



Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

NASA SP-7011 (229)  
February 1982

National Aeronautics and  
Space Administration



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STAR (N-10000 Series)      N82-10001 - N82-12026

IAA (A-10000 Series)      A82-10001 - A82-12850

# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY  
WITH INDEXES**

**(Supplement 229)**

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 January 1982 in

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

NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 109 reports, articles and other documents announced during January 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

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 1982 Supplements.

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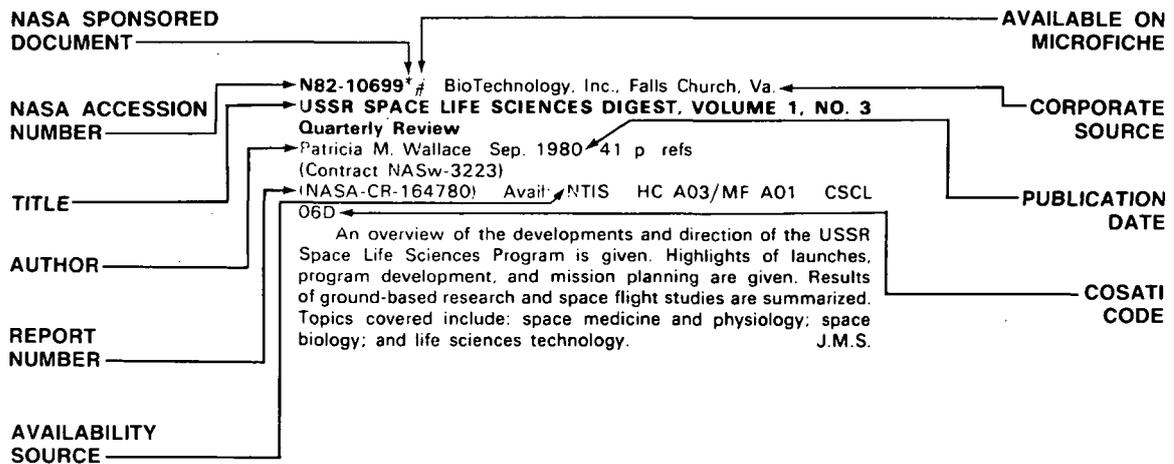
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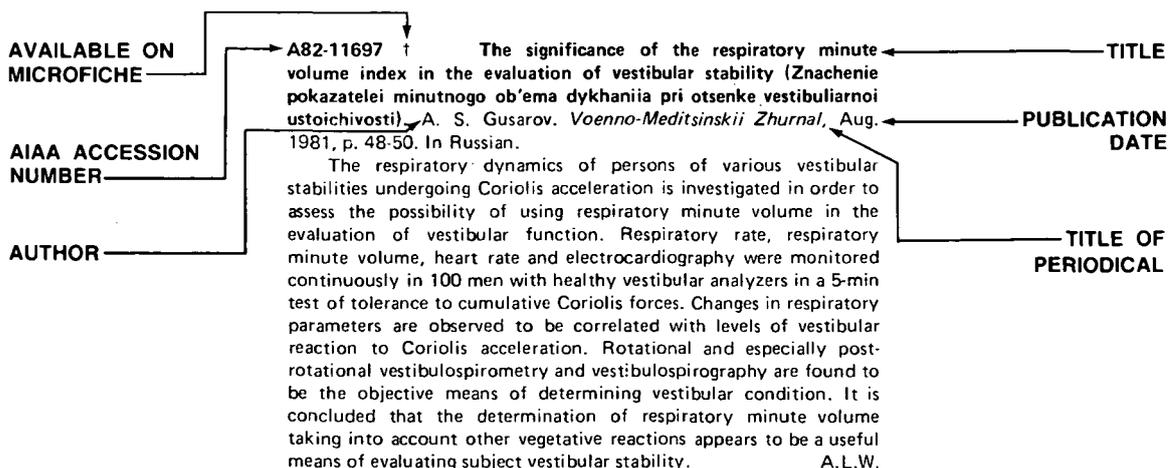
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## TYPICAL CITATION AND ABSTRACT FROM STAR



## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 229)

FEBRUARY 1982

## IAA ENTRIES

**A82-10139 #** A methodology for decision augmentation system design. W. Zachary (Analytics, Inc., Willow Grove, PA) and J. Hopson (U.S. Naval Air Development Center, Warminster, PA). In: *Computers in Aerospace Conference, 3rd, San Diego, CA, October 26-28, 1981*, Collection of Technical Papers. New York, American Institute of Aeronautics and Astronautics, 1981, p. 470-476. (AIAA 81-2201)

The domain of Decision Augmentation Systems (DAS) is composed of two general classes of systems, including decision automata and decision support systems. Problems in DAS design are examined, and the structure and organization of the DAS design framework are considered. The steps in designing a decision augmentation system are discussed, taking into account aspects of problem definition/decomposition, questions of problem aidability determination, automation level identification, decision function allocation, augmentation algorithmic technique selection, information sharing specification, and man/computer interface specification. Guidelines for DAS engineering are examined, giving attention to situation definition/decomposition guidelines, situation aidability determination guidelines, augmentation level identification guidelines, decision function allocation guidelines, technique selection guidelines, and information sharing specification guidelines. G.R.

**A82-10550** Are the 3,800-Myr-old Isua objects micro-fossils, limonite-stained fluid inclusions, or neither. E. Roedder (U.S. Geological Survey, Reston, VA). *Nature*, vol. 293, Oct. 8, 1981, p. 459-462. 19 refs.

The nature of the yeast fossil-like ovoid and elliptical objects found in the 3800-million-year-old Isua supracrustal belt of southwest Greenland is discussed. Based on considerations of the deformation of the host material, the distribution of the clear and brown objects, the crystal nature of most of the clear objects, the nature of the actual fluid inclusions present, the distribution of the objects at the quartz grain boundaries and the solubility of the brown material in HCl, it is argued that the brown objects represent limonite-stained cavities from the otherwise complete dissolution by weathering of ferruginous dolomite grains. Additional evidence presented by Bridgwater et al. (1981) in support of the fluid inclusion nature of the brown and clear objects and by Pflug et al. (1978, 1979) in support of the fossil nature of the brown objects are interpreted as ambiguous. It is pointed out, however, that although the present objects can not be regarded as Precambrian fossils, it should be possible to find organic matter trapped within single crystals. A.L.W.

**A82-10630** Progress in computer analysis of the exercise electrocardiogram. V. Bhargava, K. Watanabe, and V. F. Froelicher (California, University, San Diego, CA). *American Journal of Cardiology*, vol. 47, May 1981, p. 1143-1151. 34 refs. Grant No. NIH-HL-17682.

The development of digital computer techniques for the analysis of exercise electrocardiographic data is reviewed. Early computer studies concerned with the quantitative study of the Frank lead exercise electrocardiogram and the computerized measurement of the S-T index, S-T integral, S-T spatial magnitude and direction, S-T segment magnitude 60 ms after the end of the QRS complex, and the

parameters of the Werner et al. (1976) program are discussed, and commercial on-line exercise data processing systems and their applications in automated exercise electrocardiographic analysis, the development of a treadmill exercise score and the validation of S-T segment criteria for ischemia are examined. The theoretical aspects of the procedures used in digital processing are then considered, with attention given to analog to digital conversion, the mathematical constructs employed in processing, noise reduction, signal averaging, the data sampling window, spatial analysis based on S-T segment vectors and calibration based on with exercise radionuclide studies of myocardial perfusion and function. It is predicted that computerized exercise electrocardiography will become ubiquitous in the next decade due to revolutionary advances in microcomputers. A.L.W.

**A82-10631** Evaluation of abnormal exercise electrocardiogram in apparently healthy subjects - Labile repolarization /ST-T abnormalities as a cause of false positive responses. P. L. McHenry, H. W. Richmond, B. L. Weisenberger, J. S. Rodway, G. F. Perry, and J. W. Jordan (Indiana University, Indianapolis, IN). *American Journal of Cardiology*, vol. 47, May 1981, p. 1152-1160. 16 refs. Research supported by the Herman C. Krannert Fund and American Heart Association; Grants No. NIH-HL-06308; No. NIH-HL-07182.

The significance of abnormal S-T segment responses in exercise electrocardiography of apparently healthy subjects is investigated based on a longitudinal study of 121 subjects. Men with a normal 12-lead electrocardiogram and normal heart size who were referred because of abnormal S-T segment responses to treadmill exercise testing were tested for labile ST-T wave abnormalities before and after hyperventilation, than underwent symptom-limited treadmill exercise testing in the fasting state during initial evaluation and in a follow-up period lasting up to 66 months. A tendency toward labile S-T or T wave abnormalities was noted in 61 of the subjects, of whom only one experienced a new coronary event, while of the remaining 60 subjects 34 exhibited significant coronary artery disease. A considerable variability in the appearance of labile ST-T wave changes and abnormal S-T segment responses to exercise is also observed. Statistical analysis of the records of 35 subjects without labile ST-T abnormalities has identified a set of criteria to distinguish true positive from false positive responses with a specificity of 92%, a sensitivity of 82% and a predictive value of 95%. A review of patient records also indicated that a serial conversion from a normal to an abnormal S-T segment response was not more predictive of coronary artery disease than an initially abnormal result. A.L.W.

**A82-10632** Variations in normal electrocardiographic response to treadmill testing. V. F. Froelicher, R. Wolthuis, J. Fischer, and G. Uhl (USAF, School of Aerospace Medicine, Brooks AFB, TX; Medtronic, Inc.; California, University, San Diego, CA). *American Journal of Cardiology*, vol. 47, May 1981, p. 1161-1167. 25 refs.

Forty healthy young men at low risk for coronary artery disease underwent progressive maximal treadmill testing. Four bipolar electrocardiographic leads including CM5, CC5, inferior-superior Y, anterior-posterior Z, and a standard V5 were recorded and later computer-processed. Measurements included amplitudes of the Q, R, S, J junction and T wave, R-T and Q-S intervals and S-T segment slope. These variables are presented as the 10th, 50th (median) and 90th percentiles throughout the testing procedure to define reference values for the electrocardiographic response to maximal treadmill testing. The medians are presented graphically so that the exercise-induced changes can be visualized. In addition, the percent change of R wave amplitude in V5 compared with the supine pretest value is displayed for each subject during and after testing. (Author)

**A82-10633** Computer quantitation of Q-T and terminal T wave /aT-eT/ intervals during exercise - Methodology and results in normal men. J. O'Donnell, S. B. Knoebel, D. E. Lovelace, and P. L. McHenry (Indiana University; U.S. Veterans Administration Medical Center, Indianapolis, IN). *American Journal of Cardiology*, vol. 47, May 1981, p. 1168-1172. 19 refs. Research supported by the Herman C. Krannert Fund and American Heart Association; Grants No. NIH-HL-06308; No. NIH-HL-07182.

The methods and results of a computerized study of the Q-T interval and T wave of resting and exercise electrocardiograms obtained from normal men are presented. Treadmill exercise tests were performed using a modified Balke protocol in 130 clinically normal men and 25 consecutive QRS-T complexes from standing rest and three exercise stages were computer averaged; measurements of the Q-T interval, the ratio of the Q-T interval to the corrected Q-T interval, and the apex to end of T interval (aT-eT interval) were then made manually and by computer. No significant differences are observed between any of the visual and computer-generated W-T and aT-eT interval measurements in the X or Z axis leads, although the computer-quantitated measurements in the Z axis lead were systematically longer than those made from the X axis lead. During submaximal exercise, in 63% of the subjects, the Q-T ratio is found to be consistently greater than 1.08, a value previously taken to be a reliable indicator of heart disease. The aT-eT interval is not observed to be dependent on either age or heart rate, indicating that it might be used as a specific indicator of repolarization alterations that occur with myocardial ischemia. A.L.W.

**A82-10749** † Analysis of lung vasomotor responses to alveolar hypoxia and hypercapnia (Analiz, vazomotornykh otvetov v legkikh na alveoliarnuiu gipoksiu i giperkapniyu). D. P. Dvoretiskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Aug. 1981, p. 1229-1236. 25 refs. In Russian.

The response of pulmonary vessels and the resulting hemodynamics to conditions of reduced oxygen pressure and elevated carbon dioxide in the inspired air are investigated. Experiments measuring the effectiveness of alveolar hypoxia and hypercapnia in increasing pulmonary blood flow resistance, the dependence of vascular responses on blood pH at various alveolar ventilation volumes and the response threshold of pulmonary vessels to hypoxic and hypercapnic stimuli were performed in anesthetized cats under artificial respiration. Results confirm a previously observed inverse relationship between the magnitude of blood flow reduction in lung regions ventilated by hypoxic or hypercapnic gas mixtures and the relative mass of the lung region exposed. An inhibition in vasoconstriction in lung regions hyperventilated with a hypoxic gas mixture is observed which is interpreted as a result of a shift in blood pH toward alkalosis in the zone of respiratory gas diffusion. It is proposed that pulmonary gas exchange is thus a function of respiratory dead space. A.L.W.

**A82-10750** † Glucocorticoid receptors and metabolic disturbances in the liver and heart during immobilization (Glukokortikoidnye retseptory i metabolicheskie narusheniia v pecheni i serdtshe pri immobilizatsii). A. I. Bobkov and V. P. Kisliakova (Ministerstvo Zdravookhraneniia SSSR, Laboratoriia Radiatsionnoi Endokrinologii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 67, Aug. 1981, p. 1258-1264. 15 refs. In Russian.

The characteristics of the intracellular steroid-receptor interaction and the resultant cellular metabolism of the heart and liver during the compensation and decompensation phases of immobilization stresses are investigated. Determinations of the binding of dexamethasone and corticosterone to cytoplasmic receptors, receptor dissociation constant and binding sites, corticosterone levels, tyrosine aminotransferase activity and metabolite levels in the blood plasma and cytosol were made for 20 rats immobilized on their backs for periods from 30 min to 2 days. A significant increase in plasma and tissue endogenous glucocorticoid levels accompanied by decreases in glucocorticoid receptor binding and tyrosine aminotransferase activity, a depletion in cellular glucose and cholesterol reserves, a decrease in total plasma and cytosol protein, an increase in plasma and tissue urea and a significant hyponatremia are found to characterize the transition of the stress from the compensated to the decompensated phase. A.L.W.

**A82-10897** \* # Development status of a preprototype water electrolysis subsystem. R. B. Martin (NASA, Johnson Space Center, Crew Systems Div., Houston, TX) and A. C. Erickson (General Electric Co., Wilmington, MA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAS-9*. 8 p. Members, \$2.00; nonmembers, \$4.00.

A preprototype water electrolysis subsystem was designed and fabricated for NASA's advanced regenerative life support program. A solid polymer is used for the cell electrolyte. The electrolysis module has 12 cells that can generate 5.5 kg/day of oxygen for the metabolic requirements of three crewmembers, for cabin leakage, and for the oxygen and hydrogen required for carbon dioxide collection and reduction processes. The subsystem can be operated at a pressure between 276 and 2760 kN/sq m and in a continuous constant-current, cyclic, or standby mode. A microprocessor is used to aid in operating the subsystem. Sensors and controls provide fault detection and automatic shutdown. The results of development, demonstration, and parametric testing are presented. Modifications to enhance operation in an integrated and manned test are described. Prospective improvements for the electrolysis subsystem are discussed. (Author)

**A82-10898** \* # Application of improved technology to a preprototype vapor compression distillation (VCD) water recovery subsystem. K. L. Johnson (Lockheed Missiles and Space Co., Inc., Biotechnology Div., Sunnyvale, CA), R. P. Reysa (Boeing Co., Houston, TX), and D. H. Fricks (NASA, Johnson Space Center, Houston, TX). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAS-10*. 9 p. Members, \$2.00; nonmembers, \$4.00.

Vapor compression distillation (VCD) is considered the most efficient water recovery process for spacecraft application. This paper reports on a preprototype VCD which has undergone the most extensive operational and component development testing of any VCD subsystem to date. The component development effort was primarily aimed at eliminating corrosion and the need for lubrication, upgrading electronics, and substituting nonmetals in key rotating components. The VCD evolution is documented by test results on specific design and/or materials changes. Innovations worthy of further investigation and additional testing are summarized for future VCD subsystem development reference. Conclusions on experience gained are presented. (Author)

**A82-10899** \* # Development of an advanced Sabatier CO<sub>2</sub> reduction subsystem. G. N. Kleiner (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT) and R. J. Cusick (NASA, Johnson Space Center, Crew Systems Div., Houston, TX). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAS-11*. 7 p. Members, \$2.00; nonmembers, \$4.00.

A preprototype Sabatier CO<sub>2</sub> reduction subsystem was successfully designed, fabricated and tested. The lightweight, quick starting (less than 5 minutes) reactor utilizes a highly active and physically durable methanation catalyst composed of ruthenium on alumina. The use of this improved catalyst permits a simple, passively controlled reactor design with an average lean component H<sub>2</sub>/CO<sub>2</sub> conversion efficiency of over 99% over a range of H<sub>2</sub>/CO<sub>2</sub> molar ratios of 1.8 to 5 while operating with process flows equivalent to a crew size of up to five persons. The subsystem requires no heater operation after start-up even during simulated 55 minute lightside/39 minute darkside orbital operation. (Author)

**A82-10900** # A regenerative life support system for Space Operations Center (SOC) - A probable first flight application. H. F. Brose (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAS-12*. 8 p. Members, \$2.00; nonmembers, \$4.00.

The Space Operations Center is an earth-orbiting spacecraft which will be used to test the hardware of a regenerative life support system. This will be the first flight application for the regenerative

equipment for recycling oxygen and water and the Environmental Control and Life Support (ECLS) equipment. The ECLS performance requirements (partial pressures, temperature, ventilation, water), design average loads, and required major equipment are presented in detail. The SOC habitat configuration will be designed to provide the crew a safe and comfortable environment in which to perform tasks. Ceiling and floor panels will be removable for access to the air and water processing equipment; the equipment will be packaged so that the components are not more than one layer deep with adequate perimeter access. The ECLS control and display system will provide the information required for easy operation and maintainability, as well as train crew members in the equipment operation. J.F.

**A82-10907 \* # Treatment of CELSS and PCELSS waste to produce nutrients for plant growth.** M. Modell, H. Meissner, M. Karel (MIT, Cambridge, MA), J. Carden, and S. Lewis (Georgia Institute of Technology, Atlanta, GA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-19.* 6 p. Members, \$2.00; nonmembers, \$4.00. NASA-supported research.

The research program entitled 'Development of a Prototype Experiment for Treating CELSS (Controlled Ecological Life Support Systems) and PCELSS (Partially Controlled Ecological Life Support Systems) Wastes to Produce Nutrients for Plant Growth' consists of two phases: (1) the development of the necessary facilities, chemical methodologies and models for meaningful experimentation, and (2) the application of what methods and devices are developed to the interfacing of waste oxidation with plant growth. Homogeneous samples of freeze-dried human feces and urine have been prepared to ensure comparability of test results between CELSS waste treatment research groups. A model of PCELSS food processing wastes has been developed, and an automated gas chromatographic system to analyze oxidizer effluents was designed and brought to operational status. Attention is given the component configuration of the wet oxidation system used by the studies. O.C.

**A82-10908 \* # The potential role of aerobic biological waste treatment in regenerative life support systems.** M. L. Shuler, D. Nafis, and E. Sze (Cornell University, Ithaca, NY). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-20.* 16 p. 12 refs. Members, \$2.00; nonmembers, \$4.00. Grant No. NsG-2408.

The purpose of the paper is to make a preliminary assessment of the feasibility of using aerobic biological waste treatment in closed systems. Issues that are addressed in this paper are: (1) how high a degree of material balance is possible, (2) how much might such a system weigh, and (3) how would system closure and weight be affected if animals were included in the system. A computer model has been developed to calculate for different scenarios the compositions and amounts of the streams entering or leaving the waste treatment system and to estimate the launch weight of such a system. A bench scale apparatus has been built to mimic the proposed waste treatment system; the experiments are used to verify model predictions and to improve model parameter estimations.

(Author)

**A82-10909 \* # Ion-exchange chromatography separation applied to mineral recycle in closed systems.** E. Ballou, L. A. Spitze, F. W. Wong (San Jose State University, San Jose, CA), T. Wydeven, and C. C. Johnson (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-21.* 7 p. 10 refs. Members, \$2.00; nonmembers, \$4.00.

As part of the controlled ecological life support system (CELSS) program, a study is being made of mineral separation on ion-exchange columns. The purpose of the mineral separation step is to allow minerals to be recycled from the oxidized waste products of plants, man, and animals for hydroponic food production. In the CELSS application, relatively large quantities of minerals in a broad concentration range must be recovered by the desired system, rather than the trace quantities and very low concentrations treated in analytical applications of ion-exchange chromatography. Experiments have been carried out to assess the parameters pertinent to the

scale-up of ion-exchange chromatography and to determine feasibility. Preliminary conclusions are that the column scale-up is in a reasonable size range for the CELSS application. The recycling of a suitable eluent, however, remains a major challenge to the suitability of using ion exchange chromatography in closed systems. (Author)

**A82-10910 \* # Wet oxidation as a waste treatment in closed systems.** B. L. Onisko and T. Wydeven (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-22.* 5 p. 11 refs. Members, \$2.00; nonmembers, \$4.00.

The chemistry of the wet oxidation process has been investigated in relation to production of plant nutrients from plant and human waste materials as required for a closed life-support system. Hydroponically grown lettuce plants were used as a model plant waste and oxygen gas was used as oxidant. Organic nitrogen content was decreased 88-100% depending on feed material. Production of ammonia and nitrogen gas account for all of the observed decrease in organic nitrogen content. No nitrous oxide (N<sub>2</sub>O) was detected. The implications of these results for closed life-support systems are discussed. (Author)

**A82-10911 \* # Generic waste management requirements for a controlled ecological life support system /CELSS/.** T. Hoshizaki and B. D. Hansen, III (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-23.* 7 p. 12 refs. Members, \$2.00; nonmembers, \$4.00. Contract No. NAS7-100.

Regenerative life support systems for future space missions will require closure of the waste-food loop. Each mission application will generate specific requirements for the waste management system. However, there are generic input and output requirements that can be identified when a probable scenario is chosen. This paper discusses the generic requirements when higher plants are chosen as the primary food source. Attention is focused on the quality and quantity of nutrients necessary for culturing higher plants. The types of wastes to be processed are also discussed. In addition, requirements generated by growing plants on three different substrates are presented. This work suggests that the mineral composition of waste materials may require minimal adjustment to satisfy the plant requirements. (Author)

**A82-10912 \* # Preprototype Vapor Compression Distillation Subsystem development.** C. D. Thompson (NASA, Johnson Space Center, Houston, TX), G. S. Ellis, and F. H. Schubert (Life Systems, Inc., Cleveland, OH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-25.* 9 p. 9 refs. Members, \$2.00; nonmembers, \$4.00.

Vapor Compression Distillation (VCD) has evolved as the most promising approach to reclaim potable water from wastewater for future long-term manned space missions. Life Systems, Inc. (LSI), working with NASA, has developed a preprototype Vapor Compression Distillation Subsystem (VCDS) which processes wastewater at 1.4 kg/h. The preprototype unit weighs 143 kg, occupies a volume of 0.47 cu m, and will reclaim 96 percent of the available wastewater. This unit has been tested by LSI and is scheduled for further testing at NASA-JSC. This paper presents the preprototype VCDS design, configuration, performance data, test results and flight system projections. (Author)

**A82-10913 # Lightside atmospheric revitalization system for Space Shuttle Orbiter.** J. R. Nason and A. K. Colling, Jr. (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-26.* 9 p. Members, \$2.00; nonmembers, \$4.00.

Lightside Atmospheric Revitalization System (LARS) is a regenerable cabin life support system that can be used for extended duration Orbiter missions. A majority of the system's power usage occurs on the light side of an orbit where power is provided by solar cells. It would replace the baseline lithium hydroxide (LiOH) carbon dioxide removal subsystem, thus eliminating expendables required

for carbon dioxide removal. Both oxygen and water required for crew consumption are also conserved. The system consists of three subsystems: a solid amine water desorbed (SAWD) regenerable carbon dioxide removal subsystem, a water vapor electrolysis (WVE) oxygen generating subsystem, and a Sabatier reactor carbon dioxide reduction subsystem. This paper presents a description of LARS, a performance evaluation, and trade-off results compared against the baseline Orbiter LiOH system. (Author)

**A82-10914 \* # Nitrogen supply system based on hydrazine dissociation.** D. B. Heppner (Life Systems, Inc., Cleveland, OH) and P. D. Quattrone (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-27.* 6 p. 8 refs. Members, \$2.00; nonmembers, \$4.00.

Future long-duration manned space missions will require a method of generating N<sub>2</sub> for cabin leakage makeup and repressurization. Life Systems, working with NASA, is developing a Nitrogen Supply Subsystem (NSS) based on the dissociation of N<sub>2</sub>H<sub>4</sub> into a mixture of H<sub>2</sub> and N<sub>2</sub>. The latter is separated to provide the makeup N<sub>2</sub>. Recent advances in specific hardware developments have resulted in the design and fabrication of a nominal 3.6 kg/day N<sub>2</sub> generation module. The design integrates a N<sub>2</sub>H<sub>4</sub> catalytic dissociator, three ammonia (NH<sub>3</sub>) dissociation stages and four H<sub>2</sub> separation stages into a 33 kg, 14 cu dm module. A technique has been devised to alternate the NH<sub>3</sub> dissociation and H<sub>2</sub> separation stages to give high N<sub>2</sub> purity in the product stream. Tests have shown the product stream to contain less than 0.5 percent H<sub>2</sub> and 20 ppm NH<sub>3</sub>. This paper discusses the development and test activities of the NSS program. It reviews the design, configuration, operation and projected performance characteristics of a 4.4 kg/day NSS suitable for NASA's planned Space Operations Center. (Author)

**A82-10915 \* # Regenerable CO<sub>2</sub> collection for spacecraft application.** N. Lance, Jr. (NASA, Johnson Space Center, Houston, TX) and F. H. Schubert (Life Systems, Inc., Cleveland, OH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-28.* 8 p. 15 refs. Members, \$2.00; nonmembers, \$4.00.

The design of the CS-3, a three-person capacity preprototype CO<sub>2</sub> collection subsystem, is described. It is noted that the function of the CS-3 is to remove metabolically produced CO<sub>2</sub> from the Spacelab cabin to maintain atmospheric pCO<sub>2</sub> at 400 Pa or less. Results are presented of an extensive parametric/endurance test program characterizing the subsystem's performance. The results demonstrate the suitability of the electrochemical depolarized CO<sub>2</sub> concentration concept for possible use in the Space Operations Center. The CS-3 is found to meet or exceed all Regenerative Life Support Evaluation requirements. Specifically, the 0.13 cu m, 46 kg subsystem is able to remove CO<sub>2</sub> at an equivalent rate of 3.4 persons from an air stream having a pCO<sub>2</sub> of 400 Pa. C.R.

**A82-10921 \* # Unconventional processes for food regeneration in space - An overview.** B. O. Stokes, G. R. Petersen, W. W. Schubert, and W. A. Mueller (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-35.* Members, \$2.00; nonmembers, \$4.00. NASA-supported research.

Alternatives to conventional plant agriculture for the regeneration of food during space missions of extended duration are examined. The options considered, which may be used in combination with conventional agriculture, include the production of food from plant wastes, the chemical synthesis of food from carbon dioxide and other simple molecules or the substitution of edible chemicals, and the use of microorganisms for food and oxygen regeneration, with suitable processing. A comparison of solar energy conversion efficiencies is presented for nonphotosynthetic bacteria grown on hydrogen and algal systems photosynthetically, and it is shown that hydrogen bacteria are potentially more attractive than photosynthetic algae using artificial light. Weight-volume requirements for the conventional plant, algae and hydrogen bacteria systems are also compared to demonstrate the advantages of microbial systems. A.L.W.

**A82-10922 \* # The CELSS program - An overview of its structure and use of computer modelling.** M. M. Averner (New Hampshire, University, Durham, NH) and R. D. Macelroy (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-36.* 3 p. Members, \$2.00; nonmembers, \$4.00.

NASA has initiated a research program, CELSS, directed at the acquisition of the knowledge and technology required for the development of an autonomous, regenerative life support system. The program is structured to promote effective, cooperative research in fundamental, applied and engineering science. The initial research thrusts involve investigations into problems of food production, waste processing and system control and integration. In the area of food production both conventional, higher plant-based processes as well as chemosynthetic food production technologies are being investigated. Alternative waste processing procedures, both biological and physicochemical, are being examined. Computer based modelling as an aid to design and analysis is an integral part of the approach to system control and management. A mass balance model depicting the flow of elemental mass in a conceptualized closed, regenerative life support system is described. (Author)

**A82-10923 \* # A chamber design for closed ecological systems research.** H. Schwartzkopf and P. E. Stofan (New Hampshire, University, Durham, NH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-37.* 5 p. 5 refs. Members, \$2.00; nonmembers, \$4.00. Grant No. NCC2-27.

A single-plant growth chamber is described which is closed with respect to nutrient and gas flows, in order to serve as a tool in the investigation of control over biological systems. Such control procedures are essential for the use of biological components in the development of a closed ecological life support system (CELSS). The chamber's design consists of two concentric clear plastic cylinders equipped with aeroponic feed tubing, a supporting platform for the plant and a set of sensors that includes an anemometer, thermistors, pressure and strain gauges, and humidity sensors. O.C.

**A82-10924 # An approach to the preliminary evaluation of Closed-Ecology Life Support System /CELSS/ scenarios and control strategies.** J. D. Stahr (Boit Beranek and Newman, Inc., Cambridge, MA), D. M. Auslander, R. C. Spear, and G. E. Young (California, University, Berkeley, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-38.* 7 p. 19 refs. Members, \$2.00; nonmembers, \$4.00.

An approach to the problem of evaluating CELSS (Closed Ecology Life Support System) scenarios and different strategies within a scenario is presented. The approach combines probabilistic Monte Carlo simulation techniques with the notion of descriptors of system behavior to determine system performance. A simple CELSS model is developed along with two alternative control strategies. The approach is applied to this model to demonstrate the scope and limitations of the method. The simulations show that dynamic behavior and selection of control laws can be crucial to CELSS survival. (Author)

**A82-10925 \* # Oxygen generation subsystem for spacecraft.** F. H. Schubert, K. A. Burke (Life Systems, Inc., Cleveland, OH), and P. D. Quattrone (NASA, Ames Research Center, Moffett Field, CA). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-40.* 9 p. 5 refs. Members, \$2.00; nonmembers, \$4.00.

Recovery of oxygen from water will be needed on future long-duration manned space missions. An oxygen generation subsystem (OGS) for NASA based on the alkaline electrolyte, static feed water electrolysis concept. Recent advances in hardware development have resulted in the design, fabrication and testing of a self-contained, one-person capacity OGS (WS-1). This subsystem consists of three major parts: a six-cell electrochemical module to generate the product O<sub>2</sub>, a coolant control assembly to maintain module temperature and a pressure controller which maintains product gas pressures. The subsystem provides 0.82 kg/d O<sub>2</sub> while operating at a current density of 206 mA/sq cm, a temperature of 339 K and a pressure of 1240 kPa. (Author)

**A82-10927 \* #** Design and control strategies for CELSS - Integrating mechanistic paradigms and biological complexities. B. Moore, III, R. Kaufmann, and C. Reinhold (New Hampshire, University, Durham, NH). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-43*. 7 p. Members, \$2.00; nonmembers, \$4.00. Grant No. NCC2-27.

Systems analysis and control theory consideration are given to simulations of both individual components and total systems, in order to develop a reliable control strategy for a Controlled Ecological Life Support System (CELSS) which includes complex biological components. Because of the numerous nonlinearities and tight coupling within the biological component, classical control theory may be inadequate and the statistical analysis of factorial experiments more useful. The range in control characteristics of particular species may simplify the overall task by providing an appropriate balance of stability and controllability to match species function in the overall design. The ultimate goal of this research is the coordination of biological and mechanical subsystems in order to achieve a self-supporting environment. O.C.

**A82-10929 \* #** Advanced Microbial Check Valve development. G. V. Colombo, D. R. Greenley, D. F. Putnam (Umpqua Research Co., Myrtle Creek, OR), and R. L. Sauer (NASA, Johnson Space Center, Houston, TX). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Francisco, CA, July 13-15, 1981, Paper 81-ENAs-45*. 4 p. 12 refs. Members, \$2.00; nonmembers, \$4.00.

The Microbial Check Valve (MCV) is a flight qualified assembly that provides bacteriologically safe drinking water for the Space Shuttle. The 1-lb unit is basically a canister packed with an iodinated ion-exchange resin. The device is used to destroy organisms in a water stream as the water passes through it. It is equally effective for fluid flow in either direction and its primary method of disinfection is killing rather than filtering. The MCV was developed to disinfect the fuel cell water and to prevent back contamination of stored potable water on the Space Shuttle. This paper reports its potential for space applications beyond the basic Shuttle mission. Data are presented that indicate the MCV is suitable for use in advanced systems that NASA has under development for the reclamation of humidity condensate, wash water and human urine. (Author)

**A82-11026** Hazards of chemicals used in agricultural aviation - A review. H. R. Quantick and I. C. Perry. *Aviation, Space, and Environmental Medicine*, vol. 52, Oct. 1981, p. 581-588. 21 refs.

Aerial agriculture is an industry growing in worldwide use, and will receive even more extensive use in the future where food is in short supply. The aircraft applicator, however, may be subject to the continuous exposure to toxic chemicals over the working season: dinitrophenols, carbamates, organochlorines, and organophosphates. Exposure may never reach an identifiable or detectable chemical level, but subtle behavior changes have been noted. It is recommended that the pilots and ground crews using these pesticides have their individual cholinesterase levels established at the start of the season and monitored at intervals. The recommended lowest levels in blood and plasma are tabulated for the various toxicity classes, and methods of decontamination are discussed. Electromyography is also introduced as a sensitive, quick, and reliable method for measuring toxicity levels. J.F.

**A82-11027** A comparison between over-the-shoulder and computer-derived measurement procedures in assessing student performance in radar air traffic control. J. O. Boone and J. A. Steen (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation Space and Environmental Medicine*, vol. 52, Oct. 1981, p. 589-593. 5 refs.

Computer-derived measures (CDM) obtained at the Radar Training Facility in Oklahoma City were compared with over-the-shoulder evaluation (OSE) methods. Two sets of measures were taken: 20 CDMs and an OSE of student performance. It was concluded from regression models that CDMs predict a global rating criterion of potential ATC on-the-job success at least as well as OSE. Further, it was found that OSE is not as reliable as CDM; the CDMs, it appears, can substitute for the OSE ratings and be used to form a composite laboratory score. B.J.

**A82-11028** Instructor pilot teaching behavior and student pilot stress in flight training. G. S. Krahenbuhl, P. W. Darst, J. R. Maret, L. C. Reuther, S. H. Constable, M. E. Swinford, and G. B. Reid (Arizona State University, Tempe, AZ). *Aviation, Space, and Environmental Medicine*, vol. 52, Oct. 1981, p. 594-597. 22 refs. Contract No. F33615-78-C-0053.

The purpose of this study was to investigate the relationship between instructor pilot behavior and student pilot stress. Six instructor pilots and 12 undergraduate pilot training students served as subjects. Two students were assigned to each instructor. Ten categories of instructor pilot behavior were coded from audio cassette tapes made during four sorties from the initial instrument phase of undergraduate pilot training in the T-50 Instrument Flight Simulator. Behaviors were tallied and converted to a rate per minute; inter-recorder agreement was 87%. Instructors who relied heavily on acceptance and praise behaviors were placed in a positive group (N = 4), while those relying on criticism and scolding were placed in a negative group (N = 2). Student stress was estimated from timed urine samples used to quantify catecholamine excretion. Results indicated that missions in the T-50 Instrument Flight Simulator produced a significant stress response in the subjects and that the stress response was greater in lessons taught by the instructor pilots in the negative group. (Author)

**A82-11029** Frequency analysis of EEG in rats during the preconvulsive period of O<sub>2</sub> poisoning. D. Torbati, A. J. Simon, and A. Ranade (Pennsylvania, University, Philadelphia, PA). *Aviation, Space, and Environmental Medicine*, vol. 52, Oct. 1981, p. 598-603. 46 refs. Grant No. NIH-HL-08899-15; Contract No. N00014-76-C-0248.

**A82-11030** Lack of effect of pulsed ultrasound on the mammalian EEG. A. Amin, K. R. Foster, S. Takashima (Pennsylvania, University, Philadelphia, PA), and J. Ternes (U.S. Veterans Administration Medical Center, Philadelphia, PA). *Aviation, Space, and Environmental Medicine*, vol. 52, Oct. 1981, p. 604-607. 6 refs. Research supported by the U.S. Veterans Administration; Contract No. N00014-76-C-0642.

Anesthetized rhesus monkeys and rabbits were exposed to pulsed ultrasound from a 1.8 cm diameter transducer placed against the head. Each ultrasonic exposure lasted 4 min; it consisted of a series of 1-2 microsec pulses, with a frequency spectrum broadly centered about the transducer resonant frequency of 1.5 MHz, repeated at a rate of 950 Hz. The time-averaged ultrasonic power was 12.6 mW, with an estimated peak power of about 15 W. No changes were observed in the EEG or its power spectrum during or immediately after the exposure. This contrasts with a previous report of significant changes in the EEG of squirrel monkeys during comparable exposures to pulsed ultrasound. Analysis of the earlier reported results suggests that some of the effects were due to aliasing artifacts. (Author)

**A82-11032** Retro-hyperflexion luxation - Mechanism of cervical spinal cord contusion injury during ejection sequence. R. C. Hazzard (U.S. Marine Corps Air Station, Yuma, AZ). *Joint Committee on Aviation Pathology, Scientific Session, 12th, Aylesbury, Bucks., England, Oct. 14-16, 1980.* *Aviation, Space, and Environmental Medicine*, vol. 52, Oct. 1981, p. 625, 626.

**A82-11151** Body fluid and hematologic changes in the toad exposed to 48 h of simulated high altitude. H. M. Biswas, P. B. Patra, and M. C. Boral (University College of Science, Calcutta, India). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 794-797. 19 refs. Research supported by the University Grants Commission.

**A82-11152** Plasma norepinephrine response to exercise before and after training in humans. F. Péronnet, J. Clérout, H. Perrault, D. Cousineau, J. de Champlain, and R. Nadeau (Montréal, Université, Montréal, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 812-815. 36 refs. Research supported by the Haut-Commissariat à la Jeunesse, aux Loisirs et aux Sports, Medical Research Council of Canada, and Quebec Heart Foundation.

**A82-11153** Factors determining temporal pattern of isobaric supersaturation. C. Young and B. G. D'Aoust (Virginia Mason Research Center, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 852-857. 12 refs.

In connection with different uptake and elimination rates of inert gases in the body, it is possible to produce transient supersaturations in the body by changing the composition of the inspired gas. If this change occurs at a high pressure, the supersaturation can be sufficient to produce vascular bubbles. A calculation is performed concerning the maximum supersaturations which can occur after a gas exchange. The Krogh cylinder model of the tissues is employed in the analysis. In this model, the tissue is regarded as made up of parallel cylinders with capillaries down the center. To simplify conditions further, it is assumed that there is no gas barrier at the capillary wall. It is found that diffusion plays a role in the transient supersaturation only in long Krogh cylinders with high blood flows. Experiments show that the formation of vascular bubbles after a change of gas composition cannot be entirely explained by the different diffusion constants of the gases used. G.R.

**A82-11154** Increased hemoglobin-oxygen affinity does not decrease skeletal muscle oxygen consumption. B. K. Ross and M. P. Hlastala (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 864-870. 23 refs. Grants No. NIH-HL-12174; No. NIH-HL-05372; No. NIH-HL-00182.

The considered investigation is concerned with the role which hemoglobin-oxygen affinity plays in oxygen delivery to tissues, taking into account studies based on the use of an isolated gracilis muscle preparation. A total of 40 mongrel dogs of either sex were employed in the investigation. The results obtained are significant for a definition of the relative importance of the position of the oxygen dissociation curve in gas exchange. It is concluded that the drop in tissue oxygen consumption observed with stored blood and a venous O<sub>2</sub> partial pressure of over 40 torr must be due to some factor other than a critically low venous O<sub>2</sub> partial pressure. However, the data do not allow a definition of the precise mechanism responsible for the decreased tissue oxygen consumption seen during perfusion with stored blood. G.R.

**A82-11155** Endurance training in the rat. I - Myocardial mechanics and biochemistry. D. O. Nutter, R. E. Priest, and E. O. Fuller (Emory University, Atlanta, GA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 934-940. 34 refs. Research supported by the Noble Foundation; Grant No. NIH-HL-16420.

Schaible and Scheuer (1979) have reported increased performance and contractility in isolated hearts from groups of rats trained by running as well as swimming. The current study was performed to further define the effect of endurance training produced by treadmill running, as well as detraining, in both young and adult male rats on myocardial mechanics, cardiac mass, and structural biochemistry. Rats undergoing exercise training were run on a treadmill 5 days/wk for 12 wk. A fixed 9% treadmill grade was used throughout training. The treadmill speed and the running interval were gradually increased over weeks 1-6 and then maintained at 0.82 mph and 60 min for weeks 7-12. It was found that moderate endurance training by treadmill running does not enhance the mechanical performance of the myocardium of either the young or adult rat. The training program did not appear to produce a significant degree of cardiac hypertrophy judging from absolute heart weight and myocardial fiber diameter. G.R.

**A82-11156** Endurance training in the rat. II - Performance of isolated and intact heart. E. O. Fuller and D. O. Nutter (Emory University, Atlanta, GA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Oct. 1981, p. 941-947. 22 refs. Research supported by the Noble Foundation; Grant No. NIH-HL-16420.

**A82-11157** Metabolism and thermoregulation during stages of sleep in humans exposed to heat and cold. E. H. Haskell, J. W. Palca, J. M. Walker, R. J. Berger, and H. C. Heller (California, University, Santa Cruz; Stanford University, Stanford, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise*

*Physiology*, vol. 51, Oct. 1981, p. 948-954. 31 refs. Grants No. NIH-GM-23694; No. NIH-GM-23695.

**A82-11199** The electrocardiographic diagnosis of myocardial infarction in the presence of ventricular conduction defects - A new attempt to solve an old problem. E. A. Lopez, Jr., M. A. Araoie, C. D. McManus, M. J. Goldman, and H. V. Pipberger (U.S. Veterans Administration Medical Center, Birmingham, AL, Durham, NC, Minneapolis, MN, San Francisco, CA, Washington, DC, and West Roxbury, MA; George Washington University, Washington, DC; California, University, San Francisco, CA). *Journal of Electrocardiology*, vol. 14, Oct. 1981, p. 325-332. 31 refs. Research supported by the U.S. Veterans Administration; Grant No. NIH-HL-15047.

**A82-11200** Noninvasive assessment of T-wave abnormalities on precordial electrocardiograms in middle-aged professional bicyclists. T. Nishimura, H. Kambara, C.-H. Chen, C. Kawai (Kyoto University, Kyoto, Japan), and Y. Yamada (Kyoto University; Kyoto Medical Association for Prevention of Cardiovascular Disease, Kyoto, Japan). *Journal of Electrocardiology*, vol. 14, Oct. 1981, p. 357-363. 42 refs.

**A82-11539** Interaction of electromagnetic fields with biological bodies. K.-M. Chen (Michigan State University, East Lansing, MI). In: Research topics in electromagnetic wave theory. (A82-11526 02-70) New York, Wiley-Interscience, 1981, p. 290-347. 49 refs. NSF Grant No. ENG-74-12603; Grant No. DAAG29-76-G-0201.

A generalized theory is developed for the interaction between an electromagnetic field and a finite heterogeneous body with arbitrary conductivity. The singularity and uniqueness problems associated with the dyadic Green's function in a conducting medium are examined. A numerical method based on an integral equation for the induced electric field inside a biological body irradiated by a far-zone electromagnetic field is applied to quantify the induced electric field and the absorbed power density inside a realistic model of man irradiated by various electromagnetic waves. A similar numerical method based on two coupled integral equations for the induced electric field inside a biological body and the induced current on an antenna is developed to study the coupling between a biological body and an electromagnetic source. Theoretical findings are verified experimentally. V.L.

**A82-11697** † The significance of the respiratory minute volume index in the evaluation of vestibular stability (Znachenie pokazatelei minutnogo ob'ema dykhaniiia pri otsenke vestibularnoi ustoichivosti). A. S. Gusarov. *Voenna-Meditsinskii Zhurnal*, Aug. 1981, p. 48-50. In Russian.

The respiratory dynamics of persons of various vestibular stabilities undergoing Coriolis acceleration is investigated in order to assess the possibility of using respiratory minute volume in the evaluation of vestibular function. Respiratory rate, respiratory minute volume, heart rate and electrocardiography were monitored continuously in 100 men with healthy vestibular analyzers in a 5-min test of tolerance to cumulative Coriolis forces. Changes in respiratory parameters are observed to be correlated with levels of vestibular reaction to Coriolis acceleration. Rotational and especially post-rotational vestibulospirometry and vestibulospirography are found to be the objective means of determining vestibular condition. It is concluded that the determination of respiratory minute volume taking into account other vegetative reactions appears to be a useful means of evaluating subject vestibular stability. A.L.W.

**A82-11924** Salyut 6 medical monitoring techniques. J. Powell. *Spaceflight*, vol. 23, Nov. 1981, p. 317, 318.

Equipment and techniques used aboard the Salyut 6 space station to study weightlessness adaptation during prolonged space flights is examined as a means of gaining insight into Soviet approaches to the study of the effects of the zero-g environment. The Polinom 2M apparatus is basically a versatile electrocardiograph, used for simple electrocardiographic examination, the study of the phasic structure of the electrocardiograph, and the recording of cardiograms at compression of the vessels around the tibia, at the right jugular vein, and at the carotid and radial arteries, as well as continuous monitoring for up to 24 h to investigate periodic

bioelectric deviations. The Rheograph 2 is designed to measure blood flow in the weightless body at the head, torso, forearm and crus. The Beta instrument is an electrocardiograph covering indices not measured by Polinom 2, using a zonal system for fixing electrodes and sensors at the DS contact. The instruments are designed to be used with the cosmonauts at rest, during exercise, and while wearing a lower body negative pressure suit. Possible future developments include the use of a small experimental centrifuge to determine the optimal amount and duration of artificial gravity to prevent adverse effects of zero-g flight. S.C.S.

**A82-12036 #** Biaxial finite deformations of arterial and venous segments under + or - G/z/ acceleration stress. X. J. R. Avula (Missouri-Rolla, University, Rolla, MO). In: Emerging technologies in aerospace structures, design, structural dynamics and materials; Proceedings of the Aerospace Conference, San Francisco, CA, August 13-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 141-148. 15 refs.

Recent developments in spacecraft and high performance aircraft have resulted in the exposure of the human body to acceleration trauma which manifests itself in circulatory impairment. To aid in the design of life support systems for aerospace maneuvers, the radial and axial deformations of the arterial and venous segments under dynamic fluid loads caused by blood pooling during G/z/ acceleration are calculated. Linearized Navier-Stokes equations for blood flow and equations of large elastic deformation theory for blood vessel deformations are used. The resulting nonlinear partial differential equations, which are coupled, are solved numerically. The proposed scheme is useful to estimate cardiac insufficiency under acceleration stress of the aerospace environment. (Author)

**A82-12223 †** Neurophysiological bases for the effects of trace elements (Neiro-fiziologicheskie osnovy deistviia mikroelementov). V. S. Raitses. Leningrad, Izdatel'stvo Meditsina, 1981. 152 p. 232 refs. In Russian.

The role of trace elements in the functioning of the nervous system is discussed. The concentration and distribution of trace elements in the nervous system are considered, and changes in these concentrations in response to the conditions of basic nervous processes are examined. The role of interoceptors in the regulation of trace element exchanges and the exchange of associated metalloproteids is examined based on experimental results, and the influence of several trace elements on the functioning of the vegetative and central nervous systems and on neuromuscular transmission is discussed. Finally, consideration is given to the use of various trace elements for therapeutic purposes. A.L.W.

**A82-12279 †** The effects of space flight factors on the stress reaction of the nuclear nucleic acids in the rat liver (Vliianie faktorov kosmicheskogo poleta na stress-reaktsiiu sistemy iadernykh nukleino-nykh kislot pecheni krysa). G. S. Komolova and E. N. Troitskaia (Akademii Nauk SSSR, Institut Biokhimi, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 260, no. 1, 1981, p. 236-239. In Russian.

**A82-12299 †** The effect of adrenergic substances on cardiac activity and brain electrical activity in the rabbit under hypoxia (Deistvie adrenergicheskikh veshchestv na serdechnuiu deiatel'nost' i elektricheskuiu aktivnost' mozga krolikov pri gipoksii). N. S. Akopian, O. G. Baklavadzian, G. S. Vartanian, and S. K. Ogrmrtian (Erevanskii Gosudarstvennyi Universitet, Yerevan, Armenian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Sept.-Oct. 1981, p. 633-639. 21 refs. In Russian.

**A82-12310** Sarcoidosis and aeronautical risk (Sarcoïdose et risque aéronautique). A. Seignuric, A. Gay, and G. Leguay (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 104-107. 12 refs. In French.

Implications of the diagnosis of sarcoidosis in flight personnel for their future flight status are discussed on the basis of experience in six such cases. All six cases were discovered during routine radiological examinations, of which four were in the first stage requiring no treatment and the remaining two were in the second

stage, at which corticoid treatment may be employed to prevent complications or transition to the third stage, in which flight disqualification is inevitable. Conventional means for the diagnosis of sarcoidosis, which are usually used jointly, are identified, and the development of the technique of broncho-alveolar lavage is noted. Consequences of the disease influencing pilot capability are identified, and the problem of determining the flight risks associated with these symptoms are discussed, with particular attention given to the assessment of the risks of cardiac sarcoidosis in patients not displaying myocardial symptoms but who are at a large risk of sudden death. Further studies involving cardiac catheterization to determine the relationship between electrocardiographic abnormalities and sarcoidosis are recommended. A.L.W.

**A82-12311** Aircraft cabin furnishing materials - A toxicological problem (Les matériaux d'aménagement des cabines d'aéronefs - Un problème toxicologique). P. E. Picart, J. P. Delcroix, and M. Guerbet. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 107-111. 29 refs. In French.

The current state of research on the toxicity of aircraft cabin materials in the event of a cabin fire is reviewed. The evaluation of the dose-response relation which lies at the base of all toxicological studies is discussed, and a distinction is made between lethal and sublethal doses. The laboratory, half-scale and full-scale models of fires used to establish doses and the animal models used to establish physiological and behavioral responses to intoxication are then examined. A distinction is made between studies aimed at ranking materials in order of increasing time to death and those seeking to establish dose-response parameters in order to explain observed phenomena and lead to an improvement in the materials used. It is pointed out that much remains to be done before a simple, reproducible and standardizable method for the classification of materials according to potential danger in the event of a fire can be established. A.L.W.

**A82-12312** Presbyopia in flight personnel - Its repercussions and correction (La presbytie chez le personnel navigant: Ses repercussions - Sa correction). P. J. Manent, M. Maille, J. C. Ballion, and C. Mauclair (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris; Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 112-115. In French.

The consequences for flight personnel of the development of presbyopia are discussed, and various solutions to the problem are examined. The visual information available to flight personnel from within and outside the vehicle is reviewed, along with the visual strategies associated with visual work in the detection, identification and interpretation of data and the morphoscopic, brightness-discrimination, color-discrimination and spatial aspects of visual physiology. The physiopathology of presbyopia is then presented, and its consequences for visual acuity, the visual field, visual efficiency, oculo-motor equilibrium and visual performance in certain color ranges are identified. Classical solutions to the problems associated with presbyopia represented by unifocal and bifocal lenses are examined, and the advantages of the recently developed progressive bifocal lenses for visual acuity, and visual field are pointed out. Statistical data revealing the prevalence of presbyopia in the general population and in flyers are also presented which demonstrate the importance of the problem. A.L.W.

**A82-12313** The importance of volumetric and anthropometric techniques in the measurement of lean body mass (Intérêt des techniques volumétriques et anthropométriques pour la mesure de la masse maigre). B. Sesboué, A. Boulier, J. F. Petiot, and J. Fabre (Caen, Centre Hospitalier Universitaire, Caen, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 115-118. 12 refs. In French.

The applicabilities of densimetric and anthropometric approaches to the measurement of lean body mass or, equivalently, percentage body fat, in humans are investigated. Measurements of body volume obtained by a water displacement volumeter and skin fold thicknesses in 13 locations obtained by Harpenden calipers were

used to derive body densities and body fat percentages in 52 male and 45 female medical students. Mean percentages of body fat of 15.69 percent and 25.96 percent were obtained from the densitometric data for the males and females, respectively, in agreement with literature data. A step-by-step multiple regression analysis was then used to establish empirical relations for the calculation of fat mass on the basis of four measurements for men and women. The densitometric technique is concluded to be a very important laboratory technique for the determination of body composition, although anthropometric techniques exhibit advantages due to their extreme simplicity.

A.L.W.

**A82-12314** A follow-up on blood pressure in two groups of air traffic controllers (Un follow-up de la tension sanguine chez deux groupes de contrôleurs de la circulation aérienne). E. Evrard. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 119-127. 5 refs. In French.

Results are presented of a follow-up study of hypertension in 199 civil and 304 military air traffic controllers. Blood pressure was monitored in the controllers and in assistant controllers not sharing the responsibilities of the controller in an initial examination and at least five times annually afterwards for a period of 6 to 16 years. The proportion of controllers exhibiting excessive levels of blood pressure is found to be small, amounting to 6.53 percent in the civil radar controllers and 3.29 percent in the military controllers. The importance of obesity as well as extraprofessional factors such as nutrition, personal hygiene, physical activity and alcohol consumption in the etiology of the disease is emphasized, and it is concluded that stresses associated with the professional duties of the air traffic controller have no causal or facilitative influence on the development of hypertension.

A.L.W.

**A82-12315** Peripheral chorioretinal lesions and aeronautical flight personnel - Consequences for fitness (Lésions chorio-rétiniennes périphériques et personnel navigant de l'aéronautique - Conséquences sur l'aptitude). J. C. Ballion and P. J. Manent (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 128-132. 21 refs. In French.

The nature, significance and treatment of peripheral degenerative chorioretinal lesions discovered in flight personnel are discussed. The types of lesions encountered are considered, including lesions of external, middle and internal retinal layers and retinal dehiscences, the latter two of which are capable of giving rise to retinal detachment, and the treatment of these lesions to prevent detachment by means of diathermy, cryotherapy, xenon photocoagulation and laser irradiation is considered. The indications and risks of treatment are discussed, and results of a clinical study of civil and military flight personnel exhibiting retinal degenerations are presented in which 20 percent of the patients diagnosed as having retinal lesions, representing 0.3 percent of the total population examined, underwent prophylactic treatment, rendering them temporarily unfit for duties. In light of the possible consequences of peripheral chorioretinal lesions and their frequency in flight personnel, it is recommended that such personnel be regularly examined by in-depth ophthalmoscopy performed by specialists.

A.L.W.

**A82-12316** Aphakia in the flier - Its consequences and correction (L'aphakie du navigant: Ses conséquences - Sa correction). P. J. Manent, M. Maille, F. G. de Liniers, and C. Mauclair (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris; Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, 2nd Quarter, 1981, p. 133-135. In French.

The implications of and possible means of correcting for aphakia resulting from the extraction of a cataractous lens in flight personnel are discussed. The anatomical and functional consequences of lens removal, which results in a decompartmentation of the ocular globe on the one hand and modifications in light and color sensitivity, and hypermetropia on the other, are considered, and the treatment of the condition by the use of eyeglass lenses, contact lenses, and intraocular implants is examined. The fitness of the aphakic flier is then discussed in relation to the anatomical and functional consequences of the surgical intervention, and the mode of correction

employed, and it is noted that while contact lenses represent a significant improvement over eyeglasses, allowing the flier to resume flight duties, the perfection of intraocular implants would open new possibilities for the aphakic flier.

A.L.W.

**A82-12538** Design, development, and verification of Life Sciences experiments. C. W. G. Fulcher (Management and Technical Services Co., Houston, TX). In: The year of the Shuttle; Proceedings of the Eighteenth Space Congress, Cocoa Beach, FL, April 29-May 1, 1981. Cocoa Beach, FL, Canaveral Council of Technical Societies, 1981, p. 5-1 to 5-9.

The Life Sciences Flight Experiments Program conducts a continuing coordinated program of biomedical research in space, in order to determine the effects of space flight on man and other organisms, study basic questions in biology, and apply new understanding of such phenomena to the safe and efficient use of space by man. A NASA-industry-academic team has been developed to design, develop, test, and operate Life Sciences payloads for Space Shuttle flights. Ames Research Center works with Lyndon B. Johnson Space Center and NASA Headquarters' Life Sciences Division in the development of scientifically balanced payloads. Life Sciences experiments designated for flight aboard Space-lab-1 include studies of vestibular/space sickness, cardiovascular and cardiopulmonary changes, renal fluid shifts and endocrine control, hematology, and bone-muscle reaction. Re-flyable Life Sciences laboratory equipment is also being developed and certified for flight.

J.F.

**A82-12648** Kevlar aramid composites in life-saving equipment. J. A. Van Haastert and I. Rosenberg (A-T-O, Inc., Scott Aviation Div., Sierra Madre, CA). In: Kevlar composites; Proceedings of the Symposium, El Segundo, CA, December 2, 1980.

El Segundo, CA, Technology Conferences, 1980, p. 52-57.

The design and development of a Kevlar safety helmet for aircrew members is described. Noting that high-g forces can increase the weight of a human head with a helmet to 180 lbs, a necessity to reduce weight and retain protective strength was perceived. Helmets possessing twice the tensile strength of fiberglass were fabricated using the same techniques as fiberglass fabrication, and it was found that only anhydride-cured epoxides suffer strength degradation if moisture is present during curing. The use of test laminates with a planned fabric layup system and resin is recommended for Kevlar users. The helmet was trimmed to expand visibility and the visor was aerodynamically reconfigured to produce an airfoil shape with no lift; further improvements are discussed. The importance of upgrading aircrew member safety equipment to keep pace with the increasing sophistication of flight vehicles is stressed.

D.H.K.

containing Al and Fe in terrigenous ratios was present in all samples, even from the more remote marine locations. E.A.K.

## STAR ENTRIES

**N82-10704#** Columbia Univ., New York. Radiological Research Lab.

**RADIATION PHYSICS, BIOPHYSICS AND RADIATION BIOLOGY Progress Report, 1 Oct. 1980 - 30 Sep. 1981**

Jul. 1981 302 p refs  
(Contracts DE-AC02-78EV-04733; EP-78-S-02-4733)  
(DE81-025259; DOE/EV-04733/T1; COO-4733-4) Avail:  
NTIS HC A14/MF A01

Separate abstracts were prepared for the 29 papers in this progress report which deal with radiobiological physics, the biological effects of ionizing radiations, and the modification of these effects by chemical and pharmacological agents. DOE

**N82-10705#** Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.

**INBORN ANEMIAS IN MICE Progress Report, 1 Aug. 1980 - 1 Jun. 1981**

Seldon E. Bernstein, Jane E. Barker, and Elizabeth S. Russell  
Jun. 1981 36 p  
(Contract DE-AC02-76EV-03264)  
(DE81-029128; DOE/EV-03264/20) Avail: NTIS  
HC A03/MF A01

Four macrocytic anemias, five hemolytic anemias, nonhemolytic microcytic anemia, transitory siderocytic anemia, sex-linked iron-transport anemia, and a target-cell anemia were studied. Each of these blood dyscrasias is caused by the action of a unique mutant gene, which determines the structure of different intracellular molecules, and thus controls a different metabolic process. Each anemia was studied through: characterization of peripheral blood values, determinations of radiosensitivity under a variety of conditions, measurements of iron metabolism and heme synthesis, histological and biochemical study of blood-forming tissue, functional tests of the stem cell component, examination of responses to erythroid stimuli, and transplantation of tissue between individuals of differently affected genotypes. DOE

**N82-10706#** Argonne National Lab., Ill. Chemistry Div.

**MODEL SYSTEMS IN PHOTOSYNTHESIS RESEARCH**

Joseph J. Katz and J. C. Hindman 1980 12 p refs Presented at the 5th Intern. Photosyn. Congr., Halkidiki, Greece, 7-13 Sep. 1980 Submitted for publication  
(Contract W-31-109-eng-38)  
(DE81-023889; CONF-800963-7) Avail: NTIS  
HC A02/MF A01

Recently developed models in photosynthesis are described. The Mg-tris(pyrochlorophyllide)1,1,1-tris(hydroxymethyl) ethane triester in its folded configuration is a rudimentary antenna photoreaction center model. Self assembled chlorophyll systems that contain a mixture of monomeric, oligomeric and special pair chlorophyll are shown to have fluorescence emission characteristics. It is suggested that energy transfer between different chlorophyll species in these systems is more complex than previously suspected. DOE

**N82-10707** Tulane Univ., New Orleans, La.

**A HOMEOMORPHIC FINITE ELEMENT MODEL OF IMPACT HEAD INJURY Ph.D. Thesis**

Ronald Richard Hosey 1981 235 p  
Avail: Univ. Microfilms Order No. 8118368

A finite element model of the human head and neck, as a system, is presented which incorporates the brain and skull models of previous investigators and a model of the cervical spine into a single model. The exact geometry of the cerebrospinal fluid (CSF) space is included, and morphological continuity of the CSF space and brain material in the region of the head/spine connection is maintained in order that the proper flow of material between the head and spinal cavity may take place during a simulated head impact or whiplash. The 3-dimensional geometry of the brain, spinal cord, CSF space, cervical vertebrae, and the intervertebral disks is defined by means of eight-node, isoparametric brick elements. Dissert. Abstr.

**N82-10708** Loyola Univ., Chicago, Ill.

**THE ROLE OF SKIN TEMPERATURE IN THE CONTROL OF SWEATING IN MAN Ph.D. Thesis**

Thomas Vincent McCaffrey 1981 126 p  
Avail: Univ. Microfilms Order No. 8119982

**N82-10699\*#** BioTechnology, Inc., Falls Church, Va.  
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 3 Quarterly Review**

Patricia M. Wallace Sep. 1980 41 p refs  
(Contract NASw-3223)  
(NASA-CR-164780) Avail: NTIS HC A03/MF A01 CSCL  
06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

**N82-10700\*#** BioTechnology, Inc., Falls Church, Va.  
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 1, NO. 4 Quarterly Review**

Lyn D. Paulson Dec. 1980 65 p refs  
(Contract NASw-3223)  
(NASA-CR-164781) Avail: NTIS HC A04/MF A01 CSCL  
06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology, and life sciences and technology. J.M.S.

**N82-10701\*#** BioTechnology, Inc., Falls Church, Va.  
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 2, NO. 1 Quarterly Review**

Lyn D. Paulson Mar. 1981 50 p refs  
(Contract NASw-3223)  
(NASA-CR-164782) Avail: NTIS HC A03/MF A01 CSCL  
06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences technology. J.M.S.

**N82-10702\*#** BioTechnology, Inc., Falls Church, Va.  
**USSR SPACE LIFE SCIENCES DIGEST, VOLUME 2, NO. 2 Quarterly Review**

Lyn D. Paulson Jun. 1981 48 p refs  
(Contract NASw-3223)  
(NASA-CR-164783) Avail: NTIS HC A03/MF A01 CSCL  
06D

An overview of the developments and direction of the USSR Space Life Sciences Program is given. Highlights of launches, program development, and mission planning are given. Results of ground-based research and space flight studies are summarized. Topics covered include: space medicine and physiology; space biology; and life sciences and technology. J.M.S.

**N82-10703#** Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.

**THE TRACE ELEMENT GEOCHEMISTRY OF MARINE BIOGENIC PARTICULATE MATTER Ph.D. Thesis**

Robert William Collier Feb. 1981 304 p refs  
(Contract N00014-80-C-0273; Grant NSF DES-75-03826)  
(AD-A095300; WHOI-81-10) Avail: NTIS HC A14/MF A01  
CSCL 08/1

Plankton samples were investigated for physical and chemical leaching decomposition to identify the major and trace element composition of particulate carrier phases. The identification of trace element/major element ratios in the biogenic materials was emphasized. The majority of the trace elements in the samples were directly associated with the nonskeletal organic phases of the plankton. Calcium carbonate and opal were not significant carriers for any of the trace elements studied. A refractory phase

The role of cutaneous thermal receptors in the control of thermoregulatory sweating in men and particularly the specialized role of the head skin temperature in thermoregulatory sweating was investigated. It is suggested that tympanic membrane temperature, and oral temperature, may be affected by thermal exchange occurring between the arteries and veins in the cervical and cephalic regions. Sweating rate increases when head skin temperature increases and when the tympanic membrane and oral temperatures begin to rise. When head skin temperature decreases tympanic membrane and oral temperatures decrease and sweating rate followed the changes in skin temperature as well as the changes in tympanic membrane and oral temperatures. It is shown that head skin temperature is important in determining thermal comfort and sweating rate when compared to other body regions. It is suggested that this sensitivity is in part due to a thermal counter-current exchange between venous blood draining the head and arterial blood ascending to intracranial thermal receptors. Dissert. Abstr.

**N82-10710#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

**A COMPUTATIONAL THEORY OF VISUAL SURFACE INTERPOLATION**

W. E. L. Grimson Jun. 1981 77 p refs  
(Contract N00014-80-C-0505; Grant NSF MCS-77-07569)  
(AD-A103921; AI-M-613) Avail: NTIS HC A05/MF A01 CSCL 06/4

A computational theory of the interpolation of surfaces from visual information is presented. However, the surface must agree with the information from stereo or motion correspondence, and not vary radically between these points. Using the image irradiance equation, an explicit form of this surface consistency constraints is derived and a functional from the space of functions to the real numbers is required. Conditions on the form of the functional are derived: It is concluded that if the functional is a complete seminorm which satisfies the parallelogram law, or the space function is a semi-Hilbert space and the functional is a semiinner product, then there is a unique surface which is most consistent with the visual information. E.A.K.

**N82-10711#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

**COLOR VISION AND IMAGE INTENSITIES: WHEN ARE CHANGES MATERIAL?**

John M. Rubin and W. A. Richards May 1981 34 p refs  
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)  
(AD-A103926; AI-M-631) Avail: NTIS HC A03/MF A01 CSCL 05/1

A preliminary goal for color vision to determine where changes of material occur in a scene, using only spectral information was analyzed. It is posted that the effects of many processes are confounded with the effects of material changes in the available image intensities and material changes are essentially arbitrary. A unique condition, the spectral crosspoint, allows rejection of hypothesis that measured image intensities arise from one of the confounding processes. Image intensities are measured from regions on opposite sides of an edge. The biological visual system interprets spectral crosspoints across edges as material changes. A circularly symmetric operator is designed to detect crosspoints which resemble the double opponent cell which is commonplace in biological color vision systems. E.A.K.

**N82-10712#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

**EVIDENCE RELATING SUBJECTIVE CONTOURS AND INTERPRETATIONS INVOLVING OCCLUSION**

Kent A. Stevens Jun. 1981 14 p refs  
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)  
(AD-A103925; AI-M-637) Avail: NTIS HC A02/MF A01 CSCL 06/16

Subjective contours, according to one theory, outline surfaces that are apparently interposed between the viewer and background (because of the disruption of background figures, sudden termination of lines, and other occlusion 'cues') but are not explicitly outlined by intensity discontinuities. This theory predicts that if occlusion cues are not interpreted as evidence of occlusion, no intervening surface need be postulated, hence no subjective contours would be seen. This prediction, however, is difficult to test because observers normally interpret the cues as occlusion evidence and normally see the subjective contours. This article describes a patient with visual agnosia who is both unable to make the usual occlusion interpretations and is unable to see

subjective contours. He has, however, normal ability to interpret standard visual illusions, stereograms, and in particular, stereogram versions of the standard subjective contour figures, which elicit to him strong subjective edges in depth (corresponding to the subjective contours viewed in the monocular versions of the figures). Author (GRA)

**N82-10713#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

**EQUATION COUNTING AND THE INTERPRETATION OF SENSORY DATA**

W. A. Richards, J. M. Rubin, and D. D. Hoffman 6 Jun. 1981 27 p refs  
(Contract N00014-80-C-0505; Grant NSF MCS-79-23110)  
(AD-A103924; AI-M-614) Avail: NTIS HC A03/MF A01 CSCL 06/16

Many problems in biological information processing require the solution to a complex system of equations in many unknown variables. An equation-counting procedure is described for determining whether such a system of equations will indeed have a unique solution, and under what conditions the solution should be interpreted as correct. Three examples of the procedure are given for illustration, one for auditory signal processing and two from vision. Author (GRA)

**N82-10714#** Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 5.

**A HUMAN BEING IN THE SEA. PART 2: DEVELOPMENT TRENDS IN SUBMARINE TECHNOLOGY [MAANNISKAN I HAVET 2. UTVECKLINGSTENDENSER INOM UNDERVAT-TENSOMRAADET]**

Bo Cassel Sep. 1980 37 p In SWEDISH  
(FOA-C-58008-H3-Pt-2) Avail: NTIS HC A03/MF A01

Methods and techniques are reviewed for diving applications including: diving suits for divers exposed to pressure; self-contained diving apparatus; rigid diving apparatus and diving bells; rescue techniques, especially for long term stays in case of emergency; submarines with crew or without crew; tools; and technical development of the resources of the sea bottom. Description of easily transportable deep underwater diving apparatus in standard containers is given. Methods to evacuate divers under pressure to pressure-chambers on land are discussed. Author (ESA)

**N82-10715#** Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 4.

**CADMIUM ANALYSIS IN VIVO [KADMIUM-ANALYS IN VIVO]**

Ronny Bergman Dec. 1980 25 p refs In SWEDISH  
(FOA-C-40126-W4(C3)) Avail: NTIS HC A02/MF A01

A method for quick selective analysis of the cadmium content in organs like kidneys and the liver with the use of neutron activation was developed. The method is based on the measurement of prompt gamma radiation emitted by the neutron absorption in the Cd 113 isotope. The sensitivity of the analysis is high. With neutrons in the intermediate energy interval, 1 to 100 KeV, organs at different distances in the body are selectively analyzed. The amount of cadmium in the kidneys of normal people are analyzed with sufficient accuracy so that the dose in the most exposed tissues does not exceed 40 mrad, of which more than half are from gamma rays. With cadmium amounts higher than the normal in the kidney tissues, the doses decrease proportionally. Author (ESA)

**N82-10716#** Medical Physics Inst. Utrecht (Netherlands).

**[MEDICAL RESEARCH ACTIVITIES IN THE NETHERLANDS] Progress Report**

B. vanEijnsbergen, ed. and F. H. LopesdaSilva, ed. Dec. 1980 154 p refs  
(TNO-MFI-PR-7) Avail: NTIS HC A08/MF A01

Several aspects of medical physics are reported. Topics include: the brain (work on epileptiform transients; recording of responses via implanted electrodes; EEG monitoring during open heart surgery; and models related to the generation of propagated alpha rhythmic activity); and the heart and lungs (computerized and microcomputerized) monitoring of parameters. Author (ESA)

**N82-10717#** Department of Agriculture, Washington, D.C. National Economics Div.

**ENERGY EXPENDITURE AND DIETARY CHANGE**

Larry G. Traub and Thomas A. Stucker May 1981 27 p refs

(P881-218471; AGESS-810512) Avail: NTIS  
HC A03/MF A01 CSCL 10A

Comparative expenditures for food and costs of energy in the food system under alternative diets was studied. The types of diet analyzed are: the current average diet consumed; and a diet consistent with specifications of the dietary guidelines. It is shown that the greatest savings under a diet altered to conform with the dietary guidelines is in electrical generation, and the least energy savings in refined petroleum use. GRA

**N82-10718** Ohio State Univ., Columbus.  
**CARDIORESPIRATORY RESPONSES AND HANDGRIP ISOMETRIC COMPONENT FOR VARIOUS WHEELCHAIR PROPULSION SYSTEMS** Ph.D. Thesis

Douglas Peter Beal 1981 182 p  
Avail: Univ. Microfilms Order No. 8115083

Three types of wheelchair propulsion systems for cardiorespiratory responses normal synchronous (sync) handrim propulsion, an asynchronous (async) system of application of force to the handrims, and an arm crank system of propulsion were studied. The static exercise component of the handgrip muscles for these three methods of wheelchair propulsion were compared and a test protocol which measures these variables under equivalent conditions at submaximal and maximal power output (PO) levels, on both able bodied (AB) and wheelchair dependent (WD) subjects was employed. It is found that the static component directly related to the relative intensity of each exercise mode. Similar static components were found for sync and async handrim propulsion, whereas a higher static component was found for arm cranking. It is indicated that the sync propulsion method is slightly more stressful than the async method, and that the arm crank propulsion system significantly reduces the stresses associated with wheelchair locomotion. Dissert. Abstr.

**N82-10719** Florida State Univ., Tallahassee.  
**THE EFFECTS OF COLD- AND EXERCISE-INDUCED ALTERATIONS IN SKIN AND CORE TEMPERATURE ON SUBSTRATE MOBILIZATION AND UTILIZATION** Ph.D. Thesis

Bernard F. Hurley 1981 134 p  
Avail: Univ. Microfilms Order No. 8117944

The effects of altering skin and core temperature by cold exposure and exercise on substrate mobilization and utilization were examined. The significance of the effects of skin and core temperatures on the variables of interest was determined. It is indicated that free fatty acid, glucose, lactate, hemoglobin, and hematocrit concentrations significantly increase during rest when both mean skin temperature and rectal temperature are induced. It is concluded that reductions in both skin temperature and rectal temperature are necessary during cold exposure to produce increases in substrates, hemoconcentration, lactate, and oxygen consumption. Fat mobilization and utilization occurs during exercise in the cold only if reductions in both skin and rectal temperature are produced. Dissert. Abstr.

**N82-10720#** Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).  
**PHYSIOLOGY AND PATHOLOGY OF SPINAL AILMENTS IN AEROSPACE MEDICINE [PHYSIOPATHOLOGIE AT PATHOLOGIE DES AFFECTIONS DUR RACHIS EN MEDECINE AEROSPATIALE]**

R. P. Delahaye, R. Auffret, P. Doury, C. Kleitz, A. Leger, G. Leguay, P. J. Metges, J. L. Poirier, B. Vettes, and H. Viellefond  
Apr. 1981 336 p refs In FRENCH  
(AGARD-AG-250-FR; ISBN-92-835-2108-0) Avail: NTIS  
HC A15/MF A01

Spinal problems in aerospace medicine are reviewed. Opinions are expressed in the areas of etiology, diagnosis and prognosis for lesions in the spinal column, injuries which are activated by piloting rotary wing aircrafts, conventional airplanes, gliders, or by parachute jumping. It is concluded that this information is helpful in aerospace medicine, the medical physiology of flying personnel, and also in the enforcement of flight safety.

Transl. by E.A.K.

**N82-10721#** Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science, Industrial Engineering/Operations Research.

**A MONTE-CARLO SIMULATION INVESTIGATING MEANS OF HUMAN-COMPUTER COMMUNICATION FOR DYNAMIC TASK ALLOCATION**

Mark E. Revesman Aug. 1981 39 p refs Presented at the IEEE Intern. Conf. on Cybernetics and Soc., Atlanta, Oct. 1981  
Submitted for publication

(Contract N00014-81-K-0143)  
(AD-A103890; CSIE-81-1) Avail: NTIS HC A03/MF A01 CSCL 05/8

This paper investigates human-computer communication in multitask decision making situations. It is proposed that tasks in these systems be allocated in a dynamic manner. Communication between human and computer is essential for dynamic allocation to enhance system performance. Simulation experiments investigate two modes of communication: implicit, in which the human's planned actions are relayed to the computer by the use of model of the human's decision strategy, and explicit, in which the human overtly describes his decisions to the computer. Results indicate that implicit communication can significantly enhance system performance if the computer uses a method of decision making which complements that of the human. Explicit communication can greatly enhance system performance, but there is an inherent cost in the time it takes the human to transmit his decisions to the computer. It is concluded that the costs of both methods can be traded off so that either implicit or explicit communication may be useful in different situations. Further research is suggested for defining complementary strategies using human models and for investigating trade-offs between implicit and explicit communication. Author (GRA)

**N82-10722#** Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 4.

**THE INFLUENCE OF BEARD, BEARD-STUBBLE AND AGE WRINKLES ON THE ADJUSTMENT OF PROTECTIVE MASKS [INVERKAN AV SKAEGG, SKAEGGSTUBB OCH AALDRERSRYNKOR PAA SKYDDSMASKTILLPASSNING]**

Per-Gunnar Joensson Nov. 1980 32 p refs In SWEDISH

(FOA-A-40034-C2/A2/ B2) Avail: NTIS HC A03/MF A01

Tests were conducted with eight different types of respirators on 31 men, newly shaven and then after 8, 24, 48 and 96 hours of beard growth. Two types of safety devices covering nose and mouth, i.e., four complete gas masks and two with pressurized air, were investigated. With three of these masks a notable worsening in the adjustment is noticeable after only eight hours beard growth. The same eight protective devices were also tested on 20 full-bearded men. No satisfactory protection is recorded. Wrinkled skin can also lead to a less favorable performance. The influence of this factor was tested on 56 retired men and women with two safety devices covering nose and mouth and four different gas masks. The adjustment is significantly less tight than on younger persons. Author (ESA)

**N82-11767\*#** National Aeronautics and Space Administration, Washington, D. C.  
**CYCLIC NUCLEOTIDES IN TISSUES DURING LONG-TERM HYPOKINESIA**

V. F. Makeyeva, G. S. Komolova, I. A. Yegorov, L. V. Serova, and N. A. Chelnaya Oct. 1981 6 p refs Transl. into ENGLISH from "Tsiklicheskiye Nukleotidy v Tkanyakh Pri Dlitel'noy-Gipokinezii", Voprosy Meditsinskoy Khimii (USSR), Vol. 27, No. 1, 1981 p 59-61 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Bakh Inst. of Biochemistry, USSR (Contract NASw-3541)

(NASA-TM-76726) Copyright. Avail: NTIS HC A02/MF A01 CSCL 06C

Male Wistar rats were kept hypokinetic by placing them in small containers for 22 days. Blood plasma cAMP content was subsequently found increased, and cGMP content decreased; in the experimental animals. Liver and thymus cAMP content was similar in the control and experimental animals. There was a 20 and 38% decrease of cAMP content in the kidneys and spleen, respectively. Hypokinesia's reduction of cyclic nucleotides seems to inhibit RNA and protein synthesis. Author

**N82-11768\*#** National Aeronautics and Space Administration, Washington, D. C.

**LASER INDUCED FLUORESCENCE FROM ALGAE: RESULTS OF A SHIP-BORNE FIELD TEST**

Britt Hartmann, Ove Steinvall, and Anders Widen Sep. 1981 44 p refs Transl. into ENGLISH of "Laserinducerad Fluorescens from Alger: Resultat fraan ett Baatburet Faeltfoersok" Rept. FOA-C-30171-EL, Stockholm, Jul. 1979 p 1-51 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by National Defense

(Contract NASw-3541)  
 (NASA-TM-76626; FOA-C-30171-EL) Avail: NTIS  
 HC A03/MF A01 CSCL 06C

A basis is provided for the feasibility of air-borne laser fluorosensing not only of chlorophyll but also of pollutants such as oils and chemicals. There was a satisfactory correlation between the laser data and those obtained manually. The absolute determination of the chlorophyll concentration is discussed. T.M.

**N82-11759\***# National Aeronautics and Space Administration, Washington, D. C.

**ELECTRON MICROSCOPICAL AND HISTOCHEMICAL STUDIES ON THE TRANSVERSE STRIATED MUSCLES OF BIRDS AFTER PROLONGED HYPOKINESIS**

M. Belak, J. Kocisova, J. Marcanik, K. Boda, and R. Skarda  
 Aug. 1981 14 p refs Transl. into ENGLISH from Arch. Exp. Veterinarmed. (E. Germany) v. 33, no. 1, 1979 p 37-46 Transl. by Scientific Translation Service, Santa Barbara, Calif.  
 (Contract NASw-3198)

(NASA-TM-76717) Avail: NTIS HC A02/MF A01 CSCL 06C

Studies of the gastrocnemius muscle were carried out in 4 month old cockerels of the laying hybrid after hypokinesis lasting 15 and 30 days. It was found that restricted movement resulted in dystrophic changes of myotibrils, enlargement of the sarcoplasmic reticulum and oedem of interfibrillar spaces. Histochemical studies revealed focuses of increased activity of non-specific esterase, decreased activity of dehydrogenase of lactic acid and a positive reaction of acid phosphatase. T.M.

**N82-11760\***# National Aeronautics and Space Administration, Washington, D. C.

**PARTICIPATION OF THE HYPOPHYSEAL-ADRENAL CORTEX SYSTEM IN THROMBIN CLEARANCE DURING IMMOBILIZATION STRESS**

B. A. Kudryashov, A. M. Uljanov, F. B. Shapiro, and G. G. Bazazyan  
 Oct. 1981 15 p refs Transl. into ENGLISH from Folia Maematol. (Leipzig), v. 106, no. 2, 1979 p 244-253 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by State Univ. of Moscow  
 (Contract NASw-3542)

(NASA-TM-76729) Avail: NTIS HC A02/MF A01 CSCL 06C

Thrombin marked with I-131 resulted in a considerable increase of the thrombined clearance rate in healthy male rats during stress caused by an immobilization lasting 30 minutes, and in an increase of thrombin clearance occurred by a combination of immobilization and administration of adrenocorticotropin (ACTH). Contrary to ACTH, the thrombin clearance is not stimulated in healthy animals by hydrocortisone. The results of the examination are presented. S.L.

**N82-11761\***# General Accounting Office, Washington, D. C. Community and Economic Development Div.

**INFORMATION OF MISSION AND FUNCTIONS OF THE NATIONAL BUREAU OF STANDARDS**

22 Apr. 1981 96 p  
 (PB81-228207; CED-81-39) Avail: NTIS HC A05/MF A01 CSCL 05A

The Subcommittee on Science, Research and Technology, House Committee on Science and Technology, was concerned that the Bureau of Standards appeared divided in carrying out its functions under enabling legislation and subsequent legislative mandates and saw a need to hold hearings on the organic act, the law establishing the Bureau. GAO identified several matters which the subcommittee may wish to explore during hearings that may help the Bureau carry out its current and future responsibilities. GRA

**N82-11762** Joint Publications Research Service, Arlington, Va. **USSR REPORT. LIFE SCIENCES BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 12**

30 Oct. 1981 62 p refs Transl. into ENGLISH from various Russian publications

(JPRS-79338) Copyright. Avail: JPRS, Arlington, Va.

A mathematical model of the human memory depository is presented, the investigation of the otolithic reflex and the space perception functions of cosmonauts is described, and requirements for an automated measuring and computing complex for studies in human factors engineering are described.

**N82-11763\***# Joint Publications Research Service, Arlington, Va.

**TIME AND INFORMATION MODEL OF HUMAN MEMORY ORGANIZATION**

V. A. Ganzen and D. A. Igonin *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci., No. 12 (JPRS-79338) 30 Oct. 1981 p 23-33 refs Transl. into ENGLISH from Vestn. Leningr. Univ.: Ekon., Filosofiya, Pravo (USSR), no. 5, issue 1, Mar. 1981 p 47-56

Avail: JPRS, Arlington, Va.

A dimensional and structural model of the human memory depository is presented. Quantitative estimates of the size of the memory depository are made and the organization of the system of memory traces in a hypothetical functional space of the memory is described in psychological terms. In the model, the volume (capacity) of the depository refers to the number of storage units in it, while the concept of structure characterizing the distribution of traces in the depository is interpreted as the structure of order. Only those parts of the depository that are responsible for fixing traces of various forms of symbolic material, such as meaningless syllables, words, or the graphic signs of a written language, are considered. J.D.H.

**N82-11764\***# Joint Publications Research Service, Arlington, Va.

**OTOLITHIC REFLEX AND SPACE PERCEPTION FUNCTION OF COSMONAUTS**

I. Ya. Yakovleva and L. N. Kornilova *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci., No. 12 (JPRS-79338) 30 Oct. 1981 p 34-38 refs Transl. into ENGLISH from Vestn. Otorino-Laringol. (USSR), no. 4, Jul. - Aug. 1981 p 3-6

Avail: JPRS, Arlington, Va.

The reactions of the vestibular system and the space perception function to space flight are described. Data from preflight and postflight examinations of 24 cosmonauts following ten short term (4-19 days) and five long term (30-175 days) flights was analyzed. The otolithic reflex was investigated according to the intensity of the reaction of eyeball counterrotation, using a visual successive image representation in a transition from vertical to horizontal position to the right and left side. The function of spatial coordinate perception was investigated in the sitting position and in a horizontal position on the right side. J.D.H.

**N82-11765\***# Joint Publications Research Service, Arlington, Va.

**MEASURING/COMPUTING COMPLEX FOR AUTOMATION OF ERGONOMIC EXPERIMENTS**

O. V. Afanasyev, R. P. Burusuzov, and B. V. Yelatomtsev *In its* USSR Rept.: Life Sci., Biomed. and Behavioral Sci., No. 12 (JPRS-79338) 30 Oct. 1981 p 41-47 refs Transl. into ENGLISH from Tekh. Estetika (USSR), no. 1, Jan. 1981 p 27-29

Avail: JPRS, Arlington, Va.

Hardware and software requirements for an automated measuring and computing complex for studies in human factors engineering are considered. A complex consisting of a YeS-1010 computer, a Plurimat-S signal analyzer, an experimental camera, and a test bunch consisting of a KL 104A LED indicator, subject console, tachistoscope, and EEG-111 electroencephalograph is described. The software for the computer and signal analyzer is described. J.D.H.

**N82-11766** Royal Aircraft Establishment, Bedford (England). Library.

**ON THE ACTIVE PART PLAYED BY THE HEART IN THE VENOUS RETURN OF THE BLOOD**

W. Bohme Jun. 1980 104 p refs Transl. into ENGLISH from Ergeb. Physiol. (West Germany), v. 38, 1936 p 251-338 (RAE-Lib-Trans-2017; BR79520)

Evidence from X-ray experiments supporting the idea that the heart sucks blood into the atria during systole is reviewed. Both X-ray cinematography and kymography were used in studies on animals and humans with and without contrast media. When the volume of the ventricles decreases during systole, the volume of the atria increases markedly as the valve plane descends towards the apex, the calibre of the venae cavae decreases, and as shown by experiments involving injection of droplets of iodine containing oil, the blood accelerates towards the heart. Various pathological conditions, including respiratory and cardiac

failure, pneumothorax, air and oil emboli, and the effects of some pharmacological agents are also discussed. A.R.H.

**N82-11767** Royal Aircraft Establishment, Bedford (England). Library.

**MECHANICAL IMPEDANCE OF THE HUMAN OUTER EAR**  
H. Els and J. Schroeter Feb. 1981 21 p refs Transl. into ENGLISH from Forschungsber. (West Germany), no. 238, 1980 (RAE-Lib-Trans-2065; BR80139) Copyright. Avail: Issuing Activity

The lack of a quick, cheap and accurate method of measuring the attenuation provided by hearing protectors hampered the development of these devices. Many efforts to provide such a method involved the design of an objective test apparatus or 'artificial head'. A major drawback to this solution was the lack of detailed information about the mechanical characteristics of the skin/flesh layer at the point of contact between the protector and the head of a wearer. The measurement of the mechanical impedance of the skin/flesh layer of 100 subjects at four points in the circumaural region and at a point in the outer ear canal is described. The application of these data to the design of an artificial skin/flesh layer for use on an 'artificial head' is discussed. T.M.

**N82-11768** Pennsylvania State Univ., University Park.  
**AIRWAY GAS MIXING DURING REST AND BICYCLE EXERCISE** Ph.D. Thesis

Deborah Marie Drechsler 1981 96 p  
Avail: Univ. Microfilms Order No. 8120419

The increase in dispersion of an inert tracer bolus of helium or sulfur hexafluoride was used as a direct, non-invasive measure of longitudinal gas mixing in the conducting airways. Three types of experiments were performed. Firstly, inspiratory flow rate was varied between 0.2 and 1.8 l/s while the expiratory flow rate was held constant at 0.4 l/s. Measurements were made at penetration volumes (V) of 30, 90, and 150 ml, and tidal volume was 600 ml. The negative correlation of mixing with inspiratory flow rate at all three values of V suggests that airway gas mixing during inspiration is by turbulence. During the second group of experiments expiratory flow rate was varied from 0.2 to 2.5 l/s, and inspiratory flow rate was held constant at 0.4 l/s. The positive correlation of mixing with expiratory flow rate at all three values of V leads to the conclusion that airway gas mixing during expiration is by Taylor diffusion. The third group of experiments investigated the extent of cardiogenic gas mixing by comparing inert gas dispersion during bicycle ergometer exercise at 35 percent V sub O2 max to that dispersion occurring with matched respiratory maneuvers at rest.

Dissert. Abstr.

**N82-11769** Rochester Univ., N. Y.  
**HUMAN LYMPHOCYTE CALCIUM METABOLISM**  
Ph.D. Thesis

Andrew Harry Lichtman 1981 207 p  
Avail: Univ. Microfilms Order No. 8122380

A technique was developed for measuring the calcium content of a small number of cells using a graphite furnace atomic absorption spectrophotometer. The sensitivity of the graphite furnace technique was 60 times higher and the detection limit was 1500 times lower than a conventional flame atomic absorption technique. The low detection limit of the graphite furnace technique permitted studies of calcium metabolism in the available numbers of human lymphocytes. In the absence of serum, the lymphocyte calcium content doubled as the medium calcium concentration was increased from 1 micro mol/l to 0.5 mmol/l. At medium calcium concentrations of 0.5 mmol/l and above, the lymphocyte calcium content was 1.0 mmol/l cells. In medium adjusted 2 mmol/l calcium, the lymphocyte calcium content doubled as the medium serum concentration was increased from 0 to 2 percent. At medium serum concentrations of 2 percent and above, lymphocyte calcium content was 2 mmol/l cells. Dissert. Abstr.

**N82-11770\*** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

**LOGIC-CONTROLLED OCCLUSIVE CUFF SYSTEM** Patent  
Joseph T. Baker (Technology, Inc., Houston, Tex.), George W. Hoffer, Inventors (to NASA) (Technology, Inc., Houston, Tex.), and William N. Hursta Issued 13 Oct. 1981 6 p Filed 1 Jun. 1976 Supersedes N76-27839 (14 - 18, p 2369)  
(NASA-Case-MSC-14836-1; US-Patent-4,294,261;

US-Patent-Appi-SN-691647; US-Patent-Class-128-691;  
US-Patent-Class-128-327; US-Patent-Class-128-686) Avail: US Patent and Trademark Office CSCL 06B

An occlusive cuff system comprises a pressure cuff and a source of regulated compressed gas feeding the cuff through an electrically operated fill valve. An electrically operated vent valve vents the cuff to the ambient pressure. The fill valve is normally closed and the vent valve is normally open. In response to an external start signal, a logic network opens the fill valve and closes the vent valve, thereby starting the pressurization cycle and a timer. A pressure transducer continuously monitors the pressure in the cuff. When the transducer's output equals a selected reference voltage, a comparator causes the logic network to close the fill valve. The timer, after a selected time delay, opens the vent valve to the ambient pressure, thereby ending the pressurization cycle.

Official Gazette of the U.S. Patent and Trademark Office

**N82-11771\***# National Aeronautics and Space Administration, Washington, D. C.

**EFFECTS OF CURATIVE TREATMENT EMPHASIZING ENDURANCE TRAINING ON THE PERFORMANCE AND BLOOD PRESSURE OF HYPERTENSIVE AND NORMOTENSIVES**

F. Worms (Sanitarium of the Governmental Hospital) Jun. 1981 20 p refs Transl. into ENGLISH from Dtsche. Gesundheitswesen, v. 35, no. 31, 1980 p 1207-1212 Transl. by Kanner (Leo) Associates, Redwood City, Calif.  
(Contract NASw-3199)

(NASA-TM-76520) Avail: NTIS HC A02/MF A01 CSCL 06P

The problem of normal values of blood pressure after exercise taking into account the blood pressure at the end of the exercise test is discussed. Hypertensives showed a lower working capacity than normotensives. In normotensives, however, systolic blood pressure at the end of an exercise correlated well with the working capacity. After the endurance cure submaximal blood pressure was markedly lower in hypertensives with a striking dependence on the level of initial values. Systolic blood pressure at the end of an exercise test was not changed significantly. Most probably it is not possible to overcome this malregulation in hypertensives by endurance training alone. T.M.

**N82-11772#** Naval Ocean Systems Center, San Diego, Calif. Bureau of Medicine and Surgery.

**REMOTE MEDICAL DIAGNOSIS SYSTEM RMDS DESIGN REVIEW MEETING MINUTES** Technical Report, Aug. - Oct. 1980

W. T. Rasmussen and I. Stevens Aug. 1981 86 p refs Conf. held at Washington, D.C., 27-28 Aug. 1980  
(AD-A104555; NOSC/TD-464) Avail: NTIS HC A05/MF A01 CSCL 06/5

Contains the minutes of a design review meeting for the Remote Medical Diagnosis System (RMDS) held 27-28 August, 1980, at the Bureau of Medicine and Surgery (Department of the Navy), Washington, DC. These minutes reflect the discussions held and information exchanged at this review meeting. They paraphrase various discussions, and are not intended as complete verbatim minutes. This document also contains background and reference material on the RMDS project.

Author (GRA)

**N82-11773#** Brookhaven National Lab., Upton, N. Y. Medical Research Center.

**INTERCOMPARISON OF TECHNIQUES FOR THE NON-INVASIVE MEASUREMENT OF BONE MASS**

S. H. Cohn 1981 14 p ref Presented at the 16th European Symp. on Calcified Tissue, Knokke, Belgium, 1981  
(Contract DE-AC02-76CH-00016)

(DE81-029921; BNL-29958) Avail: NTIS HC A02/MF A01

A variety of methods are presently available for the measurement of both normal individuals and patients with metabolic disorders. Chief among these methods are radiographic techniques such as radiogrammetry, photon absorptiometry, computer tomography, Compton scattering and neutron activation analysis. In this review, the salient features of the bone measurement techniques are discussed along with their accuracy and precision. The advantages of the various techniques for measuring bone mass are summarized. Where possible, intercomparisons are made of the various techniques. DOE

**N82-11774#** Oak Ridge National Lab., Tenn. Health and Safety Research Div.

**DARTAB: A PROGRAM TO COMBINE AIRBORNE RADIONUCLIDE ENVIRONMENTAL EXPOSURE DATA WITH DOSIMETRIC AND HEALTH EFFECTS DATA TO GENERATE TABULATIONS OF PREDICTED HEALTH IMPACTS**

C. L. Begovich, K. F. Eckerman, E. C. Schlatter, S. Y. Ohr, and R. O. Chester Aug. 1981 79 p refs  
(Contract W-7405-eng-26)

(DE81-030434; ORNL-5692) Avail: NTIS HC A05/MF A01

The DARTAB computer code which combines radionuclide environmental exposure data with dosimetric and health effects data to generate tabulations of the predicted impact of radioactive airborne effluents is discussed. DARTAB is independent of the environmental transport code used to generate the environmental exposure data and the codes used to produce the dosimetric and health effects data. The human dose and risk calculations need not be added to every environmental transport code. Options are included in DARTAB to permit the user to request tabulation by various topics. DOE

**N82-11775#** Brookhaven National Lab., Upton, N. Y. Medical Research Center.

**USE OF NUCLEAR RESONANT SCATTERING OF GAMMA RAYS FOR IN VIVO MEASUREMENT OF IRON**

David Vartsky, Lucian Wielopolski, Kenneth J. Ellis, and Stanton H. Cohn 1981 20 p refs Presented at the Conf. on X- and Gamma-Ray Sources and Appl., Ann Arbor, Mich., 10 Jun. 1981

(Contract DE-AC02-76CH-00016; Grant PHS-R01-HL-24177) (DE81-026051; BNL-29737; CONF-810647-8) Avail: NTIS HC A02/MF A01

A technique for determination of elements in human body in vivo, utilizing nuclear resonant scattering of Gamma rays was developed with this technique 847 keV photons emitted from a gaseous <sup>55</sup>MnCl sub 2 source are resonantly scattered from <sup>56</sup>Fe present in the body. The detection of these Gamma rays is used to estimate the iron content of the liver or heart of patients. Details of the calibration procedure and potential molecular effects are described. DOE

**N82-11776#** Massachusetts General Hospital, Boston. Radiology Research Lab.

**MOLECULAR EVENTS BASIC TO CELLULAR RADIATION RESPONSE**

G. M. Kolodny [1981] 23 p refs Prepared in cooperation with Beth Israel Hospital, Boston  
(Contracts DE-AS02-76EV-03335; EY-76-S-02-3335)

(DE81-027898; DOE/EV-03335/T1; COO-3335-28) Avail: NTIS HC A02/MF A01

The initiation and control of the division process in normal cells to gain insight into changes caused by x-irradiation and neoplasia was discussed. It is suggested that small molecular weight RNA acts as primer for new RNA synthesis by hybridizing with DNA and there initiating the transcription of a new RNA chain. It is indicated that small molecular weight RNA will induce the production of new proteins. It is demonstrated RNA taken up from the media by cells in culture and induce in vitro the production of differential cell products. DOE

**N82-11777#** Oak Ridge National Lab., Tenn.

**ALTERED TISSUE REACTIVITY AND INTERACTIONS BETWEEN CHEMICALS**

H. P. Witschi 1981 33 p refs Presented at NRC Workshop on Multichem. Contamination, Milan, 27 Apr. 1981

(Contract W-7405-eng-26)  
(DE81-023189; CONF-810491-1) Avail: NTIS HC A03/MF A01

The interaction between chemicals which modify the biological response if exposure is simultaneous or sequential was explored. Two different situations are distinguished where interactions are caused by sequential exposure: (1) a first agent acts as an inducer or inhibitor of mixed function oxidases, this alters the response to a second, challenging agent and the nature of the biological response, is dictated by the second agent; and (2) a first agent produces slight or undetected or undetectable changes in a tissue, exposure to a second agent enhances or allows expression of the biological response determined by the first agent. Both types of interactions require an ordered sequence of exposure to two chemicals and complex dose effect and time effect relationships. DOE

**N82-11778#** North Carolina Univ. at Chapel Hill. School of Medicine.

**NEW APPROACHES TO QUANTITATING THE PULMONARY EFFECTS ON INHALED POLLUTANTS Final Report, 25 Jul. 1977 - 24 Jul. 1980**

Philip A. Bromberg, R. C. Boucher, M. Friedman, M. J. Hazucha, and R. L. Pimmell Jul. 1981 33 p refs  
(Grant EPA-R-805184)

(P881-222382; EPA-600/1-81-052) Avail: NTIS HC A03/MF A01 CSCL 06T

The following techniques described make continuous measurements of large airways caliber rapid methods for invasively measuring respiratory mechanics using forced random noise excitation at the mouth; a nontraumatic technique to measure transepithelial potential difference across respiratory (nasal and airways) epithelium; tracheal epithelial permeability in vivo, demonstrating increased permeability and decreased permselectivity; a rapid noninvasive multigas rebreathing technique to measure lung water and O<sub>3</sub> induced pulmonary. GRA

**N82-11779#** Creighton Univ., Omaha, Nebr.

**OZONE EXPOSURE AND PULMONARY METABOLIC EFFECTS OF MEDIATORS AND HORMONES Final Report, 20 Nov. 1976 - 31 Aug. 1980**

Ibert C. Wells Jul. 1981 25 p

(Grant EPA-R-804585)  
(P881-222408; EPA-600/1-81-051) Avail: NTIS HC A02/MF A01 CSCL 06T

Several physiological effects of ozone exposure involving smooth muscle contracting substances were studied. The exposure of rats to ozone concentrations of 0.5 or 1.0 ppm for 4.0 hours produced the following effects in their lungs: (1) the release of prostaglandin F<sub>2</sub> alpha and thromboxane A<sub>2</sub> (2) increased the angiotensin converting enzyme activity, and (3) decreased the uptake of serotonin from the blood. Histamine and slow reacting substance of anaphylaxis were not released nor was the histamine forming capacity of the lung altered. Succinoxidase activity decreased by short exposure to ozone and increased by long exposure. GRA

**N82-11780#** National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Surveillance, Hazard Evaluations and Field Studies.

**CARBON/GRAPHITE FIBERS: ENVIRONMENTAL EXPOSURES AND POTENTIAL HEALTH IMPLICATIONS**

Ralph D. Zumwalde and Lowell T. Harmison 12 Dec. 1980 21 p refs

(P881-229692; IWS-52.3) Avail: NTIS HC A02/MF A01 CSCL 06J

Health effects related to carbon (7449440), and graphite (7782425) fiber exposure are discussed. Industrial production of the fibers is reviewed. Data on fiber release and particle size is included. The results of epidemiological and animal toxicologic studies with fibrous glass (14808607), rock wool wollastonite (13983170), fibrous clay, asbestos (1332214) and carbon fibers are described. Animal toxicity tests based on fiber size, deposition pattern and cause of death are recommended. The synergistic effect between carbon/graphite fiber exposure and cigarette smoke also should be studied. Worker exposures to these fibers should be kept as low as possible and managed in the same way as exposure to fibrous glass. GRA

**N82-11781#** Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Directorate of Equipment Engineering.

**INVESTIGATION OF SPATIAL DISORIENTATION OF F-15 EAGLE PILOTS Final Report, 15 Jan. - Aug. 1980**

Dennis W. Jarvi Aug. 1981 72 p refs

(AD-A104684; ASD-TR-81-5016) Avail: NTIS HC A04/MF A01 CSCL 05/8

An extensive investigation, including F-15 pilot interviews at Eglin AFB FL and Langley AFB VA, into the characteristics and operation of the F-15 Eagle was conducted over a seven month period. In addition, F-16 pilots at Hill AFB UT, were interviewed. The following conclusions were drawn from the information acquired: The F-15 does not possess any unusual flight handling characteristics that could lead to pilot spatial disorientation. The large bubble canopy and the pilot's sitting height in the cockpit generally do not appear to significantly contribute to spatial disorientation. The asymmetrical exterior lighting strips on the F-15 can cause confusion on the part of the wing man regarding his formation position relative to the

lead aircraft or the bank angle of the lead aircraft. Night formation join-ups, particularly from the stern, are rather difficult for the F-15 pilot due to the absence of adequate exterior lighting to provide the necessary depth perception cues for ascertaining the range and attitude of the lead aircraft. The layout of the F-15 cockpit generally manifests adherence to good human factors design principles. The F-15 Spatial Disorientation Team also uncovered some areas of potential pilot distraction. These areas, uncovered during pilot interviews, do not necessarily affect the incidence of spatial disorientation, but may add to the F-15 pilot's workload. The report includes these areas, and also makes a number of recommendations based on the results of the study. GRA

**N82-11782#** Foster-Miller Associates, Inc., Waltham, Mass. Mining Div.

**RECOMMENDED GUIDELINES FOR OXYGEN SELF-RESCUERS. VOLUME 1: UNDERGROUND COAL MINING Progress Report, Aug. 1979 - Dec. 1980**

D. Randolph Berry and Donald W. Mitchell Jun. 1981 52 p 2 Vol.

(Contract DI-BM-J0199118)

(PB81-225872; BM-OFR-86(1)-81-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 081

The Bureau of Mines awarded a contract for the provision of recommendations on the safest, most practical methods for complying with new regulations requiring that all underground coal miners have a self-contained, self rescuer (SCSR) -- a device capable of supplying, in an emergency, 1 hour of self-contained oxygen (no breathing of mine air). Information and recommendations that could be used during the early stages of nationwide compliance, especially in the areas of inspection, testing, and underground storage of SCSR's, are presented. An executive summary, introduction, definitions, recommended guidelines for district managers and mine operators, and a storage plan checklist and sample form are provided. GRA

**N82-11783#** Foster-Miller Associates, Inc., Waltham, Mass. Mining Div.

**RECOMMENDED GUIDELINES FOR OXYGEN SELF-RESCUERS. VOLUME 2: APPENDICES Progress Report, Aug. 1979 - Dec. 1980**

D. Randolph Berry and Donald W. Mitchell Jun. 1981 265 p refs 2 Vol.

(Contract DI-BM-J0199118)

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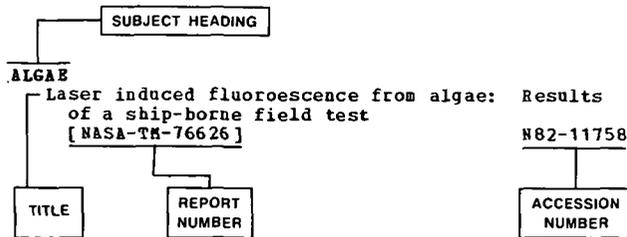
The report covers a discussion of the recommended guidelines, worldwide use of oxygen self-rescuers, hypothetical use of oxygen self-rescuers in post-1972 coal mine explosions and fires, vibration testing of self-contained, self-rescuers (SCSR's), and testing of in-service SCSR's. Discussions with representatives of underground coal mining, recommendations for SCSR storage containers, example of SCSR storage plans, testing of in-service compressed oxygen SCSR's, and 30 CFR 75.1714, 30 regulations pertaining to self-rescuers are presented. GRA

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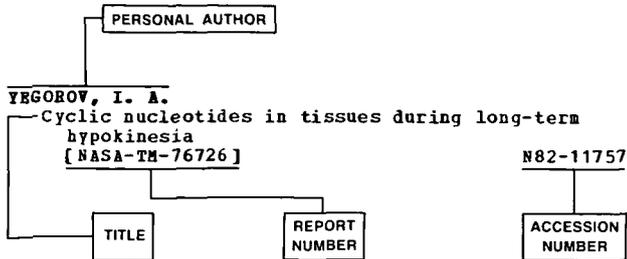
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