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A Continuing Bibliography with Indexes

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NASA SP-7011 (190)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 190)

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 1979 in

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

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 235 reports, articles and other documents announced during January 1979 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1979 Supplements.

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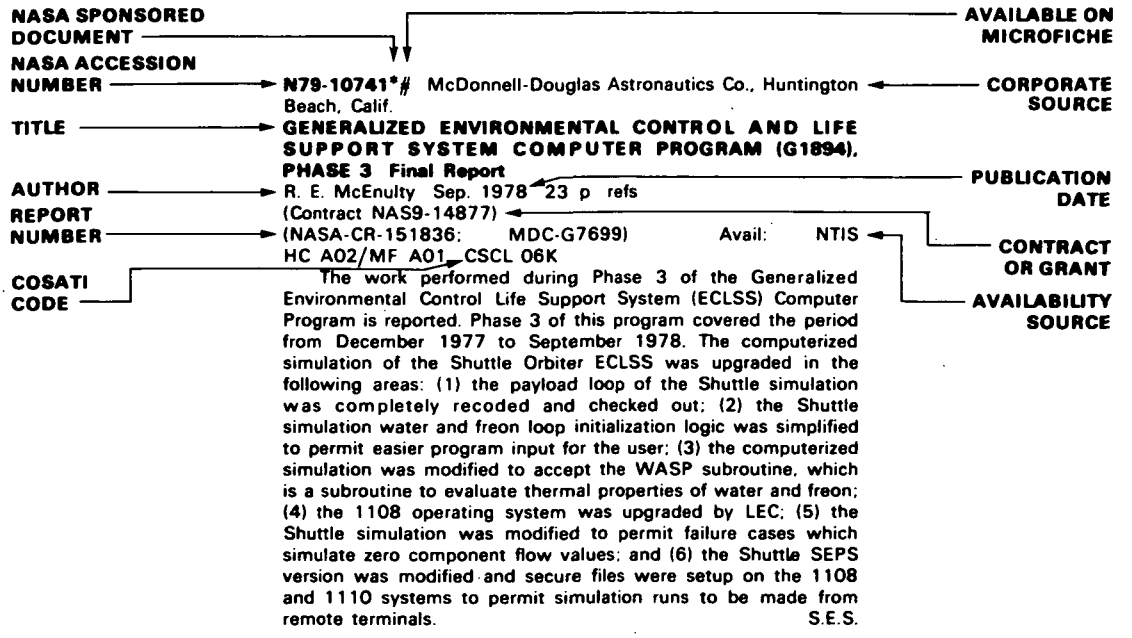

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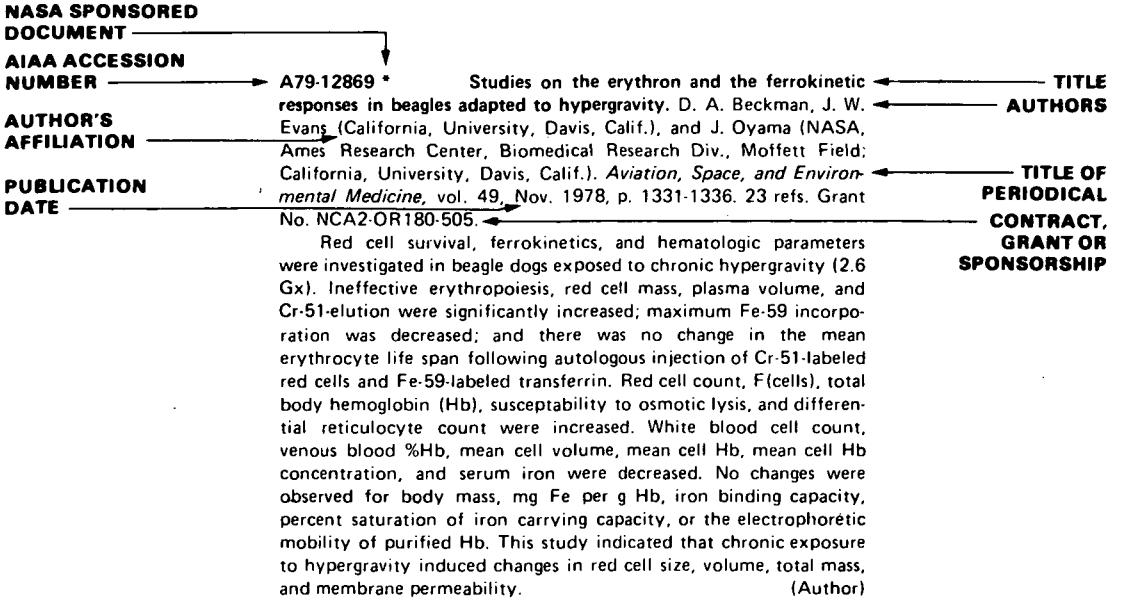

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 190)

FEBRUARY 1979

IAA ENTRIES

A79-10322 **Evolution of the man-machine interface in surveillance radar systems.** F. W. Kime (Marconi Radar Systems, Ltd., Chelmsford, Essex, England). In: Radar-77; Proceedings of the International Conference, London, England, October 25-28, 1977. London, Institution of Electrical Engineers, 1977, p. 199-203. 5 refs.

In its simplest definition, the operational requirement is the complete knowledge of all movements in the air space within the jurisdiction of the control organization. This information is required in a form which allows rapid appreciation of the overall position and prediction of future progress, either for defensive reaction in the military role or for aircraft safety in the air traffic control role. As such the basic requirement is unchanging but aircraft speed, traffic density, and the penalties for failing to react with ever-decreasing time margins have escalated enormously and alarmingly. In World War II purely manual techniques were employed. Operators at radar stations passed track information by voice communications into filter centers, where it was combined and correlated with reports from visual observers. Attention is given to early steps into electronic data handling, the introduction of digital techniques, the entry of positional data, the entry and control of instructions and data, the use of programmable keyboards, interactive touch systems, a touch-sensitive overlay for PPI, and speech recognition processors. G.R.

A79-10389 * **Flight management research utilizing an oculometer.** A. A. Spady, Jr. and M. C. Kurbjun (NASA, Langley Research Center, Hampton, Va.). *Society of Automotive Engineers, Air Transportation Meeting, Boston, Mass., May 1-4, 1978, Paper.* 20 p.

This paper presents an overview of the flight management work being conducted using NASA Langley's oculometer system. Tests have been conducted in a Boeing 737 simulator to investigate pilot scan behavior during approach and landing for simulated IFR, VFR, motion versus no motion, standard versus advanced displays, and as a function of various runway patterns and symbology. Results of each of these studies are discussed. For example, results indicate that for the IFR approaches a difference in pilot scan strategy was noted for the manual versus coupled (autopilot) conditions. Also, during the final part of the approach when the pilot looks out-of-the-window he fixates on his aim or impact point on the runway and holds this point until flare initiation. (Author)

A79-10399 **False hypothesis and the pilot.** R. E. Burgin (National Transportation Safety Board, Washington, D.C.). *Society of Automotive Engineers, Air Transportation Meeting, Boston, Mass., May 1-4, 1978, Paper 780528.* 7 p. 8 refs.

The false hypothesis phenomenon is significant in most cause factors assigned to aircraft accidents, including decision making errors, faults in judgment, inattention, and situation avoidance. Situations that support the maintenance of a false hypothesis are identified as high expectancy, reduced anxiety, divided attention, and periods following a high concentration. False hypothesis accidents may be reduced by recognizing the limitations of information processing, studying changes in pilot priorities, and examining previous accidents. S.C.S.

A79-10407 **Piloted aircraft simulation - Advantages, disadvantages, and practical problems.** R. L. Stapleford (Systems Technology, Inc., Hawthorne, Calif.). *Society of Automotive Engineers, Air Transportation Meeting, Boston, Mass., May 1-4, 1978, Paper 780548.* 11 p. 17 refs.

The advantages of ground-based simulation relative to flight test are discussed. These include: lower cost, better control of environmental factors, ability to investigate hazardous situations, completely known dynamics, comprehensive measurements and measurement accuracy, repeatability, ease of making changes and comparisons, and early availability. The disadvantages and many practical problems are associated with modeling errors and unrealistic pilot behavior. The modeling features discussed are: the aerodynamic model, modeling of atmospheric disturbances, ground effects, landing gear dynamics, sampled-data effects, and extrapolation to very low speeds. Unrealistic pilot behavior results from distortions in the visual, motion, and aural cues, and from differences in psychological factors. Practical problems in each of these areas are discussed. (Author)

A79-10419 * **Organic geochemical studies on kerogen precursors in recently deposited algal mats and oozes.** R. P. Philp, M. Calvin, S. Brown, and E. Yang (California, University, Berkeley, Calif.). *Chemical Geology,* vol. 22, 1978, p. 207-231. 38 refs. Research supported by A. L. Day Fund and ERDA; Grant No. NGL-05-003-003.

The same kerogen-like residue from the algal mats and oozes at Laguna Mormona, Baja California, is examined following degradation by saponification, alkaline KMnO4 oxidation, and HBr treatment. For comparison, pyrolytic degradation is performed for the residue and five others, two of which are obtained from algal mats at Baffin Bay, Texas. Major conclusions are that (1) Saponification of a residue specimen from the algal-ooze residue results in minor amounts of components bonded to it as esters; (2) Alkaline KMnO4 oxidation reveals that the same residue consists of a cross-linked aliphatic nucleus with additional components attached to it as esters; (3) the major products from pyrolysis of the residue include phytenes, pristenes, sterenes, and triterpenes; and (4) the HBr treatment yielded only one product, indicating the absence of a large number of ether-linkages readily cleaved by HBr. S.D.

A79-10425 * **Coupling of aspartate and serine transport to the transmembrane electrochemical gradient for sodium ions in Halobacterium halobium - Translocation stoichiometries and apparent cooperativity.** J. K. Lanyi (NASA, Ames Research Center, Extraterrestrial Biology Div., Moffett Field, Calif.). *Biochemistry*, vol. 17, no. 15, 1978, p. 3011-3018. 42 refs.

A79-10474 **Apparent saturation of blue-sensitive cones occurs at a color-opponent stage.** C. F. Stromeyer, III, R. E. Kronauer, and J. C. Madsen (Harvard University, Cambridge, Mass.). *Science*, vol. 202, Oct. 13, 1978, p. 217-219. 16 refs. Grant No. NIH-5-R01-EY-01808-02.

Data from violet test flashes on flashed violet fields in the presence of a steady yellow auxiliary field of a sustained radiance were used to study response saturation of blue-sensitive cone pathways. The results suggest that the response saturation of the blue-sensitive pathways is largely a function of spectrally opponent neural mechanisms treating signals from blue-sensitive cones and those from green- or red-sensitive cones in opposite ways. The physiological site for the opponent interaction may be the blue-sensitive cones themselves. S.C.S.

A79-10608 * **In-vivo bone strain telemetry in monkeys /M. nemestrina/.** D. R. Young, W. H. Howard (NASA, Ames Research Center, Moffett Field, Calif.), and D. Orne (Wayne State University, Detroit, Mich.). *ASME, Transactions, Journal of Biomechanical Engineering*, vol. 99, May 1977, p. 104-109. 10 refs.

A new method for collecting in-vivo bone strain data in monkeys has been developed and tested. The method includes a system which consists of a new design of implantable strain transducer and its companion telemetry package. The transducer fits into a hole drilled in a monkey tibia and is threaded for subsequent bone ingrowth. The transducers and telemetry package are biocompatible for over 503 days. The telemetry package uses Pulse Interval Ratio Modulation (PIRM) to transmit strain information to receiving equipment located outside the animal housing cage. (Author)

A79-10648 **Experimental determination of maximum permissible exposure to laser radiation of 1.54-micron wavelength.** P. S. Avdeev, Iu. D. Berezin, Iu. P. Gudakovskii, V. R. Muratov, A. G. Murzin, and V. A. Fromzel. *(Kvantovaia Elektronika* /Moscow/, vol. 5, Jan. 1978, p. 220-223:) *Soviet Journal of Quantum Electronics*, vol. 8, Jan. 1978, p. 137-139. 14 refs. Translation.

The threshold for damage to the eyes of chinchillas caused by exposure to 1.54-micron laser radiation was determined to be 3.3 J/sq cm for the Q-switched regime and 6.1 J/sq cm for the free oscillation case. Only the cornea is damaged by laser radiation, and the threshold is defined as the damage probability of 0.1% as determined from the regression curve. These figures are modified by a correction factor and a factor-of-10 safety margin, and the maximum permissible exposure of the eyes of humans to 1.54-micron radiation is set at 0.16 J/sq cm for 40 nanosec pulses and 0.3 J/sq cm for 0.001 sec pulses. M.L.

A79-10847 # **Mental work and emotions (Umstvennyi trud i emotsii).** A. I. Kikolov. Moscow, Izdatel'stvo Meditsina, 1978. 368 p. 285 refs. In Russian.

The book outlines the possibilities for the occurrence of informational neuroemotional stress and mental fatigue using the example of mental and emotional activity of individuals performing high-responsibility tasks, such as traffic controllers. Available data are used to formulate and refine the concept of neuroemotional overstress. Attention is given to a discussion of the characteristics of the development of overstress into a neurotic state upon exposure to chronic informational overload of the brain. A number of methodological approaches are described for assessing subjects engaged in emotionally stressed mental activity. Problems of diagnosis and estimation criteria for the functional state of the human organism exposed to emotional stress are discussed along with prevention of neuroemotional stress and mental fatigue. S.D.

A79-11219 * **Prolonged weightlessness and calcium loss in man.** P. C. Rambaut (NASA, Johnson Space Center, Medical Research Branch, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-48*. 10 p. 22 refs.

Calcium losses occurring in men subjected to weightlessness in orbital space flight for periods of up to twelve weeks were determined, and the data are used to predict the long-term consequences of weightlessness upon the skeletal system. Loss of calcium increased exponentially from about 50 mg/d at the end of the first week to approximately 300 mg/d at the end of 12 weeks. Hypercalciuria reached a constant level within four weeks while fecal calcium losses continued to increase throughout the period of exposure. Calcium losses from the calcaneus were closely correlated with calcium imbalance, but no changes were detected in the mineral mass of the ulna and radius. It is suggested that the demineralization process may not be totally reversible. M.L.

A79-11220 * **A review of the consequences of fluid and electrolyte shifts in weightlessness.** C. S. Leach (NASA, Johnson Space Center, Biomedical Laboratories Branch, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-50*. 15 p. 59 refs.

This review describes the renal-endocrine mechanisms related to the early losses of fluid-electrolytes from the body during weightlessness as well as their contribution to longer term adaptation of fluid-electrolyte balance. The hypotheses presented were generated by a systematic analysis of body fluid and renal dynamics observed under conditions of actual and simulated spaceflight. These have increased our understanding of the effects of acute headward fluid shifts on renal excretion, the factors promoting excess sodium excretion and the regulation of extracellular fluid composition. (Author)

A79-11221 **The comparative study of metabolism changes dynamics during hypoxia and hyperoxia in mice lungs.** N. Dekleva, O. Genbacev, and D. Vujnovic (Clinical Hospital, Zemun, Yugoslavia). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-51*. 13 p.

Exposure of white laboratory mice (Mus norvegius) to 100% oxygen at 4 atmospheres for 60 minutes is shown to increase the rate of protein synthesis in the lungs with respect to normal conditions and in comparison with other organs during hyperbaric conditions. Isolation of the lung proteins and the determination of the radioactivity of labeled proteins are described. The additional lung proteins synthesized during hyperbaric conditions are mostly 30,000-50,000 daltons and are soluble in alkali. M.L.

A79-11222 **Biomagnetism and artificial magnetic stimulation of living structures.** V. Majic, B. Beleslin (Beograd, Univerzitet, Belgrade, Yugoslavia), B. Stamenovic (VTI, Belgrade, Yugoslavia), and N. Dekleva (Clinical Hospital, Zemun, Yugoslavia). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-52*. 10 p. 13 refs.

Artificial magnetic fields have been used to confirm the influence on living structures. The successful stimulation of leeches' nerve cells and their input resistance change encouraged the experiments with frog and mice heart. The result was the alteration of heart function caused by magnetic stimulation. The authors went on using the similar magnetic stimulators for bone healing instead of electric current stimulators with evident results. (Author)

A79-11223 **Experiment Chlorella 1 on board of Salyut 6.** I. Setlik, J. Doucha, J. Necas (Ceskoslovenska Akademie Ved, Mikrobiologicky Ustav, Trebon, Czechoslovakia), V. A. Kordium, L. V. Polivoda (Ukrainian Academy of Sciences, Institute of Molecular Biology and Genetics, Kiev, Ukrainian SSR), G. I. Meleshko, and E. M. Kondrat'eva (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-53.* 12 p.

A strain of Chlorella vulgaris was grown heterotrophically in darkness at 21 C in a mineral medium on board the Salyut 6 spacecraft, while a similar culture under the same growth conditions was grown in a ground-based laboratory. In addition, three Chlorella strains and one of Scenedesmus were flown in a resting condition and examined post-flight for aftereffects. Evaluation studies performed so far have revealed no significant differences in growth rate or noticeable changes in population characteristics, so no weightlessness effect has been demonstrated. P.T.H.

A79-11224 * **Biological specimen holding facilities for Spacelab experiments.** J. K. Jackson, M. M. Yakut, G. L. Murphy (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.), and W. Berry (NASA, Ames Research Center, Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-56.* 15 p. (MDAC-WD-2857)

The paper describes the design, development, integration, and testing of two prototype holding facilities: (1) a unit housing 36 laboratory rats in individual cages, and (2) a unit housing one unrestrained 14-kg rhesus monkey. Both units are environmentally controlled enclosures complete with food, water, and waste-collection equipment. Timer-controlled fluorescent lights in both units permit automatic day-night cycling. Both units are designed to be compatible with Spacelab interfaces and to be operated by NASA payload specialists. B.J.

A79-11225 **Spacelab environmental control/life support system /ECLS/ for life science experiments.** H. Eckert and G. Wirths (Dornier System GmbH, Friedrichshafen, West Germany). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-59.* 17 p.

A general description is given of the Spacelab ECLS, with special emphasis on support for the life science experiments. The advantages of Spacelab for life science research is discussed, and attention is given to the biorack laboratory configuration which includes incubators for fishes, frogs, cells and tissues, and plants. B.J.

A79-11226 **Medical control in prolonged space flights.** N. N. Gurovskii and A. D. Egorov. *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-63.* 18 p.

Procedures and goals for monitoring the medical condition of spacecraft crew members are considered. The main complexes of symptoms developing during space flight are classified, the possibility of an outbreak of disease is examined, and a theoretical discussion of the selection of diagnostic methods is presented. Medical control and examination of Salyut-6 crew members are described. M.L.

A79-11227 * **Monitoring the state of the human airways by analysis of respiratory sound.** J. C. Hardin (NASA, Langley Research Center, Hampton, Va.) and J. L. Patterson, Jr. (Virginia Commonwealth University, Richmond, Va.). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-66.* 15 p. 17 refs.

A mechanism whereby sound is generated by the motion of vortices in the human lung is described. This mechanism is believed to be responsible for most of the sound which is generated both on inspiration and expiration in normal lungs. Mathematical expressions for the frequencies of sound generated, which depend only upon the axial flow velocity and diameters of the bronchi, are derived. This theory allows the location within the bronchial tree from which particular sounds emanate to be determined. Redistribution of pulmonary blood volume following transition from earth gravity to the weightless state probably alters the caliber of certain airways and doubtless alters sound transmission properties of the lung. We believe that these changes can be monitored effectively and non-invasively by spectral analysis of pulmonary sound. (Author)

A79-11228 **Some advances in astronaut radiation dosimetry.** S. Makra (National Oncological Institute, Budapest, Hungary). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-67.* 3 p.

A thermoluminescent dosimetry reader used to evaluate thermoluminescent dosimeters including those used in space dosimetry is described. For the evaluation of neutron dosimetry, the 05R Monte Carlo and the MUSPALB albedo matrix code were used to compute many neutron spectra. Uses of the dosimetry reader and its application to neutron dosimetry are considered. M.L.

A79-11229 **Two primate biological facility module in Spacelab.** D. Kaplan (Matra Espace, Vélizy-Villacoublay, Yvelines, France), P. C. Pesquies, C. L. Milhaud, and B. G. Cailler (Centre de Recherche de Médicine Aéronautique, Paris, France). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-70.* 8 p.

The described Spacelab two-primate biological facility module for rhesus monkeys is designed to be integrated within a Spacelab standard rack, to be reusable for several missions, to require little crew intervention, and to facilitate data collection and processing. Animal maintenance systems and electronic systems are characterized with attention to component functions such as waste collection and the monitoring of physiological parameters. M.L.

A79-11344 **On the reality of extraterrestrial biogenesis.** T. Ganti (Eotvos Lorand Tudomanyegyetem, Budapest, Hungary). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-A-51.* 7 p. 20 refs.

On the basis of the chemoton theory, it is demonstrated that abiotic formation of living systems is a necessity in the universe. Chemotons are minimal systems fulfilling life criteria. Analysis of their general stoichiometric equation combined with some experimental data enable one to conclude that spontaneous formation of living systems is a reality. P.T.H.

A79-11345 **On the man's adaptation to the operator's work under stressful conditions of space flight.** G. T. Beregovoi, N. V. Krylova, and I. B. Solov'eva (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-A-56.* 6 p.

Parachute jumps were used to simulate space crew activity in an effort to evaluate the emotional perception of stress effects on operators at the adaptation stage. Operator subjects were required to report on different aspects of their task in the course of the jump. Consideration was given to the effects of stress on operator performance for different levels of task complexity and motivation. B.J.

A79-11364 **Space medicine - A prognosis for future research.** A. H. Bellenkes (Delaware, University, Newark, Del.). *International Astronautical Federation, International Astronautical Congress, 29th, Dubrovnik, Yugoslavia, Oct. 1-8, 1978, Paper 78-ST-17.* 9 p. 25 refs.

A major factor in the planning of future manned extended-duration space missions is that of the biomedical feasibility of such exploration. It has been seen that astronauts participating in the American and Soviet space programs have shown marked physiologi-

cal changes during in-flight periods. The current paper reviews some of these biomedical findings from a historical standpoint, using data obtained from American Mercury through Skylab project flights. The review stresses physiological problems encountered in the weightless state as well as the impact of space on astronaut performance. Future manned space projects are discussed, and suggestions are made as to possible areas of primary medical concern on those flights. These include topics in the life-support sciences and human behavioral physiology. A prognosis for continued research in these areas is discussed in terms of past and present attitudes towards space studies by the scientific and lay communities. (Author)

A79-11480 Modeling and analysis using SAINT - A combined discrete/continuous network simulation language. D. B. Wortman, S. D. Duket (Pritsker and Associates, Inc., West Lafayette, Ind.), and D. J. Seifert (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Winter Simulation Conference, Gaithersburg, Md., December 5-7, 1977, Proceedings. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 528-534. 14 refs. Contract No. F33615-76-C-5012.

A network modeling and simulation technique, called Systems Analysis of Integrated Networks of Tasks (SAINT), has been developed to assist in the design and analysis of complex man-machine systems. SAINT allows engineers and human factors specialists to develop system models in which men, machines, and environmental conditions are represented as elements of a network. SAINT has been used to determine the feasibility of integrating human resources data and maintenance task data with a computer simulation technique to form a computer-based tool for performing safety analyses of nuclear systems. Aspects of network modeling and analysis are discussed along with SAINT modeling concepts, taking into account the discrete model component, the continuous model component, and discrete and continuous component interactions. Attention is also given to the SAINT simulation program. G.R.

A79-11544 * # Digital enhancement of computerized axial tomograms. E. Roberts, Jr. (NASA, Lewis Research Center, Cleveland, Ohio). *IEEE, NIH, and Stanford University, Annual Computers in Cardiology Conference, 5th, Stanford, Calif., Sept. 12-14, 1978, Paper.* 5 p.

A systematic evaluation has been conducted of certain digital image enhancement techniques performed in image space. Three types of images have been used, computer generated phantoms, tomograms of a synthetic phantom, and axial tomograms of human anatomy containing images of lesions, artificially introduced into the tomograms. Several types of smoothing, sharpening, and histogram modification have been explored. It has been concluded that the most useful enhancement techniques are a selective smoothing of singular picture elements, combined with contrast manipulation. The most useful tool in applying these techniques is the gray-scale histogram. (Author)

A79-11900 * Microflora analysis of a child with severe combined immune deficiency. G. R. Taylor, K. D. Kropp, and T. C. Molina (NASA, Johnson Space Center, Space and Life Sciences Directorate, Houston, Tex.). *Infection and Immunity,* vol. 19, Feb. 1978, p. 385-390. 22 refs.

The paper presents a microflora analysis of a 5-year-old male child with severe combined immune deficiency who was delivered by Caesarean section and continuously maintained in an isolator. Despite precautions, it was found that the child had come in contact with at least 54 different microbial contaminants. While his skin autoflora was similar to that of a reference group of healthy male adults in numbers of different species and the number of viable cells present per square centimeter of surface area, the subject's autoflora differed from the reference group in that significantly fewer anaerobic species were recovered from the patient's mouth and feces. It is suggested that the child's remaining disease free shows that the reported bacteria are noninvasive or that the unaffected components of the child's immune defense mechanisms are important. M.L.

A79-11947 * Comparison of circadian rhythms in male and female humans. C. M. Winget, C. W. DeRoshia, J. Vernikos-Danellis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.), W. S. Rosenblatt, and N. W. Hetherington (NASA, Ames Research Center, Biomedical Research Div., Moffett Field; Geneticon, Walnut Creek, Calif.). *Waking and Sleeping,* vol. 1, 1977, p. 359-363. 9 refs.

Heart rate (HR) and rectal temperature (RT) data were obtained from 12 female and 27 male subjects. The subjects were housed in a facility where the environment was controlled. Human male and female RT and HR exhibit a circadian rhythm with an excursion of about 1.2 C and 30 beats/min, respectively. The acrophases, amplitudes, and level crossings are only slightly different between the sexes. The male HR and RT circadian wave forms are more stable than those of the females. However, the actual RT and HR of males were always lower than that of females at all time points around the clock. The HR during sleep in females is 15 per cent below the daily mean heart rate and in males, 22 per cent. (Author)

A79-11948 * Comparison of hormone and electrolyte circadian rhythms in male and female humans. J. Vernikos-Danellis, C. M. Winget, A. E. Goodwin, and T. Reilly (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Waking and Sleeping,* vol. 1, 1977, p. 365-368. 16 refs.

Circadian rhythm characteristics in healthy male and female humans were studied at 4-hour intervals for urine volume, cortisol, 5-hydroxyindoleacetic acid (5-HIAA), Na, K, Na/K ratios in the urine, as well as plasma cortisol. While plasma and urinary cortisol rhythms were very similar in both sexes, the described rhythms in urine volume, electrolyte, and 5-HIAA excretion differ for the two sexes. The results suggest that sex differences exist in the circadian patterns of important hormone and metabolic functions and that the internal synchrony of circadian rhythms differs for the two sexes. The results seem to indicate that the rhythmical secretion of cortisol does not account for the pattern of Na and K excretion. M.L.

A79-11950 * Characterization of a novel extremely alkalophilic bacterium. K. A. Souza and P. H. Deal (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.). *Journal of General Microbiology,* vol. 101, 1977, p. 103-109. 20 refs.

A new alkalophilic bacterium, isolated from a natural spring of high pH is characterized. It is a Gram-positive, non-sporulating, motile rod requiring aerobic and alkaline conditions for growth. The characteristics of this organism resemble those of the coryneform group of bacteria; however, there are no accepted genera within this group with which this organism can be closely matched. Therefore, a new genus may be warranted. (Author)

A79-12006 * The robot's eyes - Stereo vision system for automated scene analysis. D. S. Williams (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Applications of digital image processing; Proceedings of the International Optical Computing Conference, San Diego, Calif., August 25, 26, 1977. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1977, p. 15-20. 20 refs. Contract No. NAS7-100.

Attention is given to the robot stereo vision system which maintains the image produced by solid-state detector television cameras in a dynamic random access memory called RAPID. The imaging hardware consists of sensors (two solid-state image arrays using a charge injection technique), a video-rate analog-to-digital converter, the RAPID memory, and various types of computer-controlled displays, and preprocessing equipment (for reflexive actions, processing aids, and object detection). The software is aimed at locating objects and transversibility. An object-tracking algorithm is discussed and it is noted that tracking speed is in the 50-75 pixels/s range. S.C.S.

A79-12030 * High-speed computerized tomography. E. E. Swartzlander, Jr. (TRW Defense and Space Systems Group, Redondo Beach, Calif.) and B. K. Gilbert (Mayo Foundation, Rochester, Minn.). In: Applications of digital image processing; Proceedings of

the International Optical Computing Conference, San Diego, Calif., August 25, 26, 1977. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1977, p. 299-306. 19 refs. Research supported by the Fannie E. Rippel Foundation and Control Data Corp.; Grants No. PHS-HL-14196; No. PHS-HL-04664; No. NIH-RR-00007; No. NGR-24-003-001; Contract No. F49620-76-C-0001.

The development of a high-speed reconstruction processor and a channelized architecture to use with a high-resolution tomographic unit is discussed with attention to the convolution reconstruction algorithm. By means of this algorithm, input data and intermediate result precision required throughout the algorithm execution have been studied with computer simulation using profile data derived from mathematically simulated test objects and experimental animal data. A prototype section for a highly parallel all-digital system executes 60 million arithmetic operations per second, and the full-scale version is expected to reconstruct 500 to 1000 cross sections per second. M.L.

A79-12122 * A model for sensorimotor control and learning. M. H. Raibert (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Biological Cybernetics,* vol. 29, 1978, p. 29-36. 28 refs.

A model for motor learning, generalization, and adaptation is presented. It is shown that the equations of motion of a limb can be expressed in a parametric form that facilitates transformation of desired trajectories into plans. These parametric equations are used in conjunction with a quantized multi-dimensional memory organized by state variables. The memory is supplied with data derived from the analysis of practice movements. A small computer and mechanical arm are used to implement the model and study its properties. Results verify the ability to acquire new movements, adapt to mechanical loads, and generalize between similar movements. (Author)

A79-12123 * A study of axonal degeneration in the optic nerves of aging mice. J. E. Johnson, Jr., D. E. Philpott, and J. Miquel (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Age,* vol. 1, Apr. 1978, p. 50-55. 38 refs.

The optic nerves of C57BL/6J mice ranging from 3 to 30 months were examined by electron microscopy. At all ages investigated, optic nerve axons contained enlarged mitochondria with abnormal cristae. With increasing age, a large number of necrotic axons were observed and were in the process of being phagocytized. The abnormal mitochondria may represent preliminary changes that eventually lead to necrosis of the axon. (Author)

A79-12400 * In vivo response of ornithine decarboxylase activity to growth hormone as demonstrated by oxidation of L-ornithine-1-/C-14/ in hypophysectomized rats. D. D. Feller, E. D. Neville, and S. Ellis (NASA, Ames Research Center, Moffett Field, Calif.). *Physiological Chemistry and Physics,* vol. 9, no. 1, 1977, p. 55-61. 6 refs.

A79-12407 # Various modeling approaches in biomechanics. A. I. King (Wayne State University, Detroit, Mich.). In: Symposium on Applications of Computer Methods in Engineering, Los Angeles, Calif., August 23-26, 1977, Proceedings. Volume 1.

Los Angeles, University of Southern California, 1978, p. 87-96. 28 refs.

Biomechanical models describing impact events are reviewed and classified. Regional models of the head, spine and thorax are discussed and contrasted with whole-body gross motion simulators. Some new models of the spine are presented along with a recent validation study of a gross motion simulator. Model validation criteria and ground rules are needed for the establishment of quantitative norms and for the objective evaluation of the large number of models presently available. (Author)

A79-12474 * Effects of fenfluramine administration on activity of the pituitary-adrenal system in the rat. J. P. Heybach and J. Vernikos-Danellis (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Western Pharmacology Society, Proceedings,* vol. 21, 1978, p. 19-25. 6 refs.

A79-12475 * Temperature-dependent morphological changes in membranes of Bacillus stearothermophilus. C. A. Halverson, A. F. Esser (California State University, Fullerton, Calif.), and K. A. Souza (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Supramolecular Structure,* vol. 8, 1978, p. 129-138. 27 refs. Research supported by the Research Corp.; Grant No. NA2-OR253-601.

A79-12508 Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Meetings sponsored by COSPAR. Edited by R. Holmquist and A. C. Stickland. Oxford, Pergamon Press, Ltd., 1978. 164 p. In English and French. $25.

A collection of papers is presented regarding the Viking Lander biology experiments, gravitational biology of animals and plants, biology in combined magnetic and gravitational fields, radiation biology and space physiology, and allied subjects. Particular attention is given to planetary quarantine and spacecraft bioburden control. Radiation biology and space physiology are discussed relative to mammals, amphibians, plants, and bacteria. A valuable contribution is the elucidation of the biochemical mechanism of the visual light-flash phenomenon reported by astronauts during space flight. S.D.

A79-12510 Public health considerations associated with a Mars surface sample return mission. M. S. Favero (U.S. Public Health Service, Hepatitis Laboratories Div., Phoenix, Ariz.). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 33-37.

The paper discusses the potential public health hazards of bringing a Mars sample to the earth in the context of the sample being contained according to current technology. In addition, brief comments are made on some of the arguments for and against embargoing Martian samples. It is shown that the view that all risks, all failures, and all worst case conditions are possible is not rational. In particular, Martian organisms, if they exist, are not detrimental to any of the earth's life forms, and they probably are so sensitive and so adversely affected by the earth's environment that the scientific community has to exert tremendous efforts simply to keep them alive. Also, the U.S. has the technology to safely bring microorganisms in Martian samples to the earth and to contain them for sufficiently long periods to keep them from escaping into the earth's environment. S.D.

A79-12511 * Planetary protection guidelines for Outer Planet missions. P. Stabekis (Exotech Research and Analysis, Inc., Gaithersburg, Md.) and D. L. DeVincenzi (NASA, Ames Research Center, Moffett Field, Calif.). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 39-44. 8 refs.

Facilities, techniques, and operational procedures used to implement Planetary Protection (PP) requirements for the Viking Project are reviewed in order to better define the COSPAR resolution which proposes that Outer Planet spacecraft be assembled using Viking-like clean room technology. It is concluded that, for such missions, PP requirements can be met by adopting Viking clean room standards, personnel and operation procedures, and by establishing PP as an official entity in project management. (Author)

A79-12512 * The effects of temperature, salinity, and other factors on the growth and formation of UV-absorbing substances by the fungus Aspergillus. B. Z. Siegel, S. M. Siegel, and J. M. Phelan (Hawaii, University, Honolulu, Hawaii). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 49-54. 12 refs. Grant No. NGL-12-001-042.

A79-12513 The responses of frogs to vestibular and visual stimulation in weightlessness. M. Burgeat, D. Loth, Y. Grall, C. Menguy, M. Toupet, and A. Gribenski (Paris VII, Université, Paris; Rouen, Université, Rouen, France). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 89-92. 7 refs.

The authors, using rotatory visual and vestibular stimulators, propose to perform an experiment to study the effect of long periods of weightlessness on vestibular and visual interactions in frogs. The results will be analyzed within the framework of sensory conflict theory. Preliminary experiments are in progress in order to determine the best method for containments of long duration. (Author)

A79-12514 Geotropism of hornet comb construction under persistent acceleration. J. Ishay and D. Sadeh (Tel Aviv University, Tel Aviv, Israel). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977.
Oxford, Pergamon Press, Ltd., 1978, p. 93-98. 14 refs.

A79-12515 Convective control of long-range coherence in plant growth regulation. J. O. Kessler (Arizona, University, Tucson, Ariz.). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 99-104. 9 refs.

It is hypothesized that morphogenetic control in plants depends on convective transport of biochemically important substances, where streaming velocity and cell shapes jointly determine spatial and temporal coherence, and where the streaming velocity in turn is affected by the gravitational field. The relative magnitudes of diffusive and convective effects are considered, and it is shown that in some plant cells for which cell sizes and streaming velocities have been measured convection could be the dominant transport mode. The consequences of this hypothesis in the presence and absence of a gravitational field are considered and permit its experimental verification or rejection. (Author)

A79-12516 Mechanism of the formation of phosphenes by X-rays (Mécanisme de formation des phosphénes par action des rayons-X). M. Doly, D. B. Isabelle, A. Tetefort, G. Gaillard, and G. Meyniel (Institut National de la Santé et de la Recherche Médicale; Clermont-Ferrand I, Université, Clermont-Ferrand, France). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 113-118. 7 refs. In French.

The effect of X-ray irradiation on living retina from albino rats and on rhodopsin is studied in order to understand the mechanism of phosphene formation in astronauts during space flights. Analysis of electroretinograms and absorbtion spectra reveals that the luminous sensations induced by the X-rays are due to the direct action of retinal photoreceptors. Furthermore, the structural changes observed on the irradiated rhodopsin are clearly responsible for the variations of ionic permeability for the membrane of the external segments of rods, thereby producing the observed excitation. S.D.

A79-12517 An apparatus for studying electroretinographic responses under conditions of space flight. Y. Grall, C. Menguy, and F. Rigaudière (Paris VII, Université, Paris, France). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 131-135. 12 refs.

The paper describes the design and potential of a prototype apparatus devised to study electroretinographic responses under space-flight conditions. The required specifications are presented, including immobilization of two frogs in the frog container in such a manner so as to prevent their eventual death, and improved contact electrodes surrounded by a plastic jacket to strengthen both the electrode and the optical fiber assembly while requiring a less rigid hold on the animal's head. The design involves a system of visual stimulation by a miniaturized flash apparatus that concentrates the light beam on the optical fiber, and a fully automatic low-mass signal amplification and recording system. Characteristics of electroretinographic responses are briefly discussed. S.D.

A79-12518 Radiobiological investigations in Cosmos 782 space flight /Biobloc SF1 experiment/. Iu. G. Grigor'ev, L. V. Nevzgodina, V. I. Popov, A. M. Marennyi, Iu. A. Vinogradov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), H. Planel, M. Delpoux, Y. Gaubin-Blanquet, B. Pianezzi (Toulouse III, Université, Toulouse, France), and R. Pfhol (CNRS, Centre de Recherches Nucléaires de Strasbourg, Strasbourg, France). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977.
Oxford, Pergamon Press, Ltd., 1978, p. 137-142.

Several biological objects were flown in Cosmos 782 in order to investigate the effects of HZE cosmic particles and other environmental factors of space. Space flight results in chromosomic aberrations in lettuce seeds, decreased germination rate and increased frequency of abnormalities in tobacco seeds and decreased developmental capacity in Artemia eggs. In lettuce and tobacco seedlings, changes were observed not only in seeds hit by heavy ions but also in nonhit seeds. The results indicate that exposure to the space environment can induce important changes in biological objects and emphasize the usefulness of investigations carried out on organisms less complex than mammals. (Author)

A79-12519 Biological study of tobacco seeds flown in the joint Apollo-Soyuz test-project. M. Barbier and H. L. Dulieu (Institut National de la Recherche Agronomique, Dijon, France). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 143-146.

A preliminary experiment was carried out in order to detect eventual effects attributable to primary and background cosmic radiations received by tobacco seeds during the joint Apollo-Soyuz space flight. No genetic effect was observed but several developmental and physiological alterations took place. (Author)

A79-12520 Genetic effects of balloon flight in Drosophila melanogaster. M. C. Giess, H. Planel, J. P. Soleilhavoup (Toulouse III, Université, Toulouse, France), C. Prudhommeau, and J. Proust (Paris XI, Université, Orsay, Essonne, France). In: Life sciences and space research XVI; Proceedings of the Open Meetings of the Working Group on Space Biology, Tel Aviv, Israel, June 7-18, 1977. Oxford, Pergamon Press, Ltd., 1978, p. 147-150. 7 refs.

A79-12554 * # The dependence of the CO2 removal efficiency of LiOH on humidity and mesh size. S. H. Davis (Rice University, Houston, Tex.) and L. D. Kissinger (NASA, Johnson Space Center, Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-5.* 7 p. Members, $1.50; nonmembers, $3.00.

The effect of humidity on the CO2 removal efficiency of small beds of anhydrous LiOH has been studied. Experimental data taken in this small bed system clearly show that there is an optimum humidity for beds loaded with LiOH from a single lot. The CO2 efficiency falls rapidly under dry conditions, but this behavior is approximately the same in all samples. The behavior of the bed under wet conditions is quite dependent on material size distribution. The presence of large particles in a sample can lead to rapid fall off in the CO2 efficiency as the humidity increases. (Author)

A79-12559 * # Animal life support transporters for Shuttle/Spacelab. W. E. Berry (NASA, Ames Research Center, Moffett Field, Calif.) and S. R. Hunt (General Electric Co., Philadelphia, Pa.).

American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-10. 8 p. Members, $1.50; nonmembers, $3.00.

Two transporter devices have been developed by the NASA Ames Research Center, primarily for the purpose of stowing small vertebrates and primates in the mid-deck avionics bay of the Shuttle during launch and re-entry. These animals will be used in Life Science Spacelab experiments. Stowage in the mid-deck area will reduce animal exposure to the high noise levels existing in Spacelab during launch; further, the possible exposure of the animals to high temperatures in Spacelab during re-entry and post-landing will be eliminated. The transporters will provide experimenters more timely access to their animals during experiment-critical, pre-launch, and post-landing periods. Rechargeable batteries in the transporters will provide life support system functions for the animals during periods of transfer and during mission phases in which power is temporarily unavailable. The transporters have been successfully designed, fabricated, and tested. Integrated testing of the transporters was performed in the Space Mission Development III (SMD III) Simulation at the NASA Johnson Space Center. (Author)

A79-12562 * # Food packages for Space Shuttle. M. F. Fohey (Technology, Inc., Houston, Tex.), R. L. Sauer, J. B. Westover (NASA, Johnson Space Center, Houston, Tex.), and E. F. Rockafeller (General Electric Co., Philadelphia, Pa.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-13.* 9 p. 5 refs. Members, $1.50; nonmembers, $3.00.

The paper reviews food packaging techniques used in space flight missions and describes the system developed for the Space Shuttle. Attention is directed to bite-size food cubes used in Gemini, Gemini rehydratable food packages, Apollo spoon-bowl rehydratable packages, thermostabilized flex pouch for Apollo, tear-top commercial food cans used in Skylab, polyethylene beverage containers, Skylab rehydratable food package, Space Shuttle food package configuration, duck-bill septum rehydration device, and a drinking/dispensing nozzle for Space Shuttle liquids. Constraints and testing of packaging is considered, a comparison of food package materials is presented, and typical Shuttle foods and beverages are listed. M.L.

A79-12563 # The Spacelab flight unit environmental control/life support system. G. Kring and J. Spintig (Dornier System GmbH, Friedrichshafen, West Germany). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-14.* 12 p. Members, $1.50; nonmembers, $3.00.

Critical design review testing of the Spacelab flight unit environmental control/life support subsystems indicated its flight-adequate design and is discussed with attention to modifications developed as a result of testing. The atmospheric storage and control section as well as the atmosphere revitalization section are described, and several test procedures - cabin loop testing, avionics loop testing, fire suppression testing, and noise control testing - are surveyed. M.L.

A79-12564 # ECLSS definition for a low cost space construction base. W. G. Nelson (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-15.* 13 p. Members, $1.50; nonmembers, $3.00.

Key trade studies (tradeoff studies) performed to select Environmental Control/Life Support System (ECLSS) concepts for the low-cost space construction base (SCB) are described. Key trades include (1) airlock pumpdown versus expendable atmosphere (i.e., overboard dump), (2) open oxygen loop CO2 control concept (LiOH *versus solid amine*), (3) oxygen recovery tradeoff, and (4) water recovery tradeoff. Since cost was the major criterion, major consequences of concept implementation were reduced to cost value. The relation between ECLSS design and various candidate SCB options is considered. M.L.

A79-12568 # A thermoelectric integrated membrane evaporation system. R. B. Trusch and G. J. Roebelen, Jr. (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-19.* 9 p. Members, $1.50; nonmembers, $3.00.

A new urine water recovery subsystem is being designed to provide efficient potable-water recovery from waste liquids on extended-duration space flights. Low power, compactness, and gravity-insensitive operation are featured in this vacuum distillation system which combines a hollow-fiber polysulfone membrane evaporator and a thermoelectric (TE) heat pump. The hollow fiber elements provide positive liquid/gas phase control with no moving parts other than a waste liquid recirculating pump and a condensate pump. Optimum matching of the membrane evaporator area and the number of TE devices resulted in a low power requirement of less than 220 w-hr/kg (100 w-hr/lb) for the TE elements. System operation was verified in separate membrane endurance tests and in a scaled-down integrated system test. A full-scale prototype system will be constructed which will produce water purified from urine at 0.68 kg/hr at a total system energy of less than 363 w-hr/kg (165 w-hr/lb). (Author)

A79-12571 # Physiological requirements for design of environmental control systems - Control of heat stress in high-performance aircraft. R. F. Stribley and S. A. Nunneley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-22.* 9 p. 29 refs. Members, $1.50; nonmembers, $3.00.

Cooling of the cockpit in high-performance aircraft is usually based upon avionics requirements, with only secondary regard for the effect on aircrew. A shift in priority may now be needed because the new fighter aircraft demand maximal human performance which may be impaired by heat stress. This paper reviews current USAF specifications for the cockpit environmental control system (ECS) together with evidence that hot-weather flight operations involve significant aircrew heat exposure. A brief analysis is made of heat exchange between man and environment. Physiological and performance effects of heat stress are discussed. A new approach is suggested for writing ECS specifications in order to ensure adequate aircrew protection and optimal man-machine system performance. (Author)

A79-12573 # The European life sciences experiments onboard the first Spacelab mission. H. Oser (ESA, Paris, France). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-24.* 12 p. Members, $1.50; nonmembers, $3.00.

The nine life science experiments selected by ESA for the Spacelab 1 mission are described. The experiments, most of which study the effects of zero gravity or of radiation, involve three-dimensional ballistocardiography, measurement of central venous pressure, serum hormone level determination, electrophysiological tape recorder, vestibular experiments, mass discrimination, lymphocyte proliferation, advanced biostack, and the effects of radiation on biological systems. Experimental purposes, procedures, and data collection are discussed, the special Sled required for vestibular research is described, and the integration of the life science experiments with other mission tasks is considered. M.L.

A79-12574 * # Vestibular Function Research aboard Spacelab. R. W. Mah and N. G. Daunton (NASA, Ames Research Center, Life Sciences Directorate, Moffett Field, Calif.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-25.* 8 p. Members, $1.50; nonmembers, $3.00.

NASA is planning to perform a series of Vestibular Function Research (VFR) investigations on the early STS missions to investigate those neurosensory and related physiological processes believed to be associated with the space flight nausea syndrome. The

first flight is scheduled for the 1981 Spacelab III Mission in which four frog specimens, mounted on a frog tilting/centrifuge device, will be subjected to periodic acceleration stimuli and periods of artificial gravity. The vestibular nerve firing responses of each frog specimen will be monitored through implanted neutral bouyancy microelectrodes and transmitted to the ground for quick analysis during the flight. The experimentation will be directed at investigating: (1) adaptation to weightlessness; (2) response to acceleration stimuli; (3) response to artificial gravity (in a weightlessness environment) and (4) readaptation to earth's gravity upon return. (Author)

A79-12575 * # **Life sciences experiments in the first Spacelab mission.** W. J. Huffstetler and J. A. Rummel (NASA, Johnson Space Center, Science Support Branch, Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-26.* 6 p. Members, $1.50; nonmembers, $3.00.

The development of the Shuttle Transportation System (STS) by the United States and the Spacelab pressurized modules and pallets by the European Space Agency (ESA) presents a unique multi-mission space experimentation capability to scientists and researchers of all disciplines. This capability is especially pertinent to life scientists involved in all areas of biological and behavioral research. This paper explains the solicitation, evaluation, and selection process involved in establishing life sciences experiment payloads. Explanations relative to experiment hardware development, experiment support hardware (CORE) concepts, hardware integration and test, and concepts of direct Principal Investigator involvement in the missions are presented as they are being accomplished for the first Spacelab mission. Additionally, discussions of future plans for life sciences dedicated Spacelab missions are included in an attempt to define projected capabilities for space research in the 1980s utilizing the STS. (Author)

A79-12576 * # **Microbial Check Valve for Shuttle.** G. V. Colombo, D. F. Putnam (Umpqua Research Co., Myrtle Creek, Ore.), and R. L. Sauer (NASA, Johnson Space Center, Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-27.* 7 p. Members, $1.50; nonmembers, $3.00.

The Microbial Check Valve (MCV) is a device developed for the Space Shuttle that prevents the transfer of viable microorganisms within water systems. The device is essentially a bed of resin material, impregnated with iodine, that kills microorganisms on contact. It prevents the cross-contamination of microorganisms from a nonpotable system into the potable water system when these systems are interconnected. In this regard, the function of the device is similar to that of the 'air gap' found in conventional one-gravity systems. Basic design data are presented including pressure drop, scaling factors, sizing criteria, and the results of challenging the device with suspensions of seven microorganisms including aerobes, anaerobes and spore formers. (Author)

A79-12577 * # **Challenges to life support system's future.** W. L. Smith (NASA, Washington, D.C.) and A. O. Brouollet (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-28.* 9 p. 5 refs. Members, $1.50; nonmembers, $3.00.

The development and future requirements of life support systems are considered, and the choice of equipment for long-duration missions is examined. The need for programmatic flexibility, capability growth, and integration of life support systems is discussed. Water supply, CO2 control, oxygen supply, trace contaminant control, and waste management are surveyed, and evolution forecast is presented. M.L.

A79-12580 # **Extended duration orbiter life support system options.** F. G. Chapel, D. A. Martin, and D. C. Gore (Rockwell International Corp., Space Div., Downey, Calif.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-31.* 20 p. Members, $1.50; nonmembers, $3.00.

Approaches to extending orbiter mission duration are examined. Factors considered include the use of consumables, choice of power source, and functions performed by the environmental control life support system (ECLS). ECLS subsystem options in conjunction with an electrical power system were evaluated in terms of ascent and descent weight, stowage requirements, and costs. Application of parametric design data can facilitate choice of ECLS subsystems once characteristics of the mission and its duration are decided. M.L.

A79-12581 # **A biophysical model for evaluating auxiliary heating and cooling systems.** G. F. Fonseca (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-33.* 5 p. Members, $1.50; nonmembers, $3.00.

The described biophysical model system uses data obtained from an electrically heated sectional manikin. Experimental values for insulation and evaporative heat transfer of clothing systems are inserted in empirical equations based on wet bulb psychrometric theory, and analysis of the data indicates the choice of climatic chamber environments to show where differences, if any, among protective clothing systems worn by a group of human subjects can best be detected. A hot environment study to determine the environmental conditions for the physiological evaluation of ventilating air distribution undergarments is considered. (Author)

A79-12582 * # **Life sciences in the Shuttle era.** S. Deutsch (NASA, Office of Space Science, Washington, D.C.) and K. M. Mallory, Jr. (Kenneth Mallory and Associates, Inc., Vienna, Va.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-34.* 12 p. 5 refs. Members, $1.50; nonmembers, $3.00.

The effect of the Shuttle program on life science research and the life science research community is examined. Responses to a NASA invitation to participate in planning the life sciences program in space are considered. The development of life science space equipment is surveyed. M.L.

A79-12583 * # **Life sciences experiments mission development test program.** W. H. Bush, Jr. and R. C. White (NASA, Johnson Space Center, Systems Integration and Test Branch, Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-36.* 13 p. Members, $1.50; nonmembers, $3.00.

The development, goals, and experimental programs of the three Spacelab Mission Developmental tests are described. The tests were structured as a total simulation of a dedicated mission commencing with experiment solicitation; continuing with experiment development, integration, and mission planning; and ending with the actual conduct of a seven-day 24-hour per day mission in mockup facilities. Topics such as test payload management; payload integration, training, and testing; test operations and program facilities are discussed. M.L.

A79-12584 * # **Support system considerations for STS biological investigations.** G. H. Bowman (Technology, Inc., Mountain View, Calif.) and P. D. Sebesta (NASA, Ames Research Center, Biosystems Div., Moffett Field, Calif.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-37.* 6 p. 11 refs. Members, $1.50; nonmembers, $3.00.

Equipment required for Space Transportation System biological experiments is considered, and environmental factors and operational constraints affecting the performance of experiments are examined. Specimen housing is discussed, problems associated with telemetry procedures are characterized, and attention is directed to the problems of handling hazardous fixatives, radioisotopes, and chemicals. M.L.

A79-12585 # **Life support systems for biological specimens in the Shuttle/Spacelab.** M. M. Yakut, D. L. Magargee, and E. N. Tell (McDonnell Douglas Astronautics Co., Biotechnology Dept., Huntington Beach, Calif.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-38.* 9 p. Members, $1.50; nonmembers, $3.00.

Life support systems were developed for the maintenance of various biological specimens in space in support of the Spacelab life sciences research program. Housing facilities were designed for small primates, rodents, plants, aquatic vertebrates, and insects. The purpose was to maintain the specimens in a relatively normal environment for flights of up to 30 days aboard the Shuttle/Spacelab. These biological specimens holding facilities were provided with environmental control systems designed to interface with the spacecraft environment and maintain conditions suitable to the well being of the experimental specimens. The holding facilities and associated systems are described in detail. (Author)

A79-12586 * # **Firefighters Integrated Response Equipment System.** H. Kaplan and F. Abeles (Grumman Aerospace Corp., Bethpage, N.Y.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-39.* 11 p. Members, $1.50; nonmembers, $3.00. Contract No. NAS8-32339.

The Firefighters Integrated Response Equipment System (Project FIRES) is a joint National Fire Prevention and Control Administration (NFPCA)/National Aeronautics and Space Administration (NASA) program for the development of an 'ultimate' firefighter's protective ensemble. The overall aim of Project FIRES is to improve firefighter protection against hazards, such as heat, flame, smoke, toxic fumes, moisture, impact penetration, and electricity and, at the same time, improve firefighter performance by increasing maneuverability, lowering weight, and improving human engineering design of his protective ensemble. (Author)

A79-12587 * # **Instrumentation for controlling and monitoring environmental control and life support systems.** P. Y. Yang, J. R. Gyorki, and R. A. Wynveen (Life Systems, Inc., Cleveland, Ohio). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-40.* 14 p. 14 refs. Members, $1.50; nonmembers, $3.00. Contracts No. NAS2-9251; No. NAS2-8666; No. NAS9-15218; No. NAS9-15267; Grant No. DAMD17-76-C-6063.

Advanced Instrumentation concepts for improving performance of manned spacecraft Environmental Control and Life Support Systems (EC/LSS) have been developed at Life Systems, Inc. The difference in specific EC/LSS instrumentation requirements and hardware during the transition from exploratory development to flight production stages are discussed. Details of prior control and monitor instrumentation designs are reviewed and an advanced design presented. The latter features a minicomputer-based approach having the flexibility to meet process hardware test programs and the capability to be refined to include the control dynamics and fault diagnostics needed in future flight systems where long duration, reliable operation requires in-flight hardware maintenance. The emphasis is on lower EC/LSS hardware life cycle costs by simplicity in instrumentation and using it to save crew time during flight operation. (Author)

A79-12588 * # **Extended duration Orbiter life support definition.** G. N. Kleiner (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.) and C. D. Thompson (NASA, Johnson Space Center, Crew Systems Div., Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-42.* 9 p. Members, $1.50; nonmembers, $3.00.

Extending the baseline seven-day Orbiter mission to 30 days or longer and operating with a solar power module as the primary source for electrical power requires changes to the existing environmental control and life support (ECLS) system. The existing ECLS system imposes penalties on longer missions which limit the Orbiter capabilities and changes are required to enhance overall mission objectives. Some of these penalties are: large quantities of expendables, the need to dump or store large quantities of waste material, the need to schedule fuel cell operation, and a high landing weight penalty. This paper presents the study ground rules and examines the limitations of the present ECLS system against Extended Duration Orbiter mission requirements. Alternate methods of accomplishing ECLS functions for the Extended Duration Orbiter are discussed. The overall impact of integrating these options into the Orbiter are evaluated and significant Orbiter weight and volume savings with the recommended approaches are described. (Author)

A79-12589 * # **Test evaluation of space station ECLSS maintenance concepts.** R. P. Reysa (Boeing Co., Houston, Tex.), C. W. Flugel (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.), and C. D. Thompson (NASA, Johnson Space Center, Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Conference on Environmental Systems, San Diego, Calif., July 10-13, 1978, Paper 78-ENAs-43.* 15 p. 13 refs. Members, $1.50; nonmembers, $3.00.

The Space Station Prototype (SSP) Environmental Control and Life Support System (ECLSS) hardware was designed and built to be maintainable by the flight crew. To achieve this goal, subsystems were designed for ease of component removal and installation, which included accessibility to component fasteners and connectors, adequate tool clearance, minimum fluid loss during changeout, positive capture of loose parts during changeout, replacement by one crewman, and protection of adjacent parts during maintenance. During testing of this hardware, many day-to-day problems arose which allowed the evaluation of the maintenance concepts under actual maintenance conditions. This paper briefly discusses the maintenance objectives of the hardware design. Specific maintenance designs and their test evaluations are discussed. A removable cartridge valve concept for liquid line components and threaded mechanical fittings and V-band couplings for gaseous line components are critiqued. Other maintenance devices are also evaluated. (Author)

A79-12859 **Sustained operations and sleep deprivation - Effects on indices of stress.** R. P. Francesconi, J. W. Stokes, L. E. Banderet, and D. M. Kowal (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1271-1274. 19 refs.

Urine samples were analyzed to evaluate the effects of sleep deprivation and additional stress imposed on two groups of highly trained and motivated military personnel deprived of sleep while sustaining performance of their assigned military tasks under simulated conditions. One group is informed that the sustained operations challenge can persist to 86 hr, while the other is told that the sustained operations scenario will not exceed 42 hr. The results suggest that anticipation and perception of the experimental situation affects the common urinary indices of stress (17-hydroxycorticosteroids, catecholamines). More importantly, similar effects are noted for sympathicoadrenomedullary and adrenocortical activity. Moreover, the responses are affected by situational uncertainty and apparent cumulative fatigue. S.D.

A79-12860 **Voluntary movement control and adaptation to cross-coupled stimulation.** J. T. Reason (Manchester, Victoria University, Manchester, England) and A. J. Benson (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1275-1280. 17 refs.

A comparative study is made of the rates of adaptation to the same graded levels of cross-coupled (Coriolis) stimulation under three conditions of movement control: (1) a passive condition where the 45-deg lateral tilts of the subject's chair on a rotating platform are initiated and controlled entirely by the experimenter, (2) an active condition where the subjects execute the same tilting motions of the chair directly through their own effector activity, and (3) an active-passive condition where the subjects control the chair motion

indirectly through microswitches mounted on the chair arms. It is shown that the passive condition is the least effective mode for adaptation, whereas the active-passive condition is the most effective mode for adaptation. S.D.

A79-12861 Motion sickness susceptibility - A retrospective comparison of laboratory tests. J. M. Lentz and F. E. Guedry, Jr. (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1281-1288. 14 refs.

Three laboratory tests for motion sickness susceptibility are compared: the brief vestibular disorientation test, the tilted-axis rotation test, and the visual-vestibular interaction test. The tests are applied to two groups of male subjects, one of which is a group of Navy and Marine aviation personnel who have suffered multiple attacks of airsickness. The results reveal substantial differences between the two groups with respect to observer ratings and individual self-ratings of motion sickness symptoms. The motion sickness-inducing stimuli in each laboratory test are discussed along with suggestions on how multiple tests may be used to predict motion sickness. S.D.

A79-12862 Core temperature measurement in man. R. J. Edwards, A. J. Belyavin, and M. H. Harrison (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1289-1294. 22 refs.

Transient changes in body temperature are induced in six male and six female volunteer subjects (20-35 yr) by immersion in a hot bath and by light exercise. Four body sites are selected for measurement of core temperature: the auditory canal, the mouth, the esophagus, and the rectum. Based on the analysis of measurements made at all four sites, a model is proposed which enables the relationship between Tc values given by the ear, mouth, esophagus, and rectum sites to be described mathematically, and the esophagus temperature to be computed from measurements made at any of the other three sites. S.D.

A79-12863 Capillary fragility during air exposure of man to 1-5 ATA and after decompression. U. Halbreich (Hadassah University Hospital, Jerusalem, Israel) and D. Torbati (Ministry of Defence, Medical Corps, Israel). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1295, 1296. 12 refs.

A79-12864 Blood volume and cardiorespiratory responses to lower body negative pressure. J. A. Loeppky, M. D. Venters, and U. C. Luft (Lovelace Medical Foundation, Albuquerque, N. Mex.). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1297-1307. 33 refs.

Breath-by-breath measurements of pulmonary capillary O2 transfer and ventilation were made on three subjects during and after 10 min of lower body negative pressure (LBNP) at -20, -40, and -60 torr. Loss in blood O2 stores (O2B) during and replenishment after LBNP were directly related to the intensity of LBNP. The peak rise in pulmonary capillary O2 transfer after release of LBNP was always preceded by a decrease in leg volume, indicating that O2B changes were related to blood volume shifts. The return of O2-depleted, pooled blood to the central circulation during the first minute of recovery caused significant hyperpnea. Three compartment lung model analyses from alveolar and arterial blood samples at -60 torr showed an increase in the alveolar deadspace fraction from 0.09 to 0.17, and a decline in the effective compartment from 0.83 to 0.77. The less effective lung perfusion during LBNP may explain a 30% increase in ventilation equivalent for O2. (Author)

A79-12865 Regional coronary blood flow at rest and during high sustained +Gz in a miniature swine with subclinical, ischemic, coronary heart disease due to coronary stenosis. M. H. Laughlin, W. M. Witt, J. W. Burns, and J. T. Young (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1308-1313. 21 refs.

New-generation high-performance aircraft can produce levels of high sustained +Gz which may exceed man's physiological capacity to withstand such stress. The severity of this stress has led to concern that sudden incapacitation due to coronary heart disease could occur during high sustained +Gz. This report presents results obtained from an apparently asymptomatic miniature swine with a severe stenosis of the left anterior descending branch of the left coronary artery. Regional coronary blood flow was measured with the radiolabeled microsphere technique using 9 + or - 0.8 micron diameter microspheres. Under resting conditions, myocardial blood flow was marginally depressed in the areas distal to the coronary stenosis. When the animal was exposed to +7 Gz, a large portion of the heart became acutely ischemic due to a redistribution of coronary blood flow. After 49 sec of exposure to +7 Gz, the animal developed fatal ventricular fibrillation. Histologically, the areas of myocardium supplied by the stenosed vessel showed a variety of ischemia-induced lesions, including infarction and patchy myocardial fibrosis. (Author)

A79-12866 Intracardial gas bubbles and decompression sickness while flying at 9,000 m within 12-24 h of diving. U. I. Balldin (Forsvarets Forskningsanstalt, Linkoping, Sweden). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1314-1318. 17 refs.

A79-12867 Psychophysiological forecasting of efficiency. P. V. Simonov, M. V. Frolov, and N. A. Luzhbin (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1319-1321. 5 refs.

The method of mathematical forecasting of the changes in efficiency throughout an increase in emotional stress is suggested on the basis of experimental data from experiments in which paratroopers discerned visual patterns. The comparison of human errors with the experimental results obtained in animals permitted formulation of several suppositions on the role of different cerebral structures in the genesis of emotional stress and the mechanisms of its effect on perceptive activity. (Author)

A79-12868 Intensity judgements of non-sinusoidal vibrations - Support for the ISO weighting method. R. W. Shoenberger (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1327-1330. Contract No. F33615-76-C-0401.

Three experiments were conducted on male Air Force military personnel subjects in order to compare the independent component method and the weighting method used for evaluating complex vibrations. A psychophysical matching technique is adopted in which the subjects matched their perception of the intensity of various sinusoidal and complex vibrations by adjusting the intensity of a sinusoidal matching frequency. The experimental procedure is essentially the same in each experiment, but the composition of the vibration stimuli are varied between experiments. In experiment I, the stimuli are composed of sinusoids with frequencies from 11 to 63 Hz; in experiment II, they are made up of third-octave bands of random vibration with center frequencies from 16 to 40 Hz; and in experiment III, they are synthesized from sinusoids from 2.6 to 16 Hz. It is shown that the weighting method is the preferred procedure for evaluating complex vibration environments. S.D.

A79-12869 * Studies on the erythron and the ferrokinetic responses in beagles adapted to hypergravity. D. A. Beckman, J. W. Evans (California, University, Davis, Calif.), and J. Oyama (NASA, Ames Research Center, Biomedical Research Div., Moffett Field; California, University, Davis, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1331-1336. 23 refs. Grant No. NCA2-OR180-505.

Red cell survival, ferrokinetics, and hematologic parameters were investigated in beagle dogs exposed to chronic hypergravity (2.6 Gx). Ineffective erythropoiesis, red cell mass, plasma volume, and Cr-51-elution were significantly increased; maximum Fe-59 incorpo-

ration was decreased; and there was no change in the mean erythrocyte life span following autologous injection of Cr-51-labeled red cells and Fe-59-labeled transferrin. Red cell count, F(cells), total body hemoglobin (Hb), susceptability to osmotic lysis, and differential reticulocyte count were increased. White blood cell count, venous blood %Hb, mean cell volume, mean cell Hb, mean cell Hb concentration, and serum iron were decreased. No changes were observed for body mass, mg Fe per g Hb, iron binding capacity, percent saturation of iron carrying capacity, or the electrophoretic mobility of purified Hb. This study indicated that chronic exposure to hypergravity induced changes in red cell size, volume, total mass, and membrane permeability. (Author)

A79-12870 **Laryngeal problems in space travel.** F. E. LeJeune, Jr. (Ochsner Medical Institutions, New Orleans, La.). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1347-1349. 5 refs.

A start has been made in enumerating possible problems of the larynx, in short or moderately long space voyages, based on our current knowledge of laryngeal diseases. The gravity-free state does not seem to be a threat to the physiology of the larynx. A relatively nonspecialized medical team must be able to recognize and manage earth-type diseases. They must also be capable of managing both the special problems associated with various degrees of decompression sickness and the increased possibility of inhaling a foreign body, which are inherent in the gravity-free state. In crew selection, a special attempt should be made to eliminate those members with an increased risk of laryngeal disease development. Simplified methods of examining the larynx, including flexible fiberoptic laryngoscopy, should be available. Airway management, including coaxial endotracheal intubation with a bivalved laryngoscope, would be possible. An audiovisual tape library of simple and moderately complex procedures would be highly valuable. (Author)

A79-12871 **Case report - Intracardial gas bubbles in relation to altitude decompression chokes.** U. I. Balldin (Forvarets Forskningsanstalt, Linkoping, Sweden). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1350, 1351. 12 refs.

A79-12872 **Measurement of skin temperatures of active subjects by wireless telemetry.** R. Higgins, A. Buguet, and L. Kuehn (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aviation, Space, and Environmental Medicine,* vol. 49, Nov. 1978, p. 1352-1354. 7 refs.

A new sensor has been developed for measurement of skin temperatures of active human subjects. It consists of a radio transmitter circuit incorporating a skin thermistor in a small epoxy slab or 'tab'. These tabs are reuseable, being large enough to permit battery replacement if required. They are glued to a subject's skin (thermistor side facing the skin) with a quick-setting adhesive and are easily removed after a 10-hr period with an appropriate solvent. Thermal information is easily obtained from the sensor by a hand-held calibrated radio receiver accurate to + or - 0.1 C. This technique permits easy and rapid documentation of the thermal stress of active human subjects without interfering with their activity or clothing. (Author)

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STAR ENTRIES

N79-10692 California Univ., Irvine.
ALGAL GROWTH UNDER MULTIPLE NUTRIENT LIMITING CONDITIONS Ph.D. Thesis
Richard A. Appleman 1978 150 p
Avail: Univ. Microfilms Order No. 7815833

Batch and continuous culture algal bioassays were used to: determine if multiple nutrient-limited growth occurs for the green alga Selenasturm capricornutum, define and characterize the growth conditions for which this phenomenon occurs, and test the validity of the previously proposed models under these conditions. Test conditions and growth medium were similar to those specified in the Environmental Protection Agency's Algal Assay Procedure-Bottle Test. Nitrogen and phosphorus were used as the test nutrients with algal growth monitored using an electronic particle counter. Dissert. Abstr.

N79-10693* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WATER SYSTEM VIRUS DETECTION Patent
Alan S. Fraser (Organon Diagnostics, El Monte, Calif.), Arthur F. Wells (Organon Diagnostics, El Monte, Calif.), and Harold J. Tenoso, inventors (to NASA) (Organon Diagnostics, El Monte, Calif.) Issued 3 Oct. 1978 7 p Filed 28 Apr. 1977 Sponsored by NASA
(NASA-Case-MSC-16098-1; US-Patent-4,118,315; US-Patent-Class-210-96M; US-Patent-Class-210-433M) Avail: US Patent Office CSCL 06M

The performance of a waste water reclamation system is monitored by introducing a non-pathogenic marker virus, bacteriophage F2, into the waste-water prior to treatment and, thereafter, testing the reclaimed water for the presence of the marker virus. A test sample is first concentrated by absorbing any marker virus onto a cellulose acetate filter in the presence of a trivalent cation at low pH and then flushing the filter with a limited quantity of a glycine buffer solution to desorb any marker virus present on the filter. Photo-optical detection of indirect passive immune agglutination by polystyrene beads indicates the performance of the water reclamation system in removing the marker virus. A closed system provides for concentrating any marker virus, initiating and monitoring the passive immune agglutination reaction, and then flushing the system to prepare for another sample.
Official Gazette of the U.S. Patent Office

N79-10694* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SYSTEM FOR AND METHOD OF FREEZING BIOLOGICAL TISSUE Patent
Thomas E. Williams and Thomas A. Cygnarowicz, inventors (to NASA) Issued 3 Oct. 1978 7 p Filed 14 Jun. 1977 Supersedes N77-27693 (15 - 18, p 0789)
(NASA-Case-GSC-12173-1; US-Patent-4,117,881; US-Patent-Appl-SN-806440; US-Patent-Class-165-2; US-Patent-Class-165-30; US-Patent-Class-62-78; US-Patent-Class-62-514R; US-Patent-Class-195-1.8; US-Patent-Class-219-299; US-Patent-Class-219-302) Avail: US Patent Office CSCL 06B

Biological tissue is frozen while a polyethylene bag placed in abutting relationship against opposed walls of a pair of heaters. The bag and tissue are cooled with refrigerating gas at a time programmed rate at least equal to the maximum cooling rate needed at any time during the freezing process. The temperature of the bag, and hence of the tissue, is compared with a time programmed desired value for the tissue temperature to derive an error indication. The heater is activated in response to the error indication so that the temperature of the tissue follows the desired value for the time programmed tissue temperature. The tissue is heated to compensate for excessive cooling of the tissue as a result of the cooling by the refrigerating gas. In response to the error signal, the heater is deactivated while the latent heat of fusion is being removed from the tissue while the tissue is changing phase from liquid to solid.
Official Gazette of the U.S. Patent Office

N79-10695# National Technical Information Service, Springfield, Va.
EUTROPHICATION. VOLUME 2: A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1974 - Jul. 1977
Elizabeth A. Harrison Aug. 1978 242 p
(NTIS/PS-78/0771/2) Avail: NTIS HC $28.00/MF $28.00 CSCL 06F

The selected abstracts cover all aspects of eutrophication, including research on primary productivity, water chemistry, ecology, the influence and impact of nutrients on lakes and streams, control techniques, and mathematical modeling. This updated bibliography contains 235 abstracts, none of which are new entries to the previous edition. GRA

N79-10696# National Technical Information Service, Springfield, Va.
EUTROPHICATION. VOLUME 3: A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Aug. 1977 - Jul. 1978
Elizabeth A. Harrison Aug. 1978 72 p Supersedes NTIS/PS-77/0687; NTIS/PS-76/0582; NTIS/PS-75/523; NTIS/PS-74/090 (NTIS/PS-78/0772/0; NTIS/PS-77/0687; NTIS/PS-76/0582; NTIS/PS-75/523; NTIS/PS-74/090) Avail: NTIS HC $28.00/MF $28.00 CSCL 06F

The selected abstracts cover all aspects of eutrophication, including research on primary productivity, water chemistry, ecology, the influence and impact of nutrients on lakes and streams, control techniques, and mathematical modeling. This updated bibliography contains 65 abstracts, all of which are new entries to the previous edition. GRA

N79-10697# Woods Hole Oceanographic Institution, Mass.
IMPACT OF LARGE SCALE AQUATIC BIOMASS SYSTEMS
Thomas Hruby Mar. 1978 32 p refs
(Grant NOAA-04-7-158-44104)
(PB-282617/0; WHOI-78-31; NOAA-78051603) Avail: NTIS HC A03/MF A01 CSCL 08A

The environmental impacts for several systems proposed for the large-scale culture of algae and other aquatic plants are presented. The impacts of algal biomass production are considered in terms of production on land, open ocean, and the coasts. The areas where dangers exist and where additional research is needed are identified. Only primary impacts are considered. GRA

N79-10698# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL 12, NO. 5, 1978
26 Oct. 1978 138 p refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 1-90
(JPRS-72115) Copyright. Avail: NTIS HC A06/MF A01

The physiological effects of space flight stress on humans and animals are evaluated.

N79-10699# Joint Publications Research Service, Arlington, Va.
NEUROPHYSIOLOGICAL BASES OF VESTIBULAR CONDITIONING
G. I. Gorgiladze *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 1-13 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 3-11

Avail: NTIS HC A06/MF A01

Processes of vestibular habituation include repeated stimulation of the labyrinthine receptors. Development of habituation is manifested by a progressive attenuation of evoked reactions to recurrent stimulation, retention of the attenuated reaction for a

certain period of time, and finally transfer of habituation to neurons that have an inhibitory effect on vestibular afferentation. G.G.

N79-10700# Joint Publications Research Service, Arlington, Va.

PROTEIN FRACTIONS AND ENZYMATIC ACTIVITY THEREOF IN THE RAT MYOCARDIUM AFTER THE FLIGHT ON KOSMOS-690 BIOSATELLITE

M. S. Gayevskaya, Ye. V. Kolchina, Ye. A. Nosova, N. S. Kolganova, and N. A. Veresotskaya *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 14-18 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 12-15

Avail: NTIS HC A06/MF A01

Exposure of rats during space flight to gamma radiation lowered AST activity of myocardial sarcoplasmic proteins. However, with respect to ATPase of myocardial myosin, the effect of weightlessness was stronger than that of radiation, and as a result the activity of this enzyme was low both on the 1st and 26th days after the biosatellite landed. It is assumed that radiation-induced inhibition of biosynthetic processes affected synthesis of myosin and lowered the protein content of the myocardial fraction T on the first day after space flight. Gamma radiation delivered in a ground-based control experiment lowered AST activity of myocardial sarcoplasmic proteins and raised the activity of ATPase of myocardial myosin on the first and 26 days after the experiment. G.G.

N79-10701# Joint Publications Research Service, Arlington, Va.

RECOVERY OF HEMOPOIESIS IN RATS EXPOSED TO RADIATION DURING SPACE FLIGHT

M. P. Kalandarova, G. P. Rodina, and T. M. Smirnova *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 19-25 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 15-20

Avail: NTIS HC A06/MF A01

Repair regeneration in the hemopoietic system of rats exposed to radiation during a space flight was studied. Comparative analysis of the obtained data indicates that prolonged weightlessness could influence, to some extent, the course of a pathological process, in particular radiolesion to hemopoiesis. G.G.

N79-10702# Joint Publications Research Service, Arlington, Va.

RADIATION LESION TO LIVER DNA OF RATS EXPOSED TO RADIATION DURING FLIGHT ABOARD THE KOSMOS-690 BIOSATELLITE

G. S. Komolova, V. F. Makeyeva, I. A. Yegorov, R. A. Tigranyan, and Yu. G. Grigoryev *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 26-30 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 21-23

Avail: NTIS HC A06/MF A01

Intrinsic viscosity test data on DNA from rat livers after termination of the flight and from synchronous experiments are reported. Animals in the control experiment were exposed to a dosage of approximately 220 rad radiation; their intrinsic viscosity values for native and denatured DNA (NDNA and ODNA) of the liver did not differ from figures obtained in intact controls. At the same time, with the same dosage delivered to animals in the flight experiment, the value of 17% and 38%, for NDNA and ODNA, respectively, was lower than in intact controls. The postflight drop in values of NDNA and ODNA indicates single-stranded and paired breaks in the DNA molecules. G.G.

N79-10703# Joint Publications Research Service, Arlington, Va.

HISTOLOGICAL AND HISTOCHEMICAL STUDIES OF THE LIVER OF RATS FLOWN ABOARD KOSMOS-690 BIOSATELLITE

V. I. Yakovleva *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 31-34 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 24-26

Avail: NTIS HC A06/MF A01

Delivery of 800 rad radiation in one day to rats involved in space flight, as well as in a control experiment, led to the development of the same morphological changes. This warrants the conclusion that space flight conditions do not have a modifying effect on the course of radiation lesion to the liver (according to the results of histological and histochemical studies). G.G.

N79-10704# Joint Publications Research Service, Arlington, Va.

STATE OF SPERMATOGENESIS IN RATS FLOWN ABOARD KOSMOS-690 BIOSATELLITE

G. I. Plakhuta-Plakutina *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 35-40 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 26-31

Avail: NTIS HC A06/MF A01

Radiation effects under weightlessness conditions were studied on the reproductive glands of 30 male Wistar rats flown aboard Cosmos-690 and submitted to prolonged gamma-radiation on the 10th day of the flight. Histological examination of the testes on the first to second day after the flight (11th-12th postradiation day, after delivery of doses of 220 and 800 rad) revealed significant destruction of spermatogonia with relatively high degree of preservation of subsequent cell generations of sex cells in the seminiferous tubules, in addition to marked dystrophic changes. After delivery of 955 rad, there was marked atrophy of spermatogenic epithelium without signs of recovery by the 36th postradiation day. G.G.

N79-10705# Joint Publications Research Service, Arlington, Va.

RAT BEHAVIOR IN MAZE AFTER FLIGHT ABOARD KOSMOS-690 BIOSATELLITE

N. N. Livshits, Z. I. Apanasenko, M. A. Kuznetsova, and Ye. S. Meyzerov *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 41-46 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 31-35

Avail: NTIS HC A06/MF A01

The differences between behavior in the maze of rats irradiated in flight and in a ground-based control experiment were not consistent. Changes in behavior after irradiation in flight were more marked according to some indices (refusal to go through the maze with a higher functional load), while irradiation on the ground under the conditions of the control experiment was more effective (damaging) according to other indices (refusal to go through the maze in the recovery period, reactions to development of second and third skills). G.G.

N79-10706# Joint Publications Research Service, Arlington, Va.

CHANGES IN BLOOD SUGAR CONTENT OF DOGS EXPOSED TO CHRONIC GAMMA RADIATION FOR SIX YEARS

A. A. Akhunov *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 47-52 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 35-39

Avail: NTIS HC A06/MF A01

A six year chronic and combined gamma irradiation study on dogs exposed to doses of 125, 370, 720, 750 and 1130 rad found a change in blood sugar content. The changes were phasic and probably due to deviations in mechanisms of neuroendocrine regulation of sugar metabolism. Certain differences were demonstrated between irradiated and control animals, with respect to their reactions to various loads. G.G.

N79-10707# Joint Publications Research Service, Arlington, Va.

ANALYSIS OF DISTRIBUTION OF SEQUENCES OF R-R INTERVALS IN ASTRONAUTS: GENERALIZED COORDINATE METHOD

Yu. M. Svirezhev, N. I. Vikhrov, and V. I. Kozharinov *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 53-57 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 39-43

Avail: NTIS HC A06/MF A01

Some distinctions in the distribution of R-R intervals are discussed. Since it was demonstrated that R-R distributions are nonstationary, they cannot be described by known canonical distributions. A plotting method, or method of generalized coordinate, is offered to describe the dynamics of change in structure of heart rhythm in astronauts. G.G.

N79-10708# Joint Publications Research Service, Arlington, Va.

COMPENSATORY REACTIONS OF THE KIDNEYS TO ORTHOSTATIC FACTORS

Ye. A. Ilin, V. I. Korolkov, K. V. Stelingovskiy, E. V. Tyurina, V. P. Berezov, and V. F. Zenin *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 58-62 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 43-46

Avail: NTIS HC A06/MF A01

Excretory function of the kidneys, as a system that is functionally linked with hemodynamic effects, is of substantial significance in compensatory reactions to orthostasis. A comprehensive study of cardiovascular functions and excretory functions of the kidneys is detailed and their role in compensatory reactions to an orthostatic load is determined. Orthostasis led to an increase in the heart rate of dogs with a drop of arterial pressure and pressure in the right atrium. Along with the changes in hemodynamic parameters, decreased diuresis, as well as a significant decrease in concentration of Na ions in urine, was demonstrated. G.G.

N79-10709# Joint Publications Research Service, Arlington, Va.

CLINICAL AND MORPHOLOGICAL STUDIES OF PEOPLE IN THE COURSE OF LONG-TERM HYPOKINESIA AND SUBSEQUENT READAPTATION

V. P. Dygin, V. A. Maksimov, V. G. Shubin, N. T. Sverdlina, and N. M. Leshchenko *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 63-67 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 46-50

Avail: NTIS HC A06/MF A01

The results of a complex and dynamic immunological study show that long-term (44-46 days) hypokinesia may lead to appearance of cardiac antigen in about 50% of essentially healthy subjects. This is attributed to increased resportion of protein structures by the myocardium due to autolytic or dystrophic processes. Anticardiac antibodies were not demonstrated. G.G.

N79-10710# Joint Publications Research Service, Arlington, Va.

CARDIAC ARRHYTHMIA FOLLOWING POSTIMMERSION +G SUB z ACCELERATIONS

I. F. Vil-Vilyams and Ye. B. Shulzhenko *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 68-75 refs Trans. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 50-56

Avail: NTIS HC A06/MF A01

Data were obtained that indicate a significant change in the functional state of the cardiovascular system during many days of immersion which, in particular, is manifested by more frequent and prognostically more serious development of extrasystolic arrhythmia with subsequent exposure to head-pelvis accelerations. The following factors probably play the leading role in the genesis of breakdown of compensatory mechanisms of regulation of cardiac function with exposure to +G sub z accelerations after immersion: increased tonus of the parasympathetic nervous system, changes in systemic and regional circulation, and impairment of fluid-electrolyte balance of the body. G.G.

N79-10711# Joint Publications Research Service, Arlington, Va.

EFFECTS OF VIBRATION AND NOISE ON SOME INDICES OF EFFICIENCY OF MI-4 HELICOPTER CREWS

Yu. N. Kamenskiy and Ye. A. Sokolova *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 76-81 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 56-59

Avail: NTIS HC A06/MF A01

The majority of Mi-4 pilots assessed noise (87.9%) and vibration (69.7%) as strong and unpleasant during the flight. Many reported intensification of these factors during take-offs, landings and hovering (there were up to 10-12 take-offs and landings per work day). Subjectively, there was a feeling of fatigue, buzzing in the ears and occasional headache. In the course of the work day, there was an appreciable change in visual function of Mi-4 pilots, with impairment of musculoarticular sensibility, and deterioration of conditioned reflex activity and capacity for fine coordination of movements. A comparison of the findings obtained on Yak-40 pilots warrants the conclusion that these changes in Mi-4 pilots were due primarily to the effects of vibration and noise inherent in that helicopter. The intensity of these changes is apparently related to the prolonged effects of vibration and noise on the pilots. G.G.

N79-10712# Joint Publications Research Service, Arlington, Va.

TISSULAR RESPIRATION OF THE BRAIN AFTER EXPOSURE OF RATS TO HYPERTOXIC HELIUM AND OXYGEN MIXTURES AT ATMOSPHERIC AND ELEVATED PRESSURE

G. V. Troshikhin and T. T. Podvigina *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 82-87 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 59-63

Avail: NTIS HC A06/MF A01

A five hour exposure of rats to a hyperoxic helium and oxygen mixture containing 0.40 kG/sq cm oxygen, at atmospheric and elevated pressure, did not induce changes in mitochondrial metabolism in the cerebral cortex. However a 5-day exposure to a helium and oxygen mixture at elevated pressure (40 kG/sq cm) with partial oxygen pressure of 0.40 kG/sq cm decreased uptake of oxygen and inorganic phosphate by cerebrocortical mitochondria. G.G.

N79-10713# Joint Publications Research Service, Arlington, Va.

EFFECTS OF ENDOGENOUS FACTORS ON THE PROCESS OF GAS BUBBLE FORMATION IN THE BODY RELATED TO DECOMPRESSION

K. S. Yurova *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72215) 26 Oct. 1978 p 88-93 ref Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 63-67

Avail: NTIS HC A06/MF A01

Animal experiments investigated the effect of feeding schedule and quality of diet on intensity of production of gas bubbles in the internal media of the organism after decompression, the effect of prior increased and decreased exercise on this process, and the correlation between intensity of postdecompression gas formation in animal blood and physicochemical and morphological blood indices. Feeding regimen did not have an appreciable effect on post-decompression gas production in young rats weighing up to 200 g; conversely, the regimen and ration altered, with statistical reliability, the intensity of gas production. Profuse feeding without a fat load and, even more so, with a fat load increased postdecompression gas production. Increased exercise prior to

decompression increased, with statistical reliability, the probability of postdecompression gas production and, at the same time, enhanced gas formation and the development of decompression disorders under such conditions. G.G.

N79-10714# Joint Publications Research Service, Arlington, Va.

CHARACTERISTICS OF VESTIBULAR NYSTAGMUS IN RATS

A. A. Shipov and V. G. Ovechkin *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 94-100 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 68-72

Avail: NTIS HC A06/MF A01

The overall characteristics of the vestibular nystagmus of rats, in response to a series of progressively increasing accelerations, show that the duration, number of beats and frequency of nystagmus increase with increase in accelerations. The rate of increase gradually decreased and the number of beats increased faster than duration. The frequency of nystagmus builds up the slowest. G.G.

N79-10715# Joint Publications Research Service, Arlington, Va.

CHARACTERISTICS OF BACTERIAL AEROSOL IN AIRTIGHT ROOMS OCCUPIED BY HUMANS

S. N. Zaloguyev, A. N. Viktorov, and G. O. Pozharskiy *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 101-105 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5 1978 p 72-75

Avail: NTIS HC A06/MF A01

The formation of bacterial aerosol in people-occupied airtight rooms was studied by determining the number of particles in the droplet and droplet-nuclear phases of aerosol in relation to the conditions under which humans generate aerosol particles. Obtained data show a finely divided aerosol is formed in the air of an airtight room occupied by humans. This is one of the factors that is favorable to transmission of conditionally pathogenic microorganisms under these specific conditions. G.G.

N79-10716# Joint Publications Research Service, Arlington, Va.

DECREASED ACTIVITY OF PALLADIUM CATALYST DURING PROCESSING OF EXCRETA

G. S. Dinyak and L. A. Margolis *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 106-109 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 76-78

Avail: NTIS HC A06/MF A01

The volatile compounds, that are formed as a result of processing human excreta, decrease the catalytic activity of palladium. The effects of water vapor and admixture of hydrogen sulfide, as components in a real gas, on the activity of a palladium catalyst were studied. Methane was selected as the component that is the most difficult to oxidize. Test results show that it is imperative to prevent access of hydrogen sulfide to assure long-term operation of a palladium catalyst. A barium-aluminovanadium catalyst can be used as preliminary catalytic purifier, in which the degree of oxidation of hydrogen sulfide constitutes 92% at 200 C, while the formed sulfur oxides can be readily adsorbed in the condensate. A gas mixture containing 3 to 5 mg hydrogen sulfide lowers palladium catalyst activity by 80% and virtually fails to lower the activity of a two-layer mixture consisting of palladium and barium-aluminovanadium contacts. G.G.

N79-10717# Joint Publications Research Service, Arlington, Va.

A METHOD OF EVALUATING THE PUPILLARY REACTION TO VESTIBULAR STIMULI

E. V. Lapayev, G. I. Pavlov, G. V. Anisimov, O. A. Cherkasov, and M. I. Katalov *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 110-116 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 19-82

Avail: NTIS HC A06/MF A01

Pupillography was performed before exposure to Coriolis and angular accelerations, as well as immediately after exposure and every minute for 10 min in the aftereffect period. Accelerations were produced on the electric revolving chair turning at the rate of 180 deg/s. Results reveal that the diameter of the pupil changes over a wide range after exposure to accelerations. The severity of the reaction was related to the subjects' individual endurance. G.G.

N79-10718# Joint Publications Research Service, Arlington, Va.

COMPARATIVE ANALYSIS OF CAUSES OF ANIMAL DEATHS DURING CHRONIC EXPOSURE TO GAMMA RADIATION AND THE AFTEREFFECT PERIOD

V. I. Yakovleva and A. S. Pankova *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 117-121 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 82-84

Avail: NTIS HC A06/MF A01

Experimental data indicate that malignant tumors occupy the most prominent place among the causes of death of animals exposed to chronic radiation. This shows that tumors of diverse morphological structure and localization can develop after long-term exposure to gamma radiation at a low dose rate. G.G.

N79-10719# Joint Publications Research Service, Arlington, Va.

EFFECTS OF LONG-TERM AND CHRONIC RADIATION ON HEMOPOIESIS

T. M. Zukhbaya *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 122-125 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 85-86

Avail: NTIS HC A06/MF A01

Phasic changes in hemopoietic rat tissue were observed in the course of long-term irradiation. The clinical effect of radiation was very consistent with the degree of depression of myelokaryocyte number in the period preceding the phase of activation of hemopoiesis, and it was directly related to the dose rate.G.G.

N79-10720# Joint Publications Research Service, Arlington, Va.

EFFECT OF ACCELERATIONS COMBINED WITH RADIATION ON OCCURRENCE OF GENE MUTATIONS IN THE DROSOPHILA

A. V. Rostopshina *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 126-128 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 86-88

Avail: NTIS HC A06/MF A01

Radiation induced a reliable increase in incidence of lethal recessive mutations at the stages of mature spermia, spermatids, and spermatocytes. Radiation did not increase the incidence of mutations at the stage of late spermatogonia. Accelerations followed by radiation induced an increased incidence of mutations at all of the spermatogenetic stages considered, and this was reliably different from the effect induced by radiation alone only at the stage of late spermatogonia. It is important to note that radiation alone at this stage does not increase the incidence of mutations, whereas when accelerations preceded radiation the effect was quite marked. The incidence of mutations in the case of accelerations following radiation did not differ from the incidence of mutations after radiation alone. Centrifuging had a modifying effect on the radiation effect only at the stage of late spermatogonia in the case of accelerations preceding radiation. G.G.

N79-10721# Joint Publications Research Service, Arlington, Va.
EFFECT OF OXYGEN POISONING ON THE SPECTRUM OF LACTATE DEHYDROGENASE ISOZYMES OF RABBIT BLOOD PLASMA
N. A. Sokolova *In its* Space Biol. and Aerospace Med., Vol. 12, No. 5, 1978 (JPRS-72115) 26 Oct. 1978 p 129-132 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 5, 1978 p 88-90
N79-10698 01-51)
Copyright. Avail: NTIS HC A06/MF A01

Evaluation of the overall activity and spectrum of LDH isozymes in rabbit blood plasma failed to demonstrate an influence by therapeutic hyperbaric oxygenation. Data on the effect of toxic HBO on overall activity and spectrum of LDH isozymes, as well as aspartate aminotransferase activity in rabbit blood plasma, are indicative of accelerated discharge of enzymes from various organs and tissues, which could be due to impaired permeability of cell membranes under the influence of hyperoxia. G.G.

N79-10722 North Dakota Univ., Grand Forks.
APPLIED ANALYSIS OF COMPUTER SIMULATED DECOMPRESSION PROFILES Ph.D. Thesis
Stephen Jack Settle 1977 165 p
Avail: Univ. Microfilms Order No. 7816002

A computer simulated decompression model was empirically tested for reliability and predictability. Bends-threshold levels in decompression were evaluated by comparing continuous decompressions and maximum-step decompressions. The model incorporated seven tissue compartments (lung, blood, bone, skin, interstitial fluid, intracellular fluid and fat) modeled in a parallel fashion. Each tissue compartment was expressed in terms of a resistance-capacitance circuit. The differential equation $dPC/dt = (PC - PE)/RC$ described the rate of change of compartmental pressure in terms of PC = compartmental pressure, PE = environmental pressure, and RC = resistance times capacitance. Decompression profiles were simulated on the IBM 370 using continuous system modeling program. Dissert. Abstr.

N79-10723 Pennsylvania Univ., Philadelphia.
ANALYSIS OF INERT GAS EXCHANGE IN THE MIDDLE EAR Ph.D. Thesis
Ashok Ranade 1978 251 p
Avail: Univ. Microfilms Order No. 7816346

Mechanical stimuli to the inner ear induced by diffusion of gases into the endolymphatic fluid of the vestibular organ were studied. The gases present in the middle ear cavity may produce vestibular symptoms of vertigo, nausea and nystagmus. A mathematical description was developed to define the exchange of ambient and respired gases in terms of the solubility, diffusion and blood perfusion characteristics of the tympanic membrane and the mucosal layer of the middle ear cavity. It also incorporates the venting function of the eustachian tube. A computer solution of the equation shows good agreement with experimental data. Computer simulation studies indicate that the diffusion of gases across the tympanic membrane is not significantly affected by the membrane's blood supply and that the diffusion of gases across the mucosal layer is perfusion-limited. Dissert. Abstr.

N79-10724* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONTOUR DETECTOR AND DATA ACQUISITION SYSTEM FOR THE LEFT VENTRICULAR OUTLINE Patent
Johan H. C. Reiber, inventory (to NASA) Issued 18 Jul. 1978 19 p Filed 16 Feb. 1977 Supersedes N77-17701 (15 - 08, p 1069)
(NASA-Case-ARC-10985-1; US-Patent-4,101,961; US-Patent-Appl-SN-769148; US-Patent-Class-364-417; US-Patent-Class-358-96; US-Patent-Class-358-111; US-Patent-Class-128-2.05R) Avail: US Patent Office CSCL 06B

A real-time contour detector and data acquisition system is described for an angiographic apparatus having a video scanner for converting an X-ray image of a structure characterized by a change in brightness level compared with its surrounding into video format and displaying the X-ray image in recurring video fields. The real-time contour detector and data acqusition system includes track and hold circuits; a reference level analog computer circuit; an analog compartor; a digital processor; a field memory; and a computer interface.
Official Gazette of the U.S. Patent Office

N79-10726 Rochester Univ., N. Y.
NONINVASIVE ULTRASONIC BLOOD FLOW CHARACTERIZATION Ph.D. Thesis
Paul Poo-Kam Lee 1978 163 p
Avail: Univ. Microfilms Order No. 7818271

A new method of transcutaneous ultrasonic characterization of blood flow in the chambers of the heart and great vessels is proposed. The basic model considers acoustic propagation and scattering in an inhomogeneous moving medium. The results are intended for noninvasive characterization of blood flow and specialize for differentiation of tissue when the medium is motionless. The theory also provides a unified approach to ultrasonic flow measurement employing the Doppler principle. Computer simulations were carried out to evaluate the performance of the Doppler system when the quadrature signals are corrupted with white noise and when phase instabilities of the detection system produce jitter. The ultrasonic method was also used to show the growth of turbulence in a jet. The in vitro experimental studies show the utility of the model.
Dissert. Abstr.

N79-10727 Johns Hopkins Univ., Baltimore, Md.
LUNG MECHANICS: DYNAMIC RESPONSE, ACOUSTIC GENERATION, AND FLOW LIMITATION Ph.D. Thesis
James Bernard Grotberg 1978 178 p
Avail: Univ. Microfilms Order No. 781682

Collapsible tube flutter is mathematically modelled by an inviscid, incompressible fluid flowing through an infinite, two-dimensional, flexible channel. The allowed natural frequencies (wave speeds) of oscillation are determined for both small amplitude and finite amplitude, nonlinear oscillations. The bifurcation theory of dynamic instability and flow over a corrugated flexible boundary are also examined. Clinical correlations to the production of wheezing sounds in the lung and Korotkoff sounds in the blood vessels are discussed. The dynamical effect of varying the cycling frequency of eight isolated dog lobes is measured by documenting corresponding changes in the dynamic compliance and hystersis area of their pressure-volume loops. Loops were recorded at eight frequencies between 0.1 cpm and 50.0 cpm. Dissert. Abstr.

N79-10728*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HYPERTHERMIA AS AN ANTINEOPLASTIC TREATMENT MODALITY
Sheila Ann T. Long, ed., James Shaeffer, ed. (Eastern Va. Med. School), and Anas M. El-Mahdi, ed. (Eastern Va. Med. School) 1978 96 p refs Symp. held at Norfolk, Va., 28 Jan. 1978 (NASA-CP-2051; L-12082) Avail: NTIS HC A05/MF A01 CSCL 06E

Preclinical evaluation of hyperthermia for treating tumerous cancers is discusse

N79-10729*# Virginia Univ. Hospital, Charlottesville. Div. of Radiation Oncology.
HYPERTHERMIA IN THE TREATMENT OF CANCER: A REVIEW OF THE RADIOBIOLOGICAL BASIS
Donald G. Baker *In* NASA. Langley Res. Center Hyperthermia as an Antineoplastic Treatment Modality 1978 p 3-24 refs

Avail: NTIS HC A05/MF A01 CSCL 06E

Temperatures in the range 41.5 C to 43.5 C tend to be more damaging to malignant than nonmalignant cells. Where local hyperthermia (41.5 C to 43.5 C) is combined with ionizing radiation, a significant therapeutic ratio may be realized. Total body hyperthermia, alone or combined with other therapeutic modalities, can provide palliation for some systemic malignancies but may not be as effective as local hyperthermia for treating local disease. The influence of hyperthermia on immune mechanisms and the risk of metastatic spread of potential tumor growth stimulation need further investigation. Among other questions needing elucidation before hyperthermia can be considered a standard treatment modality are the time-dose (for heating) relationships to produce an optimal therapeutic ratio and whether the late sequela of combined heat and ionizing radiation may result in an unacceptable risk of patient morbidity. Author

N79-10730*# Maryland Univ., College Park. School of Medicine.

TEMPERATURE UNIFORMITY IN HYPERTHERMAL TUMOR THERAPY

George H. Harrison, J. Eugene Robinson, and George M. Samaras *In* NASA. Langley Res. Center Hyperthermia as an Antineoplastic Treatment Modality 1978 p 27-32 refs

(Grants Am. Cancer Soc. PDT-33; LA-18872-01)
Avail: NTIS HC A05/MF A01 CSCL 06E

Mouse mammary tumors heated by water bath or by microwave-induced hyperthermia exhibit a response that varies sharply with treatment temperature; therefore, uniform heating of the tumor is essential to quantitate the biological response as a function of temperature. C3H tumors implanted on the mouse flank were easily heated to uniformities within 0.1 C by using water baths. Cold spots up to 1 C below the desired treatment temperature were observed in the same tumors implanted on the hind leg. These cold spots were attributed to cooling by major blood vessels near the tumor. In this case temperature uniformity was achieved by the deposition of 2450 MHz microwave energy into the tumor volume by using parallel-opposed applicators. Author

N79-10731*# Medical Coll. of Virginia, Richmond. Div. of Radiation Biology.

THE EFFECT OF HYPERTHERMIA ON THE RADIATION RESPONSE OF CRYPT CELLS IN MOUSE JEJUNUM

John D. Wilson *In* NASA. Langley Res. Center Hyperthermia as an Antineoplastic Treatment Modality 1978 p 33-43 refs

Avail: NTIS HC A05/MF A01 CSCL 06E

The effect of hyperthermia and/or gamma-radiation on the survival of intestinal crypt cells was studied in BDF sub 1 mice using a microcolony assay. Hyperthermia treatments, which in themselves caused no detectable cell lethality, inhibited the capacity of crypt cells to repair sublethal radiation damage. In addition, heat applied either before or after single radiation exposures potentiated lethal damage to crypt cells; the degree of enhancement was dependent on the time interval between treatments. At the levels of heating employed, DNA synthesis in the intestinal epithelium was significantly reduced immediately following exposure, but returned rapidly to normal levels. No further disturbances in cellular kinetics were observed for up to 10 days after heating. Author

N79-10732*# Medical Coll. of Virginia, Richmond.

A MICROANGIOGRAPHIC STUDY OF THE EFFECT OF HYPERTHERMIA ON THE RABBIT BLADDER

S-O. Hietala, Robert Howells, and I. A. Hazra *In* NASA. Langley Res. Center Hyperthermia as an Antineoplastic Treatment Modality 1978 p 45-51 refs

Avail: NTIS HC A05/MF A01 CSCL 06E

A model was used to study the effect of hyperthermia on a normal tissue. The model selected was the rabbit bladder and the end point measured was the changes in the micro-vasculature of the bladder wall. It was already demonstrated clinically that hot water bladder infusions produce regression in bladder tumors. G.G.

N79-10733*# Medical Coll. of Virginia, Richmond.

THE COMBINED EFFECTS OF PULSED MAGNETIC RADIATION (DIAPULSE) AND CHEMOTHERAPY ON TUMOR BEARING MICE. THE MEASUREMENT OF RODENT PALATAL EXPLANTS AS A DEVICE FOR MEASUREMENT OF THE BIOLOGIC EFFECTS OF NONIONIC RADIATION (EMR)

Williamson Regelson, Brian West, and Dominick P. DePaola (Fairleigh Dickinson Univ.) *In* NASA. Langley Res. Center Hyperthermia as an Antineoplastic Treatment Modality 1978 p 53-66 refs

Avail: NTIS HC A05/MF A01 CSCL 06R

Simultaneous treatment utilizing pulsed radiowave and cancer chemotherapy significantly extended the life span of mice with Lewis lung transplanted carcinoma. In comparison with nontreated controls, the combination of hydroxyurea and whole body nonionizing EM radiation (at 27.12 MHz) produced differential enhancement of longevity depending on hydroxyurea combined with highest power output achieved by pulsing the radiation 600 times per second; at a 3.9% duty cycle, peak watts = 975 produced the mean extension of life 67% greater than that of the group treated with hydroxyurea alone. G.G.

N79-10734# Albert Einstein Coll. of Medicine, New York. Dept. of Pathology.

MORPHOLOGICAL AND BIOCHEMICAL EFFECTS OF OXYGEN TOXICITY Final Report, 1 Apr. 1968 - 30 Nov. 1976

Robert M. Rosenbaum and Murray Wittner 1 Mar. 1978 49 p refs

(Contract N00014-75-C-0223)
(AD-A056778) Avail: NTIS HC A03/MF A01 CSCL 06/3

Morphologic and biochemical studies dealing with effects of high O2 concentrations were made on a wide range of cell types including protozoa, mammalian cell lines, lung cells and marine invertebrate and amphibian eggs. Studies were aimed at evaluating effects O2 on proteolysis of cells, on mitoses, on DNA, RNA and protein synthesis, on the etiology of alveolar lining cell injury, and on the development of O2 tolerance in rats. Peripheral areas related to these studies dealt with the demonstration of different subgroups of the same family of some acid hydrolases and effects of O2 on the two pathways of serotonin metabolism. Ultrastructural studies stressed the conformational changes of mitochondria in type 2 cells of tolerant rats and sequence of O2 induced injury at the level of terminal airway.
Author (GRA)

N79-10735# California Univ., Livermore. Lawrence Livermore Lab.

NEW DEVELOPMENTS IN ULTRASONIC IMAGING OF THE CHEST AND OTHER BODY ORGANS

G. W. Campbell and A. L. Anderson 27 Apr. 1978 26 p refs Presented at the IAEA Symp. on Advan. in Radiation Protec. Monitoring, Stockholm, 26-30 Jun. 1978
(Contract W-7405-eng-48)
(UCRL-80340-rev-1; Conf-780612-3; IAEA-SM-229/SM) Avail: NTIS HC A03/MF A01

The ultrasonic imaging system described measures chest-wall thickness and the percentage of fat in the chest and around other body organs. The system uses pulse-echo techniques to transmit and detect sound waves reflected from the interfaces of body organs and adjacent tissue. A computer draws these interfaces on color scans, and a code is used to exponentially average data from several points on each scan to find the average thicknesses of the chest wall and fat layers. These average thicknesses are then used to adjust X-ray calibration factors for plutonium lung counters. The correction factor for three subjects measured for fat content ranging from 12.6 to 22.2% was 18 to 41%. The ultrasonic system also defines the shape and position of the kidneys and liver so we are able to more accurately place detectors on the body during in-vivo radiation measurements. DOE

N79-10736# National Technical Information Service, Springfield, Va.
BIOCOMPATIBLE MATERIALS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1974 - Jun. 1978
Pernell W. Crockett Jul. 1978 263 p Supersedes NTIS/PS-77/0615; NTIS/PS-76-0537; NTIS/PS-75/488; COM-74-11126 (NTIS/PS-78/0675/5; NTIS/PS-77/0615; NTIS/PS-76/0537; NTIS/PS-75/488; COM-74-11126) Avail: NTIS HC $28.00/MF $28.00 CSCL 06L

The fabrication and preparation of biomaterials and the evaluation of the compatibility of the materials to tissues and blood components in vivo and in vitro tests is reviewed. The utilization in mechanical organs, prosthetic devices, implants, and surgical materials is discussed. This bibliography contains 257 abstracts. GRA

N79-10737# Illinois Univ., Savoy. Aviation Research Lab.
JUDGEMENT EVALUATION AND INSTRUCTION IN CIVIL PILOT TRAINING Final Report, Nov. 1976 - Dec. 1977
R. S. Jensen and R. A. Benel Dec. 1977 152 p
(Contract DOT-FA77WA-3920)
(AD-A057440; FAA-RD-78-24) Avail: NTIS HC A08/MF A01 CSCL 05/10

The nature of good flying judgment and its acquisition, development, and evaluation are examined from the perspectives of aviation and psychology. A definition of pilot judgment is presented consisting of an intellective part (How well can you think?) and a motivative part (are you cautious or risky?). Evidence from research in other fields indicates that both aspects of judgement can be taught and evaluated. A broad outline for a judgment training and evaluation program is presented along with techniques to be implemented in ground school and aircraft training. A.R.H.

N79-10738# Naval Training Equipment Center, Orlando, Fla.
COMPENSATION FOR TRANSPORT DELAYS PRODUCED BY COMPUTER IMAGE GENERATION SYSTEMS Final Report, Nov. 1976 - May 1978
G. L. Richard, M. L. Cyrus, D. C. Cox, T. K. Templeton, and L. C. Thompson Jun. 1978 70 p refs Prepared in cooperation with the Air Force Human Resources Lab., Brooks AFB, Tx.
(AD-A056720; NAVTRAEQUIPC-IH-297; AFHRL-TR-78-46) Avail: NTIS HC A04/MF A01 CSCL 05/9

This report describes a cooperative Navy/Air Force effort aimed at the problem of image-flutter encountered when visual displays that present computer-generated images are used for the simulation of certain flying situations. Two experiments are described that extend laboratory work on delay compensation schemes to the simulation of formation flight in a research device -- the Advanced Simulator for Pilot Training. The scheme used was one where low-pass filters were added to the lead-generation software of the visual display system. Both studies were geared to determining break-points for those filters that would allow adequate flying control performance and provide an acceptable display. These experiments were based on the notion that a trade exists between the suppression of the visual image's flutter and the removal of the low frequency information necessary for flight control. One experiment represented a factorial combination of settings of the display filters and the non-visual cues of aircraft motion provided by the ASPT's g-seat and motion platform, and the second represented a simple comparison of filter settings. Both studies indicated that, at least for formation flight, there is a range of filter settings which will not adversely affect flight control and will adequately suppress visual flutter. This range represents half-power settings for the filters of 3/4 to 1 Hertz. Author (GRA)

N79-10739# Oregon Univ., Eugene. Dept. of Psychology.
TIME-SHARING IS NOT A UNITARY ABILITY
Harold L. Hawkins, Merton Church, and Suzanne deLemos 30 Jun. 1978 46 p refs
(Contract N00014-77-C-0643)
(AD-A056632) Avail: NTIS HC A03/MF A01 CSCL 05/9

The results of the experiments lead to the conclusion that time-sharing is not a single general ability, but rather is dependent upon several more specific, and perhaps independent, processing limitations. These include: (1) an inability early in practice to simultaneously select, or retrieve, multiple responses from memory; (2) a persisting inability to initiate multiple independent responses simultaneously; (3) an inability to process, or at least efficiently process, contiguous inputs from separate modalities owing to the need for a modality-specific attentional focus; and (4) an inability to efficiently process multiple inputs from within the same modality owing to the existence of structural interference. It is suggested that the prediction of performance on complex criterion task combinations such as entailed in piloting or air traffic control requires specification of which of these component abilities is required by the criterion situations, and the tailoring or predictor tasks based on this specification. GRA

N79-10740 California Inst. of Tech., Pasadena.
STEREO 3-D PERCEPTION FOR A ROBOT Ph.D. Thesis
Scott Darrell Roth 1978 125 p
Avail: Univ. Microfilms Order No. 7817471

A stereo snapshot vision theory for a computer is proposed, based on an experimental implementation. A stereopsis algorithm is presented for growing stereo surfaces in natural scenes. First, 2-D features are extracted from the stereo pair of digital images by locating patterns of change in the images gradient-arrow representations. Then, by associating features in the left image with features in the right image, stereo regions or matches are made. The stereopsis process fuses the stereo images by growing contexts of matched features. Every match defines via the camera geometry a visible surface in the scene, interlocking with neighboring matches like the pieces of a 3-D jigsaw puzzle. The resultant surface molds provide a firm basis for a polyhedral model of the scene's forms. Dissert. Abstr.

N79-10741*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
GENERALIZED ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM COMPUTER PROGRAM (G1894), PHASE 3 Final Report
R. E. McEnulty Sep. 1978 23 p refs
(Contract NAS9-14877)
(NASA-CR-151836; MDC-G7699) Avail: NTIS HC A02/MF A01 CSCL 06K

The work performed during Phase 3 of the Generalized Environmental Control Life Support System (ECLSS) Computer Program is reported. Phase 3 of this program covered the period from December 1977 to September 1978. The computerized simulation of the Shuttle Orbiter ECLSS was upgraded in the following areas: (1) the payload loop of the Shuttle simulation was completely recoded and checked out; (2) the Shuttle simulation water and freon loop initialization logic was simplified to permit easier program input for the user; (3) the computerized simulation was modified to accept the WASP subroutine, which is a subroutine to evaluate thermal properties of water and freon; (4) the 1108 operating system was upgraded by LEC; (5) the Shuttle simulation was modified to permit failure cases which simulate zero component flow values; and (6) the Shuttle SEPS version was modified and secure files were setup on the 1108 and 1110 systems to permit simulation runs to be made from remote terminals. S.E.S.

N79-10742# Hughes Aircraft Co., Culver City, Calif.
A BEHAVIORAL MODEL OF TARGET ACQUISITION IN REALISTIC TERRAIN Final Technical Report, 15 Dec. 1976 - 15 Oct. 1977
L. A. Scanlan and A. K. Agin Jun. 1978 101 p refs Prepared for US Army Electronics Command, Fort Belvoir, Va.
(Contract DAAK70-77-C-0013)
(AD-A056760; HAC-REF-D8983; HAC-P78-70R) Avail: NTIS HC A06/MF A01 CSCL 05/5

The research obtained eye fixation data while searching for targets in both realistic and abstract scenes. A Markov model of target acquisition is proposed and preliminary tests of its adequacy are made using the eye fixation data. The model considers the influence of input data, expectation, perceptual processing, and perceived scene information on the target acquisition process and offers considerable promise as a modeling approach. Author (GRA)

N79-10743# Naval Postgraduate School, Monterey, Calif.
HUMAN FACTORS EVALUATION OF THE AN/UYQ-21 DISPLAY CONSOLE M.S. Thesis
Thomas Edward Klocek Mar. 1978 63 p refs
(AD-A056383) Avail: NTIS HC A04/MF A01 CSCL 09/5

This paper analyses the AN/UYQ-21 display console from a human factors standpoint. The AN/UYQ-21 is programmed for use in NTDS, acoustics displays and can have fire control applications. The paper is organized so that the current threat and the Naval Tactical Data System are discussed briefly in the introduction. A general discussion of man as a system component follows along with a description of the AN/UYQ-21. The man-machine engineering aspects of the console are discussed at length including controls, display, viewing angles, maintainability, symbology and physical dimension. The paper concludes with comments and recommendations for improvememt on this and follow-on systems. Author (GRA)

N79-10744# Army Construction Engineering Research Lab., Champaign, Ill.
ESTABLISHING HABITABILITY FACTORS FOR THE DESIGN OF OFFICE ENVIRONMENTS
Charles C. Lozar Jun. 1978 14 p refs
(AD-A056463) Avail: NTIS HC A02/MF A01 CSCL 05/5

The purpose of this presentation is to document an overall methodology which incorporates experimental design considerations from the social sciences, specifically environmental psychology, and transfers that technology to planning and design application to improve habitability in office environments. The importance of this application is that the habitability factors which are involved in most office environments do not have a firm basis in basic research, and are not well documented in terms of guidance information for designers. This paper will present a discussion of a means of derivation for habitability factors in a particular context of office environments. However, the same methodology will be shown to be applicable to other types of environments, with the process being beneficial to the generation of new basic research, application of new concepts, and continuing accumulation of new knowledge in the area of habitability factors for any environment. GRA

N79-11651*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
US EXPERIMENTS FLOWN ON THE SOVIET SATELLITE COSMOS 782 Final Reports
Susan N. Rosenzweig (Northrup Serv., Inc., Anaheim, Calif.) and Kenneth A. Souza Sep. 1978 416 p refs
(NASA-TM-78525; A-7612) Avail: NTIS HC A18/MF A01 CSCL 06B

Experiment hardware, preflight activities, on-orbit activities, and postflight activities relevant to the 11 U.S. experiments on board the Soviet spacecraft ard described.

N79-11652*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
US EXPERIMENTS FLOWN ON COSMOS 782 Final Report
Wayne H. Howard and Kenneth A. Souza *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 1-32

Avail: NTIS HC A18/MF A01 CSCL 06B

The Cosmos 782 mission is summarized. Seven countries participated with experiments in 15 categories. The experiments, in general, concentrated on comparing the effects of weightlessness versus artificial gravity on genetics, growth, development, and aging. The 11 U.S. experiments used rats, fruit flies, carrot tissue slices, embryoids, fish eggs, and radiation dosimeters. Lists of participating countries, experiments, and mission operations are presented. The U.S. experiment hardware, preflight activities, and postflight activities are briefly described. S.B.S.

N79-11653*# Colorado State Univ., Fort Collins. Dept. of Botany and Plant Pathology.
RESPONSE OF CROWN GALL TISSUE TO THE SPACE ENVIRONMENT: RESIDUAL CARBOHYDRATES IN SUPPORTING TISSUE Final Report
John E. Hendrix and Bonnie L. Baker *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 33-44 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

Slices of carrot crown gall supporting tissue were used to study the effect of weightlessness on respiration. Amounts of amylose, sucrose, and glucose in gall flight discs from COSMOS 728 and in comparable control discs were determined and compared. Both amylose and sucrose decreased in concentration while in the flight environment; however, there was a marked increase in the concentration of glucose. There was no detectable difference between the tissue subjected to weightlessness compared to the tissue subjected to the g environment. Results show that the overriding environmental parameter was water stress which induced the tissue to increase the number of small molecules so that water could be retained by the tissue. S.B.S.

N79-11654*# Colorado State Univ., Fort Collins. Dept. of Botany and Plant Pathology.
RESPONSES OF CROWN GALL TISSUE TO THE SPACE ENVIRONMENT: TUMOR DEVELOPMENT AND ANATOMY Final Report
Ralph Baker, Bonnie L. Baker, and Lee Elliot *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 45-57 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

Tumor development from bacterial innoculation in slices of carrot crown gall supporting tissue was used to study the effects of weightlessness on metabolism. Carrot discs from COSMOS 782 were compared to earth-based controls. Statistically significant larger crown gall tumors developed on carrot disks on a centrifuge exposed to the space environment than those in weightlessness. This is the opposite reaction predicted from previous Earth-based gravity compensated experiments. In contrast, an increase in radius of the meristematic rings of growth centers in these teratoma type galls was observed for tissues generated in weightless conditions. S.B.S.

N79-11655*# Colorado State Univ., Fort Collins. Dept. of Anatomy.
RESPONSES OF CROWN GALL TISSUE TO THE SPACE ENVIRONMENT: GLUTAMINE SYNTHETASE ACTIVITY Final Report
Stephen J. Kleinschuster and Kathleen Mahon *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 58-63 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

Carrot crown gall tumors exposed to weightlessness on COSMOS 782, null-gravity experimentation, and appropriate controls were analyzed for the specific activity of glutamine synthetase following such treatment. Results show that the specific activities of compensated or weightless material are, in general, lower than the various controls. The data also indicates that null-gravity and true weightlessness, with respect to glutamine synthetase activity, are largely comparable. S.B.S.

N79-11656*# Colorado State Univ., Fort Collins. Dept. of Botany and Plant Pathology.
RESPONSES TO CROWN GALL TISSUE TO THE SPACE ENVIRONMENT: ISOZYME PATTERNS Final Report
Penelope Hanchey *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 64-70 refs
Avail: NTIS HC A18/MF A01 CSCL 06C

The growth of carrot crown gall tumor tissue was used to study the effects of gravity on isozyme activity. Peroxidases zymograms of gravity-compensated tissue were compared with those of tissue actually flown at zero gravity on the COSMOS 782 satellite. The patterns obtained, while not identical,

were distinct from control tumors grown at one g on the spacecraft or kept stationary in the laboratory. S.B.S.

N79-11657*# State Univ. of New York at Stony Brook. Div. of Biological Sciences.
THE MORPHOGENETIC RESPONSES OF CULTURED TOTIPOTENT CELLS OF CARROT (DAUCUS CAROTA L.) AT ZERO GRAVITY Final Report
F. C. Steward and Abraham D. Krikorian *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 71-159 refs

(Contract NAS2-8986)
Avail: NTIS HC A18/MF A01 CSCL 06C

The development of totipotent carrot cells into organs, embryoids, and normal plantlets was studied to determine the effects of weightlessness on plant cell growth. Cells in plastic petri dishes were carried on the COSMOS 728 satellite for 19.5 days to expose them to weightlessness. A centrifuge on board the spacecraft exposed other cells to a gravity equivalent to Earth's. Results show that totipotent somatic cells can undergo morphogenesis to produce viable and fully competent embryos at zero gravity, apparently as effectively as 1 g for the test conditions used. S.B.S.

N79-11659*# Louisville Univ., Ky. Dept. of Anatomy.
KILLFISH DEVELOPMENT IN ZERO-G ON COSMOS 782: FUNDULUS EXPERIMENT K-104 Final Report
J. R. Keefe, H. W. Scheld (Houston Univ., Tex.), J. F. Boyd (Northrop Serv., Inc., Houston, Tex.), P. M. Fuller, and J. M. Oppenheimer (Bryn Mawr Coll., Penn.) *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 179-199 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

Fertilized eggs from Fundulus, a small shallow water minnow, were carried on board the COSMOS 782 satellite to study the possible effects of weightlessness on developing organisms. Experiment background, procedures, hardware, execution, data collection and results are presented. Results show that the development of Fundulus beyond the gastrula stage is not affected in any major way by weightlessness. It is speculated that weightlessness may be largely beneficial. S.B.S.

N79-11660*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ABSENCE OF GASTRIC ULCERATION IN RATS AFTER FLIGHT ON THE COSMOS 782 Final Report
P. A. Brown and J. Vernikos-Danellis *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 200-206 refs
Avail: NTIS HC A18/MF A01 CSCL 06C

Evidence of gastric ulceration or severe erosion of the gastric mucosa was sought in rats following 19.5 days of spaceflight on the Cosmos 782 Biological Satellite. The stomachs from the flight animals were compared macroscopically and histologically with stomachs removed from animals in the synchronous and vivarium control groups. None of the animals in the flight or the control groups ulcerated, and there were no obvious histologic differences in gastric erosion among the groups. The reasons for this failure to ulcerate are discussed. Author

N79-11661*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECT OF SPACE FLIGHT ON CELL-MEDIATED IMMUNITY Final Report
Adrian D. Mandel and Edward Balish (Wisconsin Univ., Madison) *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 207-226 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

The cell mediated immune response to Listeria monocytogens was studied in rats subjected to 19.5 days of flight in a Soviet spacecraft. Groups of rats were immunized with 1,000,000 formalin killed Listeria suspended in Freunds Complete adjuvant five days prior to flight. Immunized rats subjected to the same environmental parameters as the flight rats, excepting flight, and immunized and non-immunized rats held in a normal animal colony served as controls. Following recovery, lymphocyte cultures were prepared from spleens of all rats, and cultured in vitro in the presence of Listeria antigens, phytohemagglutinin, Conconavlin A and purified protein derivative (PPD), and measured for their uptake of H3 (thymidine). The lymphocytes of all rats gave a blastogenic response to phytohemagglutinin and Conconavlin A. Although individual rats varied considerably, all flight and immunized control rats gave a blastogenic response to the Listeria antigens and PPD. With several mitogens the lymphocytes of flight rats showed a significantly increased response over the controls. The data do not support a hypothesis of a determined effect of space flight on cell mediated immunity and suggest an opposite effect. Author

N79-11662*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENT K-002: RESULTS OF HISTOLOGICAL EXAMINATION OF INGUINAL LYMPH NODES, SUPPLEMENTARY REPORT Final Report
Lisbeth M. Kraft *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 227-231

Avail: NTIS HC A18/MF A01 CSCL 06C

Lymph nodes of the vivarium control group showed only normal variations of structure. Both nodular and diffuse arrangement of the parenchyma are found, which is further reflected in the fibrous framework as seen in picrofuchsin preparations. Active germinal centers with pyronin positive cells are found in some of the nodes of three rats of this group. Mitoses are occasionally observed. Necrotic cells and debris within the centers are normal in amount. The sinuses contain the cells usually seen: lymphocytes, histiocytes, plasma cells, and some erythrocytes. Author

N79-11663*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ALTERATIONS IN ERYTHROCYTE SURVIVAL PARAMETERS IN RATS AFTER 19.5 DAYS ABOARD COSMOS 782 Final Report
Henry A. Leon, Stephen A. Landaw (Veteran's Admin. Hosp., Syracuse, N. Y.), and Jennifer Cummins *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 232-252 refs
Avail: NTIS HC A18/MF A01 CSCL 06C

Rats were subjected to 19.5 of weightless space flight aboard the Soviet Biosatellite, Cosmos 782. The survival parameters of a cohort of erythrocytes labeled 15.5 days pre-flight based on the output of Co-14, were evaluated upon return from orbit. These were compared to vivarium control rats injected at the same time. Statistical evaluation indicates that all survival parameters were altered by the space flight. The mean potential life span which was 62.4 days in the control rats was decreased to 59.0 days in the flight rats, and random hemolysis was increased three-fold in the flight rats. The measured size of the cohort was decreased lending further support to the idea that hemolysis was accelerated during some portion of the flight. A number of factors were discussed which might be contributory to these changes. These factors include: forces associated with launch and re-entry, atmospheric and environmental parameters, dietary factors, radiation, and weightlessness. Author

N79-11664*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF SPACE FLIGHT ON PLASMA AND GLANDULAR CONCENTRATIONS OF PITUITARY HORMONES Final Report
R. E. Grindeland, L. C. Keil, S. Ellis, A. F. Parlow (Calif. Univ., Los Angeles), J. W. Kendall, Jr. (Veteran's Admin. Hosp., Portland, Oreg.), Donna Gaudette (Veteran's Admin. Hosp., Portland, Oreg.), and I. I. Geschwind (Calif. Univ., Davis) *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 253-275 refs
Avail: NTIS HC A18/MF A01 CSCL 06C

Pituitary function was investigated in rats subjected to 19.5 days orbited space flight. Male SPF Wistar rats were divided into vivarium control (VC), synchronous control (SC), and flight (F) groups. SC rats were subjected to the same caging, RHOO2, RHOO2, and temperature as F rats. Rats from each treatment group were sacrificed either immediately after recovering from flight (R+0) or 25 days after recovery. Space flight caused a marginal inhibition of growth. Pituitary concentrations of hormones were similar for all groups as were the hematocrits. At R+25 F rats had decreased plasma prolactin concentrations, decreased pituitary GH and increased pituitary vasopressin; pituitary and plasma concentations of other hormones remained unchanged from control values. Hematocrits of flight rats were higher than VC and SC values at R+25 and higher than for F rats at R+0. Anterior pituitary and testicular weights were unaffected by space flight, whereas adrenal weights (2 rats from each group) were 30% heavier than controls at R+0 and 15% heavier at R+25. Flight rats also had enlarged posterior lobes. Author

N79-11665*# California Univ. at San Francisco. Dept. of Anatomy.
HISTOLOGICAL STUDIES ON TIBIAL BONE OF RATS IN THE 1975 COSMOS-782 FLIGHT. PART 1: ENDOCHONDRAL OSTEOGENESIS; MEDULLARY BONE TURNOVER Final Report
C. Willet Asling *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 276-290 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

Tibia lengths, histological appearance of the proximaltibial epiphysis and metaphysis, and measurements of the bony spongiosa are reported for six rats subjected to weightlessness in earth-orbit for 19 days, and are compared with similar studies conducted on vivarium controls and on synchronous controls. Bone formation was slightly impaired in synchronous controls, and to an appreciably greater extent in flight animals. Bone resorption was moderately accelerated in synchronous controls, markedly more so in flight animals, to an extent under which virtually all pre-flight medullary bone was removed. S.E.S.

N79-11666*# California Univ. at San Francisco. Dept. of Anatomy.
HISTOLOGICAL STUDIES ON TIBIAL BONE OF RATS IN THE 1975 COSMOS-782 FLIGHT. PART 2: MICRORADIOGRAPHIC STUDY OF CORTICAL BONE Final Report
C. Willet Asling *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 291-307 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

The hypothesis based on a shift in the normal balance of internal structural remodelling of bone might account for reduction of bone mineral during prolonged weighlessness in earth-orbit is discussed. Rat cortical bone made by microradiography, on samples of tibia from rats in the 1975 COSMOS-782 experiment (together with synchronous and vivarium controls) is studied. Microradiographs were examined to provide semi-quantitative measurements of bone porosity and of mineral densities ranging from minimal to maximal in four proportionate ranges. Results suggested that ranges of mineral densities in these 3 month-old vivarium control rats were in accord with findings of other on human juveniles. S.E.S.

N79-11667*# California Univ. at San Francisco.
MINERALIZATION IN TEETH AND JAWS, AS JUDGED RADIOGRAPHICALLY, IN RATS OF THE COSMOS-782 EXPERIMENT Final Report
Irene Savostin-Asling, Willet Asling, and Stanley Ellis *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 308-320 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

The data on mineralization of the teeth in rats of the COSMOS-782 joint biology satellite experiment is presented. Estimations were made from radiographs by optical densitometry. The bone resorption of spongy bone in the rats in discussed. Special efforts were made to standardize the regions of tooth structure being measured, in the hoe that masses of tissue of low experimental reactivity might not obscure more highly reactive sites. S.E.S.

N79-11668*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS Final Report
Emily Morey Holton and David J. Baylink (Veterans Admin. Hospital, Seattle) *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 321-351 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

The effect of space flight on bone formation and mineralization, bone resorption, bone length, bone density and pore size distribution, and bone mechanical properties in rats was investigated and compared to vivarium and synchronous controls. The most striking effects were found on bone formation. All parameters were investigated in the flight animals immediately after flight were significantly decreased from both the vivarium and synchronous control groups. An arrest line was found at both the endosteum and the periosteum of the flight animals suggesting that a complete cessation of bone growth occurred during space flight. By 25 days postflight, the flight animals showed a significant increase in bone formation when compared to the vivarium controls suggesting that a rebound in bone formation occurred following flight. Author

N79-11669*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COSMIC RAY EFFECTS ON THE EYES OF RATS FLOWN ON COSMOS 782 Final Report
Delbert E. Philpott, Robert Corbett, Charles Turnbill, Gladys Harrison, David Leaffer, Sam Black, Walter Sapp, Gloria Klein, and Loya F. Savik *In its* US Expt. Flown on the Soviet Satellite COSMOS 782 Sep. 1978 p 352-381 refs

Avail: NTIS HC A18/MF A01 CSCL 06R

The eyes from six rats were fixed at the recovery site in Russia after circling the earth for 19.5 days in a 62.8 deg orbit. Twelve more flight eyes were fixed 25 days later. These two preparations and eyes exposed to 1000 rads of neon and argon, were compared to obtain data on possible radiation effects on the retina. The outer nuclear layer was examined for radiation changes because these nuclei control the synthesis of the outer segments. Necrotic nuclei were found in the outer nuclear layer and channels were located in the outer segment area. Macrophages were seen between the pigment layer and outer segments. Comparison of the zero day and 25 day postflight eyes suggested some possible recovery. Flight flashes seen by space travelers and damage from cosmic rays appeared to arise from two different sites of interaction. The flashes are created by cosmic ray traversal of the outer segments while pathology, when it occurs, is quite possibly from interaction with some part of the nucleus. Author

N79-11670*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF WEIGHTLESSNESS ON THE EMBRYONIC DEVELOPMENT AND AGING OF DROSOPHILA Final Report
J. Miquel, D. E. Philpott, P. R. Lundgren, R. Binnard, and C. E. Turnbill *In its* US Expt. Flown on the Soviet Satallite COSMOS 782 Sep. 1978 p 382-409 refs

Avail: NTIS HC A18/MF A01 CSCL 06C

The biological effects of weightlessness were investigated on Drosophila melanogaster of the Domodedov-32 strain, which developed and spent the first days of adult life in space. Following a 19.5 day exposure to zero g, the flies were studied by morphological, chemical and behavioral techniques. The development of Drosophila was insensitive to weightlessness and the aging process was not influenced, except for a slight reduction in the amount of lipofuscin present in the midgut and Malpighian tubules. Author

N79-11671*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
US EXPERIMENTS FLOWN ON THE SOVIET SATELLITE COSMOS 936 Final Reports
Susan N. Rosenzweig (Northrop Services, Inc., Anaheim, Calif.) and Kenneth A. Souza Sep. 1978 295 p refs
(NASA-TM-78526; A-7616) Avail: NTIS HC A13/MF A01 CSCL 06B

Results of spaceborne experiments onboard the Cosmos 936 satellite are reported. Alterations in normal bone chemistry, muscle structure, and general physiology resulting from spaceflight are covered along with measurements of cosmic radiation and its potential hazard to man during prolonged spaceflights. Postflight activities involving the seven U.S. experiments are emphasized.

N79-11672*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE COSMOS 936 MISSION Final Report
Kenneth A. Souza *In its* US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 1-31 refs

Avail: NTIS HC A13/MF A01 CSCL 06C

Cosmos 936, an unmanned spacecraft carrying biology and physics experiments from 9 countries, including both the Soviet Union and the U.S., is described. An overview of the mission focusing on preflight, on-orbit, and postflight activities pertinent to the seven U.S. experiments aboard Cosmos 936 is presented J.M.S.

N79-11673*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF WEIGHTLESSNESS ON THE GENETICS AND AGING PROCESS OF DROSOPHILA MELANOGASTER Final Report
Jaime Miquel and Delbert E. Philpott *In its* US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 32-59 refs

Avail: NTIS HC A13/MF A01 CSCL 06C

The biological effects of space flight were investigated on fruit flies (male Drosophila melanogaster Oregon R), in an experiment planned jointly with the USSR. The effects of near-weightlessness on the developmental and aging processes were studied. Larval cultures and mature flies (imagoes) were exposed to the space environment onboard the Cosmos 936 biosatellite. It is shown that the effect of hypogravity on the development processes of Drosophila is negligible. In effect, detailed investigation by scanning and transmission electron microscopy of flies which had developed in space shows that the external morphology and the internal fine structure of these insects are perfectly normal. This suggests that, at least in Drosophila, the mechanism of cell division and differentiation associated with growth and morphogenesis are not appreciably influenced by the lack of gravity. The fly populations which were exposed to near-weightlessness during the young or middle age phases of their adult life span show reduced vitality and a detrimental effect on longevity. J.M.S.

N79-11674*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECT OF WEIGHTLESSNESS AND CENTRIFUGATION (LXG) ON ERYTHROCYTE SURVIVAL IN RATS SUBJECTED TO PROLONGED SPACE FLIGHT Final Report
Henry A. Leon, Stephen A. Landaw (Veterans Administration Hospital, Syracuse, N. Y.), and Luba V. Serova (Inst. for Biomedical Problems, Moscow) *In its* US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 60-76 refs

Avail: NTIS HC A13/MF A01 CSCL 06S

Rats were flown aboard the biosatellite Cosmos 936 for 18.5 days. Five rats were subjected to near-weightless space flight and five rats were subjected to a one g force via an onboard centrifuge. These rats, and 3 control groups were injected with 2-C-14 glycine 19 days preflight. The flight rats were recovered from orbit after 18.5 days of space flight. Erythrocyte hemolysis and life span were evaluated in the five groups of rats by quantitation of radioactive carbon monoxide exhaled in the breath, which arises from the breakdown of the previously labeled hemoglobin. The results are supportive of previous findings, wherein hemolysis was found to increase as a result of weightless space flight. A comparison with the centrifuged animals indicates that artificial gravity attenuates the effect of weightlessness on hemolysis and appears to normalize the hemolytic rate in the early postflight period. J.M.S.

N79-11675*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COSMOS 936, EXPERIMENT K204: THE EFFECTS OF SPACE FLIGHT ON SOME LIVER ENZYMES CONCERNED WITH CARBOHYDRATE AND LIPID METABOLISM IN THE RAT Final Report
S. Abraham (Children's Hospital Medical Center of Northern Calif.), H. P. Klein, C. Y. Lin (Children's Hospital Medical Center of Northern Calif.), and C. Volkmann *In its* US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 78-134 refs

Avail: NTIS HC A13/MF A01 CSCL 06C

The activities of about 30 enzymes concerned with carbohydrate and lipid metabolism and the levels of glycogen and of the individual fatty acids in hepatic lipids in rat livers exposed to space flight conditions were examined. Statistically significant decreases in the activity levels of glycogen phosphorylase, alpha-clycerol phosphate acyl transferace, diglyceride acyl transferace, aconitase, and 6-phosphoglocomate dehydragenase were noted in the weightless group. All enzyme activities returned to normal 25 days postflight. When the liver glycogen and the total fatty acids of the flight animals were determined, significant differences that could be attributed to reduced group at recovery contained more than twice the amount of glycogen than did the centrifuged controls and a remarkable shift in the ratio of palmitate to palmitoleate was noted. J.M.S.

N79-11676*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS Final Report
Emily Morey Holton, Russell T. Turner (Veterans Administration Hospital, Tacoma, Wash.), and David J. Baylink (Veterans Administration Hospital, Tacoma, Wash.) *In its* US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 135-183 refs
Avail: NTIS HC A13/MF A01 CSCL 06S

The effect of space flight on bone formation, bone resorption, bone length, bone density and pore size distribution, bone mechanical properties, and bone cell number in both flight and 1 G flight centrifuged rats was investigated and compared to ground control groups. The data obtained suggest that no gross change in endosteal bone resorption occurs during flight or postflight; that mean periosteal bone formation rate decreases about 45% and is not corrected by centrifugation; that the decrease in formation rate may be due, in part, to a cessation of bone formation which occurs sometime after the eleventh day of flight and continues until the second postflight day; that although centrifugation did not correct the defect in periosteal bone formation rate during flight, it appears to hasten the recovery following flight; that femor stiffness decreases about 30%; and that centrifugation did correct the defect in bone mechanical properties. All perturbations produced by space flight returned to or exceeded normal values by 25 days after flight. Author

N79-11677*# San Francisco Univ., Calif. Physics Research Group.
SPACE RADIATION DOSIMETRY ONBOARD COSMOS 936: US PORTION OF EXPERIMENT K-206 Final Report
E. V. Benton, R. Cassou, A. Frank, R. P. Henke, and D. D. Peterson *In* NASA Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 184-245 refs
(Contract NAS2-9504)
Avail: NTIS HC A13/MF A01 CSCL 06R

The space radiation environment was investigated in a joint U.S. - U.S.S.R. experiment onboard the Cosmos 936 biosatellite.

Results derived from measurements made in a variety of passive radiation detectors including plastic nuclear track detectors, fission foil detectors, thermoluminescence dosimeters, and nuclear emulsions are reported. The mean observed HZE particle flux, as measured in cellulose nitrate plastic detectors, was 1.75 sq cm/day (+ 20%). The fluences of thermal neutrons, resonance neutrons, and high energy neutrons were, respectively, 364, 000 sq cm, 950,000 sq cm, and 2,100,000 sq cm the total dose, as measured in TLD chips located at two sites in the U.S. - 25% part of the K-206 container, was 424 mrad (+ 9%) and 523 mrad (+ 11%). The mean tissue equivalent proton ender density, as measured in nuclear emulsions located in the U.S. - 25% part, was 272,000 cu cm/tissue. The physical parameters of the radiation environment reported help specify important dosimetric information required to assess the potential radiation hazards to life systems in space. J.M.S.

N79-11678*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COSMIC RAY EFFECTS ON THE EYES OF STATIONARY AND CENTRIFUGED RATS FLOWN ON COSMOS 936, EXPERIMENT K-207 Final Report
Delbert E. Philpott, Robert Corbett, Charles Turnbill, Sam Black, Dayhoff, Jackie McGourty, Robert Lee, and Gladys Harrison *In its* US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 246-273 refs

Avail: NTIS HC A13/MF A01 CSCL 06R

Ten rats, 5 centrifuged during flight to simulate gravity and 5 in flight stationary experiencing hypogravity, orbited the earth in a 62.8 deg orbit for 18.5 days in the Russian satellite Cosmos 936. The animals were sacrificed 25 days post-recovery and the eyes were enucleated and fixed immediately. No differences were noted comparing flight stationary to flight centrifuged. Affected cells in the outer nuclear layer, where synthesis of the outer segment takes place, showed swelling, clearing of cytoplasm, and disruption of the membranes. Channels were again found similar to those seen in K-007. Preliminary results using the digitizer to quantitate the tissue response indicated an increase in cell size after radiation and decrease in the number of cells in the outer nuclear layer. Author

N79-11679*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
COSMOS 936, EXPERIMENT K-208: SPACEFLIGHT EFFECTS ON MUSCLE FIBERS Final Report
Kenneth R. Castleman, Luis A. Chui (Univ. of Southern Calif., Los Angeles), and Joseph P. Vandermeulen (Univ. of Southern Calif., Los Angeles) *In* NASA. Ames Res. Center US Expt. Flown on the Soviet Satellite COSMOS 936 Sep. 1978 p 274-289 refs
Avail: NTIS HC A13/MF A01 CSCL 06S

Muscle fiber size and type distribution were studied in the extensor digitorium longus (e.d.1.) muscle of 15 COSMOS 936 rats. The groups studied include 5 flight stationary, 5 synchronous stationary, and 5 vivarium control animals. Of the 3 groups, average fiber diameter was largest in the vivarium control animals and smallest in the flight animals. Flight muscles appeared to be shorter than those of the other groups. Fiber number showed no significant difference. The e.d.1. contains predominantly fast twitch fibers. The slow fiber percentage was quite variable in these animals, and no statistically significant fiber type conversion was noted. J.M.S.

N79-11680 Carnegie-Mellon Univ., Pittsburgh, Pa.
CALCIUM REGULATION IN SMOOTH MUSCLE: ISOLATION AND CHARACTERIZATION OF THE MYOSIN LIGHT CHAIN KINASE Ph.D. Thesis
Debra Kay Aromatorio 1978 161 p
Avail: Univ. Microfilms Order No. 7815193

The most widely accepted theory for Ca(2+) regulation in smooth muscle involves the Ca(2+) dependent phosphorylation of the myosin 20,000 dalton light chain. Although most of the evidence favors a dominant role for phosphorylation in the control mechanism, a direct correlation between actin-activation and phosphorylation has not been previously established, since heterogeneous preparations of the kinase were used. In an attempt to demonstrate a direct correlation between these two events the Ca(2+) dependent protein kinase (ATP: myosin light chain phosphotransferase) from chicken gizzard was isolated and characterized. Dissert. Abstr.

N79-11681 Southern Illinois Univ. at Carbondale.
CARDIOVASCULAR, METABOLIC, AND RESPIRATORY RESPONSES OF SEDENTARY FEMALES TO EQUAL METABOLIC WORKLOADS ON THE BICYCLE ERGOMETER AND TREADMILL Ph.D. Thesis
Daniel Stephen Miles 1978 139 p
Avail: Univ. Microfilms Order No. 7817537

The relationships between heart rate, stroke volume, cardiac output, difference in oxygen content between arterial and mixed venous blood difference, and oxygen uptake during cycling and running at 30%, 60%, and 80% of aerobic work capacity in females was studied. Ventilatory responses were analyzed to determine the influence of acid-base imbalance at equivalent metabolic workloads. Eighteen female subjects were divided into three age groups of 6 individuals each, to analyze the influence of age on cardiovascular, metabolic, and respiratory responses to exercise. Cardiovascular adjustments to equivalent metabolic workloads on the bicycle ergometer and treadmill were very similar. However, there was a greater degree of metabolic acidosis present for equivalent work on the bicycle ergometer compared to the treadmill. There was no consistent difference between age groups when comparisons were made for cardiovascular, metabolic, and respiratory responses to work on either the bicycle ergometer or treadmill. Dissert. Abstr.

N79-11682 Johns Hopkins Univ., Baltimore, Md.
THE EFFECTS OF CARBON MONOXIDE AND CYANIDE ON THE BRAIN Ph.D. Thesis
Bruce Robert Pitt 1978 227 p
Avail: Univ. Microfilms Order No. 7817971

The potential toxicological effects of carbon monoxide and cyanide were examined to provide a physiologic basis for their effects on victims of fires. Experiments were performed on anesthetized paralyzed dogs. Cerebral venous blood flow (CBF) was measured at the confluence of the sagittal, straight and lateral sinuses, with the lateral sinuses occluded. The similarities of the brain's response to CN or CO, the additive effect of CN and CO on CBF and the consistency of the CBF to VO2 relationship for combinations of CO and CN suggest that these two agents are physiologically additive. The toxicity of the fire environment may be underestimated by considering only the inventory of combustion products without taking into account possible interactions. THe additive effect of CN and CO on CBF, and the more than additive effect on VO2, may explain the altered central nervous system function and failure to escape by individuals confronted with the fire environment. Dissert. Abstr.

N79-11683*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
VESTIBULAR FUNCTION RESEARCH (VFR) EXPERIMENT. PHASE B: DESIGN DEFINITION STUDY Final Report
24 May 1978 307 p
(Contract NAS2-9781)
(NASA-CR-152207; LMSC-D-626121) Avail: NTIS HC A14/MF A01 CSCL 06S

The Vestibular Functions Research (VFR) Experiment was established to investigate the neurosensory and related physiological processes believed to be associated with the space flight nausea syndrome and to develop logical means for its prediction, prevention and treatment. The VFR Project consists of ground and spaceflight experimentation using frogs as specimens. The phase B Preliminary Design Study provided for the preliminary design of the experiment hardware, preparation of performance and hardware specification and a Phase C/D development plan, establishment of STS (Space Transportation System) interfaces and mission operations, and the study of a variety of hardware, experiment and mission options. The study consist of three major tasks: (1) mission mode trade-off; (2) conceptual design; and (3) preliminary design. G.Y.

N79-11684*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SUBCUTANEOUS CHANNELING PROBE Patent Application

Gordon F. Lund (NAC-NRC), Richard C. Simmonds, and Bill A. Williams, inventors (to NASA) Filed 31 Oct. 1978 12 p (NASA-Case-ARC-11091-1; US-Patent-Appl-SN-956162) Avail: NTIS HC A02/MF A01 CSCL 06B

The subcutaneous channeling probe 15 provided an instrument for use in the placement of biosensors with long leads in animals. The probe channeled subcutaneously through connective tissue from the site of lead entry 4 to the site of biosensor placement. After securing a sensor to the end of the probe, the probe was pulled out of an exit incision 5, guiding the biosensor and lead into place. The probe was constructed of flexible rod material, such as standard 9.5 mm (3/8 inch) nylon rod and was provided with blunted pointed tips; spearhead tip 8 and tapered end tip 9. This design permitted the efficient channeling of the instrument through connective tissue when force was exerted through the rod. However, because of the blunted edges 19 and tips, the actual cutting of the connective tissue was kept to a minimum. Further, the probe was constructed in sections 16, 17, and 18. NASA

N79-11685# Franklin Inst. Research Labs., Rockville, Md. Science Information Services Dept.

A LITERATURE REVIEW-PROBLEM DEFINITION STUDIES ON SELECTED TOXIC CHEMICALS. VOLUME 2: OCCUPATIONAL HEALTH AND SAFETY ASPECTS OF PHOSPHORUS SMOKE COMPOUNDS Final Report, Mar. 1977 - Apr. 1978

Khizar Wasti, K. J. R. Abaidoo, and Jon E. Villaume Apr. 1978 104 p refs

(Contract DAMD17-77-C-7020)

(AD-A056019) Avail: NTIS HC A06/MF A01 CSCL 06/20

This Problem Definition Study provides information on toxicological aspects and health hazards of phosphorus smoke compounds. The compounds covered in this study are red phosphorus, white phosphorus, butyl rubber/red phosphorus, plasticized white phosphorus, and epoxy white phosphorus. The subjects covered in this review are chemical and physical properties, toxicity, pharmacokinetics, sampling and analysis, industrial hygiene and safety practices, and standards. Recommendations for further toxicological studies on animals are also provided. There is virtually no information on the toxicity of butyl rubber/red phosphorus, plasticized white phosphorus, or epoxy white phosphorus. The toxicity of red phosphorus has not been studied very well. White phosphorus has been found to be highly toxic to both experimental animals and humans. Occupational exposure to white phosphorus vapors has produced necrosis of the jaw ('phossy jaw') among workers. There have been no reported cases of carcinogenicity in humans after white phosphorus intoxication. Tests for mutagenicity and teratogenicity have not been reported in the literature. Author (GRA)

N79-11686# Franklin Inst. Research Labs., Rockville, Md. Dept. of Science Information Services.

A LITERATURE REVIEW-PROBLEM DEFINITION STUDIES ON SELECTED TOXIC CHEMICALS. VOLUME 1: OCCUPATIONAL HEALTH AND SAFETY ASPECTS OF DIESEL FUEL AND WHITE SMOKE GENERATED FROM IT Final Report, Mar. 1977 - Apr. 1978

Deborah Liss-Suter and Richard Mason Apr. 1978 66 p refs (Contract DAMD17-77-C-7020; DA Proj. 3E7-62720-A-835) (AD-A056018) Avail: NTIS HC A04/MF A01 CSCL 06/20

Literature is reviewed (75 references) covering analysis, physical and chemical properties, human and animal toxicology, mammalian pharmacokinetics, industrial standards and occupational hazards of diesel fuel and white smoke (an aerosol mixture of diesel fuel, additives, diesel engine exhaust and pyrolysis products). Diesel fuel is an aliphatic and aromatic hydrocarbon mixture obtained from the straight-run distillation of petroleum and often blended with cracked fuels. Composition is controlled only by physical properties (boiling range, flash point, viscosity, cetane number); additives improve combustibility, reduce corrosiveness and reduce gum formation. The smoke is generated by feeding diesel fuel into the exhaust manifold of a diesel engine, creating a vapor which condenses into an opaque mass of microdroplets which may be useful in screening military equipment and personnel. The health hazards of exposure to white smoke have not been studied, although pure diesel fuel aerosols do not appear to be irritating to the respiratory tract or skin of humans during acute exposures to relatively low concentrations. Dermatitis following direct contact with diesel fuel is reportedly due to a combination of poor occupational hygiene and constitutional factors. Ingestion of diesel fuel results in gastritis and patchy destruction of the gastric mucosa. GRA

N79-11687# Franklin Inst. Research Labs., Rockville, Md. Dept. of Science Information Services.

A LITERATURE REVIEW-PROBLEM DEFINITION STUDIES ON SELECTED TOXIC CHEMICALS. VOLUME 5: OCCUPATIONAL HEALTH AND SAFETY AND ENVIRONMENTAL ASPECTS OF ZINC CHLORIDE Final Report, Mar. 1977 - Apr. 1978

Harriet Glaser Hill and Khizar Wasti Apr. 1978 123 p refs (Contract DAMD17-77-C-7020; DA Proj. 3E7-62720-A-835) (AD-A056020) Avail: NTIS HC A06/MF A01 CSCL 06/20

This Problem Definition Study provides a literature review (113 references) on occupational health hazards and environmental aspects of zinc chloride which is a major product of a smoke generated from HC (hexachloroethane) mixture for screening purposes and fire-fighting exercises. Included are physical and chemical properties, human and animal toxicity, effects on microorganisms, plants, and aquatic organisms, pharmacokinetics, fate in the environment, industrial safety standards and practices, and sampling and analysis methodology of zinc chloride. Environmental impact are discussed and recommendations for further studies are provided. Zinc chloride is hygroscopic and astringent and has been found to be toxic if inhaled at elevated concentrations or in enclosed spaces with inadequate ventilation. In occupational exposure, contact with the skin, eyes, or nose can cause severe burns. Ingestion of zinc chloride solutions can result in severe gastrointestinal ulceration. No evidence exists in the literature that zinc chloride is mutagenic. Injection of zinc chloride solutions into the yolk sacs of chicken eggs induced teratogenic effects. Teratogenic effects in other species have not been reported in the literature. There have been no reported cases of carcinogenicity due to zinc chloride exposure in humans. GRA

N79-11688# Franklin Inst. Research Labs., Rockville, Md. Dept. of Science Information Services.

A LITERATURE REVIEW-PROBLEM DEFINITION STUDIES ON SELECTED TOXIC CHEMICALS. VOLUME 8: ENVIRONMENTAL ASPECTS OF DIESEL FUEL AND FOG OILS SGF NUMBER 1 AND SGF NUMBER 2 AND SMOKE SCREENS GENERATED FROM THEM Final Report

Deborah Liss-Suter Apr. 1978 132 p refs

(Contract DAMD17-77-C-7020; DA Proj. 3E7-62720-A-835) (AD-A056021) Avail: NTIS HC A07/MF A01 CSCL 06/20

In this literature review (117 references) on the environmental aspects of fog oils and diesel fuel and the smoke screens, or fogs, generated from them, the topics which are investigated include the effects of petroleum fuels and lubricants on waterfowl and birds, insects, plants, soil nematodes, fish, marine worms, molluscs, crustaceans, and other marine species, phytoplankton, microorganisms and zooplankton. In addition to acute toxicity of these petroleum oils in most species, adverse effects on reproduction, carcinogenicity, chemically-mediated behavior disruption, and inhibition of photosynthesis, among others, are reported for various organisms. Factors influencing the atmospheric dispersion of the oil smokes, and the dispersion and persistence of the oil films on soil, water, and vegetation resulting from the settling of the oil smoke to ground level are reviewed, as well as pathways by which these petroleum oils are chemically and biologically degraded, and their uptake and accumulation in species ranging from algae through fish and shellfish to humans. Current techniques for sampling and analysis of fog oils and diesel fuel in water, soil and biological media are presented. GRA

N79-11689# Dynamic Science, Phoenix, Ariz.
ANALYSIS OF NAVAL AVIATION HEAD AND NECK INJURIES (1969-1978) Final Report, May 1971 May 1978
L. H. Tyndall and R. W. Carr May 1978 101 p refs
(Contract N00014-71-C-0318; RR0130301)
(AD-A057657; Rept-0249-78-81) Avail: NTIS HC A06/MF A01 CSCL 06/16

U.S. Naval aviation accidents during the period January 1969 to March 1978 were reviewed to study the nature and severity of injuries to the head and neck. Results, by aircraft models and types, were tabulated and analyzed to determine the number and types of injuries to the skull, face, eyes, neck, and cervical vertebra; this information was then used to determine the primary impact force direction. The role of the helmet in injury causation or prevention was also considered in the final directional determination. Author (GRA)

N79-11690# Desmatics, Inc., State College, Pa.
AN EXAMINATION OF STATISTICAL IMPACT ACCELERATION INJURY PREDICTION MODELS BASED ON -Gx ACCELERATOR DATA FROM SUBHUMAN PRIMATES
Dennis E. Smith Aug. 1978 35 p refs
(Contract N00014-74-C-0154; NR Proj. 207-037)
(AD-A057276; TR-102-6) Avail: NTIS HC A03/MF A01 CSCL 06/19

This report considers the application of an impact acceleration injury prediction model to observed data from a set of twenty-eight -G sub x accelerator runs involving subhuman primates (Rhesus monkeys) with securely restrained torso and unrestrained head. The data was collected by the Naval Aerospace Medical Research Laboratory (NAMRL) Detachment as part of its research effort on acceleration impact injury prevention. Using a common data base, two different models were constructed, one based on sled profile variables and the other based on head dynamic response variables. Although the latter model provided a reasonable fit given the small size of the data set, the other model (based on sled profile variables) resulted in a much better fit. Possible explanations for this seemingly anomalous result are listed and additional accelerator runs are suggested. Author (GRA)

N79-11691# California Univ., Livermore. Lawrence Livermore Lab.
QUANTITATIVE REVIEW OF HUMAN SUSCEPTIBILITY TO MAGNETIC FIELDS
A. Schiff Mar. 1978 33 p refs
(Contract W-7405-eng-48)
(UCID-17773) Avail: NTIS HC A03/MF A01

The effects of magnetic fields on humans and animals was investigated. Quantification of exposure time to the fields by the subjects was considered. The importance of some parameters such as the distinction between uniform and gradient fields and orientation between subjects and the magnetic fields was also considered. Results suggest avoiding exposure to several types of magnetic fields: alternating-current fields in the body-function frequencies at any magnetic intensity (0.3 to 10 Hz and 18 to 30 Hz); all frequencies for extended periods at intensities above 20 mT(200 gauss) (T = tesla); and all frequencies greater than 10 Hz at levels above 0.1 mT(1 gauss) for people with cardiac pacemakers. DOE

N79-11692# Advisory Group for Aerospace Research and Development, Paris (France).
PROSPECTIVE MEDICINE OPPORTUNITIES IN AEROSPACE MEDICINE
J. H. Triebwasser, ed. (School of Aerospace Med.) Sep. 1978 100 p refs Presented at Aerospace Medical Panel's 34th Panel Meeting/Specialists' Meeting, London, 24-28 Oct. 1977
(AGARD-CP-231; ISBN-92-835-1293-6) Avail: NTIS HC A05/MF A01

Various applications of prospective medicine techniques are discussed with relation to the practice of aerospace medicine. Studies were conducted on special population of military aircrew in the prevalence incidence of findings. Multiple risk assessments, correlation of with disease risks, and results of efforts to modify the risk for disease and their clinical manifestations were examined.

N79-11693# National Defence Headquarters, Ottawa (Ontario). Directorate of Preventive Medicine.
THE CANADIAN FORCES LIFE QUALITY IMPROVEMENT PROGRAMME
John E. Bardsley *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 6 p

Avail: NTIS HC A05/MF A01

The Canadiah Gorces introduced a life quality improvement program to counteract the ravages of diseases which arise from risks prevalent in most lifestyles in Western society. These so called diseases of choice are discussed in terms of their self-imposed risks. A summary of the program concept is given centering around 15 factors and six philosophies deemed essential for success. Central in the program is the individual assessment which is composed of various biomeasurements, a health hazard appraisal, a health questionnaire and an interview. In support of this assessment will be an educational/promotional campaign and a variety of supportive clinics. B.B.

N79-11694*# National Aeronautics and Space Administration, Washington, D. C.
THE ROLE OF PHYSICAL EXAMINATIONS AND EDUCATION IN PROSPECTIVE MEDICINE
Walton L. Jones, Jean Mockbee, Carolyn K. Snow, and J. Richard Compton (Natl. Health Services, Inc.) *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 9 p refs

Avail: NTIS HC A05/MF A01

NASA's prospective medicine program, with the principal elements of physical examinations and an educational program for health awareness is described. Participation in the voluntary physical examination program is increasing. In 1976 13,621 employees were given partial or complete examination in NASA Health Units. From the 941 examinations performed at NASA Headquarters in 1976, 522 principal findings were detected. Equipment and techniques in exercise EKG, tonometry, and colonoscopy were partially responsible for this high rate. The health awareness program includes consultations with physicians, training devices and courses, health bulletins, and special screening programs. Epidemiological studies, now underway, will be used to evaluate the health awareness programs. B.B.

N79-11695# Naval Aerospace Medical Research Lab., New Orleans, La.
MEDICAL QUALIFICATION PROCEDURES FOR HAZARDOUS-DUTY AEROMEDICAL RESEARCH
D. J. Thomas, P. L. Majewski, C. L. Ewing, and N. S. Gilbert *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 13 p refs

Avail: NTIS HC A05/MF A01

Volunteer subjects were recruited for hazardous duty impact and vibration acceleration stress experiments during the past 10 years. Dental and lumbosacral spinal abnormalities are the major cause of disqualification. From a group of 1,277 prospective volunteers, only 63 (4.9 percent) were qualified and only 44 (3.4 percent) successfully completed the experimental program. The procedures and findings of the selection program are presented. Volunteers were recruited, evaluated, and used in strict accordance with specified procedures. B.B.

N79-11696# Federal Aviation Administration, Washington, D. C.
EXPERIENCE WITH PERIODIC AVIATION MEDICAL EXAMINATIONS
Edwin E. Westura *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 15 p refs

Avail: NTIS HC A05/MF A01

Personal observations and experience with civilian aviation medical examinations and the Federal Aviation Administration (FAA) certification system from June 1964 through June 1977 are presented. Special attention was devoted to methods used in the assessment of the cardiovascular system. Emphasis was placed upon a systematic approach to those cardiovascular conditions, especially coronary heart disease, which might adversely affect pilot performance, and which present a hazard to public safety. Coronary heart disease and its clinical manifestations are the major cardiovascular problem in United States civilian aviation medicine today. Evaluation techniques were used in detecting potentially dangerous conditions. B.B.

N79-11697# School of Aerospace Medicine, Brooks AFB, Tex. Clinical Sciences Div.

A PROSPECTIVE MEDICINE APPROACH TO THE PROBLEM OF ISCHEMIC VASCULAR DISEASE IN THE USAF

Malcolm C. Lancaster *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 5 p refs

Avail: NTIS HC A05/MF A01

A program of ischemic vascular disease risk factor identification and intervention is described. An individual risk calculation was performed which identifies the current risk for the individual and also projects the effect of modification of individual risk upon the combined risk figure. B.B.

N79-11698# Medizinische Poliklinik der Univ., Wuerzburg (West Germany).

THE SIGNIFICANCE OF RHYTHM DISTURBANCES IN ASYMPTOMATIC PERSONS

Armin Dietz and Josef Walter *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 6 p refs

Avail: NTIS HC A05/MF A01

Nearly all rhythm disturbances can be found in persons without clinically significant heart disease. Various ECG methods and epidemiologic studies help to clarify their prognosis. The results of such investigations are of special importance to aviation medicine, because arrhythmias can cause sudden incapacitation. Those arrhythmias occurring in a well controlled asymptomatic population such as flying personnel are described. The immediate hemodynamic consequences of these ECG alterations and possible prognostic implications for the incidence of sudden dangerous arrhythmias are discussed. B.B.

N79-11699# School of Aerospace Medicine, Brooks AFB, Tex. Internal Medicine Branch.

DISTINGUISHING BORDERLINE HYPERTENSIVES FROM NORMOTENSIVES: A CLINICAL STUDY OF 300 AIRCREWMEN

David H. Hull, Roger A. Wolthuis, Joseph R. Fischer, John H. Triebwasser, Jacki T. Curtis, and Donald A. McAfoose *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 8 p refs

Avail: NTIS HC A05/MF A01

Ambulant aircrewmen (299) referred to a clinical consultation service were evaluated with a brief orthostatic test; blood pressure (BP) and heart rate were recorded alternately during both supine rest and 5 minutes of quiet standing. The patients were divided into four groups depending on BP history (normotension vs. borderline hypertension) and BP from the current clinical examination (normal vs. elevated). During supine rest, most patients with a normotensive history and a majority of those with a borderline hypertensive history and BPs in the normal range. During stand, BP remained normal in most normotensives but was elevated in a majority (62 percent) of borderline hypertensives. These results were used to compute the probability of borderline hypertension in an individual patient, given either the BP from his current clinical examination or the average BP from the stand part of his orthostatic test, or both. Curves were constructed showing this probability in populations with various prevalences of borderline hypertension. The value of an orthostatic test combined with a standard clinical BP in distinguishing between borderline hypertension and normotension was apparent. B.B.

N79-11700# Naval Air Development Center, Warminster, Pa. Biochemistry Lab.

MOLECULAR DETERMINANTS FOR THE PREDICTION AND SURVIVAL OF ISCHEMIC ANOXIC STRESS PATHOLOGY

B. David Polis *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 5 p refs

Avail: NTIS HC A05/MF A01

Quantitation of membrane phospholipids in mitochondria and microsomes from acceleration stressed as well as radiation stressed animals revealed significant variations in individual species of phospholipids which were reiterated in the blood plasma. Application of the methodology to humans showed the feasibility of achieving a molecular index to stress via blood plasma phospholipids. These results were complimented with studies for noninvasive procedures using the techniques of high pressure liquid chromatography and electron spin resonance spectroscopy to detect excited state metabolites in urine which could be correlated with stress intolerance. With this procedure a significant increase in free radical forming species was found in the urine of volunteers centrifuged to grayout as well as in a civilian population of patients scheduled for heart surgery. Correlation of the free radical concentrations with values for lipid peroxides and phenolic compounds have a three dimensional readout which separated stress tolerant individuals from those with debilitating intolerance to stress. Author

N79-11701# School of Aerospace Medicine, Brooks AFB, Tex. Neuropsychiatry Branch.

PSYCHOSOCIAL ASPECTS OF SYNCOPE AND VERTIGO IN AIRCREW

James A. Boydstun and William H. Sledge *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 7 p refs

Avail: NTIS HC A05/MF A01

For an 8.5 month period, all cases (N = 47) referred to the USAF School of Aerospace Medicine for evaluation of syncope, vertigo, or dizziness were seen for a standardized psychiatric interview, mental status examination, hyperventilation experience, and psychometrics. Twenty-one patients reported that their symptoms of hyperventilation were the same as or very similar to their reference symptoms. The findings from the subgroup were analyzed and compared to a group of 31 control subjects. The study group reported a great deal more symptoms after hyperventilating (a checklist was used). They were much more apt to report job maladjustment, parental conflict, and separation from their families. Common mental status findings were low self-esteem worry, helplessness, fearfulness, suspiciousness, evasive guardedness, meticulousness, and perfectionism. Their prominent mental defense mechanisms included projection, intellectualization, and repression. The Cornell Index and Cattell's 16 PF showed significant group differences. Author

N79-11702# Royal Air Force Hospital, Halton (England).

BETA-ADRENOCEPTOR ANTAGONISTS: CENTRAL EFFECTS

J. N. C. Cooke and A. N. Nicholson (Royal Air Force Inst. of Aviation Med.) *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 3 p refs

Avail: NTIS HC A05/MF A01

Beta-adrenoceptor antagonists used widely in therapeutics, and intended for the treatment of angina pectoris and cardiac arrythmias were reviewed. Their ability to lower blood pressure in hypertension proved to be the major clinical application. These drugs aroused interest in aviation medicine because of their possible use in the management of mild hypertension, but the question arises whether their use in aircrew may be accompanied by unacceptable changes in the function of the central nervous system. There is evidence that their hypotensive effect may involve cerebral mechanisms, and that their use may lead to behavioral disturbances such as dreams and visual hallucinations. They may be used in the management of neurological disorders such as essential tremor, thyrotoxicosis, anxiety, migraine and possibly schizophrenia, and it is these observations which suggest that a cautious approach may be appropriate when impaired central nervous activity is to be avoided. B.B.

N79-11703# School of Aerospace Medicine, Brooks AFB, Tex.
THE PREDICTION OF THE EXISTENCE OR NONEXISTENCE OF CORONARY ARTERY DISEASE USING ROUTINE CLINICAL LABORATORY MEASUREMENT
Raymond G. Troxler, Robert J. Fuchs, Eugene A. Sprague, Martin T. Bailey, John H. Triebwasser, and Emmanuel L. Mosser *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 4 p
Avail: NTIS HC A05/MF A01

Multivariate analysis shows that plasma cortisol contributes significantly over the above cholesterol and age as a discriminator between those patients with positive coronary arteriograms and patients with negative studies. Data from 57 patients were used to develop a multiple logistic risk function for cholesterol, age, and plasma cortisol. The resulting predictive model demonstrated a predictive value of 86% for a positive test and predictive value of 89% for a negative test. The model was then tested on 78 additional patients who had coronary angiography. The predictive value of a positive test was 91% and the predictive value of a negative test was 78% on the validation group. If further testing continues to validate these findings, it appears that plasma cortisol may be a risk factor for the prediction of coronary artery disease. B.B.

N79-11704# Montefiore Hospital, New York. Inst. for Steroid Research.
COMPARISON OF PLASMA AND URINARY STEROIDS IN MEN WITH TYPE A AND TYPE B BEHAVIOR PATTERNS
Barnett Zumoff, Robert S. Rosenfeld, Meyer Friedman, Sanford O. Byers, Ray H. Rosenman, and Leon Hellman *In* AGARD Prospective Med. Opportunities in Aerospace Med. Sep. 1978 8 p refs Prepared in cooperation with Mount Zion Hospital and Medical Center, San Francisco, Calif.

Avail: NTIS HC A05/MF A01

A large number of uninary and plasma steroidal parameters were compared in men with Type A and Type B behavior patterns. Two differences were found between these groups: (1)Type A men showed higher daytime (0900-1800)uniary excretion of testosterone glucuronide than Type B men; (2) Type B men showed higher average plasma concentrations of dihydrotestosterone. The results suggest that it may be possible to decrease the risk of coronary heart disease in Type A men by intervening to change the levels or antagonize the effects of certain steroid hormones. B.B.

N79-11705# Advisory Group for Aerospace Research and Development, Paris (France).
SPECIFIC FINDINGS IN CARDIOLOGY AND PULMONARY FUNCTION WITH SPECIAL EMPHASIS ON ASSESSMENT CRITERIA FOR FLYING
M. C. Lancaster, ed. (School of Aerospace Med., Brooks AFB, Tex.) Sep. 1978 170 p refs Presented at Aerospace Med. Panel's 34th Panel Meeting/Specialists Meeting, London, 24-28 Oct. 1977
(AGARD-CP-232; ISBN-92-835-0221-3) Avail: NTIS HC A08/MF A01

Cardiopulmonary disease among military and flight personnel is discussed in terms of premature disability. Data on normal values, natural history, performance of testing methods, assessment of newer techniques for disease detection and definition as well as philosophies of determination of fitness to fly are presented.

N79-11706# Centre de Medecine Aeronautique, Brussels (Belgium).
FOLLOW-UP AND TRANSVERSAL STUDY OF VITAL CAPACITY AND FEV SUB VALUES AMONG PERSONNEL OF THE BELGIAN ARMY FORCES
J. Bande, J. Clement, and K. P. VanDeWoestijne *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 10 p refs Prepared in cooperation with Academisch Ziekenhuis St. Raphael, Leuven, Belgium

Avail: NTIS HC A08/MF A01

Vital capacity (VC) and one second forced expiratory volume (FEV sub 1) measured in 7123 subjects during annual or biennial medical examinations were analyzed as a function of age (A), weight (W), and standing height (H). The subjects were grouped according to their smoking habits; nonsmokers, light and heavy smokers. Two different studies were performed: a transversal (comparison between subjects) and longitudinal study (comparison within subjects at successive times). The VC and FEV sub 1 were found to increase with age up to 22-23 years; thereafter a steady decline was observed, more pronounced in smokers than in nonsmokers. The decrease with age was more marked in the longitudinal study. In both, longitudinal and transversal surveys, body weight influences the values of VC and FEV sub 1 especially via the cross-products HW, AW, indicating that the effect of weight on the spirometric values varies with age and height. An increase of weight tends to be accompanied with an increase of VC and FEV sub 1 in the younger, taller, and lighter subjects. This effect weakens or even reverses with increasing age and weight, decreasing height, and with heavier smoking (in the longitudinal study). The influence of height on VC and FEV sub 1 appeared to depend more on the cross-product HW, than on H or a power of H, indicating that the effect of height depends markedly on the weight of the subjects, as well in the longitudinal as in the transversal study. Author

N79-11707# Centre d'Essais en Vol, Bretigny-sur-Orge (France).
DETECTION AND SUPERVISION OF OBSTRUCTED RESPIRATORY FLOW IN FLIERS. ADVANTAGES OF DEBIT-VOLUME GRAPHS [DETECTION ET SURVEILLANCE DES TROURCES VENTILATOIRES OBSTRUCTIFS CHEZ LE PERSONNEL NAVIGANT. INTERET DES COURBES DEBIT-VOLUME]
J. Droniou (Hop. d'Instruction des Armees, Clamart, France), H. Vieillefond, and G. Leguay (Hop. d'Instruction des Armees, Versailles) *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 9 p refs In FRENCH

Avail: NTIS HC A08/MF A01

Because of the multiplication of factors affecting the bronchi, the diagnosis and evaluation of obstructive respiratory flow has importance in the pneumatologic management of flying personnel. Until now, obstructive syndromes were detected by current spirographic practice according to classic parameters measured during forced expiration tests such as the second maximum expiration volume and the volume expired between 75% and 25% of the vital capacity. The recording of debit-volume curves renews interest in forced expiration tests. Maximum expiratory debits measured at low volume are, under certain conditions, independent of effort and reflect the state of the distal bronchi which are rapidly obstructed in chronic obstructive bronchopneumapathologies. These properties, together with their reproductibility in a given subject, assure to the method an undeniable superiority over classic spirography. The recording of the debit-volume curve is a simple test, well tolerated, then repeated, which requires no complicated equipment.
Trans. by A.R.H.

N79-11708# Naval Aerospace Medical Research Lab., Pensacola, Fla.
LONG TERM PULMONARY FUNCTION PATTERNS IN THE AVIATOR: THE THOUSAND AVIATOR STUDY
Neil R. MacIntyre, Robert E. Mitchell, Albert Oberman, and Ashton Graybiel *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 7 p refs

Avail: NTIS HC A08/MF A01

Lung function from a 30 year longitudinal study of 622 Naval aviators, all age 52, was analyzed. Age related deterioration in volume spirometry and the prevalence of obstructive lung disease in these subjects compares favorably with other large civilian studies. Military aviation, including the first generation of tactical jet aviation, had no effect on any measured parameters. Cigarette smoking, however, had a marked effect on the prevalence of obstructive lung disease. Even in clinically healthy subjects,

cigarette smoking significantly augmented age related deterioration in vital capacity. Smokers who quit early and consumed less than 9100 total packs of cigarettes seemed to be similar to nonsmokers in their risk of disease development and the aging of their lung function. Author

N79-11709# Technische Hochschule, Aachen (West Germany).
MECHANICS OF BREATHING DURING GRADED EXERCISE MEASURED WITH THE BODYPLETHYSMOGRAPH
F. Detering, J. D. Meyer-Erkelenz, H. Sieverts, and S. Effert *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 7 p refs
Avail: NTIS HC A08/MF A01

Airway resistance, thoracic gas volume, and gas dynamics of breathing of 20 healthy subjects with an average age of 22.6 years were measured during graded exercise with a ventilation system. It was observed, that up to a load of 50 watt the breathing rest position rises in spite of an increase of 66% in the tidal volume and even at 75 watt is still above the initial value. The expiratory reserve volume is called up at a load of 100 watt through an intensified use of the expiratory muscles. The airway resistance increases nearly linear from 2.0 cm H20/1/s at rest to 6/95 cm H20/1/s at 100 watt. J.M.S.

N79-11710# Bundeswehrsanitaetszentrum, Hamburg (West Germany).
STANDARDIZED EXAMINATION METHODS IN ERGOMETRY
J. Prohl *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 8 p
Avail: NTIS HC A08/MF A01

Standard procedures for ergometry examinations are given along with standard ranges used to compare the measured values with a normal collective. Emphasis is placed on optimum utilization of ergometer stations with an average frequency of 300 examinations per month, while meeting the criteria of (1) simplicity of performance, (2) saving of time, (3) reliability of measurement data, (4) strength of evidence, (5) reproducibility, and (6) comparability of results. J.M.S.

N79-11711# National Defence Medical Centre, Ottawa (Ontario). Cardio-Pulmonary Unit.
CORONARY ATHEROSCLEROSIS AND FITNESS FOR FLYING
Gerald M. Fitzgibbon *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 10 p refs

Avail: NTIS HC A08/MF A01

Coronary artery disease in flying personnel is considered in terms of the policy of the Canadian Armed Forces that any degree of coronary atherosclerosis is cause for grounding a member of the aircrew. Emphasis is placed on the reliability of various physiological tests - electrocardiogram, Master's two-step test, the treadmill exercise test, and selective coronary angiography in detecting coronary artery disease. J.M.S.

N79-11712# School of Aerospace Medicine, Brooks AFB, Tex.
DETECTION OF CORONARY ARTERY DISEASE IN APPARENTLY HEALTHY, ASYMPTOMATIC AIRCREW MEMBERS USING THALLIUM-201 MYOCARDIAL PERFUSION SCINTIGRAPHY
John H. Triebwasser, Thomas Kay, Thomas H. Loecker, Robert Carretta, Gary D. Harris, Roger A. Wolthuis, and Malcolm F. Lancaster *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 6 p refs

Avail: NTIS HC A08/MF A01

Thallium-201 exercise myocardial perfusion scintigraphy was accomplished in 25 aircrewmembers prior to their undergoing coronary arteriography. Ten patients had ateriographic evidence of obstructive corornary disease. Three had abnormal myocardial scintigrams. One had a borderline abnormal scintigram. Of six patients having normal scintigrams, five had greater than 50% obstruction of one or more vessels. Three of these five had multiple vessel disease. Thirteen of the 15 patients having no arteriographic coronary disease had normal scintigrams. The remaining two had borderline abnormal scans. An abnormal myocradial scintigram was associated with significant obstructive disease. However, a normal scan did not rule out the presence of high grade obstruction. This procedure is of limited value, and cannot replace corornary arteriography as a definitive method for ruling out coronary artery disease in aircrewmembers. J.M.S.

N79-11713# Royal Air Force Central Medical Establishment, London (England).
THE SIGNIFICANCE OF I WAVE ABNORMALITIES
H. B. Kelly *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis or A sessment Criteria for Flying Sep. 1978 4 p refs

Avail: NTIS HC A08/MF A01

The commonest abnormalities of routine aircrew ECG's to cause concern are those of repolarisation. These men are usually asymptomatic and the evaluation of the ECG abnormality is one of the major problems in the assessment of fitness to fly. Twenty such cases with radiologically normal coronary arteries, and the manner in which the repolarisation abnormalities may be affected by adrenaline, beta adrenergic blockade, and other factors are considered. Author

N79-11714# Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).
DIFFICULTIES POSED BY LEFT AXIS DEVIATION IN THE EVALUATION OF FLIERS, AND THEIR RELATIONS TO THE CONCEPT OF LEFT ANTERIOR HEMIBLOCK [LES DIFFICULTES POSEES DANS L'EXPERITSE DU PERSONNEL NAVIGANT PAR LA DEVIATION A GAUCHE DE L'AXE DE QRS ET SES RAPPORTS AVECLE CONCEPT D'HEMIBLOC]
A. Didier and R. Carre *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 12 p refs

Avail: NTIS HC A08/MF A01

Possible and probable causes of left QRS axis deviation in 60 subjects are discussed. In 34 individuals, previous documentation affirmed the existence of this condition before the age of 25 years as well as its stability over a number of years. This aspect is found at the extreme left of the normal electrocardiogram and the activation of the entire left ventricle is able to depend exclusively on posterior fibers as in left anterior hemiblock. Thus, everything occurs as if the left anterior bundles were barely functioning or not funtioning at all. It is a matter of anonpathological variety of ventricula activation mode. Trans. by A.R.H.

N79-11715# Army Aeromedical Research Lab., Fort Rucker, Ala.
LEFT ANTERIOR HEMIBLOCK (LAH): DIAGNOSIS AND AEROMEDICAL RISK
Frank S. Pettyjohn, Heber D. Jones, Joseph C. Denniston, John C. Kelliher, Lloyd A. Akers, George P. Rice, and James M. Faber *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 6 p refs

Avail: NTIS HC A08/MF A01

Eighteen US Army initial flight applicants and trained aircrew were evaluated for the electrocardiographic diagnosis of left anterior hemiblock (LAH). This diagnosis was sustained in 50% by the addition of vectorcardiographic criteria. With computer processing and calculation of delay of the intrinsicoid deflection (ID) of the high lateral left ventricular activation time, the diagnosis was sustained in 50% of those records available. Review of the etiology, histopathology, and prognosis indicates difinitive abnormalities of the trifascicular left bundle branch conduction system. Its is essential a complete electrocardiogram (ECG) and vectorcardiogram (VCG) study of military aircrew be obtained to establish the diagnosis of true LAH. The incidence of true LAH

is not available but the rarity of this finding with an unknown risk should preclude entry into military flight training. Complete cardiovascular evaluation of the trained airman with acquired LAH should include electrophysiologic studies and selective coronary arteriography and ventriculography prior to consideration for return to full flying duties. Author

N79-11716# Hopital d'Instruction des Armees, Versailles (France).

CARDIAC CONDUCTION AND APTITUDE PROBLEM OF FLIERS. THE BENEFITS OF ENDOCAVITAL RECORDING OF THE His BUNDLES [TROUBLES DE LA CONDUCTION ET APTITUDE AUPERSONNEL NAVIGANT. INNTERET DE L'ENGREGISTREMENT ENDOCAVITAIRE DU FAISCENAU DE His]

G. Leguay, J. C. Duret (Hopital d'Instruction des Armees Percy, Clamart, France), J. Droniou (Service de Cardiologie de l'Armee, France), B. Vettes (Lab. de Med. Aerospatiale), and J. Pernod (Service de Cardiologie de l'Armee, France) *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 9 p refs In FRENCH

Avail: NTIS HC A08/MF A01

Problems of cardiac conduction can be observed in young subjects with otherwise healthy hearts. The suprahistine localization of the trouble, its vague nature and its functional and reversible character are shown in the endocavital recording of the bundles of His as well as in the oculo-cardiac reflex in both stimulation and pharmaco-dynamic tests. Some of these subjects can recover their physical fitness. However, in addition to data from endocavital recording of the activity of the bundles of His, clinical data and good tolerance in constraint tests must be considered. Trans. by A.R.H.

N79-11717# Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).

MEASURING SYSTOLIC TIME INTERVALS AT REST AND UNDER STRESS BY EXTERNAL METHODS. ADVANTAGES IN THE EVALUATION OF FLIERS [MESURES DES INTERVALLES DE TEMPS SYSTOLIQUES PAR METHODES EXTERNES AU REPOS ET A L'EFFORT. INTERET DANS L'EXPERTISE DU PERSONNEL NAVIGANT]

M. Pijoun, F. Plas, and R. Carre *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 13 p refs In FRENCH

Avail: NTIS HC A08/MF A01

The electromechanical interval and preisometric contraction, the projection interval, the isovolumetric contraction, and the ejection time were measured in 46 subjects at rest and while pedalling a bicycle against a constant force for five minutes. The systolic time at the end of the exercise and during recouperation was measured for 10 minutes. A sensible decrease in the time of isolvumetric contraction and a significant decrease in the ratio of isovolumetric contraction time over ejection time were observed. The value of this ratio as an index of myocardial contraction is discussed, as well as the advantages of mechanographic methods in the examination of flying personnel. The replacement of a carotidogram by a rheographic tracing for a space experiment is described. Trans. by A.R.H.

N79-11718# Hopital d'Instruction des Armees, Versailles (France).

THE ADVANTAGES OF ULTRASONIC ECHOCARDIOGRAPHY IN THE CARDIOLOGICAL EVALUATION OF FLIERS [INTERET DE L'ECHOCARDIOGRAPHIE PAR ULTRASONS DANS L'EXPERTISE CARDIOLOGIQUE DU PERSONNEL NAVIGANT]

J. Droniou (Hopital d'Instruction des Armes Percy, Clamart, France), G. Leguay, J. C. Duret (Service de Cardiologie de l'Armee, France), and J. Pernod (Service de Cardiologie de l'Armee, France) *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 8 p refs In FRENCH

Avail: NTIS HC A08/MF A01

The principles and techniques of echocardiography are review and the value of this technique in diagnosing obstructive cardiomyopathy, in affirming mitral valve prolapsus in the case of mesosystolic click, and in evaluating myocardial function is assessed. Because of its nontraumatic nature, it is recommended for the cardiological evaluation of flying personnel.

Trans. by A.R.H.

N79-11719# School of Aerospace Medicine, Brooks AFB, Tex. Internal Medicine Branch.

EFFECT OF AGE ON RELAXED +G SUB z TOLERANCE OF AIRCREWMEN

David H. Hull, Roger A. Wolthuis, Kent K. Gillingham, John W. McCracken, and John H. Triebwasser *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 4 p refs

Avail: NTIS HC A08/MF A01

Healthly aircrewmen from 30 to 55 years old volunteered for a centrifuge study to determine the effect of age on acceleration responses. A visual end-point was used to measure their relaxed tolerance to +Gz forces applied gradually (GORs) and rapidly (RORs). Variability between individual subjects was much more marked with GORs than RORs. Tolerance was higher to the initial GOR than to the second GOR in most subjects. There was a tendency for relaxed G-tolerance to increase with age, but this was statistically significant ($p < .05$) only for initial GORs. These results suggest that healthy middle aged aircrewmen suffer no age related impairment of G-tolerance which would prejudice their fitness to pilot high-performance military aircraft. These results also provide a standard against which to measure the relaxed +Gz tolerance of aircrew with medical disorders, treated and untreated. J.M.S.

N79-11720# School of Aerospace Medicine, Brooks AFB, Tex. Internal Medicine Branch.

REPRODUCIBILITY OF HUMAN CARDIOVASCULAR RESPONSES TO ORTHOSTATIC STRESS

Roger A. Wolthius, David H. Hull, Joseph R. Fisher, and John H. Triebwasser *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 5 p refs

Avail: NTIS HC A08/MF A01

Orthostatic stress testing was accomplished biweekly on 19 healthy men; each man completed at least eight tests over a period of 16-21 weeks. The test involved 10 minutes of supine rest, followed by 5 minutes of quiet standing against a wall; heart rates and auscultatory blood pressures were recorded on alternate minutes. Variability between tests was similar for all meaurement/protocol condition combinations, indicating that the individual's response to quiet stand and orthostatic change is as variable as his response to supine rest. Further, the range (i.e., 1 SD = 1-9 mmHg or bpm) and magnitude (i.e., 1 SD = approximately 5 mmHg or bpm) of this variability illustrates the need for repeated orthostatic testing when attempting to characterize the typical orthostatic response of a given individual. J.M.S.

N79-11721# Freiburg Univ. (West Germany). Cardiological Centre.

CARDIOLOGICAL FINDINGS IN 115 PILOTS: DIAGNOSES AND ASSESSMENT OF THEIR FLYING FITNESS

Horst H. Renemann, Sabine Koehler, and Herbert Reindell *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 3 p refs

Avail: NTIS HC A08/MF A01

Results of cardiological examinations of 115 out of 1438 professional and nonprofessional airmen with abnormal or marginal findings in preliminary cardiological examinations are presented. Diagnoses include: (1)24 out of the 115 airmen were found to have isolated ECG alterations without any evidence of organic disease, 22 were relicensed; (2)21 airmen were found to have coronary heart disease, 19 were declared permanently unfit for flight duty and 2 were given a waiver and were required to be re-examined; (3)17 airmen were found to have myocarditis,

2 were declared permanently unfit for flight duty and 15 were relicensed after successful treatment; (4)15 were shown to have pseudoangina pectoris, 1 was declared permanently unfit for flight duty due to chronic psychic liability; and (5) 11 were shown to have hypotensive disturbances of blood pressure and were advised to undergo intensive sports therapy, 1 was declared permanently unfit for flight duty. J.M.S.

N79-11722# Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).
NORMAL AND PATHOLOGICAL CARDIOVASCULAR FINDINGS IN APPLICANTS TO THE AIR FORCE SERVICE
C. A. Ramacci and P. Rota *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 6 p refs

Avail: NTIS HC A08/MF A01

Data resulting from the medical and instrumental examinations of 1000 subjects are considered. Tests conducted include humeral arterial blood pressure control, electrocardiographic registration, and X-ray screening of the thorax. Data are discussed in terms of risk indicators. J.M.S.

N79-11723# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
EVALUATION OF CARDIAC RISK AND SUBJECT RESPONSE TO AMELIORATIVE EFFORTS
Roy L. DeHart *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 8 p refs

Avail: NTIS HC A08/MF A01

A group of mid-level military and civilian personnel attending a senior service school was provided the opportunity to participate in a cardiac risk evaluation program. Following the evaluation, each participant was provided an individual prescription for health sugggesting methods for reducing factors with excesssive risk through life style alterations. The risk factors assessed included *familiy cardiac history, obesity, smoking, pulmonary function, blood* pressure, blood lipids, and physical fitness. The assessment was conducted in three stages: historical review of medical records and by questionnaire, blood chemistry and enzyme screen, physical examination and indirect determination of aerobic power. A follow-on survey was distributed to the student body and faculty three years following the initial cardiac risk assessment. Both program participants and nonparticipants were requested to complete and return the survey form. The survey evaluated the individual's perception of his current health, life style changes which may alter cardiac risk, and factors influencing the individual's decision to reduce or ignore risk. The results of this survey are presented and their implications for military prospective medicine programs discussed. J.M.S.

N79-11724# Civil Aviation Authority, London (England).
THE IMPACT OF CORONARY VASCULAR RISK FACTORS ON PROFESSIONAL AIRCREW LICENSE LOSS IN THE UNITED KINGDOM
Michael Joy *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 6 p refs

Avail: NTIS HC A08/MF A01

The causes of license loss in UK professional aircrew were studied. Results indicate that nearly 60% are lost due to cardiovascular causes. It is suggested that preventative medicine *and not more rigorous screening is the sensible approach to a* reduction of flight deck incapacitation from cardiovascular causes. J.M.S.

N79-11725# Italian Air Force Medical Service H. Q., Rome.
CARDIOVASCULAR DISEASES AS A CAUSE OF UNFITNESS FOR FLYING SERVICE IN AIRCREWS OF ITALIAN AIR FORCE: ETIOPATHOGENESIS, INFLUENCE OF PERFORMANCE IN FLIGHT, AND PREVENTION
Gaetano Rotondo *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 7 p refs

Avail: NTIS HC A08/MF A01

Cardiac arteriosclerotic and degenerative diseases, arterial hypertension, the diseases including functional cardiac disorders, acute and chronic rheumatic cardiopathies are cited as causes of unfitness for flight duty. An evaluation and interpretation is *made of possible causes of the high inhabilitating incidence of* cardiovascular diseases, and in particular of arteriosclerosis, in provoking unfitness to flying duty among aircrews, and in influencing the military performance in flight. Preventive and predictive measures are also taken into consideration. Conclusive deductions emphasize the adviability of attempting to improve and refine methods adoped in diagnosing early signs of atherosclerotic disease in flying personnel, particularly after the age of 40, as well as the opportunity of researching major risk factors. This task could be achieved mainly by means of a periodical executiona nd correct evaluation of the tests which are recognized as useful for the early diagnosis of atherosclerosis and of the most important cardiovascular diseases. J.M.S.

N79-11726# Civil Aviation Authority, London (England). Medical Dept.
CARDIOVASCULAR FITNESS OF PILOTS OF TRANSPORT AIRCRAFT
G. Bennett *In* AGARD. Specific Findings in Cardiology and Pulmonary Function with Spec. Emphasis on Assessment Criteria for Flying Sep. 1978 4 p

Avail: NTIS HC A08/MF A01

Cardiovascular disease is discussed in terms of threatening safety in civil two-pilot transport operations. Improvements in *medical screening to reduce the already low risk of in-flight* incidents and better operational training and control measures to prevent the cardiovascular incidents from becoming accidents *are among the topics covered.* J.M.S.

N79-11727# National Aviation Facilities Experimental Center, Atlantic City, N. J.
DEVELOPMENT OF A PERFORMANCE CRITERION FOR AIR TRAFFIC PERSONNEL RESEARCH THROUGH AIR TRAFFIC CONTROL SIMULATION Final Report, Jan. 1975 - Oct. 1977
Edward P. Buckley, Kenneth House, and Richard Rood Jul. 1978 99 p refs
(FAA Proj. 216-101-100)
(AD-A058082; FAA-NA-78-9; FAA-RD-78-71) Avail: NTIS HC A05/MF A01 CSCL 05/9

Objective measurement of the radar control performance of air traffic controllers by means of air traffic control simulation exercises was investigated. A set of objective measurements developed for the NAFEC Air Traffic Control Simulation Facitlity is described. The relevance of this measurement technique for either evaluating new systems (when the same or similar controller teams are functioning) or for evaluating various controller individuals or teams (when they are using the same system control traffic) is discussed. Other applications are also described. The ability of the simulator to repeatedly present the same traffic samples is stressed as a means of accumulating comparable and normative data. The need for basic experimentation for *validation of the test measurement system and to develop* further knowledge and understanding of the measurements is recognized. A relatively small keystone experimantal design is described *and recommended as the first essential step for all* possible applications. The availability of adequate numbers of controllers as subjects is recognized as the major problem to be overcome. Development of a means for transmitting tests originating in NAFEC'S simulator to field sites is recommended. S.B.S.

N79-11728# Dunlap and Associates, Inc., La Jolla, Calif.
A7 TRAINING EFFECTIVENESS THROUGH PERFORMANCE ANALYSIS Final Report, Apr. 1975 - Dec. 1977

Clyde A. Brictson Apr. 1978 64 p refs
(Contract N61339-75-C-0105)
(AD-A056230; NAVTRAEQUIPC-75-C-0105-1) Avail: NTIS HC A04/MF A01 CSCL 05/9

Training concepts which emphasize landing performance analysis, diagnostic feedback and remedial instruction for novice A7 pilots are described. FCLP performance is analyzed to identify low performers who are potential recycle trainees. A Night Carrier Landing Trainer (NCLT) provides individualized remedial training to improve eventual carrier landing performance. Results of a field test of the method are presented. Fleet performance of previous recycle trainees is reviewed and discussed along with recommendations for training implementation. Author (GRA)

N79-11729*# National Aeronautics and Space Administration, Washington, D. C.
THE COSMONAUT IN FLIGHT
P. I. Klimuk and Ye. B. Baburina Apr. 1977 21 p Transl. into ENGLISH from Zdorovye (USSR), no. 4, 1976 p 6-9; no. 6, 1976 p 6-7; no. 7, 1976 p 6-7 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.
(Contract NASw-2791)
(NASA-TT-F-17438) Copyright. Avail: NTIS HC A02/MF A01 CSCL 05H

The unusual conditions under which cosmonauts work and live are described. The problems of weightlessness are analyzed. A description is given of a day spent by a cosmonaut on the Salyut-4 orbital manned space station. The exercise regime, food program, and scientific experiments are discussed. Observations of other planets from spacecraft are described and the growth and operation of a hydroponic vegetable garden is discussed by a cosmonaut. Author

N79-11730*# Stanford Research Inst., Menlo Park, Calif.
DEVELOPMENT OF TECHNIQUES TO ENHANCE MAN/MACHINE COMMUNICATION Final Report
Russell Targ, Phyllis Cole, and Harold Puthoff Aug. 1974 70 p refs
(Contracts NAS7-100; JPL-953653; SRI Proj. 2613)
(NASA-CR-157886) Avail: NTIS HC A04/MF A01 CSCL 05H

A four-state random stimulus generator, considered to function as an ESP teaching machine was used to investigate an approach to facilitating interactions between man and machines. A subject tries to guess in which of four states the machine is. The machine offers the user feedback and reinforcement as to the correctness of his choice. Using this machine, 148 volunteer subjects were screened under various protocols. Several whose learning slope and/or mean score departed significantly from chance expectation were identified. Direct physiological evidence of perception of remote stimuli not presented to any known sense of the percipient using electroencephalographic (EEG) output when a light was flashed in a distant room was also studied. S.B.S.

N79-11731*# Martin Marietta Corp., Denver, Colo.
SPACECRAFT UTENSIL/HAND CLEANSING FIXTURE Final Report
T. G. Jonkoniec Oct. 1978 132 p
(Contract NAS9-15012)
(NASA-CR-151845; MCR-78-618) Avail: NTIS HC A07/MF A01 CSCL 06K

A fixture which provides a means for a crewman to perform, in zero gravity, laboratory utensil/tool cleansing and personal hygiene functions such as handwashing, shaving, body wash, and teeth brushing is described. A prototype unit developed incorporating design improvements resulting from breadboard tests in a one gravity and zero gravity environment demonstrated the capability of performing the different cleansing functions. J.M.S.

N79-11732*# Martin Marietta Corp., Denver, Colo.
SPACECRAFT UTENSIL/HAND CLEANSING FIXTURE, ADDENDUM Final Report
T. G. Jonkoniec Oct. 1978 125 p
(Contract NAS9-15012)
(NASA-CR-151846; MCR-78-618-Add) Avail: NTIS HC A06/MF A01 CSCL 06K

Engineering drawings and component spec sheets used in the fabrication of the prototype spacecraft utensil/hand cleaning fixture are presented. J.M.S.

N79-11733*# Umpqua Research Co., Myrtle Creek, Ore.
WATER SYSTEM MICROBIAL CHECK VALVE DEVELOPMENT Final Report
Gerald V. Colombo, Dale R. Greenley, and David F. Putnam Jul. 1978 53 p
(Contract NAS9-15079)
(NASA-CR-151843; URC-80708) Avail: NTIS HC A04/MF A01 CSCL 06K

A residual iodine microbial check valve (RIMCV) assembly was developed and tested. The assembly is designed to be used in the space shuttle potable water system. The RIMCV is based on an anion exchange resin that is supersaturated with an iodine solution. This system causes a residual to be present in the effluent water which provides continuing bactericidal action. A flight prototype design was finalized and five units were manufactured and delivered. S.B.S.

N79-11734*# Webb Associates, Yellow Springs, Ohio.
ANTHROPOMETRIC SOURCE BOOK. VOLUME 1: ANTHROPOMETRY FOR DESIGNERS
Edmund Churchill, comp., Lloyd L. Laubach, comp., John T. McConville, comp, and Ilse Tebbetts, comp. Houston, Tex. NASA Jul. 1978 603 p refs
(NASA-RP-1024; S-479) Avail: NTIS HC A99/MF A01 CSCL 05H

All the basic areas of anthropometry and its applications to the design of clothing, equipment, and workspaces for manned space flight are presented.

N79-11735*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTHROPOMETRIC CHANGES IN WEIGHTLESSNESS
William Thornton *In* Webb Assoc. Anthropometric Source Book, Vol. 1 Jul. 1978 105 p refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Weight loss, height increases, neutral body posture, strength and body composition, changes in trunk and limb girth, and loss of muscle mass in a weightless environment are discussed. Where possible, explanations of physiological mechanisms are included. Data from the Skylab missions, Apollo-Soyuz Test Project mission, and the Russian space program are presented. Potential applications to space-related problems are also included. S.B.S.

N79-11736*# Webb Associates, Yellow Springs, Ohio.
VARIABILITY IN HUMAN BODY SIZE
James F. Annis *In its* Anthropometric Source Book, Vol. 1 Jul. 1978 63 p refs

Avail: NTIS HC A99/MF A01 CSCL 06P

The range of variability found among homogeneous groups is described and illustrated. Those trends that show significantly marked differences between sexes and among a number of racial/ethnic groups are also presented. Causes of human-body size variability discussed include genetic endowment, aging, nutrition, protective garments, and occupation. The information is presented to aid design engineers of space flight hardware and equipment. S.B.S.

N79-11737*# Webb Associates, Yellow Springs, Ohio.
ANTHROPOMETRY
John T. McConville and Lloyd L. Laubach *In its* Anthropometric Source Book, Vol. 1 Jul. 1978 106 p refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Data on body-size measurement are presented to aid in spacecraft design. Tabulated dimensional anthropometric data on 59 variables for 12 selected populations are given. The variables chosen were those judged most relevant to the manned space program. A glossary of anatomical and anthropometric terms is included. Selected body dimensions of males and females from

the potential astronaut population projected to the 1980-1990 time frame are given. Illustrations of drawing-board manikins based on those anticipated body sizes are included. S.B.S.

N79-11738*# Michigan Univ., Ann Arbor.
THE INERTIAL PROPERTIES OF THE BODY AND ITS SEGMENTS
Herbert M. Reynolds *In* Webb Assoc. Anthropometric Source Book, Vol. 1 Jul. 1978 76 p refs

Avail: NTIS HC A99/MF A01 CSCL 06P

Mass distribution properties of the adult human body are summarized. The summary is user-oriented for design engineers and mathematical modeling. Properties are dicussed in terms of the musculoskeletal linkage system, axes systems, mass, volume, center of mass, and inertial properties. Data and prediction equations or coefficients for modeling these properties are provided. Predictive formulas use total body weight and stature as independent variables. The data are based on small samples of living and cadaveric subjects typical of the white European male. S.B.S.

N79-11739*# Michigan State Univ., East Lansing.
ARM-LEG REACH AND WORKSPACE LAYOUT
Howard W. Stoudt *In* Webb Assoc. Anthropometric Source Book, Vol. 1 Jul. 1978 68 p refs

Avail: NTIS HC A99/MF A01 CSCL 05H

Information on functional reach measurements relevant to the design and layout of workspaces in the Space Shuttle and Spacelab programs is presented. Basic reach data are given, along with recommendations for applying corrective factors to adjust for differences in (1) workspace, task, and body position; (2) environmental conditions (primarily gravity forces); and (3) anthropometric characteristics of various populations. S.E.S.

N79-11740*# Webb Associates, Yellow Springs, Ohio.
RANGE OF JOINT MOTION
Lloyd L. Laubach *In its* Anthropometric Source Book, Vol. 1 Jul. 1978 20 p refs

Avail: NTIS HC A99/MF A01 CSCL 06P

An assessment of body mobility is presented. The information that is discussed includes the following; (1) selected reviews of the range of joint motion literature; (2) range of joint motion terminology; (3) techniques for measuring range of joint motion; (4) recommended range of joint motion data for the design engineer; (5) differences in range of joint motion due to the effects of age; (6) differences in the range of joint motion between men and women; (7) the assessment of differences in range of joint motion caused by protective coating; and (8) the range of joint motion of selected two-joint muscles. S.E.S.

N79-11741*# Webb Associates, Yellow Springs, Ohio.
HUMAN MUSCULAR STRENGTH
Lloyd L. Laubach *In its* Anthropometric Source Book, Vol. 1 Jul. 1978 55 p refs

Avail: NTIS HC A99/MF A01 CSCL 06P

Human muscle strength for the guidance of design engineers in dealing with a large volume of contradictory strength data is studied. Encompassing a widely variable population, the following topics are discussed; (1) a general review of human muscular strength; (2) specificity of muscular strength; (3) relationships between static and dynamic muscular strength; (4) strength within the arm reach envelope of the seated subject; and comparative muscular strength of men and women. S.E.S.

N79-11742*# Webb Associates, Yellow Springs, Ohio.
ANTHROPOMETRY IN SIZING AND DESIGN
John T. McConville *In its* Anthropometric Source Book, Vol. 1 Jul. 1978 22 p refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The application of human body-size diversity and quantification to engineering design is discussed. The following procedures are outlined for using anthropometric data in the development of effective sizing programs: (1) selection of the appropriate data; (2) selection of the key sizing dimensions; (3) selection of intervals for the key dimensions; (4) development of dimensional data for each sizing category; (5) conversion of summary data to appropriate design values; (6) preparation of a tariff; (7) establishing what the equipment must do for the operator.S.E.S.

N79-11743*# Webb Associates, Yellow Springs, Ohio.
STATISTICAL CONSIDERATIONS IN MAN-MACHINE DESIGNS
Edmund Churchill *In its* Anthropometric Source Book, Vol. 1 Jul. 1978 63 p refs

Avail: NTIS HC A99/MF A01 CSCL 05H

The statistical concepts of man-machine designs that appear repeatedly in the NASA Anthropometric Source Book are reviewed. Some statistical problems that confront the users are discussed. The averages, measures of variability, and percentiles of basic univariate statistical measures are defined. The relationship between percentiles and mean-standard deviations are explored and tables detailing this relationship are presented. S.E.S.

N79-11744# Human Engineering Labs., Aberdeen Proving Ground, Md.
INTERNAL COCKPIT REFLECTIONS OF EXTERNAL POINT LIGHT SOURCES FOR THE MODEL YAH-64 ADVANCED ATTACK HELICOPTER
Christopher C. Smyth Jun. 1978 16 p refs
(AD-A056489) Avail: NTIS HC A02/MF A01 CSCL 01/3

The US Army Human Engineering Laboratory (HEL) has developed a computer program for computing internal cockpit reflections on the transparent canopy surfaces of external point light sources. This work is part of a three-stage effort to determine optimum canopy designs for the Model 209 AH-1S Cobra Helicopter and the Model YAH-64 Advanced Attack Helicopter (AAH). The low glare canopy design presently used on both models consists of flat, transparent panels on the front surfaces and simple cylindrical panels on the sides and top. The design is a reasonable choice for reducing both solar glint to outside observers during daytime operations and internal reflections of outside light sources during nighttime operations. This work effort is directed toward a closer study of the two problems of glint and reflections, and developing an optimum design for the canopy's transparent surfaces. GRA

N79-11745# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
SPEECH QUALITY MEASUREMENT
T. P. Barnwell, III, A. M. Bush, R. M. Mersereau, and R. W. Schaffer May 1978 177 p refs
(Contract F30602-75-C-0118; AF Proj. 9567)
(AD-A056272; RADC-TR-78-122) Avail: NTIS HC A09/MF A01 CSCL 17/2

Speech quality measurement--in terms of user acceptability--is considered from 3 points of view: subjective testing, objective testing, and communicability testing. It is assumed that good intelligibility is always present. Subjective testing is considered from the perspective of isopreference, relative preference, and absolute-preference, with isometric and parametric test methodologies, with the results of PARM and QUART as a basis. It is felt that the best approach for future subjective testing will be a parametric approach using representative male and female talkers to cover the expected range of pitch. Objective testing is considered as a possible alternative to subjective testing. A two part experimental study of the relationship between a number of objective measures and the subjective acceptability measures available from the PARM study is described. In the communicability test, the user is expected to perform on the data some cognitive task which is measurable. The rationale is that the user will be better able to perform if the quality is high, than if his cognitive resource, assumed fixed, is saturated due to poorer quality transmission. GRA

N79-11746# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

STUDY OF CREW TASK LOADING ON THE C-141A AIRCRAFT Final Report, Mar. - Jun. 1977

Richard J. Schiffler, Richard Geiselhart, and John C. Griffin Apr. 1978 74 p refs

(AD-A057346; ASD-TR-78-3) Avail: NTIS HC A04/MF A01 CSCL 05/9

The objective of the study was to determine the feasibility of a four-man crew consisting of two pilots, a flight engineer and a Flight System Operator, to fly C-141 missions. The test results indicated that the airland mission can be accomplished with a four-man crew. Presently for a combat airlift mission (airdrop) the most optimal crew composition would be two pilots, navigator and flight engineer. With additional training, it might be feasible to substitute a Flight Systems Operator for navigator in the combat airlift mission. GRA

N79-11747# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

LASER EYE PROTECTION FOR FLIGHT PERSONNEL, VOLUME 1

Gloria Twine Chisum 13 Jul. 1978 16 p refs

(AD-A057417; NADC-78158-60-Vol-1) Avail: NTIS HC A02/MF A01 CSCL 06/18

Developments in laser technology have resulted in an expanding use of lasers in many fields and laboratory situations. The implications of the use of lasers in military applications have been examined for flight personnel, and the requirement for eye protection determined. Recommendations for methods of providing that protection are made. Author (GRA)

N79-11748# Sandia Labs., Albuquerque, N. Mex.

EFFECT OF IMPERMEABLE CLOTHING AND RESPIRATOR ON WORK PERFORMANCE. PART 1: LABORATORY STUDIES

P. B. Mossman and H. A. Atterbom (N. Mex. Univ., Albuquerque) Apr. 1978 47 p refs

(SAND-77-2132) Avail: NTIS HC A03/MF A01

Work performance with impervious clothing and full-face respirator was investigated during maximal and submaximal (40 to 60 percent) bicycle ergometer efforts. Five different exercise protocols were administered. Heart rate (HR), oxygen consumption (V/sub O2/), and skin and rectal temperatures (T/sub s/ and T/sub r/) were monitored. The impervious suits resulted in decreased work performance, aerobic metabolism, and tolerance time. Stress indices of HR and mean T/sub s/ were found to be correlated with these differences. The study demonstrates that a security system using a chemical deterrent places a physiological stress of considerable magnitude on an adversary group. D.O.E.

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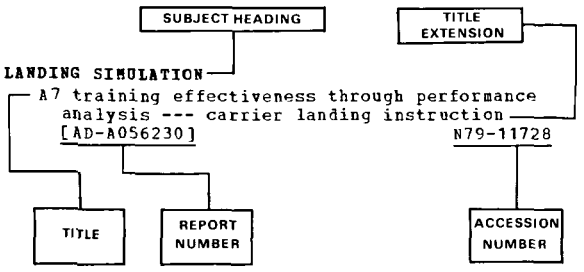

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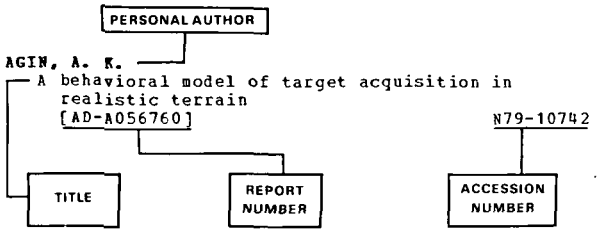

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