronic delivery of educational service are considered in a broader investigation of the role of large scale, satellite based educational telecommunications systems. Data are analyzed and trends and issues discussed to provide information useful to the system designer who wishes to identify and assess the opportunities for large scale electronic delivery in early childhood education. Author

N73-25132*# Loewy (Raymond)/Snaith (William), Inc., New York.

HABITABILITY STUDY, EARTH ORBITAL SPACE STATIONS Final Report, Jan. - Jun. 1972

30 Jun. 1972 36 p

(Contract NAS8-28362)

(NASA-CR-124276) Avail: NTIS HC \$4.00 CSCL 05E

Work is reported aimed at supporting the shuttle payload carriers, such as, the Sortie Carrier and RAM. Sketches, renderings, descriptions of scale models and full scale mock-ups, and reports required to fully explain the design recommendations are presented. Author

N73-25133*# Martin Marietta Corp., Denver, Colo.
CONCEPTUAL DESIGN STUDY FOR A TELEOPERATOR VISUAL SYSTEM, PHASE 2 Final Report
C. Grant, R. Meirick, C. Polhemus, R. Spencer, D. Swain, and R. Twell Apr. 1973 204 p refs
(Contract NAS8-29024)
(NASA-CR-124273; MCR-73-96) Avail: NTIS HC \$12.25 CSCL 05H

An analysis of the concept for the hybrid stereomoscopic television visual system is reported. The visual concept is described along with the following subsystems: illumination, deployment/articulation, telecommunications, visual displays, and the controls and display station. F.O.S.

N73-25134# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

HUMAN PERFORMANCE CAPABILITY IN THE AIRCRAFT ACCELERATION ENVIRONMENT OF AERIAL COMBAT

Kenneth A. Smiles 1972 21 p ref Presented at AFSC Sci. and Eng. Symp., San Antonio, Tex., 17-19 Oct. 1972

(AF Proj. 7222)

(AD-759174; AMRL-TR-72-60) Avail: NTIS CSCL 06/19

Five healthy, young male subjects performed a two dimensional compensatory tracking task using a simulated heads-up predictive gunsight in the gondola of a human centrifuge. The gunsight responded to control stick movement after passage of the signal through the dynamics of a high performance aircraft. The target had a random noise forcing function on the roll axis and a haversine function on the pitch axis. The most significant differences in pilot performance were between subjects. Individual differences were much larger than the effects of training or Gz load. The subjects showed a highly significant deterioration in performance during the pitch and they did not recover to pre-G performance levels immediately after G stress. This effect became more exaggerated as the G levels increased. The subjects improved in pre-G and post-G performance, but their performance during G changed very little with training. (Author Modified Abstract) GRA

N73-25135# Aerospace Medical Div., Brooks AFB, Tex.
USAF TECHNICAL OBJECTIVE DOCUMENT (TOD): AEROSPACE BIOTECHNOLOGY

Thomas D. N. Douthit 1973 48 p

(AD-759277; AMD-TR-1-73) Avail: NTIS CSCL 06/2

The document is directed to the exploratory development conducted under the Aerospace Biotechnology program element. Some operational problem areas such as crew survivability/vulnerability transcend several major subdivisions of the Technical Objective Document, and some methodologies, such as measurement of effects of operational environments on performance ability of crewmen, are used to achieve the goals described in several areas. (Author Modified Abstract) GRA

N73-25136# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.

LIMITATIONS OF UNAIDED EYE VISUAL TARGET DETECTION FROM HIGH SPEED LOW FLYING AIRCRAFT CORRELATED WITH TARGET BACKGROUND ENVIRONMENT Technical Summary Report

Bruno K. Wernicke Feb. 1973 69 p refs

(AF Proj. 7645)

(AD-759651; AFAL-TR-72-188) Avail: NTIS CSCL 17/8

Some of the limitations of detecting tactical targets with the unaided eye in high speed low flying aircraft are investigated. The situations selected are those frequently encountered in the European theatre during the winter months, up to and including the mid-day time period and during the summer months in the morning or evening hours. As explained in the first section of this report, even a detailed search cannot provide an accurate prediction capability without specific boundaries for the environmental situation. In the report one case of a slant range field of view from low-flying aircraft (F-4C) is investigated in regard to the minimum contrast ratio required between a target and its immediate environment in order that it be detectable by the airborne observer. (Author Modified Abstract) GRA

N73-25137# Defence Research Information Centre, Orpington, (England).

DECOMPRESSION DISORDERS AFTER EXPOSURE TO SAFE PRESSURE OR SAFE ALTITUDE

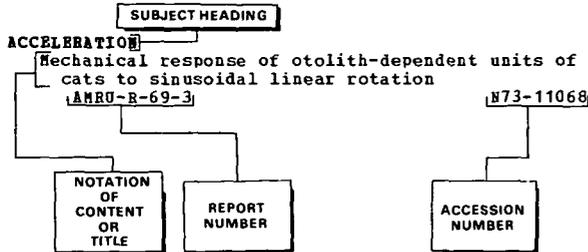
M. P. Elinskii Jan. 1973 10 p refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), Jul. 1970 p 60-63 (AD-756263; DRIC-Trans-3035; BR-30399) Avail: NTIS CSCL 06/19

From experimental studies and clinical observations cited, it is clear that decompression starting from 2.25 atm abs or less and also ascents to an altitude of less than 8000 m may lead to the appearance of gas bubbles in the blood and sometimes cause severe decompression sickness. Such cases are probably not always spotted because of the widely held view that disorders do not occur with such pressure drops. The problem raised in this paper seems to be of practical importance because if decompression sickness may arise after exposure to a depth of 12.5 m, this points to the formation of gas bubbles large enough to cause embolism. From this it follows that uninterrupted ascent from these depths is not always harmless, particularly, as occult gas bubbles may be formed leading to subclinical forms of decompression sickness. In the second place saturation of the organism with nitrogen and other gases at a pressure of 2.25 atm abs may not be taken as an index of safe supersaturation - both now and hitherto calculations of tables for stepwise decompression are based on the assumption that a pressure drop in the ratio of 2.25:1 does not cause disease. It is possible that the need to reduce the factor with increasing depths is primarily due to a false concept of the complete safety of ascending from a depth of 12.5 m. GRA

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl. 119) SEPTEMBER 1973

Typical Subject Index Listing



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A

- ACCELERATION**
 Mechanical response of otolith-dependent units of cats to sinusoidal linear rotation
 [AMRU-R-69-3] N73-11068
- ACCELERATION TOLERANCE**
 Cerebellar responses of animals under varied rotation conditions in a centrifuge A73-31506
 Calculation of a Coriolis acceleration acting on semicircular canal receptors of man in rotating systems A73-31518
 Distribution parameter model for acceleration forces acting on arterial system [AD-756530] N73-24128
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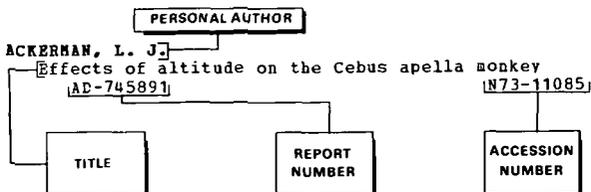
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