

N71-17450



# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

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# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during December, 1970.



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# INTRODUCTION

*Aerospace Medicine and Biology* is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA) and NASA Scientific and Technical Information Facility. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

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 on 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 will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry consists of a standard citation accompanied by its abstract in the following order:

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National Lending Library for Science and Technology  
Boston Spa, Yorkshire, England.

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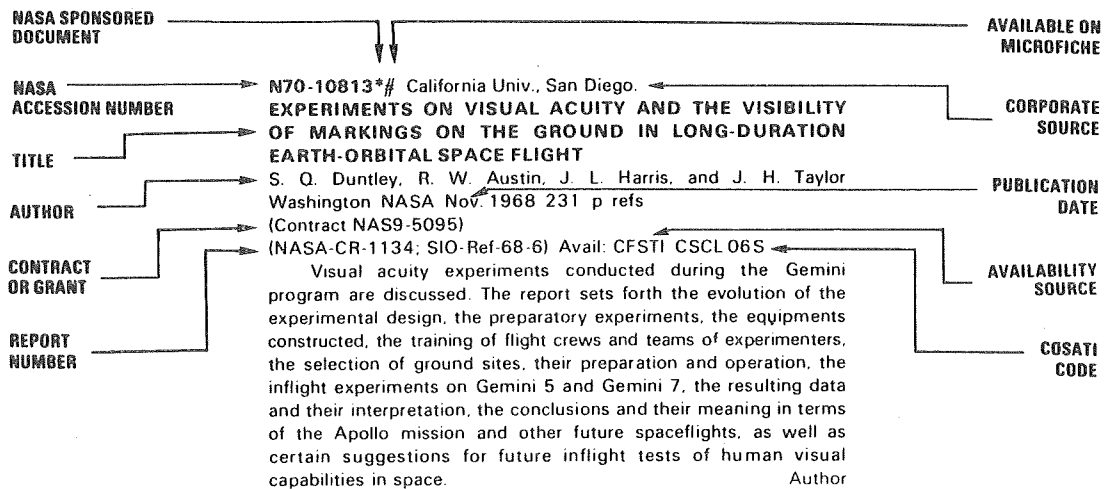
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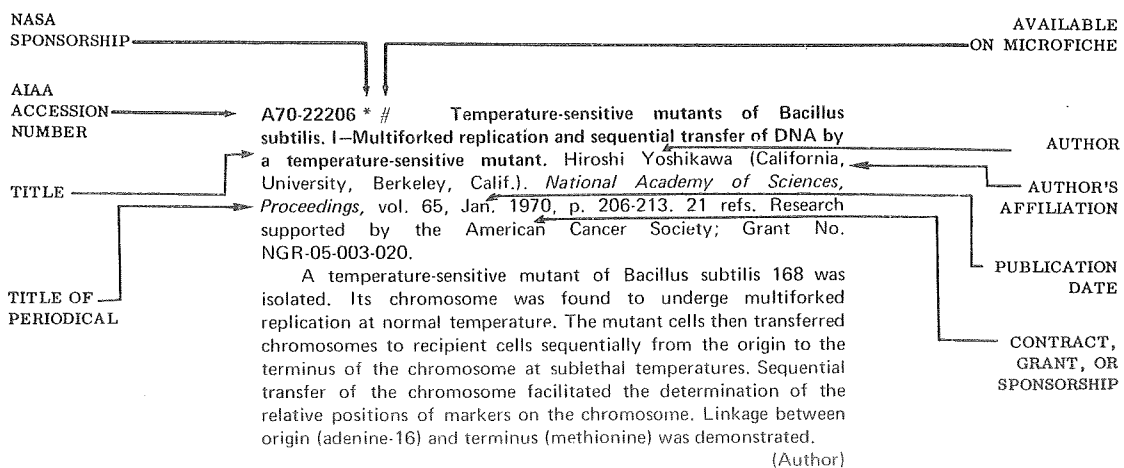
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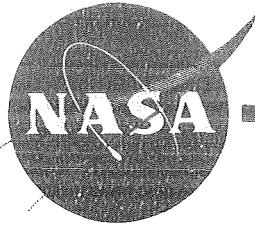
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# AEROSPACE MEDICINE AND BIOLOGY

*a continuing bibliography*

JANUARY 1971

## STAR ENTRIES

**N70-40402** + Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).  
**MEASUREMENTS IN GLOBAL LEVELS, OCTAVE BAND AND PERCENTILE BAND ANALYSIS OF THE NOISE PRODUCED BY ROOTS COMPRESSOR FOR THE EVALUATION OF ANNOYANCE IN INDUSTRIAL PLANT [MEDIDAS EM NIVEIS GLOBAIS E ANALISE EM FAIXAS DE OITAVAS E FAIXES PERCENTUAIS DO BARULHO PRODUZIDO POR COMPRESSOR ROOT PAR VERIFICACAO DO INCOMODO PRODUZIDO PELO BARULHO]**  
L. X. Nepomuceno 3 Jul. 1970 13 p refs In PORTUGUESE; ENGLISH summary  
(Rept-7007.441) Avail: NTIS

The equipment inspected, the adopted procedure and instruments used for the measurement of the noise in global levels according to ISO curves, octave band and percentile band analysis are described. The results are presented in tabular form and in graphical spectral form for the octave and percentage band analysis between 20 Hz and 20,000 Hz. Considerations concerning the annoyance produced by the compressor noise and the legal implications due to excessive noise are included. Author

**N70-40403#** Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).  
**NOISE MEASUREMENT AND ANALYSIS IN OCTAVE BAND AND PERCENTILE BAND WITH CONSIDERATIONS ON THE LEGAL ASPECTS, CONCERNING COMPRESSOR NOISE [MEDIDAS EM NIVEIS GLOBAIS, ANALISE EM FAIXAS DE OITAVAS E FAIXAS PERCENTUAIS DO BARULHO PRODUZIDO POR COMPRESSORES E AS IMPLICACOES LEGAIS DO EXCESSO DE BARULHO]**  
L. X. Nepomuceno 6 Jul. 1970 16 p refs In PORTUGUESE; ENGLISH summary  
(Rept-7007.442) Avail: NTIS

The observed compressor, the equipment used and procedure adopted for the noise measurement and analysis in global level, octave band and percentile band analysis are reported. The results are presented in tabular form with graphical presentation of both spectra. Considerations on the excess noise level and the legal implications in working surroundings are included. Author

**N70-40419#** Naval Postgraduate School, Monterey, Calif.  
**THE EFFECT OF AN EXTERNAL AUDIO SIGNAL ON VIGILANCE PERFORMANCE AND PHYSIOLOGICAL**

### PARAMETERS

William Stanley Marshall, III (M.S. Thesis) Apr. 1970 46 p refs  
(AD-709088) Avail: NTIS CSCL 5/10

Research was performed to determine the effect of an external audio signal on visual monitoring performance and any associated changes in physiological parameters of the subjects. The number of correct detections, the number of commissive errors, skin temperature, and skin resistance were recorded throughout the experiment. A two way nested analysis of variance correlated application of the audio signal to vigilance decrement. Multiple correlation analyses of the data indicated a high degree of complex interaction between the physiological parameters measured and the vigilance detection decrement. Author (TAB)

**N70-40420#** Columbia Univ., New York. Psychophysics Lab.  
**A BRIEF HISTORY OF RESEARCH ON THE PHYSICAL FACTORS INVOLVED IN AUDITORY LOCALIZATION**

John Molino 1 Jul. 1970 17 p refs  
(Contract N00014-67-A-0108-0005)  
(AD-709082; PLR-15) Avail: NTIS CSCL 6/16

Research on the physical factors involved in human auditory localization is presented in brief historical review. The intensity, phase, and time theories are followed in their development as possible explanations for auditory spatial discriminations. Theoretical calculations and empirical measurements are cited for the physical differences in the stimuli reaching the two ears from sources located in various azimuth directions. Basic psychophysical data are given for the subjective location of sound source images produced by distant external sound radiators and by acoustic stimuli delivered through earphones and tubes. Emphasis is upon the localization of pure tone stimuli in a free acoustic field or its simulation. Author (TAB)

**N70-40439#** Dartmouth Coll., Hanover, N.H. Dept. of Physiology.  
**METALLIC MICRONUTRIENTS AND INTERMEDIARY METABOLISM Final Progress Report**  
Henry A. Schroeder 30 Jun. 1970 22 p refs  
(Contract DA-49-193-MD-2595)  
(AD-708581; PR-3) Avail: NTIS CSCL 6/16

In order to evaluate biological effects of trace elements, and to ascertain relationships to chronic diseases of man, mice and rats were exposed for their lifetimes to small doses of each of 26 essential and abnormal elements in drinking water, in a laboratory and on a regimen designed to avoid environmental contamination. Growth rates, survival and longevity, microscopic pathology of tissues, concentrations of trace elements in tissues, and in rats, blood pressure, serum cholesterol, glucose and uric acid, aortic plaques and lipids and tumor rates were measured or examined. Surveys of the human environment for 21 elements in foods, water, vegetation, wild animals were also made, by trace element analysis, and human tissue concentrations for 6 elements. As a result of this work, two prevalent human diseases have been reproduced in rats. A model for human arterial hypertension has been developed in rats fed cadmium and a model for human atherosclerosis has been developed in rats deficient in chromium and in those fed refined white sugar. The following elements were carcinogenic: selenium, yttrium, rhodium, palladium and tellurate.

These elements were more or less toxic in mice and/or rats: selenite, germanate, cadmium, tin, antimony, tellurium, lead.  
 Author (TAB)

**N70-40443#** Ohio State Univ. Research Foundation, Columbus.  
**PERFORMANCE BASELINES FOR INFRA-HUMAN RESEARCH: A COMPILATION AND ANALYSIS OF THE LITERATURE ON SCHEDULES OF REINFORCEMENT, 1957-1968 Final Report**  
 Reed Lawson, Ronald C. Huff, and Laurence Miller Apr. 1970  
 350 p refs  
 (Contract AF 29(600)-5735)  
 (AD-708506; ARL-TR-70-10) Avail: NTIS CSCL 5/10

The report is a comprehensive (though not exhaustive) examination of research conducted on 15 schedules of operant reinforcement with infra-human subjects. Each schedule is viewed separately both as an independent and as a dependent variable. Complex schedules such as multiple, conjoint, interlocking, and Titration are included as well as the more common fixed ratio, fixed interval, DRL, Sidman avoidance, etc. Measurement considerations peculiar to certain schedules such as quarter-life with FI and post-reinforcement pause with FR are discussed and, where the data allow, conclusions are drawn regarding the advantages and limitations of each schedule in attacking particular problems such as matching-to-sample, drug screening, and psychophysical phenomena.  
 Author (TAB)

**N70-40569#** Dynamic Science, Phoenix, Ariz. AvSER Facility.  
**HUMAN TOLERANCE TO ABRUPT ACCELERATIONS. A SUMMARY OF THE LITERATURE**  
 William R. McKenney May 1970 68 p refs  
 (AD-708916; AvSER-70-13) Avail: NTIS CSCL 6/19

This report summarizes the history and research and associated problems in investigation of human abrupt accelerations. Enumeration of possible impact injury follows discussion of the five parameters of human tolerance. Tolerable levels of acceleration impact were extracted from current literature.  
 Author (TAB)

**N70-40576#** Army Natick Labs., Mass. Clothing and Personal Life Support Equipment Lab.  
**A STUDY OF SEAM LEAKAGE IN COATED FABRICS Summary Report, Aug. 1967-Jul. 1969**  
 Edward B. Frederick and Malcolm C. Henry Apr. 1970 48 p refs Series No. C/PEL-TS-169  
 (AD-708874; USA-NLABS-TR-70-59-CE) Avail: NTIS CSCL 11/5

Extensive investigations of sewn seams in coated fabrics have been conducted. The relative roll of thread, sewing machine components, stitch and seam types and properties of fabrics have been evaluated as parameters involved in seam leakage. Utilization of various experimental seam constructions, gasketing, application of heat during seam sewing and other techniques were attempted as potentially useful approaches in combating seam leakage.  
 Author (TAB)

**N70-40619#** Texas Nuclear Corp., Austin.  
**EXTERNAL BEAM MEASUREMENTS ON THE TEXAS A. AND M. VARIABLE ENERGY CYCLOTRON Final Report, Mar. 1968-May 1969**  
 Ben S. Burton, C. Varren Parker, Jr., and Larry A. Boles Brooks AB, Tex. School of Aerospace Med. May 1970 18 p refs (Contract F41609-68-C-0029)  
 (AD-708428; SAM-TR-70-25) Avail: NTIS CSCL 6/18

The external proton beam of the Texas A. + M. University Variable Energy Cyclotron (TAMVEC) was studied to determine its

suitability for special large-animal irradiations. Broad, uniform beams were produced by multiple-coulomb scattering of the narrow primary beam. Various energies were produced by placing absorbers in the beam or by varying the cyclotron energy, or by using both technics. Beam uniformity, energy, energy-spread, dose rate, and, in some instances, depth-dose profiles were measured in the exposure plane for a number of energies. The USAF School of Aerospace Medicine personnel measured depth-dose distributions with thermoluminescent dosimeters embedded in plastic phantoms.  
 Author (TAB)

**N70-40662** Michigan Univ., Ann Arbor.  
**CELLULAR BIOCHEMICAL RESPONSE TO OZONE INHALATION: AN EXPERIMENTAL METHOD FOR THE STUDY OF THE TOXICITY OF AIR POLLUTANTS**  
 Ahmed Nasr Mohamed Nasr (Ph.D. Thesis) 1969 97 p  
 Avail: Univ. Microfilms: HC \$5.00/Microfilm \$3.00 Order No. 69-18066

Ozone, an important component of smog in certain urban atmospheres, was used to test the model and to explore a biochemical lesion that may be involved in the basic mechanism of its toxicity. Epithelial cell suspensions were prepared from the trachea of the rat by the brush-technique. The ratio of reduced to oxidized nicotinamide adenine dinucleotide phosphate (NADP) was determined in the tracheal epithelium of normal rats, and rats which inhaled ozone at a high concentration. The oxidized and reduced forms of NADP were assayed by the method of enzymatic cycling. The interaction between ozone, in vitro, and both NADP(+) and NADPH was also investigated.  
 Dissert. Abstr.

**N70-40666#** School of Aerospace Medicine, Brooks AFB, Tex.  
**EFFECTS OF RADIATION ON CANINE LOCOMOTION Final Report, Nov. 1968-Nov. 1969**  
 John W. Watters Jun. 1970 12 p refs  
 (AD-708431; SAM-TR-70-32) Avail: NTIS CSCL 6/18

Sixteen dogs were used to determine the effect of ionizing radiation on canine locomotion. The animals were run on a treadmill, at speeds of 3 to 5 m.p.h. for periods of 60 to 75 min., with intermittent rest periods. Microswitches were attached to each dogs feet to determine the downtime for each foot. The radiation exposures ranged from 380 to 5005 rads of neutron-gamma ratios of 1:20 for ten dogs and 9:1 for the other six animals. The most common symptom after radiation exposure was vomiting. However, the emesis did not appear to be dose dependent. Although changes in the support formula could be demonstrated after irradiation, no statistical significance could be applied because of the limited number of subjects involved and because of the great variation in exposure levels and in neutron-gamma ratios.  
 Author (TAB)

**N70-40677\*#** Martin Marietta Corp., Denver, Colo.  
**STUDY PROGRAM TO DEFINE A MEDICAL AND PARAMEDICAL INVESTIGATION OF MAN IN A CLOSED ECOLOGICAL ENVIRONMENT. VOLUME 2: ANNOTATED BIBLIOGRAPHY**  
 Diane L. Dapper, comp. Jun. 1970 435 p refs  
 (Contract NAS9-10314)  
 (NASA-CR-108598; MCR-70-227-Vol-2) Avail: NTIS CSCL 06E

The annotated bibliography contains 821 references which are considered to be representative of the literature concerned with man and animals in closed ecologies and in simulated space environments. The articles focus on the years 1960 to April 1970. In order to provide a contrast, references are also included on topics not influenced by aerospace environmental conditions. The bibliography is divided into space cabin, closed ecological chamber and life support systems, biological function and regulation, microbiology, related scientific disciplines, and safety measures.  
 Author

**N70-40758\*** # Whirlpool Corp., St. Joseph, Mich. Life Support Systems Group.  
**DEVELOPMENT OF NON-CREAM STYLE SOUPS** Final Report

Robert W. Larson 7 May 1970 13 p  
 (Contract NAS9-9032)

(NASA-CR-108603) Avail: NTIS CSCL 06H

The objective of this task was to develop at least two new noncream type soups for use in the Apollo feeding system. The soups were to be shelf stable for two weeks at 100 + or - 5 F when vacuum packaged in a flexible pouch. Soups submitted for evaluation are chicken noodle and vegetable, mulligatawny, oxtail, and vegetable beef. A guide for the production of the soups is included. Author

**N70-40759#** School of Aerospace Medicine, Brooks AFB, Tex.  
**DIGITAL SIMULATION AID IN DESIGNING AN AUTOMATIC EEG ANALYZER** Progress Report, Oct. 1968-Jan. 1970

Charles S. Lessard and Harry M. Hughes Jun. 1970 16 p refs  
 (AD-708432; SAM-TR-70-33) Avail: NTIS CSCL 6/16

Through period analysis, analog sleep EEG information was compressed into a series of numbers representing the incidence of intervals generated by zero-crossing of the EEG and its first derivative (digital differential) for 11-min. epochs. The resulting measurement vectors served not only for preliminary assessment of the descriptors as stage discriminators, but also for subjective comparison of EEG signals between leads for the same stages of sleep. In efforts to generate decision surfaces for dividing sleep into five stages (I through IV, and rapid eye movements), multivariate linear discriminant analysis was employed. To limit the number of variables for training and for discrimination of a sleep night, data from only one subject were used. A 23-variable set appeared to be the best choice. According to research results, 85% accuracy can be obtained on any night of sleep for a subject, provided that the training set is from the same subject. Author (TAB)

**N70-40789#** Stanford Univ., Calif. Dept. of Computer Science.  
**HEURISTICALLY GUIDED SEARCH AND CHROMOSOME MATCHING**

Ugo Montanari Apr. 1970 31 p refs  
 (Contract ARPA SD-183)

(AD-709056; SU-AIM-118) Avail: NTIS CSCL 6/4

Heuristically guided search is a technique which takes systematically into account information from the problem domain for directing the search. The problem is to find the shortest path in a weighted graph from a start vertex  $V_a$  to a goal vertex  $V_z$ : for every intermediate vertex, an estimate is available of the distance to  $V_z$ . If this estimate satisfies a consistency assumption, an algorithm by Hart, Nilsson and Raphael is guaranteed to find the optimum, looking at the a priori minimum number of vertices. A version of the above algorithm is presented, which is guaranteed to succeed with the minimum amount of storage. An application of this technique to the chromosome matching problem is then shown. Matching is the last stage of automatic chromosome analysis procedures, and can also solve ambiguities in the classification stage. Some peculiarities of this kind of data suggest the use of an heuristically guided search algorithm instead of the standard Edmonds algorithm. The method obtained in this way is proved to exploit the clustering of chromosome data: a linear-quadratic dependence from the number of chromosomes is obtained for perfectly cluster data. Finally, some experimental results are given. Author (TAB)

**N70-40806\*** # Grumman Aerospace Corp., Bethpage, N.Y.  
**STUDY OF PERSONAL HYGIENE CONCEPTS FOR FUTURE MANNED MISSIONS** Final Report

L. C. Flocke and G. J. Frankel 7 Aug. 1970 38 p  
 (Contract NAS9-10455)  
 (NASA-CR-108607; SRP-14S-004; DRD-MSC-01241) Avail:  
 NTIS CSCL 06I

The objectives were to: (1) evaluate the applicability of existing and proposed concepts for personal hygiene systems to long-duration manned spacecraft, (2) develop concepts for personal hygiene systems applicable to long-duration manned spacecraft, (3) bring together available information into a single source manual, and (4) establish a basis for determining areas requiring future development. Requirements for personal hygiene concepts imposed by man, his vehicle, and its environment were established. Author

**N70-40829#** Joint Publications Research Service, Washington, D.C.

**RADIATION PROTECTION TRAINING DISCUSSED**

G. Sitzlack *In its* Transl. on Eastern Europe Sci. Affairs, No. 130 9 Sep. 1970 p 8-11 refs Transl. into ENGLISH from Deut. Gesundheit. (East Berlin), 6 Jul. 1970 p 1290-1292 (See N70-40826 23-34)

Avail: NTIS

The training of physicians in radiation protection is discussed. The topics include nuclear physics and safety, accident prevention, protection controls for humans, environment, and nuclear facilities, and radiation biology, genetics, and pathology. J.A.M.

**N70-40841#** Advisory Group for Aerospace Research and Development, Paris (France).

**FLUID DYNAMICS OF BLOOD CIRCULATION AND RESPIRATORY FLOW**

Jul. 1970 315 p refs Presented at a Specialists Meeting, Naples, 4-6 May 1970

(AGARD-CP-65-70) Avail: NTIS

Dynamic aspects of human blood circulation and respiratory flow physiology are discussed in detail. Hematological effects of prosthetic devices and hemodynamic gas transport in the respiratory system are somewhat emphasized. For individual titles see N70-40842 through N70-40875.

**N70-40842#** Cambridge Univ. (England).

**MOTION IN VERY NARROW CAPILLARIES**

M. J. Lighthill *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 5 p refs (See N70-40841 23-04)

Avail: NTIS

Mathematical models are formulated for the mechanics of erythrocytes in capillaries with emphasis on lubrication aspects in the passage of red cells through narrow tubes. Estimated is the thickness of any layer of plasma separating a cell from the endothelial wall and how such a layer contributes to mass transport and resistance. A general feature of the model is a parameter relating red cell constrictability to characteristic viscous stress. G.G.

**N70-40843#** Illinois Univ., Chicago.

**HEMODYNAMIC AND MASS TRANSFER IMPLICATIONS OF PHASE SEPARATION PHENOMENA IN THE MICROCIRCULATION**

George Bugliarello *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 10 p refs (See N70-40841 23-04)

Avail: NTIS

Phase separation phenomena have an immediate physiological significance in the microcirculation, where they become increasingly important in proceeding from the larger vessels to the capillaries. Investigations of several aspects of these phenomena are summarized by: (1) in-vitro studies with human blood of the characteristics of the peripheral erythrocyte-poor layer, including the

relation between its size and flow and geometrical variables, and some observations on the influence of gravity effects; (2) numerical simulations of the energy dissipation and oxygen transfer in the axial gaps between erythrocytes in the capillaries, with emphasis on the influence of erythrocyte spacing and erythrocyte configuration; (3) physical model studies of hematocrit differences occurring in the branches of bifurcations as a result of concentration differentials in the cross-section upstream of the bifurcation; and (4) numerical and physical studies of the detailed hydrodynamic behavior of an erythrocyte-shaped body, including forces on the body, and the pressure and flow field generated by it as it moves in an unconfined fluid, near a boundary and past another erythrocyte-shaped body.

Author

**N70-40844# Grenoble Univ. (France). Faculte de Medecine.  
HEMODYNAMIC POSSIBILITIES OF A PARTIAL OR TOTAL  
CARDIAC ASSISTANCE [POSSIBILITES  
HEMODYNAMIQUES D'UNE ASSISTANCE CARDIAQUE  
PARTIELLE OU TOTALE]**

L. Vadot /in AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 6 p refs In FRENCH (See N70-40841 23-04)

Avail: NTIS

Solutions for effecting the accomplishment of a double aim, i.e., to replace the heart in its operational function either partially or totally while favoring myocardium regeneration, are examined with respect to imposing an artificial branched flow circulation on the natural circulatory system. Continuous or pulsed flow, synchronization or nonsynchronization of the artificial heart with the natural heart, simultaneous operation of the natural and artificial hearts and competition between the two, total assistance, and assistance efficiency are among the questions investigated.

Transl. by P.A.B.

**N70-40845# Technische Hochschule Aachen (West Germany).  
Aerodynamisches Inst.**

**FLOW INVESTIGATIONS ON ARTIFICIAL HEART VALVES**

A. Naumann and C. Kramer /in AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 10 p refs (See N70-40841 23-04)

Avail: NTIS

Investigations on fluid dynamics aspects in medicine were carried out and a brief summary of this work is given. Model tests on artificial aortic and mitral valves were made. The steady flow patterns have been observed in order to see the regions of critical sedimentation and vortex formation depending on the relative size and on the stroke of the valve bodies. From pressure distribution measurements around the valve bodies and along the aorta, resp. in the ventricle, the total pressure loss is given. Improvements of the valve body form are proposed. Finally the drag acting on the bodies at back flow in the closure phase could be measured. All model measurements were made in water or in air.

Author

**N70-40846# Technische Hochschule Aachen (West Germany).  
Aerodynamisches Inst.**

**STUDIES ON FLOW INDUCED MECHANICAL HEMOLYSIS**

C. Kramer /in AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 18 p refs (See N70-40841 23-04)

Avail: NTIS

In blood pumping circuits, especially those including artificial heart valves, the red blood corpuscles (erythrocytes) may be damaged by mechanical factors. It is difficult to find the parameters influencing this mechanical hemolysis. Experiments under simplified flow conditions have been devised to investigate the fluid mechanical components of these problems. In a special test apparatus studies were done with fresh pig's blood. The results show that the flow induced hemolysis depends not only on the pressure loss in the flow field but also on the mechanism by which the loss is caused. Another essential parameter is the time derivative of the pressure during the flow process. Additional studies in model flows augment the discussion of the obtained results.

Author

**N70-40847# Politecnico di Milano (Italy). Istituto di Macchine.  
FLUID-DYNAMIC CRITERIA FOR THE DESIGN AND  
EVALUATION OF ARTIFICIAL VALVES**

C. Casci, R. Fumero, and F. M. Montevocchi /in AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 9 p refs (See N70-40841 23-04)

Avail: NTIS

A quantified analysis of artificial valve operation is likely to provide some bases for a deeper insight of the short and long term physiological consequences of a particular valve design. These criteria were applied to the examination of geometrical valve configurations for artificial ventricles and have produced some rather peculiar designs together with an approximated forecast of their laws of motion. Several aspects of current ball valve operation more or less interrelated with thrombous formation and hemolysis have been investigated. Quantitative analyses of time space relations determined pumping velocities at the end of the rise, rebounds, and cavitating regions on the rebounding ball back area. Analytical procedures have shown a peculiar capability for investigating the velocity patterns, pressure, and stress conditions of both the flow and ball.

Author

**N70-40848# National Aeronautics and Space Administration.  
Ames Research Center, Moffett Field, Calif.**

**THE EFFECT OF GRAVITY ON THE CARDIOVASCULAR  
AND RESPIRATORY SYSTEMS**

John Billingham /in AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 7 p refs (See N70-40841 23-04)

Avail: NTIS CSCL 06S

The effects of alterations in gravitational or inertial forces on blood and gas flows in the cardiovascular and respiratory systems are functions of the magnitude, direction, rates of change and duration of the imposed forces. Changes in flow under varying conditions are secondary to deformations and other changes of the blood vessels, airways and their surrounding structures, and are produced both passively and through active reflex mechanisms of a variety of physiological control systems. Changes produced in the systemic cardiovascular system are described for the terrestrial gravitational field, for the high accelerations produced by aircraft and spacecraft maneuvers or centrifuges, and for the weightless condition of the space environment. Changes in the pulmonary circulation are considered along with alterations in lung structure, airway dimensions and respiratory gas flows, since both are intimately linked in determining oxygen and carbon dioxide contents of the arterial blood.

Author

**N70-40849# Royal Air Force, Farnborough (England). Inst. of  
Aviation Medicine.**

**GRAVITY DEPENDENCE OF PULMONARY CAPILLARY  
BLOOD FLOW**

David H. Glaister /in AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 9 p refs (See N70-40841 23-04)

Avail: NTIS

Diagrams of the human lung are presented that show the level to which blood flow rises at various acceleration stresses in erect, supine, inverted, and prone body positions. The various factors which affect the flow of blood through pulmonary capillaries at different levels in the lung are depicted and range from collapsed capillaries at the top of the lung over a sluice flow region, governed by the hydrostatic pressure gradient present within pulmonary arteries, down to the last level where blood vessels as well as air ways are occluded and blood flow is absent.

G.G.

**N70-40850# Western Ontario Univ., London. Dept. of Biophysics  
and Medicine.**

**THE EFFECT OF LOW FREQUENCY VIBRATION ON  
ARTERIAL WALL ELASTIC**

D. R. Boughner and Margot R. Roach /in AGARD Fluid Dyn. of

Blood Circulation and Respirat. Flow Jul. 1970 10 p refs (See N70-40841 23-04)  
 Avail: NTIS

Poststenotic dilatation and intravascular turbulence both occur distal to an arterial narrowing. The dilatation is due to altered elastic properties of the vessel wall while the turbulence produces palpable and audible vibration of the wall. The vibration may produce the dilatation. Twenty-three human external iliac arteries were exposed to individual frequencies contained in murmurs. Dilatation occurred in response to one or more of the frequencies to which each was exposed and the altered elastic properties were similar to the changes seen in poststenotic dilatation. The age of the vessel determined the frequency required to produce dilatation.

Author

**N70-40851#** Ohio State Univ., Columbus. Dept. of Aeronautical and Astronautical Engineering.

**SOME ASPECTS OF CARDIOVASCULAR BEHAVIOR DURING LOW-FREQUENCY VIBRATION**

Robert M. Nerem *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 13 p refs (See N70-40841 23-04)

Avail: NTIS

The behavior of the cardiovascular system during low-frequency whole-body vibration, such as encountered by astronauts during launch and reentry, is examined from a fluid mechanical viewpoint. The vibration characteristics of typical manned spacecraft and other vibration environments are discussed, and existing results from *in vivo* studies of the hemodynamic aspects of this problem are reviewed. Recent theoretical solutions to related fluid mechanical problems are then used in the interpretation of these results and in discussing areas of future work. Included are the results of studies of the effects of vibration on the work done by the heart and on pulsatile flow in blood vessels. It is shown that important changes in the instantaneous velocity profile, mass flow rate, and wall shear stress may occur in a pulsatile flow due to the presence of vibration. The significance of this in terms of changes in peripheral vascular resistance and possible damage to the endothelium of blood vessels is discussed.

Author

**N70-40852#** Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

**EFFECT OF POSITIVE AND NEGATIVE CENTRIFUGAL ACCELERATION ON RENAL BLOOD FLOW OF UNANESTHETIZED DOGS**

John E. Chimoskey (Hahnemann Med. Coll.) *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 6 p refs (See N70-40841 23-04)

Avail: NTIS

Trained unanesthetized dogs were exposed to positive and negative centrifugal accelerations in the range of +6G sub z to -3G sub z. Renal arterial pressure and inferior vena cava pressure at kidney level were measured through indwelling catheters attached to pressure transducers. Renal blood flow velocity was measured by a Doppler principle ultrasonic flow meter. The flow signal was telemetered and the pressure signals were transferred by sliprings from the centrifuge. About ten days after the sensing devices were implanted, under pentobarbital anesthesia, the experiments began for which the dogs were unanesthetized. During positive acceleration, renal blood flow velocity decreased in proportion to +G sub z to a minimum mean value of 16% of control during +6G sub z. Mean arterial pressure rose at all +G sub z levels.

Author

**N70-40853#** Avco-Everett Research Lab., Everett, Mass.

**FLUID DYNAMICS OF HEART ASSIST DEVICES**

Robert T. Jones *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 96 p refs (See N70-40841 23-04)

Avail: NTIS

Reviewed are certain hemodynamic phenomena that arise in connection with the use of artificial blood pumping devices. Among these are: (1) flows produced by collapsing bulbs; (2) the impact presented by the aorta; (3) limiting velocities and instability of flow in elastic vessels; (4) effectiveness of valveless arterio-arterial pumps; and (5) wave reflection phenomena and instabilities associated with the intra-aortic balloon pump.

Author

**N70-40854#** Imperial Coll. of Science and Technology, London (England). Physiological Flow Studies Unit.

**WALL SHEAR RATE IN ARTERIES AND DISTRIBUTION OF EARLY ATHEROMA**

C. G. Caro, J. M. Fitz-Gerald, and R. C. Schroter *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 (See N70-40841 23-04) 10 p refs

Avail: NTIS

Examination of arterial fluid mechanics indicates that there will be spatial variation of wall shear; studies in model systems identify regions expected to experience high or low shear. A study of human post-mortem arterial material reveals that early atheromatous lesions are found in regions expected to experience low wall shear, while high shear regions are spared. Published reports substantiate this distribution of lesions. This correlation of early atheroma with low wall shear is inconsistent with a mechanical wall damage hypothesis. It suggests implication of shear-dependent mass transfer processes. A shear dependent mass transfer process, including arterial wall synthesis of lipid, is proposed.

Author

**N70-40855#** Nijmegen Univ. (Netherlands). Dept. of Physiology. **RESPIRATORY FLUCTUATIONS OF OXYGEN TENSION IN CENTRAL VESSELS OF THE DOG**

H. Yokota and F. Kreuzer *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 (See N70-40841 23-04) 10 p refs

Avail: NTIS

Oxygen tension was continuously recorded in the aorta, pulmonary artery, and the caval veins of anesthetized dogs during spontaneous and artificial ventilation, using catheter oxygen electrodes of own design with a response time of fractions of a second. The respiratory fluctuations of the aortic oxygen tension showed a rather uniform pattern according to the course of the alveolar oxygen tension during hypoxia and normoxia. The amplitude was inversely related to the breathing frequency and increased with increasing oxygenation. The pattern with 100% oxygen breathing was different and more irregular, probably due to the influence of veno-arterial shunting since the amplitude was proportional to the alveolar-arterial oxygen pressure difference. The amplitude of the respiratory fluctuations of venous oxygen tension was smaller in the superior than in the inferior caval vein although the mean oxygen tension was higher in the superior caval vein. The pulmonary arterial fluctuations were surprisingly small.

Author

**N70-40856#** Technische Hochschule Aachen (West Germany). Aerodynamisches Inst.

**MODEL STUDIES OF PULSATING FLOW IN ARTERIAL BRANCHES AND WAVE PROPAGATION IN BLOOD VESSELS**

H. Zeller, N. Talukder, and J. Lorenz *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 (See N70-40841 23-04) 10 p refs

Avail: NTIS

Steady flows through models of arterial branches at different Re-numbers show the presence of secondary spiral motion immediately behind the point of bifurcation. If the mean velocities of the flow in the two branches are different, an enclosed deadwater region is developed near the outer wall of the branch with the lower mean velocity. These two phenomena persist even if the flow pulsates, however the rotation of the fluid in the deadwater

zone becomes stronger. To simulate the propagation of waves in blood vessels tubes of different elastic wall materials have been used. Experiments with liquids in systems of rubber and PVC walls show the strong influence of the dynamic visco-elastic properties on the velocity the distortion and the damping of pulse waves.

Author

**N70-40857#** Naples Univ. (Italy). Istituto di Aerodinamica.  
**MOMENTUM AND ENERGY TRANSFER IN BLOOD FLOWS THROUGH DEFORMABLE PIPES**

L. G. Napolitano and G. M. Carlomagno *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 (See N70-40841 23-04) 11 p refs

Avail: NTIS

Recent advances in momentum and energy transfer in blood flows through deformable pipes have been surveyed. On the one hand attention has been focused on what it is necessary to know, and what is presently known in order to set up adequate biological fluid-dynamics models for the blood circulation. On the other hand, a critical survey is made of what is the present status of theoretical and experimental knowledge on those basic fluid-dynamic problems which, although related to simpler and more naive models, still need to be solved. It has been shown that much experimental and theoretical work needs to be done on both the equilibrium and irreversible thermodynamics properties of the blood and the vessel walls; in particular the effective role played by the smooth muscle behavior should be definitely investigated; furthermore the need of an accurate theoretical and experimental analysis of heat transfer processes in pulsating flows, both in rigid and flexible pipes, is stressed.

Author

**N70-40858#** Oxford Univ. (England). University Lab. of Physiology.

**ARTERIAL WAVE PROPAGATION IN VIVO**

F. V. Mc L. Booth *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 (See N70-40841 23-04) 8 p refs

Avail: NTIS

Measurements have been made on the transmission of short trains of sinusoidal waves of pressure, peak to peak amplitude 10-15 mm Hg and frequency 40-100 in mature greyhounds. In these experiments no significant difference on transmission grounds could be detected between the aorta and the femoral artery. Similar experiments on rubber tubing gave results which agreed with predictions from separate determinations of static and dynamic elasticity, using the Womersley expressions for the fully tethered tube as modified by Taylor for the viscoelastic case.

Author

**N70-40859#** Oxford Univ. (England).

**THE MEASUREMENT OF INSTANTANEOUS BLOOD VELOCITY AND A CALCULATION OF TOTAL MECHANICAL ENERGY EXPENDITURE IN VENTRICULAR PUMPING**

D. H. Bergel, C. Clark, D. L. Schultz, and D. S. Tunstall Pedoe *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 18 p refs (See N70-40841 23-04)

Avail: NTIS

The paper describes the adaptation of thin film anemometers to the measurement of blood velocity in the major arteries of animals. Using these instruments, it has been possible to produce a rough survey of the radial velocity distribution in the ascending and descending aorta of dogs and to observe the velocity waveform in smaller branch vessels such as the brachiocephalic and coronary arteries. The instrument has more than adequate frequency response for the flow situation both in resting and exercise states and as an example of its ability to detect turbulence, some results of observations on the propagation of turbulent disturbances in the aorta and brachiocephalic artery of a dog are shown, together with observations of turbulent flow in the aorta of patients with valvular lesions. More recent research has been directed towards a study of the total mechanical energy expenditure in ventricular pumping

where simultaneous measurements of the blood velocity and pressure are required. It is shown that the kinetic energy component, while normally small, may increase markedly following the administration of isoprenaline.

Author

**N70-40860#** General Electric Co., Philadelphia, Pa. Environmental Sciences Lab.

**NONLINEAR THEORY OF PULSATILE BLOOD FLOW THROUGH VISCOELASTIC BLOOD VESSELS**

Paul Gordon and Sinclair M. Scala *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 16 p refs (See N70-40841 23-04)

Avail: NTIS

In most earlier work on theoretical models for blood flow, the point of departure has been the incompressible, viscous Navier-Stokes equations. However, in the arterial vessels adjacent to the heart, there is much evidence to suggest that the flow has no time to develop a significant boundary layer. For calculating the inlet pressure rise an inviscid model based on the complete time-dependent Euler equations was formed. Demonstrated is that although the density variation is small, it is by no means insignificant; this density variation is a stable and computable function whose calculation is no more difficult than that of the other flow variables. A real difficulty with the compressible inviscid equations is that the time step that can be utilized in the calculations is governed by the quasi-steady features of the physical problem, which is discussed in detail herein. A series of results based on our computations is presented, and the effects of wall elasticity, downstream bifurcations and tethering points on left ventricular pressure are discussed.

Author

**N70-40861#** Case Western Reserve Univ., Cleveland, Ohio. Div. of Fluid, Thermal, and Aerospace Sciences.

**SIMULATION OF VASCULAR DYNAMICS AND MEASURED FLOW CHARACTERISTICS**

Simon Ostrach, B. H. Ruterbories, and P. H. Hepner *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 9 p refs (See N70-40841 23-04)

Avail: NTIS

The dimensionless parameters that describe the pulsating flow of an incompressible fluid in a distensible tube are derived. Evaluation of these parameters from the physiologic data for the macrocirculation indicates that three are most significant for flow in the great vessels. These are: (1) an unsteadiness parameter; (2) the Reynolds number; and (3) a flexibility parameter (which indicates the ratio of wall elastic to fluid pressure forces). On the basis of the three significant parameters an experimental apparatus was designed to operate over the range of values of these parameters that correspond to normal and pathological conditions in a portion of the human cardiovascular system. It was determined that the dimensionless parameters derived are the significant ones and the data correlates well with their use. Peaking of the pressure profiles and the appearance of a dirotic arch, two phenomena that are observed in the circulatory system, were also obtained in the experiments and some insight is obtained of the conditions of their occurrence.

Author

**N70-40862\*#** Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

**THEORETICAL ANALYSIS OF NONLINEAR PHENOMENA AFFECTING THE PRESSURE AND FLOW PULSE IN ARTERIES**

Max Anliker, Robert Rockwell (Naval Weapons Center), and Eric Ogden (NASA. Ames Res. Center) *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 12 p refs (See N70-40841 23-04)

(Grant NGL-05-020-223)

Avail: NTIS CSCL 06P

As part of a systematic effort to develop noninvasive methods of measuring the deconditioning of the cardiovascular system of astronauts during space flights of long duration, studies have been initiated on the effects of various system parameters on the pressure and flow pulses in arteries. To examine the significance of the nonlinear effects associated with the variation of the wave speed with pressure and flow and with the large local changes in the cross-sectional area of the blood vessel which may be of the order of 20 to 50%, the method of characteristics was used to solve the one-dimensional equations of incompressible viscous flow. The artery was modeled geometrically in the form of a tube segment whose radius decreases in a prescribed fashion with distance from the heart at a given mean pressure; the effect of discrete branches was simulated by a continuously distributed outflow. Full advantage was taken of available experimental data in specifying the mechanical properties of the vessel wall through the local speed of propagation of small signals and its pressure dependence. As boundary condition at the proximal end the ejection pattern into the aorta was prescribed, while at the distal end a constant terminal pressure was specified. The nonlinear phenomena considered have a marked influence on the pressure and flow patterns. For pressure signals of sufficiently large initial amplitude shock waves develop within a relatively short distance from the heart. Author

**N70-40863#** Queen Elizabeth Hospital, Birmingham (England).  
**MORPHOLOGICAL ASPECTS OF THE PULMONARY CIRCULATION AND OF THE AIRWAYS**

G. Cumming, L. K. Harding, K. Horsfield, K. Prowse, S. S. Singhal, and M. Woldenberg *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 8 p refs (See N70-40841 23-04)  
Avail: NTIS

The quantitative morphometry of the pulmonary artery and the bronchial tree in the human has been studied using combined techniques of plastic corrosion specimens, thick sections and scanning electron microscopy. All large structures in both branching systems have been uniquely identified and measured, the data being recorded on computer cards and magnetic tape. A variety of methods for describing branching systems has been used, and from these a mathematical expression for the number of branches arising from each parent branch has been derived. The ratio of diameters and lengths of successive branches is also expressed in mathematical form. The information is summarized. Author

**N70-40864#** Paris Univ. (France). Dept. de Physiologie.  
**INDIRECT STUDY OF THE PATTERN OF FLOW IN THE HUMAN AIR PASSAGES**

D. Bargeton, M. Cousin, G. Danon, E. Florentin, and A. Teillac *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 12 p refs (See N70-40841 23-04)  
Avail: NTIS

The changes of partial pressures in the expired gas of carbon dioxide and of oxygen are due to propagation to the mouth of the changes of the composition of alveolar gas during the respiratory cycle and mixing of the alveolar gas with dead space air. Observation of the expired gas at the mouth gives indirect information upon the pattern of flow in the upper air passages. It is shown that: (1) the pattern of flow in the upper airways is intermediary between the Poiseuille and the Prandtl types; (2) an index of turbulence  $\gamma$  can be fitted to the data giving the situation of the actual pattern of flow between these two theoretical limits; (3)  $\gamma$  is expected to increase with conditions which increase turbulence; and (4) model experiments and observations in man at rest and at moderate exercise shows that  $\gamma$  increases linearly with the mean velocity of flow, and  $\gamma$  increases with the density of the gas, if  $N$  sub 2 in the inspired is replaced by SF sub 6 or Xe. Author

**N70-40865#** Medical Research Council, London (England). London School of Hygiene and Tropical Medicine.  
**THE USE OF AEROSOLS TO INTERPRET THE**

**FUNCTIONING IN THE HUMAN LUNGS**

C. N. Davies, J. Heyder (Ges. fuer Strahlenforsch.), and M. C. Subba Ramu (Bhabha Atomic Res. Centre) *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 7 p refs (See N70-40841 23-04)  
Avail: NTIS

Attention has been given to increasing the consistency of continuous measurements of the exhaled concentration of aerosol containing 0.5 micrometers diameter particles of di-ethyl-hexyl sebacate during steady breathing, single breath inhalation and other respiratory maneuvers. When breathing steadily, at a controlled frequency and amplitude, it has been found that aerosol deposition depends on the expiratory reserve volume; this has been studied by measuring the subject's deep exhalation after breathing aerosol. The recovery of aerosol from the lungs, after a number of breaths and after a single breath, has been measured both by changing over to pure air and by deep exhalation; it also depends on the resting expiratory level. From the experimental data it is possible to estimate the surface area and volume of the alveoli at different resting respiratory levels. It is shown that 0.5 micrometer particles remain airborne in the residual air during several breaths before depositing on the alveolar walls. Author

**N70-40866#** Naval Medical Research Inst., Bethesda, Md.  
**THE ROLE OF HEMODYNAMICS IN THE TRANSPORT OF INERT GASES IN THE PERIPHERAL CIRCULATION**

Richard G. Buckles *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 10 p refs (See N70-40841 23-04)  
Avail: NTIS

Decompression sickness, which afflicts both fliers and divers, occurs primarily because the body is unable to rid itself of excess dissolved inert gas when subjected to a reduction in hydrostatic pressure. The inert gas leaves principally through the lungs, being carried there from the peripheral tissues by the blood. In peripheral regions such as skin, cartilage, bone, and connective tissue the anatomy strongly suggests that diffusion will play a role in defining inert gas exchange. Such factors as intercapillary separations and counter current arterio-venous diffusive exchange are dramatically different in these tissues. In addition, most of the peripheral tissues are sensitive to environmental factors such as temperature, pressure, and O<sub>2</sub> pressure in a fashion unlike the central tissues. A series of studies will show the actual dynamics of Kr85 exchange in the pouch of a hamster when it is attached to a closed breathing loop filled with air and Kr85. Uptake and washout are monitored in order to assess the relative roles of perfusion and diffusion. Author

**N70-40867#** Imperial Coll. of Science and Technology, London (England). Physiological Flow Studies Unit.

**A THEORY FOR GAS MIXING IN A SIMPLE MODEL OF THE LUNG**

T. J. Pedley *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 7 p refs (See N70-40841 23-04)  
Avail: NTIS

The object of this theory is to assess the importance, for example on the slope of the alveolar plateau in single breath N<sub>2</sub> washout experiments, of the mixing which a gas undergoes as it is being inspired or expired. Regional variations are ignored, and the lung is approximated by a single tube whose cross-sectional area increases with distance  $x$  from the trachea. Gas concentrations are assumed to be uniform across this tube, and the mixing process is described by an effective diffusivity which varies continuously from the Taylor value for turbulent flow in the trachea to the molecular value at the alveolar end. Inspiratory and expiratory velocities are assumed to be independent of time, and the governing equation is a one-dimensional diffusion equation with  $x$ -dependent coefficients. This equation is solved, subject to appropriate boundary and initial conditions, by means of an eigenfunction expansion. Some preliminary numerical results for the eigenvalues are presented. Author

N70-40868# Imperial Coll. of Science and Technology, London (England). Physiological Flow Studies Unit.

**REVIEW OF THE EUROMECH 12 COLLOQUIUM ON FLUID MECHANICS OF CIRCULATION AND RESPIRATION**

C. G. Caro *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 3 p Colloq. held at Jablonna, Poland, 8-11 Sep. 1969 (See N70-40841 23-04)

Avail: NTIS

Topics discussed under microcirculation included the distribution of blood pressure within the arterial system and diffusion and convection in capillaries. There was particular interest in studies of the motion of the flexible red cells in capillaries and of the plasma between these cells. Contributions under respiration included pressure and flow in the trachea, flow patterns in branched tubes, the pressure drop in the bronchial airways, and experimental and theoretical studies on or related to the behaviour of inhaled particles. The section on large vessels and the heart included wave propagation in elastic tubes, the origin of sound within the circulation and the effect of turbulence on the arterial wall. Papers on techniques indicate that prospects exist for the making of important new measurements. Moreover the techniques and the information they promise may become interesting areas for analysis.

Author

**N70-40869# Nijmegen Univ. (Netherlands). Dept. of Physiology. FACILITATED DIFFUSION OF OXYGEN IN THE PRESENCE OF HEMOGLOBIN AND MYOGLOBIN**

F. Kreuzer and L. J. C. Hoofd *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 7 p refs (See N70-40841 23-04)

Avail: NTIS

The possible facilitation of oxygen diffusion by hemoglobin or myoglobin has attracted increasing interest in recent years. A quantitative description of the experimental results was not obtained hitherto. Developed was an approximate solution for the basic diffusion equations including the chemical reactions between oxygen and hemoglobin or myoglobin and the resulting expressions were applied to numerical computer solutions. The most important physical data were collected and critically evaluated, particularly the diffusion coefficients of hemoglobin and myoglobin as a function of protein concentration. Using these data the facilitated oxygen fluxes were computed for hemoglobin and myoglobin as a function of protein concentration. The agreement with experimental values was excellent for hemoglobin, but the computed curves tended to be too high when compared with experimental points in the case of myoglobin. The influence of the magnitude of the oxymyoglobin dissociation velocity constant was therefore also examined.

Author

**N70-40870# Texas A&M Univ., College Station. ANALYSIS OF THE DYNAMIC RESPONSE OF SUSPENDED PARTICLES IN A FLOWING NEWTONIAN FLUID MATRIX**

Paul H. Newell, Jr. and Daniel G. Barbee *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 8 p refs (See N70-40841 23-04)

Avail: NTIS

The trajectories of dilute suspensions of rigid, spherical particles were calculated from developing, axial and radial fluid velocity profiles determined from a numerical analysis of the boundary layer equations for an undisturbed flow in rigid tubes. The forces on the particles were evaluated from a Stokes formulation based upon relative velocities. Fluid streamlines and particle pathlines are presented for a flow developing from an initial slug-profile. Attention is called to the need to report detailed particle injection procedures and to be more cognizant of entrance effects in future experimental investigations into suspended flows. Finally a model is suggested which will provide for the theoretical quantification of the tubular pinch effect.

Author

N70-40871# Toulouse Univ. (France). Lab. d'Applications de Radioelements.

**CEREBRAL BLOOD FLOW AND THE CHOICE OF RADIOACTIVE INDICATORS (METHODS AND MEANS) [LE DEBIT SANGUIN CEREBRAL ET LE CHOIX DES INDICATEURS RADIO-ACTIFS (METHODES ET MOYENS)]**

M. C. Curie and J. P. Marc-Vergnes *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 9 p refs *In* FRENCH (See N70-40841 23-04)

Avail: NTIS

The measurement of cerebral flows can be distinguished by two methods, one using inert gases, allowing the conditions of cerebral tissue saturation to be seen, and the other using products which do not cross the parenchyma, enabling the study of the behavior of the vascular bed. The relationships between these flows permit the measurement of the weight of the brain.

Transl. by P.A.B.

**N70-40872# Lille Univ. (France). Lab. de Physiologie. MEASURE BY THERMODILUTION OF LOCAL BLOOD FLOW, PRINCIPALLY THE FLOW OF THE CORONARY SINUS [LA MESURE PAR THERMODILUTION DES DEBITS SANGUINS LOCAUX, PRINCIPALEMENT LE DEBIT DU SINUS CORONAIRE]**

Yvon Houdas, Michel E. Bertrand, and Jacques Y. Ketelers *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 10 p refs *In* FRENCH (See N70-40841 23-04)

Avail: NTIS

A thermoelement probe for the measurement of human coronary flow is described. The technique consists of injecting into the upper part of the coronary sinus a small quantity of NaCl at 9 p. 1000 at a temperature on the order of 23 C, and studying the variation of the temperature of the blood as a function of time at the outlet of the coronary sinus. Theoretical considerations and experimental studies using a model permit the conclusion that the precision is acceptable if the moment of injection is marked with reference to the cardiac cycle.

Transl. by P.A.B.

N70-40873# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.

**MEASURE OF BLOOD FLOW BY ELECTRIC PLETHYSMOGRAPHY: UTILIZATION IN AERONAUTICAL MEDICINE [MESURE DU DEBIT SANGUIN PAR PLETHYSMOGRAPHIE ELECTRIQUE. UTILISATION EN MEDICINE AERONAUTIQUE]**

J. M. R. Demange *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 9 p refs *In* FRENCH (See N70-40841 23-04)

Avail: NTIS

Rheograph and electroplethysmograph apparatus, using either two or four electrodes, are discussed, and the variations of electrical impedance are examined with reference to the blood vessels. Utilization of the techniques for measuring human limb, cerebral, and cardiac blood flow is investigated. It is concluded that electroplethysmographic blood flow measurement can be useful in the study of aerospace stresses and in the course of the selection, training, and expertise of the flight staff.

Transl. by P.A.B.

N70-40874# Institute of Aviation Medicine, Fliegehorst (West Germany).

**TESTS ON ARTIFICIAL BLOOD FLOW BY IMPEDANCE PLETHYSMOGRAPHY**

Helmut Vitz *In* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 4 p refs (See N70-40841 23-04)

Avail: NTIS

Measuring methods permitting reproducible measurements of the circulatory system are presented, such as determination of



stroke volumes, coefficients of elasticity, changes and quantifications of peripheral circulation. The latter method is in the development phase. The high value of longtime examinations has been emphasized, since the examinations are generally conducted in subjects with a sound circulatory system. Calibration, reproducibility and validity tests of formulae were conducted with the aid of an accurately described circulatory model. Author

N70-40875# Bologna Univ. (Italy).

**THE DIGITAL COMPUTER APPLIED DURING THE ARTIFICIAL HAEMODIALYSIS**

S. Focardi, C. Pallotti, G. Pallotti, and F. Viaggi / *in* AGARD Fluid Dyn. of Blood Circulation and Respirat. Flow Jul. 1970 8 p refs (See N70-40841 23-04)

Avail: NTIS

Possibilities to control by digital computer the artificial kidney, during application to a patient, are studied. General conditions of the patient are considered starting from Fick's law and the filtration law. The mutations of the values for toxic concentration substances in the blood are investigated when a large amount of toxic substances is produced by the human body during artificial haemodialysis. A particular program for digital computer application in clinical departments is presented. Author

N70-40893\*# Naval Medical Research Inst., Bethesda, Md. Dept. of Microbiology.

**EFFECTS OF HIGH AND LOW BAROMETRIC PRESSURES ON SUSCEPTIBILITY AND RESISTANCE TO INFECTION Quarterly Status Report, 1 Apr. - 30 Jun. 1970**

Francis B. Gordon, James D. Gillmore, Eugene Zebovitz, and Shelia Bond 30 Jun. 1970 12 p refs

(NASA Order A-3061A-(AS-1); NASA Order L-97; NASA Order L-464; NASA Order R-21-010-010)

(NASA-CR-113639; QSR-20) Avail: NTIS CSCL 06E

The problem of maintaining the body temperature of small experimental animals in a helium atmosphere, and an analysis of the significance of a lowered body temperature in susceptibility to influenza viral infection are investigated. Maintenance of the gas phase (1% O<sub>2</sub> in He, 500 psig) at 35 C enabled mice to preserve a body temperature within 2-3 C of normal. Additional experiments point toward an adverse effect of a normoxic O<sub>2</sub>-He atmosphere, at normal or increased barometric (95 psig) pressures; even when the temperature of the gas phase is raised to a point (30 C) that enables mice to maintain a normal, or nearly normal, body temperature. An experiment utilizing 11% O<sub>2</sub> in N<sub>2</sub> at one atmosphere for exposure of mice following inoculation with Coxsackie virus has confirmed the earlier observation of a more severe infection due to hypoxia as provided by an atmosphere of air at 7.3 psia. Although definitive tests on the incidence of transformation in altered atmospheres are not yet complete, an increased resistance of transformed cells to O<sub>2</sub> toxicity was observed. Author

N70-40920 National Lending Library for Science and Technology, Boston Spa (England).

**RECOMMENDATIONS FOR THE CALCULATION OF DISPERSION IN THE ATMOSPHERE OF NOXIOUS AGENTS (DUST AND SULPHUR DIOXIDE), CONTAINED IN THE EFFLUENTS FROM INDUSTRIAL UNDERTAKINGS**

22 Jun. 1970 49 p Transl. into ENGLISH from Gidromet. Izdat. (Leningrad), 1967 49 p

(NLL-CE-Trans-5184-(9022.09)) Avail: Natl. Lending Library, Boston Spa, Engl.: 5 NLL photocopy coupons

The recommendations set out a procedure for calculating dispersion in the atmosphere of dust and sulphur dioxide discharged to atmosphere by industrial installations and boiler plants. Single sources and groups of sources of emission are considered, and recommendations are given for: taking into account the background

pollution of the air basin of a residential area; determination of the boundaries of the health protection zone; and undertaking basic measures for protecting the air basin from pollution with the operation of industrial installations and boiler plants. Author

N70-40942# Army Edgewood Arsenal, Md.

**INHIBITION OF SWEATING BY SALTS OF HYOSCINE AND HYOSCYAMINE**

F. N. Craig Jul. 1970 25 p refs

(AD-709622; EA-TR-4411) Avail: NTIS CSCL 6/15

In tests of the inhibitory effect on sweating of optical isomers of hyoscyamine camphor sulfonate in one man, the levorotatory isomer was about 70 times more active than the dextrorotatory isomer. There was no significant difference in effect of equimolar doses of the levorotatory isomer and of atropine sulfate. Weight loss, body temperature, and heart rate were recorded for several hours on eight resting men at 41 and 52C. At 41C, seven men received intravenous injections of atropine sulfate and scopolamine hydrobromide, four men received atropine methylnitrate and the remaining four men received methscopolamine bromide. The doses were equimolar for the active base. The quaternary salts atropine methylnitrate and methscopolamine bromide were between two and three times more potent than the tertiary salts atropine sulfate and scopolamine hydrobromide. The hyoscyamine salts were indistinguishable from the hyoscyne salts with respect to inhibition of sweating and elevation of heart rate and skin and rectal temperatures. Because the salts differ widely in their potency in the central nervous system, the similarity of their peripheral actions supports the view that the action of low doses of atropine on temperature regulation is mainly peripheral. Author (TAB)

N70-40946# Texas Univ., Houston. Graduate School of Biomedical Sciences.

**THE EFFECTS OF LASER RADIATION ON RECEPTOR FUNCTION IN HUMAN AND PRIMATE EYES Annual Progress Report, 1 Jun. 1969 - 1 Apr. 1970**

Harry G. Sperling, Ronald S. Harwerth, John H. Mabry, and Clement Johnson 8 May 1970 47 p refs

(Contract DADA17-67-C-7154)

(AD-709655; UT-GSBS-DADA-3; APR-3) Avail: NTIS CSCL 6/5

In a series of experiments, the effects of intense spectral bands having the characteristics of ruby and argon laser light were measured in rhesus monkey eyes. Results obtained by measuring spectral sensitivity in their presence - or immediately after these exposures - demand a two-stage (receptor stage, neural opponent stage) explanation of spectral sensitivity for the highly light adapted eye. In continuing studies, these measures are being carried over the entire range up to intensities of laser light which will produce gross thermal injury. It is planned to relate changes in visual sensitivity to ultrastructural changes in the retina. The techniques for ultrastructural study of the vertebrate retina are briefly discussed. Author (TAB)

N70-40949\*# Miami Univ., Coral Gables, Fla. Inst. of Molecular Evolution.

**EXPERIMENTALLY DERIVED EXPLANATIONS OF SOME ASPECTS OF THE ORIGIN OF LIFE**

Sidney W. Fox May 1969 34 p refs / *its* Contrib. No. 137

(Contract NAS9-8101; GRANT NGR-10-007-008)

(NASA-CR-113795) Avail: NTIS CSCL 06C

Research is reported aimed at obtaining answers to the fundamental questions of how enzymes began in the absence of enzymes, of how cells arose in the absence of cells, and of how genes appeared in the absence of genes. Experimentation discussed deals with models of the origin of energy transfer mechanisms, internal synthesis of peptide bonds, and origin of the genetic code. Based on the results of these experiments, explanations are offered as to the origin of enzymes, metabolism, order in proteins, cells, membranes, and reproduction. D L G.

**N70-41000\***# Grumman Aerospace Corp., Bethpage, N.Y.  
**STUDY OF MOBILITY AND RESTRAINT DEVICE CONCEPTS FOR FUTURE MANNED SPACE SYSTEMS** Final Report, 7 Jan. - 7 Aug. 1970  
 C. R. Bassano and G. P. Gibbons 7 Aug. 1970 63 p refs  
 (Contract NAS9-10456)  
 (NASA-CR-108609; DRD-MS-C-1232; SRP-14S-104) Avail: NTIS CSCL05E

Research is reported aimed at evaluating existing and/or proposed concepts for mobility/restraint systems, and to develop new concepts applicable to long duration manned spacecraft. The study was limited to applications for broad classes of earth orbital space stations and logistic spacecraft for the 1973 to 1978 time period. The major tasks performed were: (1) a literature search; (2) establishment of mobility and restraint requirements for long term, large spacecraft operations; (3) synthesis and development of concepts for mobility and restraint devices; (4) evaluation and selection of recommended concepts; (5) development of parametric data to establish design characteristics, spacecraft interfaces, and associated penalties; and (6) assessment of development and implementation factors. D.L.G.

**N70-41006#** Federal Aviation Administration, Washington, D.C.  
**DEVELOPING MANPOWER REQUIREMENTS IN NONSTANDARD ENVIRONMENTS WITH RANDOM WORKLOAD DEMANDS**  
 Peter N. Kovalick [1970] 28 p refs Presented at the 21st Ann. Conf. of the Am. Inst. of Ind. Engr., Cleveland, May 1970  
 Avail: NTIS

The concept of developing manpower requirements in nonstandard environments with random workload demands is presented through an application in air traffic control towers. It is based on developing standard data by a microanalysis of air traffic operations. The standard data can then be used to formulate customized standards for various combinations of work situation variables. Humanistic effects resulting from variations in workload stress and complexity are considered in relation to requirements for handling 100% of random peak traffic volumes. Both the static and dynamic characteristics and constraints of the system are treated. Author

**N70-41039\***# Massachusetts Inst. of Tech., Cambridge, Man-Vehicle Lab.  
**SENSORY FEEDBACK IN HUMAN POSTURE CONTROL**  
 Lewis Michael Nashner (Ph.D. Thesis) Jun. 1970 209 p refs  
 (Grant NGL-22-009-156)  
 (NASA-CR-113796; MVT-70-3) Avail: NTIS CSCL05E

Current models for physiological components and a series of experiments on human subjects form the basis for a multiloop control model which describes how a human uses multiple feedback sensors to control his orientation. Particular emphasis is placed on defining functional interfaces between the feedback sensors and postural responses. Because of the inherent complexities within the posture control system, analysis is simplified by considering only control of forward and backward rotational motions about the ankle joints during quiet standing tasks. The research effort is divided into three segments. First, a general posture control model is assembled given current models for motor and sensory components. This general model forms the basis for a series of experiments with human subjects using a specially designed two-degree-of-freedom simulator. Finally, experimental observations are combined with the general model, developing specific models which predict the observed postural responses. Author

**N70-41048#** American Inst. for Research, Pittsburgh, Pa.  
**EVALUATION OF A LOW COST IN-FLIGHT AUDIO/VIDEO RECORDING SYSTEM FOR PILOT TRAINING** Final Technical Report, 15 Sep. 1967 28 Jul. 1968

Sanford P. Schumacher, Melvin H. Rudov, and Horace H. Valverde (AF Human Resources Lab.) Brooks AFB, Tex. Human Resources Lab. Oct. 1970 191 p refs  
 (Contract F33615-68-C-1048)  
 (AD-709213; AIR-728-7/69-FR; AFHRL-TR-69-31) Avail: NTIS CSCL5/9

The report describes a study to determine the feasibility and effectiveness of using in flight audio/video recording and ground playback equipment in the United States Air Force undergraduate pilot training (UPT) program. It includes a detailed description of a low cost audio/video recording system (AVRS) which was developed for the study. Audio/video equipment configurations are discussed as they apply to training operations in the T-37 aircraft. A description is given of the training methodology which was formulated for integrating the audio/video recordings of student maneuvers into the flight training program. Airborne cameras were used to view the flight instruments and the pilots forward outside scene. The operational use of the AVRS is described for two ongoing classes of pilots. The results in terms of differences in achievement levels and learning rates for TV and non-TV students are described. Conclusions as to high equipment reliability and easy maintainability and the training benefits which can be expected to accrue from use of the AVRS are detailed. Author (TAB)

**N70-41065#** Columbia Univ., N.Y. Psychophysics Lab.  
**BEHAVIORAL DEFINITION OF MINIMAL REACTION TIME IN MONKEYS**  
 Carol A. Saslow 1 Mar. 1970 51 p refs Prepared in cooperation with Wash. Univ., Seattle.  
 (Contract N00014-67-A-0108-0005; Grants PHS-FR-00166; PHS-GM-66-08)  
 (AD-709081; PLR-12) Avail: NTIS CSCL5/10

Two monkeys (*M. mulatta*) were trained to press a telegraph key after onset of a tone and to release it after a fixed foreperiod of 1 sec ended by a light flash (SD). To be reinforced, the response had to fall within a payoff band, with two limits 50 msec. apart, located at some interval after SD. The payoff band was moved toward SD in a gradually descending series and then returned to longer intervals in an ascending series while medians and semi-interquartile ranges (SIQRs) were determined from latency distributions for each band. A simple RT model suggested that latency distributions could be composed of a combination of high-variability foreperiod time estimations, low-variability minimal RTs or responses timed from SD. The SIQR, according to the model, would increase rapidly when the animal included foreperiod estimation in his latency distribution to meet a fast band location. Minimal RT was defined as the fastest the animal would go before beginning to inflate his variability and decrease his reinforcements by foreperiod estimations. The predictions of the model were confirmed. The results are used to evaluate the interpretation of RT as a scaling measure of subjective intensity. Author (TAB)

**N70-41072\***# Becton, Dickinson and Co., Rutherford, N.J.  
**PRELIMINARY SUBLIMATION STUDIES**  
 J. J. Tulis and H. S. Lilja 14 Feb. 1969 9 p  
 (Contract NASw-1764)  
 (NASA-CR-113856; TR-4) Avail: NTIS CSCL06M

Preliminary studies were performed to determine whether viable microorganisms are released from the frozen state, when in an aqueous menstruum, upon sublimation. Data indicated that small numbers of viable bacterial spores are released from a frozen aqueous suspension and could thereby contaminate outer space. However, when microorganisms contained in skim milk were frozen and subsequently exposed to high vacuum, the process of sublimation was not associated with microbial transfer, whether using bacterial spores or vegetative cells. Thus, the residual protein matrix resulting from the sublimation process, when using skim milk, may provide a structure that contains the microorganisms and

prevents their release. It is recommended that further studies be performed using a prototype of the Apollo sublimation apparatus.

Author

N70-41108# RAND Corp., New York.

**FACE RECOGNITION: A SPECIAL PROCESS?**

Robert K. Yin Jul. 1970 26 p refs

(AD-709624; P-4419) Avail: NTIS CSCL 5/10

Four experiments analyzed the ability to distinguish and remember faces by comparing face and object recognition under several conditions. First, memory was tested for correctly oriented pictures and inverted ones. Second, it was tested for pictures presented for long and brief exposures. Third, subjects described pictures and later re-matched their own descriptions with the same pictures. Fourth, people with different brain injuries performed on a shorter version of the upright-inverted memory tests. In each of these cases, face recognition was different from object recognition, providing some evidence that face recognition may involve a face-specific process.

Author (TAB)

N70-41110\*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Systems Studies Div.

**DRY-HEAT STERILIZATION MODELING Interim Report**

J. P. Brannen Aug. 1970 103 p refs Sponsored in part by AEC

(NASA Order N-12853)

(NASA-CR-113817; SC-PR-70-439) Avail: NTIS CSCL 06M

A rational model for spacecraft dry-heat sterilization is considered based on the following assumptions: (1) Microorganisms are independently sterilized, i.e., the sterilization of a particular organism has no effect on the sterilization of another. (2) In a thermal environment, sterilization is the consequence of chemical reactions. (3) These reactions have order. (4) There may be several competing mechanisms involved in sterilization. Model generalization and analyses for both microbial water activity and pressure are included. The results show that DNA denaturation is responsible for wet-heat sterilization of *Bacillus subtilis*. It is concluded that the inclusion of water activity is accomplished in a kinetic sterilization model by means of absolute reaction-rate theory and the entropy of activation, and from a kinetic viewpoint, there is little difference between experiments run at a pressure of 0.000001 torr and 10 to the minus 17th power torr. Consequently, experiments run at 0.000001 torr are adequate for kinetic sterilization prediction related to an outer space environment.

F.O.S.

N70-41159\*# J & J Marine Diving Co., Inc., Pasadena, Tex.

**SURFACE INTERVAL PROVIDING SAFETY AGAINST DECOMPRESSION SICKNESS IN HYPERBARIC-HYPOBARIC EXPOSURES Final Report**

Peter O. Edel 25 Mar. 1970 57 p refs

(Contract NAS9-9036)

(NASA-CR-108645) Avail: NTIS CSCL 05E

Astronauts are required to carry out a simulated weightlessness training program at a depth of 40 feet of fresh water. They wear space suits pressurized to 3.5 psi above ambient pressure so that they are exposed to a pressure differential equivalent to 47 feet of sea water (FSW). The underwater program varies, consisting of a single two-hour dive; or two dives lasting two hours each, with a three-hour surface interval between them; or a repetition of the two-dive schedule on a maximum of five successive days, with a minimum of 16 hours separating the work days. Following the underwater exposure, the astronauts then pilot their jet aircraft from Huntsville to Houston in a flight lasting approximately two hours. Empirical tests were carried out to determine the probability of an attack of decompression sickness during the proposed compression-decompression training schedule. As a result of the tests, surface intervals are recommended before ascent to altitude is attempted following one or more exposures to 47 FSW lasting two hours.

Author

N70-41163\*# Food and Drug Administration, Cincinnati, Ohio. Div. of Microbiology.

**ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Apr. - 30 Jun. 1970**

R. B. Read, Jr. Sep. 1970 9 p ref

(NASA Order R-36-015-001)

(NASA-CR-113870; OPR-21) Avail: NTIS CSCL 06M

Experiments were conducted, involving thousands of spore populations, to identify the nature of the thermal inactivation curve of *B. subtilis* var. *niger* spores under 2.6, 10, and 100 micrograms of water per ml of headspace air. The spores were suspended in 95% ethyl alcohol, diluted in sterile double distilled water, and dispensed in 0.01 ml amounts into stainless steel cups to give about 1 million spores per cup. The cups were placed in tin cans and dried in a vacuum oven for 90 minutes at 46 to 50 C at 1.5 inch Hg pressure. Spore survivors from cups containing less than 10 spores per cup were assayed by sonifying the cups in peptone water and plating. Cups were scored for growth or no growth and the most probable numbers of survivors per cup calculated from these data. Typical thermal inactivation curves are given.

D.L.G.

N70-41220# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**PHYSIOLOGICALLY TOLERABLE DECOMPRESSION PROFILES FOR SUPERSONIC TRANSPORT TYPE CERTIFICATION**

Stanley R. Mohler Jul. 1970 16 p refs

(AM-70-12) Avail: NTIS

The supersonic transport represents a quantum step in civil aeronautics. It will cruise at altitudes having low ambient gaseous pressures far exceeding human capacities for compensatory respiration. In consideration of this evolutionary step, tentative airworthiness standards with respect to SST pressurization capabilities in the event of depressurization emergencies are discussed and a series of evolved SST cabin altitude-time profiles, together with the basis of their development, are than presented.

Author

N70-41221# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

**PILOT HEART RATE DURING IN-FLIGHT SIMULATED INSTRUMENT APPROACHES IN A GENERAL AIRCRAFT**

A. Howard Hasbrook and Paul G. Rasmussen Apr. 1970 14 p refs

(AM-70-7) Avail: NTIS

Eight instrument rated pilots with flying experience ranging from 600 to 12,271 hours each flew 10 simulated ILS instrument approaches in a single engine, general aviation aircraft equipped with a primary flight display arranged in a conventional configuration. Continuous heart rate data were recorded during each approach. Approaches were flown consecutively at approximate 10 minute intervals, with a 1 minute in-flight rest period prior to each approach. Principal findings were: heart rate increased significantly during each approach; mean increase in heart rate during the approaches was 5.2 beats per minute (BPM) and was of a relatively constant magnitude for each of the 10 approaches; and the overall mean heart rate level decreased on successive approaches for a total of 11.0 BPM for the 10 approaches. The results are discussed in terms of responses to stress introduced by the demands of the task.

Author

N70-41223\*# Stanford Univ., Calif. Cardiology Div.

**EVALUATION OF THE CARDIOVASCULAR SYSTEM DURING VARIOUS CIRCULATORY STRESSES Progress Report, 1 Jun. 1969 - 30 May 1970**

Donald C. Harrison 30 May 1970 29 p refs

(GRANT NGR-05-020-305)

(NASA-CR-113933) Avail: NTIS CSCL 06C

Dopamine, lidocaine, and morphine studies with an animal myocardial infarction model were completed. Preliminary results are given for further animal studies concerning the effects of digitalis glycosides in experimental myocardial infarction, an evaluation of factors which relate to measurement of the left ventricular dp/dt, multiple flow transducer utilization for recording the distribution of cardiac output, and the circulatory effects of myocardial infarction in unanesthetized dogs. Progress in human studies is reported for ultrasound research, pressure transducer testing, fiber optics studies, and work concerning the dynamic geometry of the left ventricle. Proposed studies are summarized, and a bibliography listing abstracts, manuscripts, and presentations resulting from the research is included. P.A.B.

**N70-41224\*#** Standard Univ., Calif. Medical Center.  
**GLC OF SERUM PHENYLALANINE: A GAS LIQUID CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF PHENYLALANINE SERUM**

E. Jellum, V. A. Close, W. Patton, W. Pereira, B. Halpern, et al [1970] 17 p refs Supported in part by the Norweg. Cancer Soc. (Grant NGR-05-020-004) (NASA-CR-113875) Avail: NTIS CSCL 06A

A rapid, specific, and precise gas liquid chromatographic method is described for the quantitative determination of phenylalanine in serum. The method is based on the conversion of the amino acid to the volatile neopentylidene phenylalanine methyl ester derivative. It is useful as a confirmatory test in diagnosis of suspected phenylketonuria and in evaluating the affectiveness of a diet low in phenylalanine. Author

**N70-41225\*#** Florida State Univ., Tallahassee.  
**BIostatISTICS OF SPACE EXPLORATION: MICROBIOLOGY AND STERILIZATION Final Report, 1 Sep. 1965 - 1 Sep. 1970**

Richard G. Cornell 15 Sep. 1970 6 p refs (Grant NGR-10-004-029) (NASA-CR-113863) Avail: NTIS CSCL 06M

Statistical problems related to investigations on the decontamination of spacecraft and related studies of microbial life are discussed. The research is divided into three categories of spacecraft sterilization probability models, statistical procedures for microbial assays and related nonlinear regression problems, and statistical procedures of general usage. R.B.

**N70-41274\*#** Florida State Univ., Tallahassee. Dept. of Statistics.  
**EXPONENTIAL DECONTAMINATION MODELS FOR COUNT DATA**

Richard G. Cornell and Ashok K. Bansal 1 Sep. 1970 19 p refs (Grant NGR-10-004-029)

(NASA-CR-113861; TR-22) Avail: NTIS CSCL 06T

Several models are developed for the estimation of the rate of exponential die-off from decontamination data. Calculations with illustrative data are reported which indicate that the estimation of this rate and its variance are sensitive to changes in modelling assumptions. Since extrapolation using this estimated rate is used in the specification of planetary quarantine standards, special care should be taken in the selection of an appropriate model and corresponding estimation procedure for the analysis of each set of decontamination data to be used for this purpose. Author

**N70-41297\*** National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

**LIQUID-GAS SEPARATOR FOR ZERO GRAVITY ENVIRONMENT Patent**

Robert E. Smylie and Frank H. Samonski, Jr., inventors (to NASA) Issued 31 Jan. 1967 (Filed 21 Sep. 1964) 5 p Cl 55-35

(NASA-Case-XMS-01492; US-Patent-3,300,949; US-Patent-Appl-SN-398131) Avail: US Patent Office CSCL 06K

An apparatus is described for separating the gas from the liquid-gas stream used for environmental control under zero gravity conditions. Two adjacent layers of a highly absorptive material of different density are contained in a housing. The density of the first layer is relatively loose and permits both the gas and liquid to pass through. The gas passes directly through the first layer while the liquid is absorbed and flows across the layer due to the pressure of the incoming stream. The second layer is compressed to such a density that no gas can pass through and it also absorbs the liquid upon saturation of the first layer. A check valve is provided on the gas outlet to retain a portion of the gas in the housing and to create and maintain a positive pressure on the first absorbing layer, thus forcing the liquid through the layers into a storage tank. R.B.

**N70-41327#** Rowland and Co., Haddonfield, N.J.

**VISUAL ILLUSION PROBLEMS Final Report**

George E. Rowland and Joseph F. Snyder Sep. 1970 94 p refs

(Contract DOT-FA69NA-357)

(FAA-NA-69-42; FAA-RD-69-49) Avail: NTIS

A literature search was made concerning purely visual illusions which might originate from lighting or marking of aircraft and which might induce pilots to become involved in near-misses or collisions. (The study specifically avoided vestibular-induced illusions.) Areas were identified that are capable of causing illusions to pilots, including the geometrical illusion; aftereffects, with particular reference to figural after-effects; hypnogogic hallucinations; expectancy (or mental set) and unexpected events; interactions between kinesthetic and visual stimuli; and personality variables in response to after-effects and illusions. Recommendations are made for a wide variety of researches, but specific attention is drawn to improvements in the way pilots are taught to utilize their visual sense and research on after-images and figural after-effects. These two effects hold some likelihood of being a serious source of illusory perception to pilots. In general, further research in illusions should be quite limited since the effects they create are probably not causing much trouble. A small research program on figural after-effects is recommended. Author

**N70-41329\*** National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

**INSTRUMENT FOR USE IN PERFORMING A CONTROLLED VALSALVA MANEUVER Patent**

Maxwell W. Lippitt, Jr. and John H. Reed, Jr., inventors (to NASA) Issued 17 Jan. 1967 (Filed 10 Dec. 1963) 7 p Cl 128-2.05

(NASA-Case-XMS-01615; US-Patent-3,298,362;

US-Patent-Appl-SN-329595) Avail: US Patent Office CSCL 06B

A device for producing a known constant positive pressure within the lungs is described. The device consists of a hollow cylinder of transparent plastic which is fitted at one end with a mouthpiece. It is provided with a piston constrained by a spring device attached to one end of the piston and an adjustment screw on the mouthpiece. When pressure is applied to the cylinder by a person exhaling through the mouthpiece, the piston moves down the bore of the cylinder against the action of the spring by a distance proportional to the pressure applied. A hole is drilled through the cylinder at a preselected distance from the mouthpiece and the subject develops a positive pressure in the lungs by exhaling with sufficient force to move the piston past the escape port. Because air continually escapes while the subject is maintaining the pressure within the cylinder, the thoracic muscles rather than the cheeks must be used to sustain the desired pressure. The device is designed for conducting the Flack test on astronauts subjected to prolonged periods of limited activity and zero gravity. R.B.

**N70-41334\***# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

**A NONEQUILIBRIUM THERMODYNAMIC MODEL OF ION TRANSPORT IN A THREE-COMPARTMENT SYSTEM**

Heinz George Hausch (Ph.D. Thesis—Med. Coll. of Virginia) Jun. 1970 129 p refs

(NASA-TM-X-66345) Avail: NTIS CSCL06C

A physical analog of steady-state sodium and potassium transport in a two-membrane, three-compartment system was studied utilizing the principles of nonequilibrium thermodynamics. This physical system is analogous to physiological systems where one compartment consisting of a cell monolayer separates two other compartments, such as the interstitial fluid and the renal tubule lumen in the kidney. The phenomenological equations relating the flows through the membranes to the chemical potential gradients were developed from the equation for energy dissipation within each membrane. The flows defined both the nonsteady-state rates of change of concentrations within each compartment and the steady-state transport across each membrane. Ion transport due to chemical convection was studied by adding water to the cell compartment and removing it from the interstitial compartment. The lumen compartment was left as a strictly passive compartment. The Na(+), K(+), and Cl(-) concentrations were measured periodically until a steady-state was reached. Author

**N70-41385#** Technische Univ., Berlin (West Germany). Fakultät fuer Allgemeine Ingenieurwissenschaften.

**RESEARCH ON THE ELEMENT AND ISOTOPE DISCRIMINATION OF ALKALIS ON MEMBRANES OF UNICELLULAR ALGAE [UNTERSUCHUNG UEBER DIE ELEMENT- UND ISOTOPEN- DISKRIMINIERUNG VON ALKALIEN AN MEMBRANEN EINZELLIGER ALGEN]**

Ulrich Zimmermann (Ph.D. Thesis) 1968 73 p refs In GERMAN  
Avail: NTIS

The effects of alkali elements and isotopes on the membranes of unicellular algae are discussed. The chemical and physical properties of algae immersed in various concentrations of alkali solutions are presented. Mass spectroscopy and radiometry techniques are used to determine the effects. The results of the research are presented in tables and graphs. Transl. by P.N.F.

**N70-41454\***# Battelle Memorial Inst., Columbus, Ohio.  
**INVESTIGATION OF SPACECRAFT MATERIALS THAT SUPPORT MICROORGANISM GROWTH**

H. T. Kemp and C. W. Cooper 17 Jun. 1970 51 p refs  
(Contract NAS8-30504)

(NASA-CR-113798) Avail: NTIS CSCL06M

Seventeen externally applied spacecraft paint coatings were selected from a literature survey and evaluated in laboratory studies for growth supporting or biocidal properties using representative bacteria and fungi strains. Extract, petri plate, high humidity, and soil burial experiments were carried out. None of the coatings totally inhibited test organisms and few were highly resistant to microbial deterioration. The best coatings were varnish, phenolic-butylate, and polyimide. E.C.

**N70-41463#** Joint Publications Research Service, Washington, D.C.

**INTELLECT, COGNITION, AND TECHNOLOGY**

Yevgeniy Semenovich 15 Sep. 1970 48 p Transl. into ENGLISH of the booklet 'Intellekt, Poznaniye, Tekhnika' Moscow, Znaniye, 1970

(JPRS-51372) Avail: NTIS

The heuristic quality, creativity, mobility, and prediction ability of an individual's intellect are discussed as well as his reasoning power, independence of reflection, intellectual openness, self-reflection, inclinations, dissatisfaction, and optimism. The dread of newness and conformism is also mentioned. The principles of

compatibility, correspondence, permanentness, and scientific equality and superiority are included under collective intellect along with the right to make mistakes, criticism, and the principles of encouragement, permanentness of the research cycle, and minimal control. J.M.

**N70-41465\***# Grumman Aerospace Corp., Bethpage, N.Y.  
**USE OF THE BEN FRANKLIN SUBMERSIBLE AS A SPACE STATION ANALOG. VOLUME 1: SUMMARY TECHNICAL REPORT Final Report**

May 1970 54 p refs

(Contract NAS8-30172)

(NASA-CR-102828; OSR-70-4-Vol-1) Avail: NTIS CSCL05E

A technical review is presented of the NASA effort using the Ben Franklin submersible as a space station analog during the 30-day drift mission in the Gulf Stream from 14 July to 14 August 1969. Psychological and physiological measurements during the pre-mission, mission, and post-mission phases were investigated as well as habitability in a closed ecosystem; microbiological analysis of the water system, human flora, and environmental samples; and maintainability considerations for scheduled and unscheduled tasks. Ben Franklin characteristics, tabulated ocean scientific data, and the Captain's log are appended. J.M.

**N70-41466\***# Grumman Aerospace Corp., Bethpage, N.Y.  
**USE OF THE BEN FRANKLIN SUBMERSIBLE AS A SPACE STATION ANALOG. VOLUME 2: PSYCHOLOGY AND PHYSIOLOGY Final Report**

May 1970 122 p refs

(Contract NAS8-30172)

(NASA-CR-102823; OSR-70-5-Vol-2) Avail: NTIS CSCL05E

A description is presented of the crew, environment, data collection, training, and pre-drift testing for the long term test of human physiological and psychological responses to long term confinement in the Ben Franklin submersible. Psychological adaptability, compatibility and interactions, and crew performance are summarized. The physical condition, medication required, food, and food preferences are included in the study of crew physiological adaptability. Living and working conditions are reported for analogy to long term space voyages. Medical and command and control comments are appended with a sample of a personal log of the submerged confinement test. J.M.

**N70-41467\***# Grumman Aerospace Corp., Bethpage, N.Y.  
**USE OF THE BEN FRANKLIN SUBMERSIBLE AS A SPACE STATION ANALOG. VOLUME 3: HABITABILITY Final Report**

May 1970 121 p refs

(Contract NAS8-30172)

(NASA-CR-102830; OSR-70-6-Vol-3) Avail: NTIS CSCL05E

Methods and limits of analysis, area utilization, crew activity and time lines, and habitability planning considerations are described for the long term habitability test on the Ben Franklin submersible. Instruments, procedures, crew pre-mission training and experience, and mission data are included in the environmental analysis. Basic food requirements, the food system, and crew acceptance are reported under food management. Hot and cold water distribution and allocation are described as well as clothing and bedding utilized during the test. Personal hygiene, noise and light levels, and free volumes and areas are also considered. Conclusions and recommendations are given for long space voyage consideration. J.M.

**N70-41468\***# Grumman Aerospace Corp., Bethpage, N.Y.  
**USE OF THE BEN FRANKLIN SUBMERSIBLE AS A SPACE STATION ANALOG. VOLUME 4: MICROBIOLOGY Final Report**

May 1970 117 p refs  
(Contract NAS8-30172)  
(NASA-CR-102831; OSR-70-7-Vol-4) Avail: NTIS CSCL 05E

Methods are described for biological sampling and culturing from the human body, environment, water and waste water, garments and linen, and food. Total counts, simplification/shift of flora, and specific bacteria and fungi are included for each sample area, along with conclusions and recommendations. Guidelines are discussed for future space stations based on the Gulf Stream drift mission. Summaries of manned chamber tests, water chemistry, and the on-board sampling instruction manual are appended. J.M.

**N70-41469\*#** Grumman Aerospace Corp., Bethpage, N.Y.  
**USE OF THE BEN FRANKLIN SUBMERSIBLE AS A SPACE STATION ANALOG. VOLUME 5: MAINTAINABILITY Final Report**

May 1970 113 p refs  
(Contract NAS8-30172)  
(NASA-CR-102832; OSR-70-8-Vol-5) Avail: NTIS CSCL 05E

Mission planning, data acquisition and analysis, prediction techniques, pre-mission crew training, and maintainability analysis of the long term confinement test in the Ben Franklin are presented. Maintenance workload and manpower distributions are reported with an analysis of maintenance tasks. Conclusions and recommendations are given with analogy to space station maintenance. Space maintainability background, drift mission planning, maintenance procedures, and maintainability analysis and prediction techniques are appended. J.M.

**N70-41581\*** National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

**THREE-AXIS CONTROLLER Patent**  
Earl O. Menefee and Albert A. Puccinelli, inventors (to NASA)  
Issued 3 Jan. 1967 (Filed 27 Apr. 1964) 12 p Cl. 74-471  
(NASA-Case-XAC-01404; US-Patent-3,295,386;  
US-Patent-Appl-SN-363348) Avail: US Patent Office CSCL 05E

The controller is operated basically by a combined hand and wrist motion and is designed for high speed aircraft or spacecraft which permit little freedom of arm movement by the operator. To provide for the complex motion of the human hand about a multiplicity of centers, the pitch control mechanism has two horizontal transverse axes arranged one behind the other. Yaw and roll are each controlled by rotating the mechanism about a single axis. It is suggested that the controller is also useful in the remote control handling of radioactive materials, control of equipment by an invalid who has the use of one hand, and remote control of steering and braking of various transportation vehicles. N.E.N.

**N70-41605#** Los Alamos Scientific Lab., N.Mex.  
**ENERGY DEPENDENCE OF ALBEDO NEUTRON DOSIMETERS PLACED ON THE HEAD**

Dale E. Hankins Apr. 1970 13 p refs  
(Contract W-7405-eng-36)  
(LA-4341) Avail: NTIS

A study was made of the energy dependence of an albedo neutron dosimeter system placed at various locations on the head. An albedo dosimeter placed behind the ear has an energy dependence closer to the desired rem response than a chest-mounted dosimeter. The improvement in the energy response is greatest for intermediate- and low-energy neutrons, but the response for fast-energy neutrons is still poor. The large overresponse of an albedo dosimeter caused by room-scattered neutrons and shielding materials placed between the source and the dosimeter is described. The directional effect of a head-mounted albedo dosimeter was better than a chest-mounted dosimeter. NSA

**N70-41627#** Harvard Univ., Boston, Mass. Medical School.  
**[SPATIO-TEMPORAL FACTORS IN VISUAL PERCEPTION]**  
Final Report, 1 Jun. 1967 30 Jun. 1970

David N. Lee 1970 25 p refs  
(Contract Nonr-1866(52))  
(AD-709457) Avail: NTIS CSCL 6/16

A program of studies on the psychological and physiological changes that take place in the human organism exposed to a restricted and systematically varied perceptual field, is presented. TAB

**N70-41645#** Laboratory for Research in Neuropsychology, Inc., Boston, Mass.

**THE ROLE OF THE PINNA IN SPEECH INTELLIGIBILITY Final Report, 15 Apr. 1969 14 Apr. 1970**  
Sanford J. Freedman May 1970 19 p refs  
(Contract F44620-69-C-0064)  
(AD-709712; AFOSR-70-2043TR) Avail: NTIS CSCL 17/2

Nine normal-hearing subjects listening through earphones were required to identify spoken words in a noisy background. Acoustic stimulation was picked up alternately by bare microphones and by microphones equipped with casts of human external ears (pinnae). Test scores and subjective impressions both indicated a highly significant and consistent superiority for the pinna condition. Sound level measurements and sonograms confirmed the superiority of the pinna condition. Author (TAB)

**N70-41661#** RAND Corp., Santa Monica, Calif.  
**THE MIND SYSTEM. THE MORPHOLOGICAL-ANALYSIS PROGRAM**

Martin Kay and Gary R. Martins Apr. 1970 92 p refs  
(Contract F44620-67-C-0045; Proj. RAND)  
(AD-709176; RM-6265/2-PR) Avail: NTIS CSCL 9/2

A detailed description of the ANALYZE module of the MIND information system is presented. This part of the system receives English sentences as input, segments them into words, and reduces the words to their ultimate lexical components through morphological analysis. Dictionary entries providing morphological, syntactic, and semantic information about the components are retrieved and amalgamated into word-level grammatical representations, and are then concatenated to form a bottom-level grammatical representation of the input sentence. This representation is passed to the PARSE module for further processing. Significant developments incorporated in the module include: (1) a sophisticated morphological analysis procedure, (2) a very efficient dictionary referencing organization, (3) powerful techniques for representing lexical generalizations, and (4) simple but effective means for morphological recombination of lexical components. Author (TAB)

**N70-41663#** Michigan Univ., Ann Arbor. Dept. of Computer and Communication Sciences.

**AUTOMATION DESIGN, CONSTRUCTION, COMPLEXITY AND ADAPTATION Final Report, 1 Jan. 1968-31 Dec. 1969**

Jun. 1970 5 p refs  
(Contract N00014-67-A-0181-0011)  
(AD-709467) Avail: NTIS CSCL 6/4

In the two years of the contract, 15 technical reports of research in the field of theory of automata and related computer areas were submitted to the Office of Naval Research. The principal reports and publications resulting from the research are listed and a listing of the scientific personnel whose ONR supported research led to the obtaining of advanced degrees at The University of Michigan is given. TAB

**N70-41684#** Air Force Systems Command, Lackland AFB, Tex. Human Resources Lab.

**PROFICIENCY DIFFERENCES OF PILOT AND NAVIGATOR F-4 SECOND SEAT CREWMEMBERS: A SOUTHEAST ASIA EVALUATION**

C. Wayne Shore, Charles R. Curran, Forest R. Ratliff, and John R. Chiorini Brooks AFB, Tex. Apr. 1970 28 p refs  
(AD-709728; AFHRL-TR-70-9) Avail: NTIS CSCL 5/9

A proficiency rating form was administered to F-4 crewmembers following each of a series of combat missions. The rating form was one of several data collection instruments developed as part of Project Combat Team to gather behavioral data designed to relate the differences in the training of pilots and navigators to operational performance. The rating categories were designed to measure proficiency in ten second-seater functions and three general characteristics related to second-seater proficiency. Using an 11-point rating scale, aircraft commanders compared their second-seat crewmember with second-seaters of equal combat experience. Differences between pilot and navigator second-seaters on each rating category were tested by a multiple linear regression analysis. Data from other instruments relevant to evaluation of mission success were also presented. Several conclusions were drawn on the basis of these data. Author (TAB)

**N70-41710#** Naval Submarine Medical Center, Groton, Conn. Medical Research Lab.

**UNDERWATER HEARING IN MAN. 2: A COMPARISON OF TEMPORARY THRESHOLD SHIFTS INDUCED BY 3500 Hz TONES IN AIR AND UNDERWATER Interim Report**

Paul F. Smith, Robert Howard, Martin Harris, and Day Waterman  
15 Jan. 1970 11 p refs  
(AD-709550; SMRL-608) Avail: NTIS CSCL 6/16

An experiment was undertaken to explore the upper intensity limit of useful underwater hearing by comparing Temporary Threshold Shifts (TTS) produced by exposure to intense underwater signals with TTS produced by comparable stimuli in air. Author (TAB)

**N70-41712#** New England Deaconess Hospital, Boston, Mass. Cancer Research Inst.

**[NEUTRON ACTIVATION ANALYSIS] Annual Report, 1 May 1969 - 30 Apr. 1970**

Constantine J. Maletskos 30 Apr. 1970 81 p refs  
(Contract AT(30-1)-3778)  
(NYO-3778-9; PR-4) Avail: NTIS

Further studies were made of the method of removing specific interferences from activated samples by a heterogeneous isotopic exchange reaction in a column using an organic solvent for elution. Sample handling procedures and other operations related to sampling and sample handling, irradiation, and measurement were studied. In particular, the work includes an assessment of tissue contamination when using scalpels for sample cutting, the cleaning of polyethylene vials using a small ball mill and compared to ultrasonic cleaning, methods of gridding salts for separation columns, and flux mapping in the irradiation containers. Tissue analyses on normal uterine muscle and fibroids growing in it are described. Uses of tissue results are considered from a statistical standpoint. Computer programs are described briefly. Some preliminary experiments on in vivo activation of rats using the slow neutron beam in the Medical Therapy Room, Massachusetts Institute of Technology Reactor, are described. Measurements were made both with Na(Tl) and Ge(Li) detectors. The results show that such activation of small animals is quite feasible. Author (NSA)

**N70-41748#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

**A DISCRETE STOCHASTIC OPTIMAL CONTROL MODEL OF THE HUMAN OPERATOR IN A CLOSED LOOP TRACKING TASK**

Harvey M. Paskin (Ph.D. Thesis) Jun. 1970 153 p refs  
(AD-709380; DS/EE/70-1) Avail: NTIS CSCL 5/8

A discrete stochastic optimal control model of the human operator is developed for the single-loop compensatory/pursuit tracking situation. The model generates signals corresponding to

those in the physical closed-loop tracking situation. There is one parameter which is varied to match model-experimental normalized tracking error at one data point. With this parameter fixed, the model then predicts normalized tracking error and power spectra of control loop signals for an input which approximates a rectangular power spectrum. The model is applied to simple first and second order controlled elements in both compensatory and pursuit display situations. Author (TAB)

**N70-41768#** Congress. Senate. Committee on Public Works.  
**AIR POLLUTION: 1970, PART 1 From the Subcommittee on Air and Water Pollution**

Washington GPO 1970 451 p refs Hearings on S. 3229, S. 3466, and S. 3546 before Comm. on Public Works, 91st Congr., 2d Sess., 16-18 Mar. 1970  
Avail: SOD \$1.75

Senate bills to amend the Clean Air Act are presented and their provisions discussed and compared. Information is provided concerning such areas as sulfur oxide pollution, fossil fuel combustion, and the inadvertent modification of the atmosphere by air pollution. The air pollution control law of West Virginia is reprinted. Answers by HEW to questions concerning air quality criteria, control technology and development, automotive emission control, fuel additives, noise pollution, standards and enforcement, and government expenditures are supplied. P.A.B.

**N70-41769#** Congress. Senate. Committee on Public Works.

**AIR POLLUTION: 1970, PART 2 From the Subcommittee on Air and Water Pollution**

Washington GPO 1970 318 p refs Hearings on S. 3229, S. 3466, and S. 3546 before Comm. on Public Works, 91st Congr., 2d Sess., 19, 20, and 23 Mar. 1970  
Avail: SOD \$1.50

Information is provided and discussed on an exhaust manifold reactor to reduce exhaust emissions, air quality criteria for lead, current medical developments in lead research, and photoreactivity of trichloroethylene. Copies of briefs concerning DDT litigation are included. P.A.B.

**N70-41770#** Congress. Senate. Committee on Public Works.

**AIR POLLUTION: 1970, PART 3**

Washington GPO 1970 294 p refs Joint hearings on S. 3229, S. 3466, and S. 3546 before Comm. on Public Works and Comm. on Com., 91st Congr., 2d Sess., 24-25 Mar. 1970 Prepared by Subcomm. on Air and Water Pollution of the Comm. on Public Works and the Comm. on Com.  
Avail: SOD \$1.25

Noise pollution, its effects on man and animals, and possible abatement legislation are discussed. Other topics include wheat for motor fuel, airline antipollution measures, automobile exhaust emission and the position of the auto industry, the effect of gasoline composition and associated research and development, and toxicological problems associated with lead. P.A.B.

**N70-41771#** Congress. Senate. Committee on Public Works.

**AIR POLLUTION: 1970, PART 4 From the Subcommittee on Air and Water Pollution**

Washington GPO 1970 300 p refs Hearings on S. 3229, S. 3466, and S. 3546 before Comm. on Public Works, 91st Congr., 2d Sess., 26 Mar., 17 Apr., and 27 May 1970; also in Los Angeles, 1 Apr.  
Avail: SOD \$1.50

Information on California air basins, standards for exhaust emissions, and ambient air quality standards is presented. National air quality standards are then discussed, including automobile emission reduction, industrial processes, metropolitan areas, and the proposed amendments to the Clean Air Act. Data are presented on the ability of gas additives to clean engines and reduce exhaust emissions, and on specific research concerning the effects of the Chevron F-310 gas additive package. Methods to prevent and

control air pollution build-up are described, and the guidelines for air pollution planning grants are presented. P.A.B.

**N70-41772#** Congress. Senate. Committee on Public Works. **AIR POLLUTION: 1970. PART 5: APPENDIX** From the Subcommittee on Air and Water Pollution Washington GPO 1970 150 p refs Hearings on S. 3229, S. 3466, and S. 3546 before Comm. on Public Works and Comm. on Com., 91st Congr., 2d Sess., Aug. 1970 Avail: SOD \$1.00

The proposed subcommittee amendments to the Clean Air Act are presented. Opinions and suggestions are given by the air transport industry, AFL-CIO American Mining Congress, Automobile Manufacturers Association, HEW, Ford Motor Company, National Steel Corporation, Manufacturing Chemists Association, and other corporations. Comments on citizens' suits are included. P.A.B.

**N70-41819\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**UNIVERSAL PILOT RESTRAINT SUIT AND BODY SUPPORT THEREFOR Patent**

Hubert C. Vykukal, inventor (to NASA) Issued 7 Feb. 1967 (Filed 12 Dec. 1961) 15 p Cl. 128-1

(NASA-Case-XAC-00405; US-Patent-3,302,633; US-Patent-Appl-SN-158916 Avail: US Patent Office CSCL 06Q

An astronaut restraint suit which eliminates the need for a contoured couch is described. The posterior portion of the body is supported by a rigid chair-like structure used with the suit which also has a rigid support structure and may be attached to the chair. The suit is adjustable to different sized pilots by inflating bladders. A latch arrangement between the suit and support structure provides rapid ingress and egress. The restraint suit allows movement of the arm for manipulating controls and is lightweight. N.E.N.

**N70-41888#** Federal Aviation Administration, Washington, D.C. Communications Development Div.

**TABLES OF RUNWAY VISUAL RANGE VALUES AS A FUNCTION OF TRANSMITTANCE AND VARIOUS VALUES OF PILOT'S ILLUMINANCE THRESHOLD AND LIGHT TARGETS Final Report**

Alcott J. Larsson, John K. Marut, and Robert L. Northedge Aug. 1970 71 p (FAA-RD-70-58) Avail: NTIS

Values of runway visual range (RVR) were developed for various atmospheric transmittances utilizing Allard's Law and Koschmieder's Law. Commonly employed constant's of pilot's contrast threshold and visual illuminance threshold are utilized in the appropriate RVR equations. Computations are based on a 250 foot baseline transmissometer with light target intensities of 10,000, 2,000 and 400 candela, values which are presently used in the United States. Information is presented in tabular form showing transmittances corresponding to runway visual range readings from 600 feet to 7000 feet in 50 foot increments. Each table includes data for each of the three light target intensities. A total of eight tables is provided. The computer program which was utilized to develop each set of data is included with each table. Author

**N70-41891\*#** Techtran Corp., Glen Burnie, Md. **OCCURRENCE OF FILTERABLE MICROORGANISMS IN NATURE AND THEIR CULTURABILITY [UEBER DAS VORKOMMEN FILTRABLER MIKROORGANISMEN IN DER NATUR UND IHRE ZUECHTBARKEIT]**

Gustav Seiffert Washington NASA Oct. 1970 10 p refs Transl. into ENGLISH from Zentr. Bakteriell. Parasitenk. (Germany), v. 7, no. 139, 10 Aug. 1937 p 337-342 (Contract NASw-2037)

(NASA-TT-F-13321) Avail: NTIS CSCL 06M

After enrichment of filtrates of various origins, it was possible to detect microscopically and culturally microorganisms which appear to be related to the pathogens of peripneumonia. They involve a special group of microorganisms which perhaps represent a transition to the typical virus forms. It was also possible to detect in nutrient liquids, biological reactions which indicate the presence and proliferation of an organism which is not visible and which otherwise cannot be cultivated. Author

**N70-41904\*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

**APPLICATION OF MODERN NETWORK THEORY TO ANALYSIS OF MANNED SYSTEMS**

John C. Fakan Washington Oct. 1970 42 p refs (NASA-TN-D-6034; E-5612) Avail: NTIS CSCL 06K

The techniques of Modern Network Theory are modified and expanded to provide a generalized methodology for the analysis of systems that contain man as a functioning part. An approach to the formulation of the systems equations that describe a human subsystem, by characterizing the phenomenological appearance of man in each of his functional roles, is described. The problems associated with metering of the significant human parameters are discussed, and a series of physiological measurements are described which indicate that human heart rate can provide a useful measure of total work output in the engineering sense. A sample man-machine system modeled after an experience of two men involved in a representative system of this type is presented, along with a series of results which demonstrate the recovery response of this system to stochastic perturbations. A FORTRAN 4 computer program developed for the analysis of this type of system is included in the appendix. Further possible uses for the generalized methodology are suggested, including the analysis of urban renewal, finance, and social behavior problems as well as analyses of proposed manned planetary expeditions. Author

**N70-41934#** Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

**DEVELOPMENT OF PRACTICAL HIGH-INTENSITY THERMAL PROTECTION SYSTEMS Interim Report**

Alice M. Stoll, Maria A. Chianta, and L. B. Judge 14 Jul. 1970 21 p (AD-709570; NADC-MR-7016) Avail: NTIS CSCL 6/17

The military requirement for high-intensity thermal protection entails provision of a system which is effective in the nuclear weapon range and at the same time practical from the logistics point of view and comfortable for extended periods of wear. With these ends in mind, small-scale laboratory procedures and full-scale evaluation procedures were devised whereby specific systems could be designed to meet specific needs. Thermal barriers were designed through application of basic heat transfer principles with careful consideration for the influence of thermal and optical properties of materials on heat exchange. In the present example a green assembly was developed to replace a white one designed for protection of flight personnel from the thermal effects of nuclear weapons. In thermal exposures delivering approximately 50 cal/(sq cm) in 2 seconds in some areas, with an overall average of about 20 cal/(sq cm) in 2 seconds, the new system offered protection equal to that of the white assembly while weighing only half as much and representing significant advantages in comfort and logistics. The procedures developed in this study are general in nature and widely applicable to the development of other thermal protection systems. Author (TAB)

**N70-41936#** RAND Corp., Santa Monica, Calif. **LEARNING-CURVE TABLES. VOLUME 3: 86-99 PERCENT SLOPES**

H. E. Boren, Jr. and H. G. Campbell Apr. 1970 286 p (Contract F44620-67-C-0045)

(AD-709178; RM-6191-PR-Vol-3) Avail: NTIS CSCL 14/1



The document contains volume 3 of three volumes of learning-curve data, including unit curve midpoints for plotting first-lot quantities. TAB

**N70-41941#** Illinois Univ., Champaign. Dept. of Psychology.  
**RELATIONS BETWEEN MULTIDIMENSIONAL SCALING AND THREE-MODE FACTOR ANALYSIS**

Ledyard R. Tucker Jul. 1970 39 p refs  
(Contract N00014-67-A-0305-003)  
(AD-709575) Avail: NTIS CSCL 5/10

A combination is achieved of two lines of psychometric interest: multidimensional scaling and factor analysis. This is accomplished with the use of three-mode factor analysis of scalar product matrices, one for each subject. Two of the modes are the group of objects scaled and the third mode is the sample of subjects. Results are an object space, a person space and a system for changing weights given to dimensions and of angles between dimensions in the object space for individuals located at different places in the person space. The development is illustrated with data from an adjective similarity study. Author (TAB)

**N70-41971#** Florida State Univ., Tallahassee. Dept. of Psychology.

**VISUAL EFFECTS OF IONIZING RADIATION**  
Kenneth L. Schafer (Ph.D. Thesis) [1969] 40 p refs  
(TID-25431) Avail: NTIS

Data are reviewed from a number of studies on the effects of ionizing radiation on the visual systems of a number of species including insects, molluscs, and man. The data are compared in an effort to clarify the mechanisms of action of ionizing radiation and known functional aspects of the visual system. It was concluded that there is no good evidence to support the idea that ionizing radiation acts on the visual purple of the eye in a manner analogous to light quanta. The studies of bleaching and energy absorption are simply not clear enough to indicate the nature of the interaction between ionizing radiation and the photopigment. In addition there is clear evidence from the studies of interactions between X-ray and light stimuli as backgrounds as well as stimulus pulses to indicate that the mechanisms for the detection of the two stimuli probably differ in basic ways at the receptor level. NSA

**N70-41980\*#** National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

**OPEN TYPE URINE RECEPTACLE Patent Application**  
Anthony S. Giralda, inventor (to NASA) Filed 13 Aug. 1970 10 p  
(NASA-Case-MSC-12324-1; US-Patent-Appl-SN-63384) Avail: NTIS CSCL 061

An open type urine receptacle comprising a tubular housing having an inlet and an outlet end is described. The housing contains a honeycomb insert for polarizing the urine stream in order to eliminate splashback. A fine mesh screen insert adapted to serve as a wicking means upon completion of micturition is supported at one end of the honeycomb insert. A receptacle cover is also provided for covering the open end of the housing and a vacuum-removal tube is connected to the other end in fluid communication with the interior. NASA

**N70-42000\*** National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

**MASS MEASURING SYSTEM Patent**  
William Lawrence Green and Richard W. Bricker, inventors (to NASA) Issued 6 Jun. 1967 (Filed 16 Dec. 1964) 7 p Cl. 73-432  
(NASA-Case-XMS-03371; US-Patent-3,323,370)  
US-Patent-Appl-SN-418931) Avail: US Patent Office CSCL 06P

The apparatus and method for determining the mass of a human body in a zero or reduced gravity environment are described. The subject is supported by straps in an attitude normal

to the local acceleration field, in a rotating space station. Force applied by the body to the straps is determined from load cell output signals, and the acceleration to which the subject is subjected is read on an accelerometer or is determined by measurement of the space station's angular velocity. N.E.N.

**N70-42058#** RAND Corp., Santa Monica, Calif.  
**UNIQUE MATHEMATICAL MODELS OF INDIVIDUAL BLOOD**

E. C. De Land, E. Magnier, and J. V. Maloney, Jr. May 1970 106 p refs  
(Contract F44620-67-C-0045; Grants PHS FR-3; PHS GM-13242; PHS G-5F3-HE-19; PHS-G-HE-08665-02 et al)  
(AD-709183; RM-5396-PR) Avail: NTIS CSCL 6/16

A study was made of mathematical, computer-based methods of simulating the blood composition of individual clinical patients. Earlier studies developed procedures for constructing models of the respiratory function and acid-base biochemistry of statistically normal human blood. This memorandum extends these procedures and shows that, with sufficient laboratory data, such a model can be derived for individual patients, and conjectures that the blood's chemical pattern may indicate the patient's physical condition. Such models may be useful for clinical and experimental fluid therapy. Author (TAB)

**N70-42079#** National Academy of Sciences-National Research Council, Washington, D.C.

**SPACE BIOLOGY**  
1970 61 p refs  
Avail: Issuing Activity

A review is presented of a program dealing with space biology in a general biological context. While the study was primarily concerned with biological investigations in the space environment, it also considers the potential applications of earth-circling vehicles for measuring biological and ecological events in the earth's surface. Recommendations are made for medical and physiological investigations to be made in space and for earth-sensing uses of satellites for animal orientation and tracking. Other areas of interest include: biological rhythms; cells, plants, and invertebrates in space; and radiobiology. D.L.G.

**N70-42090#** Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

**ACTIVATION ENERGIES OF ACCELERATION AND HYPOXIA STRESS Phase Report**  
Freeman W. Cope 2 Jul. 1970 17 p refs  
(AD-709569; NADC-MR-7015) Avail: NTIS CSCL 6/19

The activation energy of 13 kcal/M for loss of peripheral vision in man subjected to acceleration stress of 4% to 5% Gz resembles that of 12 kcal/M for survival of rats of 40% Gz, which suggests that the physiological mechanisms of acceleration protection are similar in the two species. The activation energy of survival to hypoxia stress (mouse) is 8.4 kcal/M which resembles the value of 8 kcal/M obtained for function of the normal human brain (alpha frequency of the eeg), which supports the concept that survival of the organism to hypoxia stress is indeed limited by survival of brain function. The large difference in activation energy of acceleration stress from that of hypoxia or of normal brain function suggests that tolerance to acceleration stress is not limited simply by the ability of nervous tissue to endure hypoxia, but must be dependent upon additional mechanisms. Author (TAB)

**N70-42114\*#** Exotech, Inc., Washington, D.C.  
**PLANNING, EVALUATION, AND ANALYTICAL STUDIES IN PLANETARY QUARANTINE AND SPACECRAFT STERILIZATION Quarterly Progress Report, Period Ending 30 Sep. 1970**

Sep. 1970 31 p refs  
(Contract NASw-2062)

(NASA-CR-114166; QPR-2) Avail: NTIS CSCL06M

The quarantine document system for planetary flight missions is reported in operation, with thesaurus expansion continuing. In the area of technology transfer planning, assistance was given for a briefing concerning the application of sterilization technology advances to Army field hospital operations in the 1980's. Work on the task of microbial release probability analysis focused on the quantification of fracture-related parameters of the release model. Three analytical models designed to facilitate flight project implementation of planetary quarantine requirements were developed or updated and exercised. These models include the thermal dynamics sterilization model, for which the computer program and flow chart is included; a water diffusion model of a spore; and a model relating the processes of microorganism growth and proliferation after release on a planet. Work concerning the feasibility of an organic constituent inventory for planetary flight missions is reported in terms of coordination with the Viking Project. P.A.B.

**N70-42123#** Catholic Univ. of America, Washington, D.C.  
**CRASHWORTHINESS AND BIOMECHANICS OF VEHICLE IMPACT**

Nicholas Perrone Sep. 1970 41 p refs Proposed for presentation at Colloq. on Dyn. Response of Biomech. Systems, ASME Ann. Meeting, New York, 2 Dec. 1970

(Grant NSF GK-23747) Avail: Issuing Activity

The title problem is considered in a fairly self-contained manner. Firstly, background information is provided indicating the seriousness of vehicle impact as well as a detailed profile of the problem. The changing or dynamic nature of the field is observed by considering innovations of the last few years that have had a significant effect on safety level. Major difficulties that arise when one attempts to design for impact attenuation are examined and an approach is suggested to overcome these problems, namely use of a unit crashworthy element. The transversely loaded tube is recommended as one worth-while possibility. Airbag systems, which are candidates for massive deployment in new cars during the next few years, are considered to be a very favorable development but should be approached with caution. Even after these systems have reached a high degree of reliability, they should be phased in on a stepped basis over a 2-4 year time period. Energy absorbing systems ranging from frangible tubes to frame assemblies are examined and some general assessments given of the potentials of the various candidate systems. Author

**N70-42158\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**STUDIES OF THE PULMONARY CIRCULATION Annual Report**

N. R. Kuchar 31 May 1970 86 p refs  
(Contract NASw-1896)

(NASA-CR-114231) Avail: NTIS CSCL06P

Using an approach based on the physical sciences, several aspects of blood flow through the pulmonary vascular bed are investigated. A model for the flow of red blood cells through narrow capillaries is formulated. The equations of fluid dynamics which pertain to the regions between adjacent cells (bolus region) and between a cell and the capillary wall (lubrication layer) are solved. Velocity and pressure distributions are presented for the physiological ranges of the physical parameters. Implications pertaining to pressure drop and mass transfer in capillaries are discussed. Based on the impedance concept for unsteady viscous flow in elastic tubes, a model which simulates the pressure-flow relationships for the pulmonary circulation in terms of the physical and environmental parameters is formulated and solved using an analog computer. Some preliminary simulations of interest for space physiology and medicine are presented. In vivo animal experiments, performed for model validation, are described. Author

**N70-42169\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**QUALITY ASSURANCE REQUIREMENTS MANUAL FOR PLANETARY SPACECRAFT TO BE STERILIZED BY HEATING**

Huntsville, Ala. NASA 30 Dec. 1968 246 p refs  
(Contract NAS8-21139)

(NASA-CR-114264) Avail: NTIS CSCL06M

Information and guidelines dealing with quality assurance requirements necessary for the production, assembly, and checkout of a spacecraft to be sterilized by heating in accordance with current NASA sterilization requirements are presented. The manual is intended for use as a supplement to a quality assurance manual for the class of spacecraft under consideration. Background data are included on planetary quarantine requirements and microbiology to provide quality assurance personnel with information on problems outside their area of specialization. Training programs, mathematical models, data bank requirements, inspection, fabrication and assembly, decontamination and terminal sterilization requirements, and detailed microbiological procedures are covered in the various sections. Author

**N70-42176#** Smithsonian Institution, Washington, D.C.  
**DISTRIBUTION OF PLANKTONIC FORAMINIFERA IN THE VICINITY OF THE NORTH ATLANTIC CURRENT**

Richard Cifelli and Roberta K. Smith 1970 55 p refs *ts* Smithsonian Contrib. to Paleobiol. No. 4

(Contracts Nonr-2196(00); AT(30-1)-2174; Grant NSF GP-861)

Avail: SOD \$0.65

Planktonic Foraminifera collected from the vicinity of the North Atlantic Current and the Gulf Stream during late winter-early spring and fall of 1964 are described and their distributions are recorded. Variations in faunal composition seem to be related largely to water regime dynamics and seasonal cycle. Among the fall collections, three distinctive assemblages can be recognized: a western group in the vicinity of the Gulf Stream, containing predominantly Sargasso Sea-Gulf Stream species dominated by Globigerinoides ruber; a northern group, dominated by Globigerina quinqueloba egelida, new subspecies, reflecting the influence of cold, northern waters adjacent to the North Atlantic Current; and an eastern group, dominated by Globigerina incompta, apparently developed within the limits of the North Atlantic Current. The last group seemingly represents an anomaly, as North Atlantic Current surface temperatures were relatively high at the time of collection, and dominance of a warm-water form, such as Globigerinoides ruber, was expected. The anomaly suggests that the North Atlantic Current is a partially closed gyre, fed by both slope waters and Gulf Stream. Temperatures are considered to be close to threshold for both cold and warm-water species. Author

**N70-42185\*#** George Washington Univ., Washington, D.C. Biological Sciences Communication Project.

**SCIENTIFIC PUBLICATIONS AND PRESENTATIONS RELATING TO PLANETARY QUARANTINE. VOLUME 5: THE 1969 SUPPLEMENT**

Frank D. Bradley and Sandra G. Moritsugu Sep. 1970 106 p refs

(Contract NSR-09-010-027)

(NASA-CR-114112) Avail: NTIS CSCL06T

This bibliography lists publications of the NASA Planetary Quarantine Program under funded contracts and grants issued during the calendar year of 1969. Author

**N70-42225#** California Univ., Los Angeles.  
**ELECTROMAGNETIC SEPARATION OF BIOLOGICAL PARTICLES Final Technical Report, 1 May 1960-31 Aug. 1969**

Alexander Kolin 13 Aug. 1970 11 p refs  
(Contract Nonr-233(64))

(AD-709986) Avail: NTIS CSCL20/3

The project began with the general objective of utilizing

electromagnetic forces in biological research methods. The phenomenon of electromagnetophoresis was discovered and explored. The possibility of stimulating irritable tissues without electrodes by alternating magnetic fields was demonstrated. The method of electromagnetic determination of blood flow was further developed and has become a standard method in biological and medical research, and in operating room blood flow measurements on human patients. The main investigations led to the conception of the method of isoelectric focusing which was demonstrated under ONR sponsorship and further developed in Sweden until it is now widely used in biochemical research as perhaps the most powerful method of protein analysis. Combination of electric and magnetic fields in a new configuration led to the development of the rotationally stabilized method of endless fluid belt electrophoresis which has high resolving power and is applicable to macromolecules as well as biological particles. This method is now being refined as it is put to use in measurements of electrokinetic properties of microorganisms. Author (TAB)

**N70-42232\*#** Oak Ridge National Lab., Tenn.  
**CALCULATION OF THE RADIATION HAZARD AT SUPERSONIC AIRCRAFT ALTITUDES PRODUCED BY AN ENERGETIC SOLAR FLARE, 2**

T. W. Armstrong and H. S. Moran 31 Dec. 1969 16 p refs  
 Submitted for publication Sponsored in part by AEC  
 (NASA Order H-38280A)

(NASA-CR-110774; ORNL-TM-2844) Avail: NTIS CSCL 06R

Calculations were carried out to estimate the absorbed-dose and dose-equivalent rates at various depths in the atmosphere produced by an energetic solar flare - the flare of February 23, 1956. The dose rates are determined both by computing flux spectra using air only and applying flux-to-dose conversion factors and by computing the dose rates in tissue using an air-tissue-air arrangement. The two methods of calculation are in reasonable agreement when the flux-to-dose factors are applied to the forward-flux spectra, but the calculations indicate that previous results obtained using omnidirectional-flux spectra overestimate the dose rates. Also, the effect of the fuel carried by a supersonic aircraft on the dose received by the passengers in the event of a solar flare has been considered and found not to be substantial. Author

**N70-42250\*#** Michigan Univ., Ann Arbor. Human Performance Center.

**RISKY DECISIONS BY INDIVIDUALS AND GROUPS**

Barbara Cora Ettinger Goodman Jun. 1970 58 p refs  
 (Grant NGL-23-005-171)

(NASA-CR-114255; TR-21) Avail: NTIS CSCL 05J

Shifts were investigated between individual and group performance in two action selection tasks (a choice dilemma task in which subjects equate a risky option with a sure thing and a gambling task in which subjects wager their own money) and in one Bayesian diagnosis task (likelihood ratio estimation). Twenty-seven male subjects performed each task alone. Then 24 of these subjects were formed into 6 four-man leaderless groups and repeated each task. Three subjects, serving as individual controls, performed each task alone a second time. Finally, all 27 subjects repeated each task again alone. The group decisions in the choice dilemma task reproduced previously found patterns of shifts (compared with mean pregroup performance) toward the risky option or toward the sure thing. In the gambling task, groups tended to prefer higher variance gambles than did the average group member on his pregroup performance. In the likelihood ratio estimation task, 22 of the 24 test subjects estimates more closely resembled their group's values than their own pregroup estimates. Both group and individual correlations between measures of performance in all three tasks were low. Thus proclivity for a risky option in the choice dilemma, preference for higher variance in gambling, and tendency to extreme likelihood ratio estimates seem to be unrelated. Author

**N70-42253#** Battelle Memorial Inst., Columbus, Ohio.  
**PROCEEDINGS PURITY STANDARDS FOR DIVERS BREATHING GAS SYMPOSIUM**

9 Jul. 1970 335 p refs Symp. held at Columbus, Ohio, 8-9 Jul. 1970

(Contract N00014-70-C-0072)

(AD-710006; SUPDIVE-RR-6-70) Avail: NTIS CSCL 6/11

Reported incidents of gross contamination in some of the divers breathing air systems on board U. S. Navy ships initiated an extensive effort to minimize this condition. The methods for such minimizations have been investigated and resulting techniques are being implemented. However, the source of contamination and the resultant physiological effect in a hyperbaric environment are not well established. A symposium was held as a first step towards a more adequate definition of purity standards. The symposium covered the following topics: Physiological effects; Gas processing; Gas monitoring; and Divers support system design. Author (TAB)

**N70-42256\*#** Mayo Association, Rochester, Minn.  
**STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report**

Earl H. Wood 1 Apr. 1970 37 p refs

(Grant NGR-24-003-001)

(NASA-CR-110793) Avail: NTIS CSCL 06S

An assessment is given of the reproducibility and accuracy of the biplane roentgen videometry system developed for dynamic (60 per second) studies of the shape and volume of the left ventricle in intact animals or man. A study of the effects of a water immersion restraint system on distortion of the thorax and pulmonary arterial-venous shunts induced by transverse acceleration is discussed. Progress is reported on a study of the effects of breathing liquid fluorocarbon on regional differences in pleural pressures and other physiological parameters. Author

**N70-42266\*#** Naval Medical Research Inst., Bethesda, Md.

**PROJECT RIM: DESIGN AND IMPLEMENTATION**

J. Michael Walsh, Ira Donenfeld, Seward Smith, William W. Haythorn, Philip L. Briley et al Apr. 1970 103 p refs

(NASA Order L-16423)

(NASA-CR-114259; AD-709075; REPT-2) Avail: NTIS CSCL 06P

In the fall of 1968, a comprehensive investigation into the psychological and physiological effects of long-term isolation and confinement began in the Behavioral Sciences Department of the Naval Medical Research Institute. The purpose of the paper is to provide comprehensive documentation of the research rationale and procedures for Project RIM. It is intended primarily as a reference document to answer broad as well as detailed questions that cannot be answered thoroughly in the limited space of a journal publication. No research data results are included. The various data areas of this small-group confinement study will be detailed in other papers as analyses are completed. Author (TAB)

**N70-42268\*#** Aerojet-General Corp., El Monte, Calif. Aerojet Medical and Biological Systems.

**DESIGN FEASIBILITY STUDY FOR CONSTRUCTION OF A MICROBIAL ECOLOGY EVALUATION DEVICE (MEED) Final Report**

A. M. Taylor Sep. 1970 201 p

(Contract NAS9-10820)

(NASA-CR-108661) Avail: NTIS CSCL 06B

A discussion of the results of the feasibility investigations and the conclusions reached, data on alternate designs, a recommended design approach, and the major protocols that define the procedures required for use of the hardware are included. Long-duration space missions may result in microbial mutants that

are more virulent than the initial microbial forms. The conditions that may lead to the mutations are: (1) lowered gravity states, (2) ultra-violet irradiation, (3) variations of the oxygen content in the environment, and (4) exposure to the hard vacuum of space. The equipment microbial ecology evaluation device (MEED) can be developed and used in space experiments to determine the effects of these environmental factors on selected microbial systems. The general plan for the proposed flight experiments is to carry three packages MEEDs of microbial samples to the lunar surface, where two will be exposed to the solar radiation of space. The third MEED will serve as an unexposed control unit on the lunar surface. A fourth MEED will be an unexposed control unit in orbit around the moon in the Command Module. A fifth MEED will be kept as a control unit under carefully controlled conditions at the Manned Spacecraft Center, Houston. This study had the objective of establishing the feasibility of designing and fabricating hardware for the proposed flight experiments. Requirements were defined, concepts were evaluated, selected hardware was fabricated, analyses and feasibility tests were performed and a mock-up of the flight assembly was completed. Author

**N70-42272\*#** National Communicable Disease Center, Atlanta, Ga. Bacterial Diseases Branch.

**REDUCTION OF MICROBIAL DISSEMINATION Progress Summary Report**

Jul. 1969 9 p refs

(NASA Order W-13062)

(NASA-CR-114263; PSR-13) Avail: NTIS CSCL 06M

Studies related to the reduction of *Clostridium perfringens* dissemination from humans in support of planetary quarantine requirements are reported. The suitability of brain heart infusion agar and anaerobic agar as media for recovering and culturing viable airborne particulates of *Cl. perfringens* was investigated and the results compared with those of studies using reinforced clostridial agar. Initial results in detecting clostridial shedding from humans are described. N.E.N.

**N70-42274#** United Aircraft Corp., Norwalk, Conn. Norden Div. **INTEGRATED VERTICAL DISPLAY RESEARCH Final Technical Report**

Harold C. Wooding, Jr., John A. Simpson, H. Harper, and R. Sweetnam Jul. 1970 163 p refs

(Contract Nonr-4489(00))

(AD-709460; Rept-1161-R-0037; JANAIR-680611) Avail: NTIS CSCL 1/4

Simulation studies were conducted with eight civilian and military pilot subjects. A series of flight maneuvers were performed using a hypothetical tilt-wing vehicle, and the integrated electronic vertical display (IEVD) with a set of conventional instruments. Comprehensive data acquisition, computation and online printout of error scores were utilized. Data reduction and statistical analysis ensued to determine the efficacy of performance to the criteria model and to the set of conventional instruments. Author (TAB)

**N70-42277\*#** Maryland Univ., College Park. **RELATIONSHIP BETWEEN SLOW DRIFT AND SMOOTH PURSUIT EYE MOVEMENTS**

Robert Jesse Cunitz (Ph.D. Thesis) 1970 85 p refs

(Grant NSG-398)

(NASA-CR-114249) Avail: NTIS CSCL 06P

The relationship between noisy drift, corrective drift, and smooth pursuit eye movements was examined. The suggestion that smooth pursuit of a moving target is controlled by the same low velocity system that corrects position errors produced by noisy drifts during fixation of a stationary target was investigated by recording two-dimensional eye movements with a contact lens-optical lever while 2 experienced subjects fixated and subsequently tracked a point target suddenly set into motion in 8 unpredictable directions at 6 constant velocities. A correlational technique was used to determine the degree to which drifts corrected position errors during

fixation of a stationary target. A vector averaging procedure was used to determine the direction and velocity of smooth pursuits. Author

**N70-42278\*#** Virginia Univ., Charlottesville. Div. of Biomedical Engineering.

**TECHNOLOGY TRANSFER IN BIOMEDICAL ENGINEERING Final Report, 1 Sep. 1969 - 30 Jun. 1970**

Michael L. McCartney Jul. 1970 53 p refs

(Grant NGL-47-005-014)

(NASA-CR-114242; BioM-4070-101-70U) Avail: NTIS CSCL 06B

A mechanism for transfer of aerospace technology appropriate to biomedical problems was designed and put into operation. Problems have been received from each of NASA's Biomedical Applications Teams and are in various locations within the transfer system herein described. The creation of an application engineering center, the generation of its operational guidelines, and the recommendations for improvements in the transfer system as viewed by the facility responsible for reengineering technology are discussed. Individual projects are presented for illustrative purposes. Author

**N70-42279#** Congress. House. Committee on Interstate and Foreign Commerce.

**CLEAN AIR ACT AMENDMENTS OF 1970**

Staggers Washington GPO 1970 53 p refs Rept. to accompany H.R. 17255 presented by the Comm. on Interstate and Foreign Com. at the 91st Congr., 2d Sess., 3 Jun. 1970

(Rept-91-1146) Avail: US Capitol, House Document Room

The Committee on Interstate and Foreign Commerce presents the amendments of the Clean Air Act of 1970. Emphasis is placed on the community responsibility in implementing and enforcing the strategies outlined. Prompt and effective efforts are urged to win the campaign for clean air. The committee further recommends that the Federal Government provide technical and financial assistance to State and local governments in connection with the development and execution of their air pollution and control programs. E.M.C.

**N70-42284#** Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex.

**RADIATION EFFECTS ON AUDITORY AND VISUAL DISCRIMINATION TASKS IN MONKEYS Technical Progress Report**

V. Bogo, R. A. Hutton, and A. Bruner Mar. 1970 29 p refs

(Contract DA-49-146-XZ-359)

(AD-709971; DASA-2460) Avail: NTIS CSCL 6/18

Following shock-avoidance training on color and auditory discrimination problems, 12 rhesus monkeys were exposed to either 1500 or 6000 rads of pulsed, neutron-gamma radiation. Testing began one hour after irradiation. All monkeys exhibited performance decrement in the form of generalized incapacitation shortly before death, which occurred earlier for the 6000-rad animals. Prior to onset of the moribund state, however, no significant changes in performance were observed, although marked fluctuations in individual performances were evident. Of the response measures used, response latency underwent more change following irradiation than discrimination accuracy. Author (TAB)

**N70-42285#** Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.

**SENSORY BEHAVIOR OF NAVAL PERSONNEL. MONAURAL/BINAURAL MINIMUM AUDIBLE ANGLE OF AUDITORY RESPONSE Interim Report**

J. Donald Harris and Russell L. Sergeant 14 Jun. 1970 24 p refs

(AD-709549; SMRL-607) Avail: NTIS CSCL 6/16

The paper considers what one ear contributes to man's perception of the auditory world and evaluates the monaural/binaural role in spatial orientation. Minimum audible angles

were determined for monaural listening to moving sounds, and results were compared to similarly obtained binaural data. The findings are related to a review of facts and theories of sound localization by man. Author (TAB)

N70-42292\*# Hughes Aircraft Co., Fullerton, Calif.  
**HUMAN RELIABILITY STUDY, PHASE 1 Final Report,**  
 Jan.-Jul. 1970  
 Jul. 1970 230 p refs  
 (Contract NAS10-6976)  
 (NASA-CR-110781; GP-891) Avail: NTIS CSCL 05H

An investigation was performed to determine the reliability, validity, and completeness of published industrial safety data for the purpose of predicting personnel hazard resulting from human error. Technical papers, safety publications, and industrial data banks were collected, reviewed, and assembled into a complete safety bibliography; those sources having direct impact on the present study were collected into a smaller, annotated bibliography. Author

N70-42294# Naval Postgraduate School, Monterey, Calif.  
**THE COLLECTION AND ANALYSIS OF HUMAN FACTORS DATA IN TASK ANALYSIS**  
 Rodney Paul Kempf (M.S. Thesis) Apr. 1970 53 p refs  
 (AD-709061) Avail: NTIS CSCL 5/5

The paper develops a questionnaire to be used in determining the necessity of various human factors to the successful performance of any particular job. Included in the proposed questionnaire are fifty-eight characteristics and a scheme for rating the variables. A program is developed for analyzing the data collected. A two-way analysis of variance by ranks is used to detect significant difference between the characteristics, and, given a difference exists, a method similar to the multiple range test is employed to separate the several characteristics into significance groups, the various groups being ranked on an ordinal scale. Author (TAB)

N70-42355# Federal Aviation Administration, Washington, D.C.  
**PHYSIOLOGICAL RESPONSES OF MEN DURING SLEEP DEPRIVATION**  
 Vincent Fiorica, E. Arnold Higgins, M. T. Latogola, Audie W. Davis, Jr., and P. F. Lampietro May 1970 23 p refs  
 (FAA-AM-70-8) Avail: NTIS

The effects of 84 hours of sleep deprivation were examined in a group of six young men and compared with a group of six controls. Subjects were studied in pairs, one sleep-deprived and one control. Primary attention was given to the responses to acute whole body cold exposure in terms of internal body and skin temperature changes, oxygen consumption changes, and plasma catecholamine levels. Psychomotor performance was evaluated at 4-hour intervals over the course of the sleepless period and the patterns of urinary excretion of catecholamines, magnesium, and creatinine were followed. After the first sleepless night, psychomotor performance of sleep-deprived subjects was significantly lower than that of control subjects. The ability to regulate body temperature during standardized cold exposures, however, was not impaired by the loss of sleep. Urinary excretion patterns for the two groups were similar, except for differences related to activity level. Author

N70-42364\*# Louisville Univ., Ky.  
**PERFORMANCE MEASUREMENT OF NONVERBAL MEDIATION: A DIGITAL READOUT VERSION OF THE CODE TRANSFORMATION TASK (DR-COTRAN)**  
 Earl A. Alluisi, Ben B. Morgan, Jr., and Thomas K. Dempsey  
 1970 73 p refs  
 (Grant NGR-18-002-008)  
 (NASA-CR-114234) Avail: NTIS CSCL 05H

The first two experiments compared the factorial structures

of the DR-COTRAN and 3P-COTRAN tasks, and the relative sensitivities of the two versions to practice effects and to the effects of infectious disease (subjects ill with Sandfly fever) when both tasks were used alone without any requirement for time-sharing. The third study measured the acquisition of skill on the DR-COTRAN task and the influence of practice on the nonverbal mediation measured with the task. The fourth investigation measured the effects of operator loading on DR-COTRAN performances, and, conversely, the effects of adding the DR-COTRAN task to various combinations of tasks currently employed in a multiple-task performance (MTP) battery. The DR-COTRAN task permits the measurement of the same nonverbal-mediational aspects of intellectual functioning as provided for in the third, or problem-solving, phase of 3P-COTRAN task. The two versions of the COTRAN task differ in terms of some apparently nonessential characteristics, and in these cases the differences favor the DR-COTRAN version for use as an additional task in the MTP battery. Author

N70-42415# National Physical Lab., Teddington (England).  
 Aerodynamics Div.

**AN OUTLINE GUIDE TO CRITERIA FOR THE LIMITATION OF URBAN NOISE**

D. W. Robinson London Aeron. Res. Council 1970 48 p refs  
 Supersedes NPL-AERO-Ac-39; ARC-31161  
 (ARC-CP-1112; NPL-AERO-Ac-39; ARC-31161) Copyright. Avail:  
 NTIS; HMSO: 12s; BIS: \$2.40

A review is given of the steps involved in relating noise emitted in urban areas to the disturbance caused to the community, with special reference to transportation noise. An outline of existing methods of rating individual noises and of successions of noises is presented. From the latter a common measure, termed noise pollution level, emerges which is derived in a simple manner from physical quantities and which summarizes the disturbing character of a complex noise environment. Suggestions for noise limits are included. Author (ESRO)

N70-42445\*# Louisiana State Univ., Baton Rouge, La. Div. of Engineering Research.

**THE CONSTRUCTION OF A CHEMICAL-MICROBIAL PILOT PLANT FOR THE PRODUCTION OF SINGLE CELL PROTEIN FROM CELLULOSIC WASTES**

C. E. Dunlap [1970] 143 p refs  
 (Grant NGL-19-001-024)  
 (NASA-CR-114241) Avail: NTIS CSCL 13B

A pilot plant was designed, constructed, and operated which produced microbial single cell protein from waste sugar cane bagasse. Bagasse was ground and given a mild alkaline-oxidation treatment prior to fermentation. Bagasse was slurried at up to 10.0 grams per liter dry weight in water with a simple nutrient salts mixture to form the fermenter feed stream. The process was operated in both batch and continuous flow patterns. Cellulomonas, gn. bacteria were used in a pure culture for most runs, but a mixed culture run of cellulomonas and the symbiotic organism alcaligenes fecalis showed much higher production capabilities. Maximum cell density obtained with pure cellulomonas was 1.7 grams dry weight per liter, and 6.24 grams per liter for the mixed culture. Culture mass doubling times during log phase growth were usually from 3.2 to 3.7 hours. Single cell protein was produced as a light brown to yellow-brown powder, and had a crude protein content of 50 to 55 percent. Preliminary cost analysis showed a production cost of from 10 to 15 cents per pound of dry cells. Author

N70-42459# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

**PROCEEDINGS OF THE SIXTH ANNUAL CONFERENCE ON MANUAL CONTROL**

1970 913 p refs Held at Wright-Patterson AFB, Ohio, 7-9 Apr. 1970  
 (AD-709381) Avail: NTIS CSCL 1/3

The volume contains the proceedings of the following sessions: displays, neuro-muscular system analysis, man-machine analysis, manipulators and manipulation, advanced modeling techniques, describing function models, and describing function measurement techniques. Author (TAB)

**N70-42461** National Lending Library for Science and Technology, Boston Spa (England).

**THE AUTOMATIC MEASUREMENT OF PHOTOSYNTHETIC INTENSITY IN PLANTS BY MEANS OF APPARATUS IN WHICH THE CO<sub>2</sub> CONCENTRATION IS CONTROLLED [AVTOMATICHESKOE IZMERENIE INTENSIVNOSTI FOTOSINTENZA RASTENII V USTANOVKAKH S REGULIRUEMOI KONSENTRATSIEI CO<sub>2</sub>]**

V. I. Rozhdestvenskii Jun. 1970 19 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 6, 1968 p 865-875 (NLL-RTS-5810) Avail: Natl. Lending Library, Boston Spa, Engl.: 36s; 6 NLL photocopy coupons

The equipment used to measure the rate of photosynthesis in plants by means of apparatus in which the CO<sub>2</sub> concentration is controlled is described. The equipment consists of serial units and enables the current values of photosynthetic rate to be registered on a self-recording tape at intervals of 2 to 10 minutes. The apparatus can function as a signal data unit proportional to the rate of photosynthesis in systems which automatically control the physiological processes. Author

**N70-42522\*** # Battelle Memorial Inst., Columbus, Ohio.

**CONTINUOUS CATALYTIC DECOMPOSITION OF METHANE**

B. C. Kim, J. Zupan, L. Hillenbrand, and J. E. Clifford Washington NASA Oct. 1970 63 p refs (Contract NAS2-5051) (NASA-CR-1662) Avail: NTIS CSCL 06K

Experimental studies of catalysts for decomposition of methane and process design studies were directed to the problems of carbon production in a high-temperature reaction required for one subsystem of the closed Sabatier system as applied to space life support. The basis for a new reactor design for continuous carbon removal in a gravity-independent manner was demonstrated; a rotating magnetic field was used to support the catalyst in the flowing methane stream and to confine the catalyst bed within the high temperature reaction zone until a high catalyst utilization was achieved. For this purpose, the preferred catalyst was cobalt powder, which maintains magnetic properties above the desired reaction temperature of 850 C. On the basis of the experimental data obtained, a methane decomposition reactor having a catalyst bed volume of about 1 liter was designed for a nominal 3-man system. Author

**N70-42535#** Naval Research Lab., Washington, D.C.

**CHEMICAL RESEARCH IN NUCLEAR SUBMARINE ATMOSPHERE PURIFICATION** Progress Report

V. R. Piatt and E. A. Ramskill 2 Jun. 1970 2 p refs (AD-709896; NRL-7037) Avail: NTIS CSCL 6/11

Considerable progress has been made in developing both laboratory and shipboard methods of sampling, analysis, and control, but major shipboard analytical equipment continues to be of marginal quality. Some of the topics covered include a fire-retardant and nontoxic paint system for application when necessary during submergence, atmospheric contamination with a cleaning solvent, the NRL Total Hydrocarbon Analyzer, catalyzed combustion of various types of atmospheric contaminants, and CO<sub>2</sub> absorption properties of some new amines. Author (TAB)

**N70-42560#** Battelle Inst., Frankfurt am Main (West Germany).

**ANALYSIS OF COLLOIDAL AIR AND WATER POLLUTION BY LIGHT SCATTERING**

Jan Bol, Josef Gebhart, Christa Roth, and Gerhard Wurzbacher In its Battelle Inform. No. 5 Aug. 1969 p 23-29 refs (See N70-42557 24-34)

Avail: NTIS

Optical methods for measuring the sizes of colloidal particles and their concentrations in polluted air and water are described. The methods are based on Mie forward light scattering and make use of lasers. ESRO

**N70-42561#** Battelle Inst., Frankfurt am Main (West Germany).

**BIOLOGICAL WASTE DISPOSAL AND ITS LIMITS**

Wolfgang Schoenborn In its Battelle Inform. No. 5 Aug. 1969 p 30-35 (See N70-42557 24-34)

Avail: NTIS

The use of microorganisms for biological waste disposal is limited by general physical and chemical conditions, nutrient requirements, adaptation limits, metabiosis and polyauxie, toxins, etc. The great variety in type and quantity of waste products also causes problems for relevant technical processes. ESRO

**N70-42568#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

**FOREARM POSITION CONTROL: PARAMETERS OF A MODEL WITH AGONIST-ANTAGONIST SWITCHING**

William Watamaniuk (M.S. Thesis) Mar. 1970 101 p refs (AD-710599; GE/BE/70-28) Avail: NTIS CSCL 6/2

The thesis describes an experimental study which validates and extends a proposed model of position control in the human forearm. Comparisons are drawn between best-fit theoretical curves, derived from the assumption of constant driving force, and actual distribution of phase trajectory data. At moderate to high velocities the data supports the assumption of constant driving force and optimal agonist-antagonist switching. Data of low variability is obtained to determine that the velocity feedback loop gain remains constant for all test conditions while the position feedback loop gain varies inversely with final position and directly with initial velocity signal. Author (TAB)

**N70-42581#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**ANTHROPOMETRY OF THE AIR FORCE FEMALE HAND** Final Report

John W. Garrett Mar. 1970 85 p refs (AD-710202; AMRL-TR-69-16) Avail: NTIS CSCL 6/14

The report describes 56 anthropometric dimensions measured on the hands of Air Force female personnel (Women in the Air Force, Nurse Corp, and Biomedical Science Corps), aged 18-56. Summary statistics including the means, standard deviations, ranges, selected percentiles, measures of distribution, and coefficients of variation are presented for the 56 dimensions. Also included are statistical variations by age, rank and Corps within the sample, a complete correlation matrix, bivariate tables, and nomographs for various selected combinations of dimensions. TAB

**N70-42596** National Lending Library for Science and Technology, Boston Spa (England).

**THE OLDEST TRACES OF LIFE ON EARTH [DREVNEISHIE SLEDY ZHIZNI NA ZEMLE]**

N. Krylov Jul. 1970 30 p refs Transl. into ENGLISH from Priroda (USSR), v. 11, 1968 p 41-54 (NLL-RTS-5829) Avail: Natl. Lending Library, Boston Spa, Engl.: 58s; 10 NLL photocopy coupons

A review of the geological findings of Precambrian life is presented. Pre-algae microorganisms, blue green algae, and the earliest fauna are described. Illustrations of the fossils are included. N.E.N.

N70-42625# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**ANTHROPOMETRY OF THE HANDS OF MALE AIR FORCE FLIGHT PERSONNEL** Final Report

John W. Garrett Mar. 1970 80 p refs

(AD-709883; AMRL-TR-69-42) Avail: NTIS CSCL 6/14

This report contains descriptions of and data on 56 anthropometric dimensions of the hands of 148 male Air Force flight personnel. Selected dimensional comparisons indicate that this sample is representative of the total group of Air Force flight personnel. Summary statistics presented include the means, standard deviations, ranges, selected percentiles, and coefficients of variation. Also included are data on the age, rank, major Air Command, and commissioned status of the sample; a complete matrix of intercorrelations among the anthropometric dimensions; bivariate tables; multiple regression equations; and nomographs for selected combinations of dimensions. A procurement table for the U.S. Air Force 12-size glove program revised to reflect the latest anthropometric data is presented. Author (TAB)

N70-42646# Toronto Univ., (Ontario), Inst. for Aerospace Studies.

**AN INVESTIGATION INTO CERTAIN ASPECTS OF THE DESCRIBING FUNCTION OF A HUMAN OPERATOR CONTROLLING A SYSTEM OF ONE DEGREE OF FREEDOM**

M. Gordon-Smith Feb. 1970 159 p refs

(Grant AF-AFOSR-1490-68)

(AD-710206; UTIAS-149; AFOSR-70-2197TR) Avail: NTIS CSCL 5/8

An experimental investigation was carried out of the remnant portion of the mathematical model of the human operator. This model consists of the combination of a quasilinear describing function and a remnant term. A single-axis tracking task, with random forcing functions and a compensatory display, was used to investigate the effect of the type of manipulator and the bandwidth of the forcing function on the remnant. Pressure and free-moving manipulator were employed with rate-control vehicle dynamics and filtered-white-noise forcing functions similar in spectral shape to those used in previous work. Data is presented which show the effects of the manipulator and of the forcing function on the describing function, on the performance measures of the system and on the power spectrum and the amplitude probability distribution of the remnant. Author (TAB)

N70-42650# Pennsylvania Univ., Philadelphia. School of Medicine.

**HISTOPATHOLOGY OF ARGON LASER-INDUCED RETINAL LESIONS** Annual Progress Report, 1 Aug. 1969 - 31 Jul. 1970

Myron Yanoff Aug. 1970 10 p refs

(Contract DADA17-70-C-0011)

(AD-710406; APR-1) Avail: NTIS CSCL 6/5

The purpose of this project was to obtain information on the biologic effects of the argon laser on the retina. After owl and rhesus monkeys were exposed to a continuous wave argon laser the eyes were evaluated. Serial sections were cut with a microtome through the suspicious retinal areas in order to determine the presence or absence of retinal damage. Both methods--the serial sections of the suspicious retinal lesions and the flat-mount retinal pigment epithelial preparations--gave very satisfactory information on threshold argon laser retinal lesions. The flat-mount preparations, however, proved to be the quickest and most useful method. Both methods enabled us to show that the histopathology correlated excellently with the clinically seen retinal lesions. The flat-mount preparations proved to be slightly more sensitive than ophthalmoscopic observations in identifying threshold retinal lesions. The pigment epithelium was the most sensitive area of the retina exposed to threshold argon laser energies. The photoreceptor and outer nuclear layers were the next most sensitive retinal areas. The inner layers of the retina seemed to be relatively unaffected by the argon laser at threshold energies. Author (TAB)

N70-42652# Honeywell, Inc., St. Paul, Minn. Research Dept.

**A TIME COURSE EVALUATION OF THE EYE'S ACCOMMODATIVE RESPONSE** Final Report, 1 May 1969 - 28 Feb. 1970

Clinton L. Jolliffe Jun. 1970 78 p refs

(Contract DADA17-69-C-9130)

(AD-710394; Rept-12159-FR) Avail: NTIS CSCL 6/16

Accommodative response durations of the eye were measured by an objective and subjective technique. Results of the study demonstrate that a relationship exists between the accommodative response duration and spectral composition of the target and subject age. Target luminance levels that differed by no more than three orders of magnitude were tested for effect on the accommodative response duration. Author (TAB)

N70-42662# Battelle Inst., Frankfurt am Main (West Germany).

**CELL BIOLOGY RESEARCH GROUP AT BATTELLE**

In its Battelle Inform. No. 4 Apr. 1969 p 22-23 (See N70-42660 24-34)

Avail: NTIS

The development of the new discipline of cytochemistry is described. Microphotometry and microfluorometry, microspectrophotometry and interference, polarising and electron microscopy quantitative methods for cell structure investigations are described. ESRO

N70-42664\*# Techtran Corp., Glen Burnie, Md.

**CHANGES OF MINERAL METABOLISM DURING HYPOKINETIC CONDITIONS [IZMENENIYE VODNO-SOLEVOGO OBMENA PRI GRANICHENII DVIGATEL'NOY AKTIVNOSTI]**

V. P. Krotov Washington NASA Oct. 1970 13 p refs Transl. into ENGLISH from 21st Intern. Astronautical Congr. (Constance, Moscow), 4-10 Oct. 1970 13 p

(Contract NASw-2037)

(NASA-TT-F-13375) Avail: NTIS CSCL 06S

The effect of prolonged restriction of motor activity on the mode of changes in mineral metabolism of rabbits is examined. During the first day of the exposure to hypokinesia the plasma liquefied, and the hematocrit number and hemoglobin concentration in the blood tended to decrease. The plasma volume calculated according to the method of Strauss increased by 5.1%. During the subsequent three hypokinetic weeks a redistribution of water between the plasma and erythrocytes took place. The potassium and sodium concentration in the plasma decreased as the exposure continued. The potassium and sodium content in various myocardial compartments of test rabbits changed differently. Judging by mineral metabolism parameters, no distinct signs of adaptation of the animal organism to prolonged hypokinesia were observed. Author

N70-42666\*# Techtran Corp., Glen Burnie, Md.

**REGENERATION OF THE ATMOSPHERE IN SPACECRAFT CABINS USING UNICELLAR ALGAE [REGENERATSIYA ATMOSFERY KABIN KOSMICHESKIKH KORABLEI S ISPOL'ZOVANIEM ODNOKLETOCHNYKH VODOROSLEY]**

G. I. Meleshko Washington NASA Oct. 1970 8 p refs Transl. into ENGLISH from 21st Intern. Astronautical Congr. (Constance, Moscow), 4-10 Oct. 1970 8 p

(Contract NASw-2037)

(NASA-TT-F-13377) Avail: NTIS CSCL 06K

The development of air regeneration systems utilizing photosynthesis of unicellular algae is discussed with respect to the efficiency of current bioengineering systems used for Chlorella cultivation and the possibility of assuring stable performance of the systems. The efficiency of cultivation procedures is achieved first of all by reuse of the culture medium without its intermediate treatment in adjacent components of the system. Stability of the

system is related to biological peculiarities of the biological material (populations involving specimens of different age and high reproduction rate) and can be maintained by certain techniques. The practical efficiency of air regeneration systems based on *Chlorella* cultivation may increase provided that the *Chlorella* culture performs some additional functions in the life support system (urine utilization, water evaporation during its reclamation, and cabin air purification from man-produced contaminants). Author

**N70-42727\*#** Sandia Corp., Albuquerque, N.Mex. Planetary Quarantine.

**A STOCHASTIC APPROACH TO BIOBURDEN ESTIMATION AND PREDICTION: A PRELIMINARY REPORT**

A. L. Roark Aug. 1970 63 p refs

(NASA Order W-12853)

(NASA-CR-110902; SC-RR-70-561) Avail: NTIS CSCL 06M

An approach to modeling bioburdens that has many of the properties generally recognized as desirable for such models is described. A probability distribution for the bioburden on a surface, at any time  $t$ , is derived in closed form. This distribution depends upon the way in which organisms are clumped and the deposition rate and removal percent of these clumps. Examples are given of how this model may be used to estimate and predict bioburdens and specify confidence limits about these estimates and predictions. An indication is also given of how the model may be used to establish sampling protocols. Author

**N70-42740\*#** Translation Consultants, Ltd., Arlington, Va.  
**STUDY OF REACTIVITY TO TRANSVERSE ACCELERATIONS AND RADIOPROTECTANTS [ISSLEDOVANIYE REAKTIVNOSTI ORGANIZMA V USLOVIYAKH DEYSTVIYA POPERECHNO NAPRAVLENNYKH PEREGRUZOKI PROTIVOLUCHEVYKH FARMAKOKHIMICHESKIKH SREDSTV]**

V. V. Antipov et al Washington NASA Oct. 1970 12 p refs  
Transl. into ENGLISH from Russian Report Presented at the 21st Intern. Astronautical Congr., Constance, West Ger., 4-10 Oct. 1970

(Contract NASw-2038)

(NASA-TT-F-13370) Avail: NTIS CSCL 06S

The results of studies on the effect of radioprotectants on the animal tolerance to back-to-chest accelerations and sensitivity to the preparations under space environment simulation are presented. Author

**N70-42741#** Utrecht State Univ. (Netherlands). Physics Lab.  
**THE EFFECT OF GAMMA-RADIATION IN COLLAGEN SOLUTIONS. A PHYSICO-CHEMICAL STUDY**

Johannes Jacobus Maria Labout (Ph.D. Thesis) Jan. 1970 81 p refs  
Sponsored in part by Neth. Ogan. for Pure Sci. Res. and Neth. Found. for Chem. Res.

Avail: NTIS

The behavior of collagen solutions under gamma irradiation was studied and the often drastic changes in the sizes and shapes of the molecules were investigated using light scattering, viscometry, and electron microscopy. ESRO

**N70-42745#** Little (Arthur D.), Inc., Cambridge, Mass.  
**MEMBRANE SYSTEMS FOR CARBON DIOXIDE AND WATER VAPOR TRANSPORT Final Report, 21 Jun. 1968 - 15 Dec. 1969**

John M. Ketteringham, Dexter D. Snyder, and Douglas Shooter  
Wright-Patterson AFB, Ohio AMRL Mar. 1970 108 p refs

(Contract F33615-69-C-1223)

(AD-710404; ADL-C-71321; AMRL-TR-70-4) Avail: NTIS CSCL 6/11

Following a preceding study of the use of a porous silica membrane system for humidity control in aircraft and space vehicles,

the potential weight and volume improvements derived from the use of membranes in the form of thin tubes were investigated. A one-man capacity demonstration model of such a system taking advantage of these considerable savings was developed. Also the wasteful transport of oxygen or air at lower humidities (40-50% RH) can be significantly reduced by impregnating the pores with a desiccant solution. The usefulness of the basic system was extended by using it as a water exchanger in which a dry flushing gas stream provided the driving force across the membrane instead of a vacuum. Porous cellulose containing an aqueous solution of a reversible carbon dioxide absorbent sandwiched between hydrophobic (TFE), microporous membranes showed promise for carbon dioxide removal systems. No advantage over state of the art systems was observed for impregnated microporous silica membranes in this application. A screening program was undertaken to find a substitute for arsenites as catalysts for the absorption and facilitated transport of carbon dioxide. Tin and zinc organometallic complexes with promising properties were identified. For practical application, solubility limitations in particular will have to be overcome. Author (TAB)

**N70-42773\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**PROBABILITY LEARNING: THE SHORTEST PATH HYPOTHESIS**

Edward M. Huff Sep. 1970 8 p refs

(NASA-TM-X-62005) Avail: NTIS CSCL 05J

A specific hypothesis was tested concerning the development of a preference effect in human decision tasks that require predictions of future events. Six groups of subjects were exposed to different probabilistic sequences in which the recurrence paths to the preceding event varied in length. It was hypothesized that subjects would develop a preference for alternatives with the shortest recurrence paths. The results clearly support the hypothesis and show how the characteristics of the probabilistic environment influence human task performance. Author

**N70-42779#** Congress. House. Committee on Government Operations.

**THE ENVIRONMENTAL DECADE (ACTION PROPOSALS FOR THE 1970's) From the Conservation and Natural Resources Subcommittee**

Washington GPO 1970 367 p refs Hearings before Comm. on Govt. Operations, 91st Congr., 2d Sess., 2-6 Feb., 13 Mar., and 3 Apr. 1970

Avail: SOD \$1.25

Congressional testimony is reported on proposals for the 'Environmental Decade' of the 1970's. The proposals include adequate funding for waste treatment plants, separation of storm and sanitary sewers, development of desalinization and recycling and the prevention of waste by evaporation and other causes, elimination of sources of pollution, preservation of wetlands and estuaries, development of pollution-free automotive engines as alternatives to present internal combustion engines, standards for industrial and power plants in elimination of polluting discharges, elimination of agricultural soil erosion and siltation from highway construction and suburban development, control of chemical pollution from the use of fertilizers, herbicides, and persistent pesticides, standards for regional and national planning, strict controls for solid waste disposal, preservation of wildlife habitats and marine resources, and provisions for better management of mineral and forest resources. R.B.

**N70-42780** National Lending Library for Science and Technology, Boston Spa (England).

**IMPROVEMENT OF INDICES OF THE BLOOD COAGULATORY SYSTEM OF HAEMOPHILIA PATIENTS FOLLOWING PHYSICAL EXERCISES [OB ULUSHCHENII POKAZATELEI SVERTIVAYUSHCHEI SISTEMY KROVI U BOLNYKH GEMOFILIEI PRI FIZICHESKIKH**



**UPRAZHENIYAKH]**

J. S. Damsker et al. Jul. 1970 8 p refs Transl. into ENGLISH from Probl. Gematol. i Peretiv. Krovi (Moscow), v. 14, no. 3, 1969 p 24-26

(NLL-RTS-5902) Avail: Natl. Lending Library, Boston Spa, Engl.: 14s; 2 NLL photocopy coupons

The effects of various physical stresses on the course of hemophilia and the change in the activity of the blood coagulation factors in hemophilic patients were investigated. The group of subjects consisted of 30 cases of hemophilia with blood effusions and lesions of joints. The study included the possibility of physical exercises in cases of hemophilia with frequent relapses of the disease, the possibility of physical exercises leading to a deterioration of the morbid conditions, and an exercise program suitable for hemophilic patients with hemorrhagic effusions into joints. R.B.

**N70-42804#** Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

**ELECTROCARDIOGRAM RECORDING WITH PASTELESS ELECTRODES**

George E. Bergey, Russell D. Squires, and William C. Sipple 30 Jun. 1970 24 p refs

(AD-709919; NADC-MR-7014) Avail: NTIS CSCL 9/1

Experimentation regarding various aspects of a technique for recording electrocardiographic potentials from unprepared skin, without the use of conventional paste, is described. Because of the relatively high skin-to-electrode impedances encountered without electrolytic paste, high input impedance amplifiers must be utilized for acquisition of the signal. In order to minimize susceptibility to external electrostatic and electromagnetic interference, an inherent problem with high input impedance amplifiers, buffer amplifiers were incorporated directly within the electrode housing. Of the different metals tested, stainless steel proved to be the most stable skin contact material for pasteless operation. The integrated electrode/buffer amplifiers described comply with specifications of the American Heart Association and should prove useful as a direct replacement for conventional paste-type electrodes in existing clinical ECG equipment as well as for long-term applications, such as space missions and intensive care unit patient monitoring, where frequent attention to the electrodes is inconvenient.

Author (TAB)

**N70-42816#** Tulane Univ., New Orleans, La.

**DELTA REGIONAL PRIMATE RESEARCH CENTER. LONG TERM EFFECTS OF PRENATAL X-IRRADIATION AND GAMMA-IRRADIATION ON CEREBRAL CORTEX** Technical Progress Report, 1 Jun. 1969 - 31 May 1970

Kenneth R. Brizzee May 1970 21 p refs

(Contract AT(40-1)-3832)

(ORO-3832-8) Avail: NTIS

The effects of exposure of prenatal or neonatal rats to various doses of single, fractionated dose, or continuous whole-body gamma or X-radiation on the development of the cerebral cortex were investigated. The kinetics of brain cell development in nonirradiated and 100 R gamma-irradiated rats were studied in timed pregnancy rats injected with H-3-thymidine on the 13th gestation day followed by counts of labeled metaphase nuclei in cells of the primordial ependymal layer. Histological examination of brain tissues showed that residual radiation damage in cerebral hemispheres increased slowly between doses of 25 R and 75 R, but increased rapidly following exposure to higher doses. The brains of animals exposed to fractionated doses of 100 R plus 50 R and 100 R plus 100 R gamma radiation showed much less residual damage than animals subjected to the same total dose administered by a single exposure. Hypothermia induced at various times during the irradiation schedule caused changes in the radiation response. NSA

**N70-42825\*#** Martin Marietta Corp., Denver, Colo.

**A STUDY PROGRAM ON THE DEVELOPMENT OF A MATHEMATICAL MODEL(S) FOR MICROBIAL BURDEN****PREDICTION. VOLUME 10: PHASE 9 WITH REVISIONS TO VOLUME 6 USER'S MANUAL, ADDENDUM**

Lloyd B. Farabee Sep. 1970 90 p refs Prepared for JPL

(Contracts NAS7-100; JPL-952532)

(NASA-CR-110892; MCR-68-97) Avail: NTIS CSCL 06M

The histogram method for combining random variables was refined in order to obtain more realistic predictions of the microbial burden on spacecraft. The bases of histogram operations (adding, multiplying, dividing, subtracting, determining the maximum) are described to show the nature of the problems involved and the reasons for inaccuracies. A recommended technique is outlined and a listing of the revised computer program to incorporate the technique into the previously developed Microbial Burden Prediction model is included. Sample calculations are included to illustrate the operations discussed. Author

**N70-42848#** Albert Einstein Medical Center, Philadelphia, Pa. Dept. of Genetics.

**ULTRAVIOLET LIGHT EFFECTS ON NUCLEIC ACID FORMATION AND GENETIC EVENTS IN BACTERIA** Annual Progress Report

C. O. Doudney Apr. 1970 48 p refs

(Contract AT(30-1)-3893)

(NYO-3893-16) Avail: NTIS

Studies were conducted on photoreversibility of UV-induced mutations and lethality in *Escherichia coli*. It was found that loss of photoreversibility with postirradiation incubation of UV-induced mutations for streptomycin resistance and lethal damage occurred during the first 20 min of incubation and was unaffected by the absence of tryptophan with an amino acid-requiring substrain or by the absence of thymine with a thymine-requiring substrain but was blocked by dinitrophenol. Loss of photoreversibility of UV-induced lethality and damage to DNA replication were studied. Effects of acriflavine on mutation frequency following ultraviolet radiation were investigated. The rates of DNA replication relative to unirradiated controls were calculated for various doses of UV in amino acid-starved bacteria. Studies on photoreversibility of dark repair blockage of DNA synthesis showed that with low doses of UV this inhibition was eliminated by photoreversal treatment. NSA

**N70-42849#** Albert Einstein Medical Center, Philadelphia, Pa. Dept. of Genetics.

**ULTRAVIOLET LIGHT EFFECTS ON NUCLEIC ACID FORMATION AND GENETIC EVENTS IN BACTERIA, THREE YEAR COMPREHENSIVE REPORT**

C. O. Doudney Apr. 1970 48 p refs

(Contract AT(30-1)-3893)

(NYO-3893-15) Avail: NTIS

When *Escherichia coli* H/r cells were exposed to 400 ergs/sq mm of ultraviolet light and incubated without arginine, degradation of RNA and of ribosomes occurred. Under these conditions the ribosomes remained stable for one hour but rapid breakdown of the ribosomes occurred within two hours. The presence of arginine in the medium prevented most of the breakdown. Most of the damage was not photoreversible. Studies on the effects of acriflavine on uv-damaged bacterial cells were conducted. Results showed that concentrations of acriflavine that do not interfere with RNA synthesis in nonirradiated bacteria decrease the formation of RNA in uv-damaged bacteria. This phenomenon was used to study the recovery of normal capacity to form RNA in acriflavine by bacteria damaged by uv light. Experiments showed that photoreversible pyrimidine dimers in DNA were responsible for post-radiation effects of the dye on RNA formation. NSA

**N70-42851\*#** Scripta Technica, Inc., Washington, D.C.

**PROBLEMS OF SPACE BIOLOGY. VOLUME 13: PROLONGED LIMITATION OF MOBILITY AND ITS**

**INFLUENCE ON THE HUMAN ORGANISM**

A. M. Genin, ed. et al NASA Oct. 1970 271 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Tom 13. Dlitel'noye Ogranicheniye Podvizhnosti i Yego Vliyaniye Na Organizm Cheloveka" Moscow, Nauka, 1969 (Contract NASw-2036) (NASA-TT-F-639) Avail: NTIS CSCL 06S

Papers are presented from a complex clinical-physiology study of healthy subjects who were confined to bed for long periods. The following are described in broad terms: effects of prolonged mobility restriction on functional systems, tolerance to orthostatic tests and load factors, efficacy of physical exercises and other prophylaxis in preventing unfavorable shifts in the organism during prolonged confinement to bed. For individual titles see N70-42852 to N70-42883.

**N70-42852\*# Scripta Technica, Inc., Washington, D.C.**  
**PROLONGED LIMITATION OF MOBILITY AS A MODEL OF THE INFLUENCE OF WEIGHTLESSNESS ON THE HUMAN ORGANISM**

A. M. Genin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 1-7 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Experimental approaches to evaluation of the biological effects of prolonged weightlessness are examined. Laboratory simulation of weightlessness, with prolonged bed rest as an example, is defended. The initial conception that formed the basis for the 70-day hypodynamia study is formulated. Author

**N70-42853\*# Scripta Technica, Inc., Washington, D.C.**  
**ORGANIZATIONAL AND METHODOLOGICAL PRINCIPLES FOR THE CONDUCT OF PROLONGED HYPODYNAMIA RESEARCHES**

P. A. Sorokin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 8-14 (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The influence of prolonged hypodynamia on the human organism was investigated under clinical conditions in five series of experiments in which 16 subjects spent 70 days confined to bed. Series 1 was the control (pure hypodynamia), consisting of 4 subjects. Series 2 through 5 imposed hypodynamia together with various combinations of prophylactic measures on 12 subjects. The most general methodological approaches to study of the effects of hypodynamia and evaluation of the effectiveness of various prophylactic measures are characterized. Author

**N70-42854\*# Scripta Technica, Inc., Washington, D.C.**  
**CLINICAL OBSERVATIONS IN PROLONGED HYPODYNAMIA**

P. A. Sorokin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 15-25 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The results of clinical observations on the state of 16 subjects over 70 days of bed rest are reported. The psychological effects of prolonged hypodynamia are analyzed and data on the pathology of the subjects during the experiments are presented. Author

**N70-42855\*# Scripta Technica, Inc., Washington, D.C.**  
**CHANGES IN ELECTROCARDIOGRAM AND STATISTICAL STRUCTURE OF CARDIAC RHYTHM IN THE COURSE OF CONFINEMENT TO BED**

A. D. Voskresenskiy et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 26-33 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Analysis of EKG recorded during a 70-day confinement to bed showed position changes, relative inhibition of conduction, decreased amplitude of the R and T deflections, a change in the relationship between the T from various leads, a periodic

displacement of the S-T segment, and changes in the repolarization process for all of the subjects. These shifts appeared later and were less consistent in subjects who performed a set of physical exercises. Correlation functions calculated for series of 200 to 300 successive values of the R-R interval revealed a picture of respiratory-arrhythmia decay and the appearance of undulating variations of the rhythm that were not related to respiration. The R-R correlation functions showed little change from their original form in the individuals who performed physical exercises. Author

**N70-42856\*# Scripta Technica, Inc., Washington, D.C.**  
**HEMODYNAMIC CHANGES DURING PROLONGED HYPOKINESIA ACCORDING TO MECHANOCARDIOGRAPHIC DATA**

V. V. Simonenko *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 34-42 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

A dominant influence of the sympathetic innervation on the cardiovascular system is observed during prolonged hypokinesia. Prolonged hypokinesia changes the reaction of man to cold, as manifest in the phasing of the reactions, lower strength of the response reaction, and lowering of the tonicity coefficient of the blood vessels. The cuff test can serve as a tentative indicator of the ability of the cardiovascular system to react during hypokinesia to compensate exclusion of a certain amount of blood from circulation. Physical conditioning mitigates the deconditioning effect of hypokinesia on the cardiovascular system to some degree, but does not eliminate it completely. Author

**N70-42857\*# Scripta Technica, Inc., Washington, D.C.**  
**HEMODYNAMIC CHANGES DURING PROLONGED HYPOKINESIA ON THE BASIS OF THE DYE-DILUTION METHOD**

A. P. Pekshev *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 43-51 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Under the conditions of strict confinement to bed, the hemodynamic changes in the subjects usually increase with increasing time of hypodynamia. In a number of cases, however, stabilization of certain blood-circulation indices is observed, or they return to their original values in the course of the experiments; this makes it possible to speak of a certain adaptability of the cardiovascular system to the abnormal conditions of hypodynamia. Individual peculiarities make their appearance here in the hemodynamics of the subjects. Under the conditions of hypodynamia without prophylactic measures, there is a distinct decrease in stroke volume, minute heart volume, and the mass of central (intrathoracic) blood, a slight decrease in circulating plasma, an increase in the hematocrit, and an increase in the time of a complete blood-circulation cycle. If measures are taken during hypodynamia to prevent circulatory disorders (pharmaceuticals, physical exercises), there are some changes in the directions taken by the hemodynamic shifts. Here, the nature of the hemodynamic changes observed in some subjects suggests mitigation of the circulatory disturbances that arise during prolonged hypodynamia. Author

**N70-42858\*# Scripta Technica, Inc., Washington, D.C.**  
**PHASE CHANGES IN THE CARDIAC CYCLE DURING PROLONGED HYPODYNAMIA ACCORDING TO POLYCARDIOGRAPHIC AND KINETOCARDIOGRAPHIC DATA**

M. I. Tishchenko et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 52-57 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Phase analysis of cardiac activity under the conditions of prolonged hypodynamia brings out changes in the phase structure of the cardiac cycle that are manifested in the development of a hypodynamic phase syndrome. This takes the form of shortening of the blood-expulsion and mechanical-systole phase, lengthening

of the tension, isometric-contraction, and myocardial-relaxation phases and a decrease in the initial rise rate of intraventricular pressure. By the fourth week after hypodynamia, normal phase activity has been restored in the cardiac cycle. The hypodynamic phase syndrome is equally in evidence among subjects of the control group and those of the group in which prophylactic measures were taken. Author

**N70-42859\*#** Scripta Technica, Inc., Washington, D.C.  
**INFLUENCE OF PROLONGED HYPODYNAMIA ON HEART SIZE AND THE FUNCTIONAL STATE OF THE MYOCARDIUM**

I. G. Krasnykh *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 58-65 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The thoracic organs of individuals subject to prolonged hypodynamia (70 to 73 days) were studied roentgenologically. It was established as a result of the study that prolonged hypodynamia leads to substantial hemodynamic abnormalities, with the result that heart size decreases by 12.9 to 17.9%. When complex medication was given by way of prophylaxis, the area changes were half those in the control in two subjects and the same as in the control in one subject. The contractile function of the myocardium changed in all subjects. Physical exercises combined with medication resulted in less significant changes in both heart size and heart contractile function. The extent of heart-area decrease when a set of prophylactic measures was taken (physical exercises, femoral cuffs, and complex medication) was the same as in the control group in 5 of 6 subjects, and even greater in certain individuals. The observed changes in the heart were functional in nature, and returned to normal after the subjects resumed their normal everyday activities. Author

**N70-42860\*#** Scripta Technica, Inc., Washington, D.C.  
**CERTAIN PECULIARITIES OF EXTERNAL RESPIRATION AND GAS EXCHANGE DURING PROLONGED HYPODYNAMIA**

M. I. Mikhasev et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 66-72 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The effects were studied of 70-day hypodynamia on the basal metabolic level, the spiographic and pneumotachymetric indicators of external respiration, oxygenation of arterial blood, bloodstream velocity, and gas exchange under standard physical load and in orthostatic tests. Basal metabolism was lowered by 5 to 21%, pulmonary ventilation volume was reduced, oxygen demand in the orthostatic tests was increased, and there was a substantial decrease in the tolerance of physical load. The disturbances noted were mitigated by the use of preventive measures: medication and physical exercise. Author

**N70-42861\*#** Scripta Technica, Inc., Washington, D.C.  
**NUTRITION AND METABOLISM DURING PROLONGED HYPODYNAMIA**

M. S. Seregin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 73-88 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Examination of subjects who spent 70 days in hypodynamia indicated a decreased energy requirement coupled with a decrease in body weight. The level of protein metabolism was depressed. A negative nitrogen balance was established. The protein loss averaged 8 g/day. Calcium excretion was up 40%. The excretion of vitamins C1, B1, B2, and PP with the urine decreased. The blood concentration of corticosteroids had fallen, and smaller amounts were excreted with the urine. The orthostatic test was accompanied by considerable enhancement of hypophyseal-adrenal function. Neither physical exercises nor medications prevented the metabolic disturbances. Author

**N70-42862\*#** Scripta Technica, Inc., Washington, D.C.  
**MINERAL SATURATION OF BONE TISSUE UNDER CONDITIONS OF PROLONGED HYPODYNAMIA**

I. G. Krasnykh *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 89-95 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The mineral-saturation level of the right calcaneus and the first phalanx of the fifth finger of the right hand was studied by X-ray photometry in individuals subjected to prolonged hypodynamia. It was established that 70 to 73 days of hypodynamia reduced the amount of calcium salts in the calcaneus by an average of 11.8% and in the first phalanx of the fifth finger by 6.9%. Recovery of the calcium salts to the initial level was not complete a month later. Use of complex preventive medication did not favorably influence the level of decalcification by comparison with a control. Physical exercises prescribed for prophylactic purposes and a combination of exercise with inflatable femoral cuffs and medications resulted in smaller (by factors of 2 to 5) losses of phosphorus and calcium salts by comparison with the control. Author

**N70-42863\*#** Scripta Technica, Inc., Washington, D.C.  
**INVESTIGATION OF CERTAIN BIOCHEMICAL BLOOD SERUM INDICATORS DURING PROLONGED HYPODYNAMIA**

I. I. Ivanov et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 96-105 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

A trend to lower blood-serum potassium contents was noted toward the end of an extended period of hypodynamia. A rise in the activity of alkaline phosphatases in the blood serum is reported. The activities of aspartate-aminotransferase, alanine-aminotransferase, aldolase, and creatinekinase, and the contents of sodium, phosphorus, calcium, microelements, and urea in the blood serum of the individuals studied showed no change. Author

**N70-42864\*#** Scripta Technica, Inc., Washington, D.C.  
**UREA CONTENT IN THE BLOOD DURING PROLONGED LIMITATION OF MOBILITY**

T. A. Orlova *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 106-107 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Blood urea content was studied in 19 subjects of a 70-day hypodynamia experiment to determine whether increases previously observed in 15- and 30-day experiments normalize over longer periods of restricted mobility. The results indicate that the effect is nonpathological, that normalization does occur, and that the most probable cause of high blood urea is renal insufficiency rather than increased nitrogen intake or tissue protein breakdown. Author

**N70-42865\*#** Scripta Technica, Inc., Washington, D.C.  
**COAGULABILITY OF BLOOD DURING PROLONGED HYPODYNAMIA ACCORDING TO THROMBO-ELASTOGRAPHIC DATA**

Ye. I. Dorokhova *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 108-112 ref (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Prolonged hypodynamia was accompanied by the appearance of a general hemophilic reaction of the blood. The partial blood coagulation reactions varied in the opposite direction. Physical exercises reduced the hemophilic shifts. Combining physical exercises on a treadmill or bicycle ergometer with occlusion conditioning slightly reduced the antihemophilic effect of the physical exercises. Author

**N70-42866\*#** Scripta Technica, Inc., Washington, D.C.  
**RESISTANCE TO INFECTION UNDER CONDITIONS OF HYPODYNAMIA**

B. A. Chukhlovina et al *In its* Probl. of Space Biol., Vol. 13 Oct.

1970 p 113-120 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Changes in both the nonspecific resistance of the organism to infection and specific immunological reactivity took place under conditions of prolonged hypodynamia. These changes may tend to increase the activity of conditionally pathogenic and saprophytic automicroflora vegetating in the organism, and may also contribute to activation of latent infections or the propagation of an agent introduced from the outside. Author

**N70-42867\*#** Scripta Technica, Inc., Washington, D.C.  
**FUNCTIONAL STATE OF THE CENTRAL NERVOUS SYSTEM DURING PROLONGED HYPODYNAMIA**  
 G. D. Yefimenko *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 121-132 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Rheoencephalography brought out consistently directed shifts in the hemodynamics of the brain in all subjects: a decrease in the blood-filling index and vascular tone index, shorter propagation times of the rheographic wave, and increased lability of the hemoregulatory nerve centers. Signs of the functional disturbances to the central nervous system that are characteristic of neurotic states were observed on the survey electroencephalograms of all subjects. There was apparently no decrease in the short-term fitness of the subjects for light mechanized labor during the 75 days of hypodynamia. Analysis of the indicators for each individual subject indicates phasing of the changes during the prolonged hypodynamia. Author

**N70-42868\*#** Scripta Technica, Inc., Washington, D.C.  
**CHANGES IN THE FUNCTIONS OF THE NERVOUS AND MUSCULAR SYSTEMS UNDER THE INFLUENCE OF PROLONGED HYPODYNAMIA**  
 A. G. Panov et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 133-147 (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Definite staging of the changes was discerned. The initial stage was characterized by early adaptive reactions, and the intermediate stage by atrophy of muscles, especially those of the lower legs. The advent of the third stage (after 20 days of hypodynamia) was marked by disturbances to higher nervous activity: disturbed sleep, emotional disturbances, and other asthenic symptoms. With the asthenic state as a background, oral-automatism phenomena and signs of pyramidal insufficiency appeared among the subjects. The latter were manifested in increased tendon and periosteal reflexes in the right extremities, loss of strength in these extremities, decrease or loss of the abdominal and plantar reflexes on the right side, smoothing of the right nasolabial fold, and deviation of the tongue to the right. The development of interhemispheric asymmetry with hypodynamia and functional insufficiency of the dominant hemisphere was noted in 14 out of 16 subjects. A gradual recovery of nervous system functions was observed after reactivation. Author

**N70-42869\*#** Scripta Technica, Inc., Washington, D.C.  
**CHANGES IN CERTAIN HUMAN MOTOR FUNCTIONS AFTER PROLONGED HYPODYNAMIA**  
 V. S. Gurfinkel et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 148-159 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The influence of prolonged hypodynamia on the retention of such motor functions as maintaining vertical position, walking, and rising from the supine position, and the innervation relationships (crossover effects in the spinal cord, vestibulospinal effects) on which these functions are based were investigated and the various ways of preventing hypokinetic disturbances were evaluated. The motor functions studied were selected because they are primarily automatic and independent of voluntary intervention under ordinary

conditions. The physical conditioning methods used in the experiments were effective in preventing gross motor disturbances. R.B.

**N70-42870\*#** Scripta Technica, Inc., Washington, D.C.  
**CHANGES IN THE BIOCHEMICAL PECULIARITIES OF WALKING UNDER THE INFLUENCE OF HYPODYNAMIA ACCORDING TO ICHNOGRAPHIC DATA**  
 V. G. Skrypnik *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 160-169 ref (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

The locomotor act of walking was studied in six subjects before and after an experiment during which they were confined to bed in the supine position for an extended period. Studies of the gait of the subjects produced data indicating reconstruction of the original stereotype of walking. A relative shortening of the distance covered in a double step and the symmetry between its component elements were noted. A change in the habitual kinematics of the trunk and extremities and disturbance of the ability to walk a straight line also occurred. Use of physical conditioning as a prophylactic measure reduces but does not eliminate the detrimental effects of prolonged hypodynamia. Use of the physical conditioning appliances in the supine position results in development of a new stereotype whose stability is greater the closer the similarity between the motions and load of the motor apparatus. Author

**N70-42871\*#** Scripta Technica, Inc., Washington, D.C.  
**STATE OF PSYCHIC ACTIVITY IN SUBJECTS DURING PROLONGED CONFINEMENT TO BED**  
 V. P. Bogachenko *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 170-174 (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Distinct changes in psychic state were studied in subjects who were strictly confined to bed and did not perform physical exercises or receive medication during confinement. The changes were less distinct in the group of individuals who performed specially designed physical exercises. In the two series of experiments in which a composite set of prophylactic measures was applied, practically no changes in the psychic state were detected. The decisive factor in the development of the neuropsychic disturbances was forced immobility. Author

**N70-42872\*#** Scripta Technica, Inc., Washington, D.C.  
**STABILITY OF PSYCHIC FUNCTIONS DURING PROLONGED CONFINEMENT TO BED**  
 V. L. Marishchuk et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 175-183 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL 06S

Undesirable changes in the psychic functions were investigated in relation to vegetative shifts. The subjects generally retained operational efficiency and matched their original scores or improved on them as a result of training in tests of memory, the stability, distribution, and transfer of attention, sensomotor reactions, accuracy of time-interval judgment, and mentation efficiency. Some of the minor changes had an initial tendency toward deterioration, with a subsequent improvement of the indicators on the function-mobilization pattern, resembling the anxiety reaction to a state of stress, especially during periods when psychopharmaceuticals were being given. The detrimental changes were less frequent in the groups who performed physical exercises. The decrease in emotional stability and the increase in the numbers of errors are explained by preferential weakening of the inhibitory process. Author

**N70-42873\*#** Scripta Technica, Inc., Washington, D.C.  
**INFLUENCE OF PROLONGED HYPODYNAMIA ON THE STATE OF THE VESTIBULAR ANALYZER**  
 K. L. Khilov et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970

p 184-191 refs (See N70-42851 24-04)

Avail: NTIS CSCL 06S

Phasing was observed in the excitability changes of the vestibular analyzer. The largest changes were noted on the 7th, 10th, and 20th days of hypodynamia in individuals whose vestibular function was found to be asymmetric before the experiment. The transition to active movement after hypodynamia was accompanied by vestibular function disorder, with normalization only after 2 to 3 weeks. It is concluded that the functions of both vestibular analyzer receptors are disturbed during hypodynamia, but that the otolith apparatus is more strongly affected. Author

**N70-42874\*#** Scripta Technica, Inc., Washington, D.C.  
**STATE OF THE VISUAL ANALYZER DURING HYPODYNAMIA**

N. T. Drozdova et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 192-195 refs (See N70-42851 24-04)

Avail: NTIS CSCL 06S

A decrease in certain visual functions and a change in the fundus picture of the eye were observed from effects of prolonged hypodynamia on the visual analyzer. Visual acuity decreased by 21% and intraocular pressure by 3 mm Hg; there was a 15 deg loss in peripheral vision, the point of clear vision had moved out 4.5 cm, the size of the blind spot had increased by 38%, and there was a 120% increase in the time to recover visual acuity after flashing light in the eyes. Reactive vascular effects were noted on the fundus of the eye: the veins were dilated, tensed, and darker in color. The optic disk had faded. The transition to motor activity resulted in gradual recovery of the disturbed functions. Author

**N70-42875\*#** Scripta Technica, Inc., Washington, D.C.  
**PHYSICAL CONDITIONING FOR MAN UNDER CONDITIONS OF PROLONGED HYPODYNAMIA**

A. V. Yeremin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 196-204 refs (See N70-42851 24-04)

Avail: NTIS CSCL 06S

Under conditions of artificially suppressed physical activity and prolonged confinement to the horizontal position the use of specific sets of physical exercises were studied to reduce hypodynamic shifts, especially with respect to the strength of various muscle groups, static endurance, the coordination habits of walking and psychomotor functions. Exercising on a treadmill appliance has advantages over the bicycle ergometer because of the prophylactic and emotional effects of the exercises. Author

**N70-42876\*#** Scripta Technica, Inc., Washington, D.C.  
**OCCLUSION CONDITIONING UNDER THE CONDITIONS OF PROLONGED HYPODYNAMIA**

V. G. Voloshin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 205-210 refs (See N70-42851 24-04)

Avail: NTIS CSCL 06S

A technique is examined in which inflatable thigh cuffs are applied as a measure against the unfavorable effects of prolonged hypodynamia on the cardiovascular system. The operating principle of a machine that automatically maintains a specified occlusion-conditioning regime is described. The results of completed tests are presented and the prophylactic procedure in question is evaluated. Author

**N70-42877\*#** Scripta Technica, Inc., Washington, D.C.  
**RESULTS FROM USE OF MEDICATION IN INDIVIDUALS SUBJECT TO PROLONGED HYPOKINESIA**

P. V. Vasil'yev et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 211-218 refs (See N70-42851 24-04)

Avail: NTIS CSCL 06S

The influence of prolonged hypokinesia on the reactivity of the organism with respect to a combination of medications

(amphetamine, securinine, caffeine) and the possibility of improving human tolerance to orthostatic loads and the action of transverse G-forces with the aid of these drugs were studied in experiments in which 11 subjects participated. It was established that the action of the medication changed under hypodynamia; in most cases, the effect was weaker, and inversion occurred in a number of observations. As a rule, tolerance of orthostatic loading and G-forces increased following administration of the above agents, especially when they were given to individuals who performed a set of physical exercises. In all cases, the decrease or increase in the subjects' stability after hypodynamia was arrived at with considerably greater stressing of the organism's functional systems than was observed before hypokinesia. Author

**N70-42878\*#** Scripta Technica, Inc., Washington, D.C.  
**STATE OF NERVOUS-SYSTEM FUNCTIONS DURING AFTEREFFECTS OF HYPODYNAMIA**

G. S. Kalin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 219-226 (See N70-42851 24-04)

Avail: NTIS CSCL 06S

Distinct disturbances to the functions of the nervous system and the neuropsychic sphere were detected in subjects after prolonged hypodynamia. Organic microsymptoms, asthenia, vegetative cardiac instability, and akinetic hypotrophy of the muscles of the lower leg were noted. After load tests administered at the end of hypodynamia, the changes in the animal nervous system increased. There was a certain tendency to preferential weakening of the left (dominant) hemisphere of the brain (the appearance of occasional signs of dextral pyramidal and sinistral cerebellar insufficiency). Subjects who participated in the hypodynamia experiments without preventive measures showed more pronounced functional disturbances; the disturbances were less hypodynamia was combined with physical exercises on a treadmill and with autogenous conditioning. Author

**N70-42879\*#** Scripta Technica, Inc., Washington, D.C.  
**RESULTS OF INVESTIGATIONS OF THE CARDIOVASCULAR SYSTEM DURING THE AFTEREFFECT OF 70-DAY HYPODYNAMIA**

A. V. Beregovkin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 227-233 refs (See N70-42851 24-04)

Avail: NTIS CSCL 06S

Data on the aftereffect of prolonged hypokinesia are presented and the effectiveness of the preventive measures taken against its unfavorable effects is evaluated on the basis of the stability and degree of the changes in the circulatory system. During 1 to 3 days before the start of the experiment and in the afterperiod until the changes noted had vanished, the subjects were examined by a therapist who used generally accepted clinical methods; electrocardiograms were recorded and hemodynamics was studied by N.N. Savitskiy's method at rest, after measured physical exertion, and during the passive orthostatic test. Electrocardiographic examination during the afterperiod showed a change in the bioelectrical activity of the heart and disturbance of metabolic processes in the myocardium. The hemodynamic changes indicate disturbance of cardiovascular regulation and poor adaptation of the system to physical exertion and orthostatic disturbances. Author

**N70-42880\*#** Scripta Technica, Inc., Washington, D.C.  
**REGIONAL ARTERIAL OSCILLOGRAPHIC INDICES DURING HYPODYNAMIA**

Ye. G. Ryabkova et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 234-237 (See N70-42851 24-04)

Avail: NTIS CSCL 06S

Oscillograms from symmetrical zones of the upper arms and lower legs, the Korotkov arterial pressure, and pulse frequency were registered systematically over the course of the experiments.

Prolonged hypodynamia resulted in neurocirculatory dystonia, which appeared in asynchronous variations of arterial pressure and vascular tone and asymmetry and instability of the vascular reactions. Author

**N70-42881\*#** Scripta Technica, Inc., Washington, D.C.  
**AN INVESTIGATION OF ORTHOSTATIC STABILITY AFTER PROLONGED HYPODYNAMIA**

I. D. Pestov et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 238-247 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL06S

The reactions of the cardiovascular system to the orthostatic test are examined in men who were restricted to the horizontal position for 70 days. Certain prophylactic measures taken against detrimental effects of prolonged hypodynamia are evaluated. The possible mechanisms of the orthostatic disturbances that result from simulation of weightlessness are discussed. Author

**N70-42882\*#** Scripta Technica, Inc., Washington, D.C.  
**CHANGE IN LOAD-FACTOR TOLERANCE AFTER 70 DAYS OF HYPODYNAMIA**

A. R. Kotovskaya et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 248-255 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL06S

Stability to the action of transverse g-forces was investigated in 12 subjects before and after a prolonged (70-day) confinement to bed. Overload tolerance was evaluated in terms of the maximum g-force at which the first signs of physiological function disturbance made their appearance, and on the basis of shifts in the physiological reactions during and after action of the load factor. A distinct decrease in the tolerance to transversely directed g-forces was noted after bed rest. Use of drugs and physical exercises during hypodynamia was clearly helpful. The combination of prophylactic measures resulted in an increase in the maximum load factor tolerated after hypodynamia without any substantial decrease of overall stability. In all cases, however, the physiological systems were more severely stressed under a given g-force after hypodynamia. Author

**N70-42883\*#** Scripta Technica, Inc., Washington, D.C.  
**BASIC RESULTS FROM STUDIES OF THE INFLUENCE OF 70-DAY HYPODYNAMIA ON THE HUMAN ORGANISM**

A. M. Genin et al *In its* Probl. of Space Biol., Vol. 13 Oct. 1970 p 256-262 refs (See N70-42851 24-04)  
 Avail: NTIS CSCL06S

The results obtained during the experiment are examined in juxtaposition to the expected consequences of hypodynamia, which are presented in diagram form. Certain aspects of the influence of prolonged bed rest on the organism are revealed: a decrease in immunological resistance, certain disturbances to the mental functions, the development of trophic changes in the myocardium, and changes in reactivity to medication. The specifically designed physical conditioning procedures were found to be relatively effective in mitigating the detrimental effect of hypodynamia. Author

**N70-42894#** University of Southern Calif., Los Angeles.  
**ESR STUDIES ON THIYL FREE RADICALS IN RELATION TO BIOLOGICAL EFFECTS OF RADIATION** Progress Report

Walter Wolf 1 Mar. 1970 43 p refs  
 (Contract AT(11-1)-113)  
 (USC-113-P-21-X-2) Avail: NTIS

Studied are the ESR characteristics of thiyl and related free radicals, in order to achieve a better understanding of the role of mercapto-containing compounds, both in radiation damage and radiation protection processes. The oxidation of thiols with ceric ion, in solution, leads to a number of free radical signals, ascribable to at least 6 different species. Correlations between the coupling constants and structure suggest possible means of identifying free radical sites, of potential interest for polypeptide and protein

studies. At this time, the ceric ion remains the most versatile oxidizing system; attempts to use other homogeneous or heterogeneous phase one-electron transfer agents were unsuccessful. Author (NSA)

**N70-42907#** California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.

**INFLUENCE OF TEMPERATURE DURING THE GAMMA IRRADIATION THERMOLUMINESCENCE OF SOILS AND LiF AND CaF2 DOSIMETERS**

H. Nishita and M. Hamilton [1970] 20 p refs  
 (Contract AT(04-1)-Gen-12)  
 (UCLA-12-781) Avail: NTIS

The influence of temperature (0 deg to 70 C) during the exposure period to cobalt-60 gamma radiation on the thermoluminescence of two soils and LiF (TLD-100) and CaF2 (TLD-200) dosimeters was examined. The thermoluminescence of these materials was affected by their temperature during irradiation. The effect of temperature during irradiation was eliminated in the soils by using a pre-readout, post-irradiation heating regimen of 100 C for 20 min or by allowing the thermoluminescent decay to progress for an appropriate length of time. For the two soils examined, this time was about 58 and 168 hr. The pre-readout, post-irradiation heating regimen (100 C for 10 min) sometimes used for TLD-100 and TLD-200 dosimeters did not eliminate the effect of temperature during irradiation. Author (NSA)

**N70-42926#** RAND Corp., Santa Monica, Calif.  
**RAND SYMPOSIUM ON PILOT TRAINING AND THE PILOT CAREER: RECOLLECTIONS OF THE CHAIRMAN**

W. A. Stewart Mar. 1970 17 p Conf. held at Santa Monica, Calif., 23-27 Feb. 1970 Revised  
 (Contract F44620-67-C-0045; Proj. RAND)  
 (AD-707098; RM-6282-1-PR-Rev.) Avail: NTIS CSCL 5/9

A report is made on a symposium that included Air Force officers engaged in flight training operations and in career planning, representatives of the Canadian Armed Forces and the Royal Air Force, and a cross-section of civilian research specialists in flight training problems. Topics discussed included the economics of flight training, the flying career, college versus high school graduates, defining the trained pilot, motivation and selection, innovation in pilot training, goals of training, transfer of training, and the role of simulators. TAB

**N70-42971#** Atomic Energy Commission, New York. Health and Safety Lab.

**CALCULATION OF DOSE AND DOSE-EQUIVALENT RATES TO MAN IN THE ATMOSPHERE FROM GALACTIC COSMIC RAYS**

Keran O'Brien and James E. McLaughlin May 1970 22 p refs  
 (HASL-228) Avail: NTIS

An accelerator shielding code LUIN was adapted to the calculation of galactic cosmic-ray ionization, dose rates, and dose-equivalent rates as functions of altitude. Comparisons with spectral measurements were made and agreement is generally good. The sea-level ionization density and the derived dose-equivalent rates also agreed acceptably well with comparable measurements. Agreement among estimates of neutron dose rates was only fair, probably because of inadequately defined detector responses and dose models. The calculations permitted a parametric study of variations due to latitude and altitude, and such a study is now underway. Author (TAB)

**N70-43006\*#** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.  
**INTEGRATED LIFE SUPPORT SYSTEMS FOR THE SPACE SHUTTLE**

Robert S. Osborne and Lenwood G. Clark *In its* Space Transportation System Technol., Symp., Vol. 7 Jul. 1970 p 15-29 (See N70-43004 24-30)  
 Avail: NTIS CSCL06K

A survey of environmental control and life support systems for space shuttle vehicles accomplished as part of and in conjunction with ILRV studies is discussed. The results of the research and various approaches for accomplishing some of the EC/LS functions are considered. The EC/LS systems for the orbiter vehicle are emphasized. R.B.

**N70-43009\*** # McDonnell-Douglas Co., St. Louis, Mo.  
**SPACE SHUTTLE MAN-MACHINE INTEGRATION AND AEROMEDICAL TECHNOLOGY REQUIREMENTS**  
 E. R. Jones *In* NASA. Lewis Res. Center Space Transportation System Technol. Symp., Vol. 7 Jul. 1970 p 59-74 (See N70-43004 24-30)  
 Avail: NTIS CSCL05H

Shuttle-specific independent research and development (IRAD) is described along with shuttle-related IRAD, contract research and development, and hardware developments. A briefing in October 1969 on man-machine integration and aeromedical technology requirements for space shuttles is reviewed and related to further definition of the system. It is concluded that existing technology activities are not readily adaptable to the central issues of shuttle vehicles. Based upon the survey and the technology gaps, recommendations are given in broad categories of man-machine integration and aeromedical technology. Author

**N70-43035** # Arizona State Univ., Tempe.  
**A SYSTEM FOR STUDIES OF HYPERBARIC ENVIRONMENT EFFECTS ON PRIMATE BEHAVIOR AND PHYSIOLOGY**  
 Dwight Sutton and Eugene M. Taylor 1 Aug. 1970 27 p (Contract N00014-68-A-0150)  
 (AD-710419; TR-70-01) Avail: NTIS CSCL 6/12

The report describes a small (5 ft. i.d.) hyperbaric chamber together with associated features designed for the purpose of studying primate behavioral and physiological capacities. The chamber is rated for work at pressures equivalent to 2000 FSW and can be utilized for extended studies of performance under saturation conditions. Basic functions of chamber operation and gas control are automated and can be placed under programmed control of a computer (LINC-8). Up to five gases may be used simultaneously. Apparatus assembled for the analysis of neuromuscular control and of cardiovascular responses under hyperbaric stress is described. Author (TAB)

**N70-43049** # Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.  
**HUMAN STRENGTH: TERMINOLOGY, MEASUREMENT, AND INTERPRETATION OF DATA**  
 K. H. Eberhard Kroemer May 1970 33 p refs  
 (AD-710593; AMRL-TR-69-9) Avail: NTIS CSCL 5/5

Application of strength data to human engineering problems is often hampered by ambiguities of both terminology and data. This paper attempts to point out some of the problems. After defining strength and clarifying related terms, mechanical, physiological and statistical implications of strength testing are discussed. Strength data are considered to be fully relevant to human engineering problems only if the operator must exert maximal static muscle force. If submaximal forces are required, the applicability of strength data is very limited. Research is needed to establish relations between human static force capacity and the abilities to perform maximal or submaximal dynamic work. At present there is little evidence that static force data accurately predict dynamic performance. Author (TAB)

**N70-43089** # Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.  
**THE TOXICITY AND THE NATURE OF THE ACTION OF**

**FLUORINATED ALCOHOLS (TRIFLUOROETHANOL AND 1,1-DIHYDROPERFLUOROBUTANOL)**  
 T. K. Nikitenko et al 28 May 1970 12 p refs Transl. into ENGLISH from Gig. Tr. Prof. Zabol. (Moscow), v. 13, no. 10, 1969 p 29-33  
 (AD-710292; FTD-HT-23-233-70) Avail: NTIS CSCL 6/20

The paper discusses the toxic action of fluorated alcohols (trifluoroethanol and 1,1-dihydroperfluorobutanol) and different routes of their access into the organism of experimental animals. The fluorated alcohols under study are shown to be toxic compounds. Topical irritating action at the site of their application and general toxic effect of these poisons, characterized by manifestations of their narcotic action on the central nervous system and by dystrophic changes in parenchymatous organs, were revealed. Maximum permissible concentrations of their fumes in the air of industrial premises have been established, which for trifluoroethanol is 10 mg/cu m and for 1,1-dihydroperfluorobutanol - 20 mg/cu m. Author (TAB)

**N70-43096\*** # Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.  
**EFFECT OF ENVIRONMENT ON BIOLOGICAL BURDEN DURING SPACECRAFT ASSEMBLY**  
 D. M. Taylor, G. H. Redmann, A. R. Hoffman, and M. D. Wardle 1 Dec. 1969 35 p refs  
 (Contract NAS7-100)  
 (NASA-CR-110875; JPL-900-345) Avail: NTIS CSCL 06M

Three environments were selected: a typical high-bay manufacturing area having a Class 100,000 cleanliness, a 16 x 16 ft Class 100 laminar downflow tent, and the Sterilization Assembly Laboratory (SADL) 30 x 40 Class 100 laminar downflow assembly room with personnel and equipment entry control systems. The test item, assembled under these varying conditions, was a 14 ft diameter capsule mechanical training model, consisting of mockups of the major subassemblies expected to comprise a typical spacecraft capsule. The complete encapsulation of the capsule in a biobarrier was the terminal step of the assembly process. The results of the study program show that there are no significant effects on the aerobic spore accumulation due to environment; however, there is an effect on the control of aerobic vegetative cells. The configuration of the spacecraft surfaces and their exposure to the environment has an effect on the bioburden accumulation in all three test environments. Author

**N70-43100** # Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.  
**REMOTE CONTROLLED PHYSIOLOGICAL DATA MONITORING SYSTEM** Technical Report, Jul. 1968-Feb. 1969  
 David A. Ratino, Adolf R. Marko, and James H. Lovin Mar. 1970 27 p  
 (AD-710594; AMRL-TR-69-59) Avail: NTIS CSCL 6/2

A remote controlled physiological data monitoring system was designed and built to be used on the Aerospace Medical Research Laboratory Dynamic Environment Simulator (DES), a sophisticated human centrifuge. The system grew out of the necessity to have a dependable and accurate means of monitoring physiological signals from subjects in a stressed environment like that afforded by the DES. The monitoring system is a 16 channel, hardware physiological data transmission system capable of conditioning signals from a wide variety of sensors and amplifying them to a standard plus or minus 5 volt peak level for further processing or recording. The system is capable of self-calibration. It may be manually or computer operated. While built specifically for operation on a centrifuge, this monitoring system can be used in most kinds of experimental environments where remote controlled monitoring is advantageous. Author (TAB)

**N70-43124\*** # Missouri Univ., Columbia.  
**GAS-LIQUID CHROMATOGRAPHY OF AMINO ACIDS IN BIOLOGICAL SUBSTANCES**

N70-43129

Robert W. Zumwalt, Don Roach, and Charles W. Gehrke [1969]  
57 p refs Sponsored in part by Dept. of Agr.  
(Grants NGR-26-004-011; NSF GB-7182)  
(NASA-CR-110882) Avail: NTIS CSCL 06A

The development of a gas-liquid chromatographic (GLC) method for the quantitative analysis of amino acids in complex biological substances, specifically blood plasma and urine, is discussed. The amino acids present in these physiological fluids were quantitatively isolated by ion-exchange methods and retained on the ion-exchange resin while the substances which interfere with the GLC analysis passed through the column and were discarded. The amino acids were then eluted from the column, derivatized to their N-TFA n-butyl esters and analyzed by GLC. Quantitative recovery of the amino acids from the cation and anion-exchange cleanup columns, and amino acids in blood and urine were carried out.

Author

N70-43129# Johns Hopkins Univ., Baltimore, Md. Dept. of Radiological Sciences.

**KINETICS OF CELLULAR PROLIFERATION IN THE SEMINIFEROUS EPITHELIUM UNDER CONTINUOUS IRRADIATION**

Jacob I. Fabrikant 6 Oct. 1969 23 p refs Presented at 12th Intern. Congr. of Radiology, Tokyo, 6-11 Oct. 1969

(Contract AT(30-1)-3970)

(NYO-3970-30; CONF-691021-3) Avail: NTIS

Under continuous gamma irradiation, cell renewal during spermatogenesis in the mouse could achieve a near-steady state of cell population at a dose rate of 1.8 rads/day or less for at least 15 weeks by limited mechanisms of compensatory cell proliferation. Changes in the patterns of spermatogonial cell population kinetics indicated there was some reserve of proliferative capacity, but the extent to which these changes were caused by decreasing the cell cycle time of a precursor subpopulation in the type A cell compartment, or the bringing-in of a potentially proliferative dormant A sub 0 cell population, is not, as yet, clearly understood. Both mechanisms may be important in maintaining the steady state of spermatogenesis. Autoradiographic data indicated that there was a delay in the flow of spermatogonia in each proliferative compartment from the post-synthetic period into cell division, associated with a decrease in the duration of DNA synthesis, but with a normal cell cycle time. There was a slight differential radiosensitivity among spermatogonia affecting proliferation. NSA



## IAA ENTRIES

**A70-43788 #** Effect of microwave fields on biological structures. E. Kuzmann and K. Bretz (Eötvös Lóránd Tudományegyetem, Budapest, Hungary). In: Hungarian Academy of Sciences and Scientific Society for Telecommunication, Colloquium on Microwave Communication, 4th, Budapest, Hungary, April 21-24, 1970, Proceedings. Volume 4 - Microwave theory and techniques. (A70-43776 23-09) Colloquium co-sponsored by the International Union of Radio Science. Edited by Géza Bognár. Budapest, Akadémiai Kiadó, 1970, p. MT-23/1 to MT-23/9. 11 refs.

Use of the Mössbauer effect to study submolecular changes induced in blood specimens of various animals by microwave irradiation. The Mössbauer spectrum of the oxyhemoglobin in blood exposed to a microwave field shows a decrease in the isomer shift and an increase in quadrupole splitting. The implications of these changes are assessed, and it is concluded that the covalence of oxyhemoglobin increases in blood exposed to the action of microwave fields.

A.B.K.

**A70-43790 #** Safety standards and biological effects of microwave radiation. Saul W. Rosenthal (Brooklyn, Polytechnic Institute, Brooklyn, N.Y.). In: Hungarian Academy of Sciences and Scientific Society for Telecommunication, Colloquium on Microwave Communication, 4th, Budapest, Hungary, April 21-24, 1970, Proceedings. Volume 4 - Microwave theory and techniques. (A70-43776 23-09) Colloquium co-sponsored by the International Union of Radio Science. Edited by Géza Bognár. Budapest, Akadémiai Kiadó, 1970, p. MT-33/1 to MT-33/10. 9 refs. Army-ARPA-supported research.

Evaluation of experimental data obtained in two investigations of biological effects of microwaves. One of these investigations was a study of microwave cataractogenesis performed in an effort to determine the dependence of microwave injury on such factors as frequency, duration, and level of exposure and modulation. The other investigation is a continuing experiment on behavioral effects of microwave radiation and parallels some work done in the USSR by Presman and Levitina (1962) on heart rate effects in rabbits during low-level microwave irradiation.

A.B.K.

**A70-43813** Lateral inhibition between orientation detectors in the human visual system. Colin Blakemore, Roger H. S. Carpenter, and Mark A. Georgeson (Cambridge University, Cambridge, England). *Nature*, vol. 228, Oct. 3, 1970, p. 37-39. 19 refs.

Description of the psychophysical evidence concerning the lateral inhibition between orientation detectors in the human visual system. It is found that two lines of different orientation interact with each other so that they seem displaced from each other in orientation. The effects can be explained in terms of mutual inhibition between neighboring columns in the visual cortex, each of which contains cells tuned to one orientation.

Z.W.

**A70-43818** Image quality in the human eye. G. Westheimer (California, University, Berkeley, Calif.). *Optica Acta*, vol. 17, Sept. 1970, p. 641-658. 37 refs. PHS Grant No. EY-00220.

Description of the components of the human eye as an image-forming system, and outline of a model eye based on Gaussian optics. The actual performance of the eye's optics is discussed with respect to chromatic aberration, absorption losses, scatter, and the in vivo measurement of the modulation transfer function. Physiological aspects of the eye's visual performance are described, including pupil size, and the influence of various factors on visual acuity is reviewed.

M.V.E.

**A70-43822** The ability of normal subjects to tolerate added inspiratory loads. S. Freedman and E. J. M. Campbell (Royal Postgraduate Medical School, London, England). *Respiration Physiology*, vol. 10, Sept. 1970, p. 213-235. 53 refs. Research supported by the Medical Research Council.

Investigation of the ability of normal subjects to tolerate added inspiratory mechanical loads and their ventilatory response to loading by progressively increasing the load every two minutes until subjects were forced to stop the experiment. The maximum tolerable level was reproducible in individual subjects and the average values in ten subjects were: elastic, 145 cm H<sub>2</sub>O/liter, viscous, 283 cm H<sub>2</sub>O/liter sec, and threshold, 75 cm H<sub>2</sub>O. Maximum tolerable threshold load was closely correlated with maximum voluntary static inspiratory pressure, but inability to tolerate elastic and viscous loads could not be explained in terms of critical or limiting values of inspiratory pressure, added inspiratory work, ventilation, frequency, tidal volume, or end-tidal CO<sub>2</sub> tension. Changes in ventilation with progressive loading were small, but with elastic and viscous loading there were big and significant increases and decreases, respectively, of frequency, which were absent in anesthetized subjects. These changes of frequency were in the direction which would be expected to stabilize ventilation. The underlying mechanisms are not entirely clear, but may be largely voluntary.

(Author)

**A70-43823** The ventilatory response to resistance unloading during muscular exercise. E. E. Nattie and S. M. Tenney (Dartmouth College, Hanover, N.H.). *Respiration Physiology*, vol. 10, Sept. 1970, p. 249-262. 23 refs. NIH Grant No. HE-02888(13).

Study of the response of the ventilatory system to resistance unloading in exercising human subjects by changing the inspire from room air to an 80:20, He:O<sub>2</sub> mixture. The responses, in general, were opposite to those seen in resistance loading experiments and were characterized by increased ventilation (principally by an increased frequency without change of tidal volume), decreased arterial CO<sub>2</sub> tension, decreased tidal and minute work, and decreased tidal and minute tension x time index. The predominant response was an increase of mean and peak expiratory flows, achieved with a decreased intrapleural pressure. The system did not compensate either to bring the decreased driving pressure back to control value or to maintain constant (i.e., at control level) arterial CO<sub>2</sub> tension. It is concluded that the principal mechanism of the response is best explained by the intrinsic force-velocity property of muscle. This and other possibilities, particularly reflex modulation, are discussed.

(Author)

**A70-43863 \*** Xanthine dehydrogenase activity in parental and F sub 1 *Drosophila* and *Habrobracon* under conditions of hypogravity. E. C. Keller, Jr. (West Virginia University, Morgantown, W. Va.). *BioScience*, vol. 20, Oct. 1, 1970, p. 1045-1049. 19 refs. Contracts No. AF 44(620)-67-0059; No. NAS 2-3723; No. NAS 2-3528; No. NAS-G-678.

Description of the results of three Biosatellite experimental investigations of the effects of hypogravity as they concern parental and F sub 1 xanthine dehydrogenase (XDH) activity. The experimental results show that a significant decrease in the average enzyme activity of the F sub 1 individuals is noted as a consequence of the hard environment simulation. Two significant differences are detected by the variance ratio tests among the variances of the adult *Drosophila* experiment. A significant variance difference is detected between the variances of the irradiated ground control set and the nonirradiated ground control group.

M.M.

**A70-43900** Transient thermal behavior in biological systems. M. A. Mainster, T. J. White, J. H. Tips, and P. W. Wilson (Technology, Inc., San Antonio, Tex.). *Bulletin of Mathematical Biophysics*, vol. 32, Sept. 1970, p. 303-314. 7 refs. DASA-supported research; Contract No. AF 41(609)-68-C-0023.

The Peaceman-Rachford finite difference method is applied to cylindrically symmetric, transient heat conduction problems in biological media. Inhomogeneous media and internal sources which

vary in both space and time are permitted. Boundary conditions are satisfied without sacrificing high local resolution by means of an exponentially stretched grid. Computation time on a Philco 2000/210 computer is approximately 5 msec per grid point per time step. (Author)

**A70-43922 #** Recording neuron activity in the visual system (Rejestracja dzialalności neuronów w układzie wzrokowym). Jan J. Kulikowski. *Pomiary, Automatyka, Kontrola*, vol. 16, Aug-Sept. 1970, p. 343-346. 10 refs. In Polish.

Survey of experimental methods for studying the visual system which detects changes in signals with spatial and temporal distribution. A specific technique is proposed for recording the temporal distribution of pulses generated by neurons in response to stimuli, and a system is described for generating sinusoidal stimuli in space for the purpose of determining the spatial transfer function. The nature of pulses from individual neurons is evaluated by recording collective potentials. Subjective characteristics of the modulation sensitivity of vision are determined which approximately correspond to the sensitivity of potential measurement on the skull. T.M.

**A70-43946** Indirect assessment of left ventricular performance in acute myocardial infarction. Bernard Diamant and Thomas Killip (New York Hospital, New York, N.Y.). *Circulation*, vol. 42, Oct. 1970, p. 579-592. 21 refs. PHS Grant No. PH-43-67-1439.

One hundred patients admitted to a cardiac care unit had indirect serial determinations of left ventricular systolic ejection times. Patients were divided into groups with transmural infarction, nontransmural infarction, and no infarction, according to clinical, biochemical, and electrocardiographic criteria. Total electro-mechanical systole and left ventricular ejection time were shortened in acute myocardial infarction, whereas the pre-ejection period and its components, the Q-S sub 1 and isovolumic contraction time intervals, were prolonged. The most abnormal measurements were observed in patients with transmural infarction. Patients with nontransmural infarction demonstrated less severe abnormalities of the systolic ejection times, and the patients without infarction were the least affected. Some of the greatest deviations in the measured intervals were observed in the transmural infarction patients who died. Indirect measurement of left ventricular systolic ejection time is a valuable adjunct in the bedside assessment of left ventricular performance and provides a prognostic index for patients with acute myocardial infarction. (Author)

**A70-43947** Prediction of coronary heart disease based on clinical suspicion, age, total cholesterol, and triglyceride. Irvine H. Page, J. N. Berrettoni, Antanas Butkus, and F. Mason Sones, Jr. (Cleveland Clinic Foundation, Cleveland, Ohio). *Circulation*, vol. 42, Oct. 1970, p. 625-645. NIH Grant No. HE-6835.

Study of the relationship between coronary heart disease (CHD), age, total cholesterol (TC), and total triglycerides (TG) in male humans. The results obtained, based on the definition of coronary heart disease by cinearteriography, show that definite relationships exist among incidence of CHD, age, TC, and total triglycerides, with less definite ones between free cholesterol and phospholipids for a specific group of 450 male patients referred because of suspected coronary heart disease. Equations and graphs of the association of incidence of CHD with these conditions are presented. The relationships were strong enough to be of aid in discriminating CHD from normal, the most useful being age, TC, and TG. Incidence determinations were presented in terms of total incidence and incidence associated with the variable itself. Coronary angiography demonstrated 350 CHD and 100 normals or a ratio of 3.5 to 1. This ratio is a reflection of the high accuracy with which physicians suspect CHD. M.M.

**A70-43948** Cinecoronary arteriography in young men. C. Charles Welch, William L. Proudfit, F. Mason Sones, Jr., Earl K. Shirey, William C. Sheldon, and Mehdi Razavi (Cleveland Clinic Foundation, Cleveland, Ohio). *Circulation*, vol. 42, Oct. 1970, p. 647-652. 7 refs.

Investigation of the extent and location of coronary artery narrowing, correlations of clinical symptoms with arterial lesions, influence of serum cholesterol levels, and the relationship of duration of symptoms to the severity of arterial involvement in humans. Of a group of 723 men less than 40 years old who underwent cine-coronary arteriography primarily for evaluation of chest pain, 357 (49%) were found to have at least 50% narrowing of one or more coronary arteries. The youngest person was 17 years old. The distribution of lesions in young men was similar to that found earlier in a study of persons not selected by age. The anterior descending coronary artery was most frequently affected; the right coronary artery was most often totally occluded. No total occlusions of the left main coronary artery were seen. Electrocardiographic evidence of myocardial infarction, found in 109 patients, was less common with disease of the circumflex or right coronary arteries than with disease of the anterior descending coronary artery. This observation was confirmed by examination of left ventriculograms for areas of decreased contractility. Six patients had no significant arterial narrowing. The extent of arterial involvement seemed to be related to the duration of symptoms in patients who had angina pectoris or myocardial infarctions. M.M.

**A70-43952 #** Graphical link between the operator and a digital computer during automatic design in electronics (Graficheskaia sviaz' operatora s ETsVM pri avtomaticheskome proektirovani v elektronike). V. P. Sigorskii, A. I. Petrenko, S. V. Denbnovetskii, and O. F. Tsurin. *Radioelektronika*, vol. 13, June 1970, p. 686-692. 7 refs. In Russian.

Investigation of problems associated with the organization of a graphical link between a human operator and a digital computer with the aid of a CRT display and a light-pen input system. The block diagram of such a system used in electronic circuit design applications is explained to demonstrate the various functions involved and the equipment utilized. The keyboard set required for feeding electronic circuit data into the computer is examined, and technical specifications are given for a representative computer system. The procedures which must be followed by the operator during design are outlined. T.M.

**A70-43965** Distance judgments in space. Kiyoe Mizusawa (Pennsylvania State University, Erie, Pa.). *SPIE Journal*, vol. 8, Aug-Sept. 1970, p. 237-239. 10 refs.

Discussion of the optimum conditions of stereoptics in relation to man's capabilities of distance judgment. One of the visual problems encountered during space missions is the limitation of the human ability to accurately judge distance, due to lack of visual-cue stimuli in space. A series of experiments was performed in order to determine whether significant enhancement of human judgment of distance could be obtained by combining the effect of stereoptics with that of the apparent movement phenomenon. The results of these experiments tend to suggest that, by using stereoptical instrumentation in combination with the apparent movement phenomenon, a better judgment of distance may be obtained than by using the stereoptical effect alone. M.V.E.

**A70-44222** Man, a cybernetic being (Der Mensch, ein kybernetisches Wesen). Wolf D. Keidel (Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Naturwissenschaftliche Rundschau*, vol. 23, Oct. 1970, p. 401-409. In German.

Discussion of the biocybernetic aspects of the human central nervous system. The principles underlying the design of modern electronic computers are reviewed and their possible analogy to the functions of the human brain is examined. Energy transformation, information processing, and the highest qualitative, conscious processes in the human brain are analyzed, showing that a direct analogy is only partly possible. O.H.

**A70-44223** Medical problems in the present-day air transport (Ärztliche Probleme im heutigen Luftverkehr). Hans-Werner Kirchhoff (Bundesministerium der Verteidigung, Flugmedizinisches

Institut, Fürstenfeldbruck; München, Universität, Munich, West Germany) and Johannes Dietrich Meyer-Erkelenz (Bundesministerium der Verteidigung, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Naturwissenschaftliche Rundschau*, vol. 23, Oct. 1970, p. 410-417. In German.

Discussion of several major physiological and medical problems encountered in passengers on modern subsonic and supersonic aircraft. The various aspects of the effects of modern air transport on the physical condition of small children, old people and, in particular, persons suffering from a variety of diseases are examined in detail. In conclusion, some suggestions are presented concerning aircraft design to improve the passengers' comfort. O.H.

**A70-44224**      **Anomalous water (Anomales Wasser).** Hans-Ludwig Krauss (München, Technische Hochschule, Munich, West Germany). *Naturwissenschaftliche Rundschau*, vol. 23, Oct. 1970, p. 417-420. 24 refs. In German.

Discussion of the present state of knowledge of anomalous water, referred to as polywater. Following a brief historical review of the discovery of this substance, methods of its preparation are described. Finally, an analysis of this substance is presented and its anomalous properties are examined. O.H.

**A70-44225**      **Physiological death (Der physiologische Tod).** Werner Ries (Leipzig, Universität, Leipzig, East Germany). *Naturwissenschaftliche Rundschau*, vol. 23, Oct. 1970, p. 426-429. 24 refs. In German.

Discussion of the problem of physiological death in the light of various hypotheses, theories, and facts. The problem of death as a biological problem is considered in various living organisms. The nature of physiological death is defined and its causes are examined. The various conflicting theories and observations of the possibility of occurrence of death having a purely physiological character are reviewed and discussed. O.H.

**A70-44311 #**      **Effect of stimulators of different modalities on impulse activity of hippocamp neurons (Vpliv podraznikiv riznikh modal'nostei na impul'snu aktivnist' neuroniv gipokampa).** D. P. Artemenko and V. M. Shaban (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 465-472. 24 refs. In Ukrainian.

In experiments with narcotized rabbits, made motionless by tubocurarine, the effect was studied of peripheral stimulations of different modality (stimulations of ischiatic nerve with electrical current, taxil, optical and auditory) on impulse activity of neurons in the CA sub 1 and CA sub 2 fields of hippocamp dorsal division area. Peripheral stimulators in most cases evoked long inhibition of spike activity of neurons and only in a negligible minority - their activation. Independently of the type of the reaction, all the investigated neurons proved to be polymodal with respect to the applied stimulators. The reactions of most neurons were extremely long - only a small group of neurons responded to peripheral stimulation by short-term excitation. Latent periods of the response of most neurons were small and similar to the latent periods of separate phases of the hippocamp evoked potential in response to the same peripheral stimulations. There were also neurons the latent period of which exceeded 60 msec. (Author)

**A70-44312 #**      **Impulse activity of sinus and diaphragmatic nerves during asphyxia (Impul'sna aktivnist' sinusnogo i diafragmal'nogo nerviv pri asfiksii).** A. S. Drach (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 473-479. 28 refs. In Ukrainian.

Experimental study of the changes in the impulse activity of sinus and diaphragmatic nerves during different stages of development of acute hypoxia. The impulse activity at different stages of hypoxia served as an indication of the state of afferent and efferent links of the respiratory reflex governed by the gas composition of arterial blood in cells of the carotid body. Tests involved tracheot-

omy with nembutal on 25 cats. Oscillograms of the impulse activity of the sinus and diaphragmatic nerves are given for normal respiration and for different stages of hypoxia. The results show clearly evident electrophysiological changes which reflect different disturbed functions of external respiration. T.M.

**A70-44313 #**      **Influence of laser radiation on the electrical parameters of live tissue (Vpliv viprominiuvannia optichnogo kvantovogo generatora na elektrichni parametri zhivoi tkanini).** Iu. M. Volkov, E. P. Sidorik, and M. I. Danko (Kiiv's'kii Derzhavnyi Universitet; Kiiv's'kii Institut Eksperimental'noi i Klinichnoi Onkologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 480-483. 12 refs. In Ukrainian.

Investigation of the electrical parameters of skin tissue at different times after exposure to laser radiation, in conjunction with simultaneous histomorphological studies. The largest changes in the electrical parameters were observed one day after laser irradiation. Skin resistivity, dielectric constant, and impedance gradually recovered their original values with passing time, and after two weeks did not differ from normal. Histomorphological studies show the deepest damage in the zone of irradiation, indicating coagulative necrosis. A relationship is established between changes in the skin electrical parameters and its degree of damage after irradiation. T.M.

**A70-44314 #**      **Effect of sublethal and lethal radiation doses on extracellular and intracellular distribution of sodium and potassium in the brain, liver, kidneys and muscular tissue of rats (Vpliv subletal'nikh ta letal'nikh doz opromeniennia na pozaklitinnii ta vnutriklitinnii rozpodil natriiu i kaliuu v mozku, pechintsi, nirkakh ta m'iazovii tkanini shchuriv).** E. F. Shamrai and V. I. Sokolova (Kiiv's'kii Medichnii Institut, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 513-518. 14 refs. In Ukrainian.

With a sublethal radiation dose (600 R) the total content of sodium in the brain and muscular tissues somewhat decreased; with a lethal radiation dose (900 R) the total content of sodium vice versa sharply increased on the 9th, 11th and 13th days after radiation. With 600 R dose influence on organism the total extra- and intracellular content of potassium in the investigated tissues did not change. With an increase of the dose up to 900 R essential shifts took place in extracellular and intracellular content of potassium. Essential changes were observed in the distribution of sodium ions between the cell and environment. (Author)

**A70-44315 #**      **Investigation of oxidative phosphorylation processes during circulatory hypoxia in liver and brain tissues of white rats (Doslidzhennia protsesiv oksliuvannia fosforiluvannia pri tsirkuliatornii gipoksii v tkaninakh pechinki ta mozku bilikh shchuriv).** A. I. Nazarenko (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 519-522. 5 refs. In Ukrainian.

Investigation of oxygen intake and oxidative phosphorylation in mitochondria of the liver and brain, subjected to acute ischemia caused by ligation of blood vessels and by lethal bloodletting resulting in clinical death. Tests were performed on albino rats. Results show that acute circulatory hypoxia of the liver and brain causes a severe reduction of oxygen intake and oxidative phosphorylation in the mitochondria of these organs. During bloodletting, the oxidation and phosphorylation of the brain and liver mitochondria remain within normal limits. For the first 10 to 15 min after clinical death, both oxidation and phosphorylation remain at a high level, decreasing significantly within 25 to 30 min. T.M.

**A70-44316 #**      **Oxidative phosphorylation in the liver of albino rats after the influence of hyperoxia (Oksine fosforiluvannia u pechintsi bilikh shchuriv pistia vplivu giperoksii).** V. V. Matsinin (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 523-528. 32 refs. In Ukrainian.

Investigation of the influence of hyperoxia (4 atm abs for 15

min and 5 atm abs for 60 min) on respiration and phosphorylation in mitochondria preparations and tissue homogenates from albino rat liver. A decrease in oxygen consumption by the liver mitochondria was observed in the 4-atm tests. The 5-atm tests showed increased oxygen consumption in a preparation without phosphate acceptors and reduced respiratory control in mitochondria preparations and homogenates. T.M.

**A70-44317 #** Semiconductor thermometer for measuring skin temperature differences (Napivprovidnikovii termometr dlia vimiruvannia riznitsi shkirmoi temperaturi). O. N. Lebed' and E. G. Petrov (Voroshilovgradsk'ii Medichnii Institut, Voroshilovgrad, USSR). *Fiziologichnii Zhurnal*, vol. 16, July-Aug. 1970, p. 559-561. 9 refs. In Ukrainian.

Description of a device for measuring skin temperature differences using a balanced four-arm resistance bridge network and a dc amplifier based on four transistors. A 200-microampere ammeter with temperature calibrated scales serves as the indicator. Two thermistors in the bridge network are used as the sensor elements. The thermometer measures skin temperature differences in ranges of 0 to 2 C and 0 to 10 C. T.M.

**A70-44376** Acceleration profile for minimum injury. Robert F. Deery (Lewis and Clark College, Portland, Ore.) and David D. McNeilis (TRW Systems Group, Redondo Beach, Calif.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Oct. 1970, p. 292-295.

Description of the existence, uniqueness, and form of an acceleration profile which provides a minimum severity index in the injuries sustained by a human subject. The profile is shown to produce a severity level 87% of that associated with a constant acceleration level. The form of this optimum profile is shown to be relatively insensitive to variations in the medical data used to develop the severity level. This result provides analytical support for work in areas where the medical data base is very limited. M.M.

**A70-44377 \*** Real-time contourography - An improved electrocardiographic display. Donald P. Golden, Jr., Donald G. Mauldin, and Roger A. Wolthuis (Technology, Inc., Houston, Tex.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Oct. 1970, p. 296-302. Contract No. NAS 9-7675.

An extension of the contourography concept forms the basis for a new electrocardiographic (EKG) display system. The EKG is displayed in real time on the face of a variable-persistence cathode-ray tube (CRT) in a contourographic format. This particular presentation emphasizes significant changes in the EKG from its established cyclic pattern. The continuous real-time contourogram facilitates on-line comparison of waveforms of successive EKG cycles, and allows instantaneous heart rate to be determined directly from a scale on the CRT face on a beat-by-beat basis. The simple controls and the straightforward nature of the display permit the real-time contourogram to be effectively monitored by qualified personnel without extensive training. Solid-state construction of the contourograph lends component stability, low cost, and high reliability to the entire system. (Author)

**A70-44378** An application of signal processing techniques to the study of myoelectric signals. Eugene Kwatny, Donald H. Thomas, and Harry G. Kwatny (Drexel Institute of Technology, Philadelphia, Pa.). (*Institute of Electrical and Electronics Engineers, Annual Conference on Engineering in Medicine and Biology, 21st, Houston, Tex., Nov. 17-21, 1968.*) *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Oct. 1970, p. 303-313. 23 refs. Research supported by Temple University; NIH Grant No. FR-15.

Description of the use of power spectral density and cumulative power functions in the examination of the electromyogram (EMG). The EMG signals were obtained with surface electrodes from two muscles, the flexor pollicis brevis and the extensor digitorum, in four subjects. Each muscle was studied at two levels of contraction, both

before and during fatigue. The power spectral density functions are compared, using a cumulative power difference function and the mean frequency of the spectrum, to determine differences between loading conditions in an individual muscle, before and during fatigue, between different muscles, between individuals, and combinations of these conditions. The difference in cumulative power of the EMG signals produced under various experimental conditions is shown to illustrate clearly the emphasis of particular frequency bands as the experimental conditions change. Muscular fatigue is shown to shift most of the energy in the signal to a lower frequency band. The effect of fatigue on the average power of the myoelectric signal is discussed. M.M.

**A70-44379** Automatic detection of the K-complex in sleep electroencephalograms. Gordon Bremer (Honeywell, Inc., Communication Development Center, St. Petersburg, Fla.), Jack R. Smith, and Ismet Karacan (Florida, University, Gainesville, Fla.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Oct. 1970, p. 314-323. 14 refs. Research supported by the Veteran's Administration Hospital; NIH Grants No. MH-16960; No. MH-15508.

The development and application of an electronic system which is capable of automatically detecting the K-complexes, aperiodic waveforms found in sleep electroencephalograms, is described. The system can be used either on- or off-line. From research into the electrical characteristics of the K-complex and other waveforms which constitute the sleep electroencephalogram, a mathematical description of the K-complex is developed, which then serves as a foundation for development of a detection system. This detection scheme automates the visual pattern recognition techniques that are used by human scorers, resulting in a much faster and more objective detection procedure. The system was developed only after careful consideration of the more popular classical techniques showed them to be inadequate. Finally, the developed system is compared to human scoring as to detection reliability. (Author)

**A70-44380** A multichannel telemetry system for use in exercise physiology. H. Richard Skutt, Roger B. Fell, and Robert Kertzer (New Hampshire, University, Durham, N.H.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Oct. 1970, p. 339-348. 16 refs.

A four-channel frequency-modulation radio-telemetry system for the measurement of two electrocardiograms (EKGs), respiration rate, and pulmonary ventilation of human subjects during vigorous exercise is described. From the measurement of pulmonary ventilation, the oxygen uptake (and thus energy expenditure) was predicted. This is the first time (to the author's knowledge) that oxygen consumption has been predicted by telemetry of pulmonary ventilation for such sports as squash, handball, and track. The transmitter uses pulse-duration modulation. It has a range of approximately 100 meters, which may be extended by using a whip antenna. Linearity of the system is 2 per cent or better from a best straight line, and baseline drift is less than 1 per cent at 25 C. The telemetry transmitter weighs approximately 100 grams and is contained in two boxes measuring 5 by 5 by 1.25 cm. Construction of this system is considerably simplified through extensive use of integrated circuits. A complete transmitter costs about \$50 (for components only) and dissipates approximately 60 mW. The batteries used provide a continuous life of 125 hours. The system has been used to obtain data from persons participating in squash, handball, track, and tennis. It may be used for many other physical activities. (Author)

**A70-44381 \*** A digital recording system for body temperature telemetry from small animals. Donald L. Homquest (NASA, Manned Spacecraft Center, Houston, Tex.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Oct. 1970, p. 356, 357.

A relatively simple instrumentation system is described which samples and records the body temperatures from up to twelve experimental animals over long periods of time. Body temperatures are sensed by temperature-sensitive FM transmitters implanted in the

peritoneal cavities. The emitted signals are received by antennas, amplified, and sequentially gated into a frequency counter for counting; the resulting digital numbers are recorded in binary-coded decimal (BCD) format on punched paper tape. Samples can be spaced at intervals of from 1 to 60 minutes, and sampling can be continued over long periods of many months. This system eliminates the need for analog-to-digital conversion and allows rapid and direct transmission of the raw data to the digital computer for processing and analysis. (Author)

**A70-44398 \*** Viruses respond to environmental exposure. Bailus Walker, Jr. (Ohio State, Dept. of Public Health, Cleveland, Ohio). *Journal of Environmental Health*, vol. 32, Apr. 1970. 20 p. 47 refs. Grant No. NGR-24-005-063.

Review of some recent developments and findings of research on environmental microbiology as related to planetary quarantine. Particular attention is devoted to the natural environment with emphasis on temperature, humidity, light, and conditions in extraterrestrial environments. The physical, chemical and morphological characteristics of viruses are discussed, together with the theoretical rationale underlying virus stability and some aspects of virus disease transmission in the inanimate environment. It is pointed out that the theoretical basis for the influences exerted by response to the physical environment by cell-free virus seems, on cursory inspection, rather simple. A particular environmental stress may act directly on the viral agent by influencing its dissemination either by affecting the mechanism of transmission or by determining the frequency or duration of exposure. However, it has become progressively more evident that the role of environmental factors in the survival of viruses and also in determining disease occurrence is not only very extensive but understood only in rather superficial ways as, for example, in relation to viral spread. M.M.

**A70-44453** Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. Van Nuys, Calif., Survival and Flight Equipment Association, 1970. 343 p. \$10.00.

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Houston, Tex.), p. 171-197. (See A70-44461 23-05)

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A statewide civilian helicopter ambulance system. Results of the first year of operation in Arizona. J. L. Schamadon (Samaritan Health Service, Phoenix, Ariz.), p. 251-254.

Helicopter automatic approach and hover coupler systems. L. Cotton and R. Mills (United Aircraft Corp., Stratford, Conn.), p. 255-278. (See A70-44464 23-02)

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Industry's role in the safe exploration of the deep ocean environment. H. J. Smith, Jr. (Lockheed Missiles and Space Co., Sunnyvale, Calif.), p. 289-293.

Commercial and military aircraft emergency egress systems. J. D. Caldara and F. B. Pollard (Aircraft and Missile Consultants, Manhattan Beach, Calif.), p. 295-333. 14 refs. (See A70-44466 23-02)

Training simulation to improve go/no go ejection decisions. W. F. Cunningham, E. V. Rice, F. A. Radcliffe, and H. W. Purefoy (U.S. Naval Safety Center, Norfolk, Va.), p. 335-339. 5 refs. (See A70-44467 23-11)

**A70-44454** The USAF School of Aerospace Medicine's approach to training the medical investigator of aircraft accidents. Hugh F. Mulligan (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. (A70-44453 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 1-6.

Discussion of a new concept in the training of medical investigators of aircraft accidents taking into account the program presented in the Aerospace Medicine Primary Course. The objectives of the new approach to training are discussed. The flight surgeon investigator is to be taught that he is the chief of a team of life support specialists. The objectives of the new approach are implemented by classroom instruction combined with exercises involving the practical application of classroom material. G.R.

**A70-44458 \*** Manned testing in the simulated space environment. Aleck C. Bond (NASA, Manned Spacecraft Center, Houston, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. (A70-44453 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 89-141. 9 refs.

Discussion of the man-rated chamber facilities at the Manned Spacecraft Center (MSC) and the basic safety requirements and criteria that have been developed during the past few years. Manned testing safety requirements are examined and safety reviews and surveys are discussed. The design of man-rated environmental test chambers is considered, and significant test results from integrated-systems tests are presented. G.R.

**A70-44459 #** An optimal hierarchy of colors for markers and signals. Robert L. Hilgendorf (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. (A70-44453 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 143-155. 6 refs.

Search for a hierarchy of optimal colors for pyrotechnic markers and signals taking into consideration tests in which 8 colors were evaluated. The colors were evaluated against a Southeast Asia terrain model background. On the basis of the data obtained it is concluded

that any hierarchy of signal colors should have red, violet, and amber hues at the top. G.R.

**A70-44461 \*** Development of nonmetallic materials for space applications. R. E. Smylie and E. L. Hays (NASA, Manned Spacecraft Center, Houston, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. (A70-44453 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 171-197.

Discussion of nonmetallic materials with improved flame-resistant properties developed by NASA and its industrial associates. Fibrous, cellulosic, elastomeric, and plastic materials have been developed. These basic materials have been used to produce fire-resistant fabrics, films, paper products, thermal and various electrical insulations, and other electrical accessories. These materials, either alone or in combination, also can be used to cover or coat flammable materials or substrates to render them fire resistant. In addition, they can be used to protect (by thermally insulating) or to contain flammable materials. Furthermore, use of these materials in original designs will result in nonflammable hardware items. G.R.

**A70-44462 \*** Nonmetallic-material selection criteria, test requirements, test techniques and data, and configuration control as applied to manned spacecraft. William M. Bland, Jr. (NASA, Manned Spacecraft Center, Houston, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. (A70-44453 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 199-245.

The selection criteria and the test requirements applied to nonmetallic materials used in manned spacecraft to eliminate or to minimize the flammability hazard are described. Particular emphasis is placed on the new concept of material-usage categories, based on the location, the amount, and the application of nonmetallic materials in addition to their flame-resistance properties. Some of the more significant test techniques generated to implement the test requirements and the methods for collecting and disseminating the test data are described. In addition, the technical management system for controlling the specific configuration of nonmetallic materials used in and around the Apollo spacecraft is discussed.

(Author)

**A70-44463** Highlights of the survival training program for physicians in the Aerospace Medicine Primary Course at the USAF School of Aerospace Medicine. Eugene F. Hames (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 1. (A70-44453 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 247-250.

Discussion of a course for physicians in the U.S. Air Force which is to prepare them for the role as advisors to their respective commanders as regards survival equipment and survival medicine. There are 14 hours of survival training presented, to include 6 hours of survival techniques and stresses, 4 hours of survival equipment demonstration and practicum, and a wet ditching exercise. A two hour classroom lecture is presented to the students with particular emphasis on where to obtain additional information on survival and survival medicine not readily available in Air Force manuals. G.R.

**A70-44479** Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 2. Van Nuys, Calif., Survival and Flight Equipment Association, 1970. 347 p. \$10.00.

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An engineering treatment of continuous-flow requirements in aircraft passenger oxygen systems using the phased dilution principle. J. Whitla (Lockheed-California Co., Burbank, Calif.), p. 369-397. (See A70-44483 23-02)

The space shuttle also needs 'SAFE.' H. G. Nulton, Jr. (General Dynamics Corp., San Diego, Calif.), p. 399-410. (See A70-44484 23-31)

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Status of deep diving within the Navy. R. D. L. Jones (U.S. Navy, Diving Systems Div., San Diego, Calif.), p. 431-454.

Passenger emergency evacuation briefing cards - Recommendations for presentation style. (A summary report). H. B. Altman (Douglas Aircraft Co., Long Beach, Calif.), p. 455-474. 12 refs. (See A70-44486 23-02)

Emergency life-saving instant exits for transport aircraft. B. Chesterfield (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio) and F. B. Burkdoll (Engineering - Explosive Technology, Inc., Fairfield, Calif.), p. 475-488. (See A70-44487 23-02)

The advances of testing and promulgation of information of safety, survival and life support equipment. C. F. Robb and A. M. Irving (Dayton T. Brown, Inc., New York, N.Y.), p. 489-491. (See A70-44488 23-02)

U.S. Air Force exploratory development in impact injury prediction and protection. C. J. Weinberg (USAF, Aerospace Medical Div., Brooks AFB, Tex.), p. 493-512. 13 refs. (See A70-44489 23-05)

Application of photochromic dyes for nondestructive testing. S. Allinikov and A. Olevitch (USAF, Materials Laboratory, Wright-Patterson AFB, Ohio), p. 513-528. (See A70-44490 23-14)

The F-111 crew escape module. J. L. Charleville (McDonnell Aircraft Co., St. Louis, Mo.), p. 529-537. (See A70-44491 23-02)

Prediction of escape survivability. J. L. Charleville (McDonnell Aircraft Co., St. Louis, Mo.), p. 539-542. (See A70-44492 23-02)

The need for better safety standards, criteria, and requirements. G. B. Mumma and T. J. Lebel (Martin Marietta Corp., Denver, Colo.), p. 543-551. (See A70-44493 23-05)

Development of a family of flares to aid in search and rescue operations. R. M. Miller and D. L. Cochran (MB Associates, San Ramon, Calif.), p. 553-573. (See A70-44494 23-03)

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The will to live. W. W. Spruance (U.S. National Guard, Dover, Del.), p. 599-606. (See A70-44497 23-05)

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Design achievements with the S11S-3 ejection seat escape system. W. R. Peck and R. J. Manzuk (Stencel Aero Engineering Corp., Asheville, N.C.), p. 621-662. (See A70-44499 23-03)

Men under stress. S. R. Elek, p. 663.

The Ben Franklin Gulf Stream drift mission space craft analog. W. K. Muench (Grumman Aerospace Corp., Bethpage, N.Y.), p. 665.

Fire fighter protective clothing concepts and configurations. J. P. Meade (USAF, Directorate of Aerospace Safety, Norton AFB, Calif.), p. 667.

The double lift - An improved approach to personnel rescue. D. P. Hansen (U.S. Naval Safety Center, Norfolk, Va.), p. 669.

Combat use of life support system in Southeast Asia 1 Jan 1967

- 30 June 1970. A. N. Till, Jr. and R. H. Shannon (USAF, Directorate of Aerospace Safety, Norton AFB, Calif.), p. 671.

Undersea navigation. H. H. Hemming (Westinghouse Electric Corp., San Diego, Calif.), p. 673.

Target and terrain contrast effects on air search and rescue observer performance. F. D. Fowler and D. B. Jones (Martin Marietta Corp., Orlando, Fla.), p. 675.

'KYNOL' fibers for flame protection. L. C. Wohrer, J. Economy, and E. J. Frechette (Carborundum Co., Niagara Falls, N.Y.), p. 677.

**A70-44480** Evaluation of an improved flotation device for infants and small children. Ernest B. McFadden and Joseph W. Young (FAA, Aeronautical Center, Oklahoma City, Okla.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 29-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 341-348. 6 refs.

Study of a flotation device concept for infants and small children incorporating life support and survival capabilities. In addition to its application to aviation safety, the device is of potential value for boating and other forms of marine transportation. With certain modifications, it can be adapted for usage by larger children and adults. The device provides in excess of 46 lb of buoyancy and demonstrates excellent self-righting and stability. Ventilation is accomplished by motion of the device in water and/or flow of air across a snorkel device. Protection from the effects of immersion in cold water is provided by unicellular neoprene foam which limits the heat loss of that portion of the body submerged.

G.R.

**A70-44481** Nonflammable textile materials for AF applications. Robert M. Stanton, Stanley Schulman, and Jack H. Ross (USAF, Nonmetallic Materials Div., Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 29-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 349-355.

Discussion of nonflammable fibrous materials which are to prevent injury and loss of personnel in fires caused by aircraft accidents. Tests for evaluating such materials are discussed taking into consideration flame propagation studies and flame impingement on the fabric surface. Thermal insulation qualities of materials are discussed, and a test procedure that simulates a fire hazard is considered.

G.R.

**A70-44489** U. S. Air Force exploratory development in impact injury prediction and protection. Carl J. Weinberg (USAF, Aerospace Medical Div., Brooks AFB, Tex.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 29-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 493-512. 13 refs.

Review of impact research and development in the U.S. Air Force taking into consideration work connected with injury prediction during emergency ejection and protection from crash impact. The role of the aerospace medical division is examined and the development of injury prediction models is discussed. Investigations concerned with the development of escape system design criteria are considered. Studies regarding the biomechanics of the vertebral column and the internal organ response are reported, and support and restraint systems for horizontal impact are discussed.

G.R.

**A70-44493** The need for better safety standards, criteria, and requirements. George B. Mumma and Thomas J. Lebel (Martin Marietta Corp., Denver, Colo.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 29-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 543-551.

This paper discusses the many forms of safety information, informational sources, and what can be done to present the information to designers in usable form. At the present time, safety information is received by the user in a myriad of forms from accident report summaries to voluminous reports or textbooks. For the designer, who is constrained by schedules and costs, to peruse all this information is out of the question. Therefore, the data must be condensed into usable criteria and standards that are readily available. The paper presents an approach to accomplishing the tasks for developing such standards and criteria.

(Author)

**A70-44495** The business of survival - A challenge to SAFE. James M. Chenoweth (Survival Systems, Inc., Ontario, Calif.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 575-591.

Formulation of a series of questions about civilian survival kits. Survival is confined to those postemergency situations where individuals or groups find themselves on their own in a strange and possibly hostile environment. Survival kits are defined, the persons who should carry them are listed, and the reasons why they are so seldom carried are explored. A list of items found in one or more of 34 survival kits surveyed is tabulated. Suggestions are made for improving the current state of the general public's survival and flight equipment.

M.M.

**A70-44497** The will to live. William W. Spruance (U.S. National Guard, Dover, Del.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 599-606.

Description of the details of a general's near-fatal crash in a T-33 aircraft. Mistakes that, if prevented, could have diminished the seriousness of the injuries sustained are pointed out, and precautionary measures are suggested in order to prevent injuries from assuming devastating proportions in case of crashes followed by fire.

M.M.

**A70-44498** Aids to investigation of over-water accidents. Joseph H. Lyon (Dukane Corp., St. Charles, Ill.). In: Survival and Flight Equipment Association, Annual Symposium, 8th, Las Vegas, Nev., September 28-October 1, 1970, Proceedings. Volume 2. (A70-44479 23-05) Van Nuys, Calif., Survival and Flight Equipment Association, 1970, p. 607-620. 5 refs.

Discussion of the general scope of the problem of investigating over-water accidents in order to bring about greater survival in future over- and underwater travel. A list of requirements for the optimum locating system is presented, and the various systems within the parameters of these requirements are evaluated. The most satisfactory recovery system and its use in combination with other systems are briefly discussed.

M.M.

**A70-44546 \* #** Pilot assessment aspects of simulation. George E. Cooper and Fred J. Drinkwater, III (NASA, Ames Research Center, Moffett Field, Calif.). *NATO, AGARD, Flight Mechanics Panel Symposium, Moffett Field, Calif., Mar. 10-13, 1970, Paper. 7 p.*

Discussion of some of the problems involved in pilot assessment aspects of simulation. Special attention is given to the important function of examining critical questions raised by pilots so that they can be discussed with the aim of developing solutions and improving understanding. Some answers are proposed that may in themselves be controversial and stimulate further discussion. One major difficulty consists in that there are no simple black and white answers for many of the problems, and continuing communication between pilots and engineers is essential. Common pilot gripes and complaints arising from simulation experiences are reviewed, in order to bring out the pilot's viewpoint. A selected number of questions and problems believed to focus attention on areas of maximum interest and

concern are discussed. First, the apparent primary concern of pilots participating in simulation work is considered, and next the questions related to the pilot's actual participation in the planning and conduct of experiments are examined, along with the simulation situation, in terms of the facility being used, and the analysis and reporting of results. M.V.E.

**A70-44617 \* # Tissue repair and replacement in weightlessness.** D. D. Feller, K. S. Talarico, E. D. Neville (NASA, Ames Research Center, Moffett Field, Calif.), K. Weinbren, and P. Johns (Nottingham University, Nottingham, England). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 5 p.

Investigation of the occurrence of metabolic and/or genetic alteration in the growth of mammalian tissues, such as liver, under conditions of weightlessness. In rats centrifuged after partial hepatectomy, it was found that liver regeneration is delayed, and that the delay is proportional to the intensity of the centrifugation. This experiment served as the essential preliminary investigation leading to a forthcoming space flight experiment. M.V.E.

**A70-44622 # Crew sustenance for long-term space flight.** Bert Cooper (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 25 p.

Description of some of the critical task areas associated with providing a habitable environment for long-term space flight. Specific emphasis is laid on food management, station housekeeping, and personal hygiene. It is shown that the elements of habitability relate to each other in that the input and/or output of one operational element impacts on another. The food system not only sustains the crew, but contributes to the problem of waste handling by the amount of trash, debris, and refuse generated. The design of a waste control system is dependent on the type of wastes to be handled from crew, systems, laboratories, or experiments. It is pointed out that it is the responsibility of the life scientist to consider habitability as a total package, and generate integrated requirements that are in consonance with the overall task of habitability support and crew sustenance. M.M.

**A70-44625 \* # Prevention of reflex vestibular disturbances and motion sickness by natural means and by drugs.** Ashton Graybiel (U.S. Navy, Naval Aerospace Research Laboratory, Pensacola, Fla.). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 41 p. 14 refs. NASA-supported research.

Description of early guidelines for the prevention of vestibular side effects on space missions involving the generation of artificial gravity. A conceptual framework underlying the vestibular problem as a whole is presented prior to discrete experimental findings. Three major categories of stimulus response relations are examined, and recovery characteristics are outlined. Problems arising in the prediction of susceptibility to vestibular side effects in the novel conditions of a rotating space base are evaluated. Attention is given to the use of a slow rotation room, adaptive capacity tests, dial tests, and parabolic flights. Techniques for prevention of vestibular side effects are analyzed in terms of incremental adaptation tests and antimotion sickness drugs. The selection of astronauts and detection of vestibular side effects are considered in phases of transition into weightlessness, transition into a rotating environment, and sudden transitions between rotation and weightlessness. T.M.

**A70-44630 # Further theoretical and experimental contributions on the degree of acceleration dependencies of the organisms using O-G-simulation and hyper-G.** W. Briegleb, A. Schatz, and G. Teuchert (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 18 p. 18 refs. Ministerium für Bildung und Wissenschaft

Contract No. WRK 35.

Study of the reactions of organisms in zero gravity and under combined forces, using the method developed by Müller. The experiments were made with *Rana temporaria* eggs. It is shown that the eggs furrowed and developed to regular larvae under 560 g. Eggs stratified by centrifugation rearranged their substances in the same way under normal conditions as under zero-g simulation. These results are similar to those obtained for plant cells subjected to acceleration. Z.W.

**A70-44632 \* # Future manned tests using regenerative life support systems.** J. N. Pecoraro (NASA, Office of Advanced Research and Technology, Washington, D.C.) and J. K. Jackson (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 24 p. 9 refs. Research supported by the McDonnell Douglas Independent Research and Development Funds; Contracts No. NASw-1612; No. NAS 1-8997. (MDAC-WD-1359)

Discussion of integrated life support manned tests designed to provide a technology baseline for future space laboratory design and development. It is shown that manned system tests under operational conditions provide system engineers with the necessary data on interactions between equipment elements and man to design integrated regenerable systems with a high level of confidence in success. In many instances, where units operate satisfactorily in laboratory bench tests, operation as an integrated system with all the attendant interface matching problems and realistic input/output conditions emphasizes weaknesses which appear as lower performance or outright failure. Determination of human ability to operate and maintain the equipment, man's requirement for support, and the actual loads he imposes on the various subsystems are also valuable results of such tests. M.V.E.

**A70-44651 # Some results of the flight of space vehicle 'Soyuz-9' (Einige Ergebnisse des Fluges des Raumschiffes 'Sojus-9').** Andrei Nikolaev. *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 8 p. In German.

Discussion of the flight of the space vehicle 'Soyuz-9' which had a duration of 18 days and was undertaken in connection with the program for solving problems of manned orbital space stations. One objective of the flight was the investigation of changes regarding the astronauts and their ability to perform work upon long term exposure to conditions of weightlessness. It was found that the human organism adapts itself to space conditions within a certain time. This time varies individually from a few hours to several days. However, difficulties in a readaptation to normal gravity after the flight are reported, and the preparation of special measures for solving this problem in case of flights of a duration of several months are recommended including a provision of artificial gravity for interplanetary flights. A number of scientific tests conducted by the astronauts during the flight are discussed. G.R.

**A70-44654 # Special features of heat transfer in humans under conditions of low barometric pressure in the presence of a sufficient oxygen supply (Osobenosti teploobmena u cheloveka v usloviakh ponizhennogo barometricheskogo davleniia pri dostatochnom kislorodnom obespechenii).** E. M. Kuz'micheva and A. D. Logunov. *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper.* 12 p. 5 refs. In Russian.

Study of the heat balance in human subjects under normal and reduced atmospheric pressure. A comparison is made between body heat production and heat transfer through convection, radiation, and evaporation. The results of the experiments performed show the extent of decreasing convection heat loss and increasing heat transfer through evaporation in humans in a rarefied atmosphere (0.42 and 0.27 kg/sq cm) and at an air temperature of 25 C. A.B.K.



**A70-44655 #** Regeneration of a space cabin atmosphere with the aid of unicellular algae (Regeneratsiia atmosfery kabin kosmicheskikh korablei s ispol'zovaniem odnokletochnykh vodoroslei). G. I. Meleshko. *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper. 10 p. 9 refs.* In Russian.

Assessment of the feasibility of air regeneration systems based on photosynthesis of unicellular algae. The efficiency of the Chlorella cultivation procedures used at present is achieved first of all by reuse of the culture medium without subjecting it to intermediate treatment in adjacent components of the system. Stability of the system is related to the biological peculiarities of the biological material and can be maintained by certain techniques. The practical efficiency of air regeneration systems based on Chlorella cultivation may be increased provided that the Chlorella culture performs some additional functions in the life-support system. Thus atmosphere regeneration based on algal photosynthesis may help to solve some other problems of life-support systems. A.B.K.

**A70-44656 #** Changes in the water and salt metabolism during restricted motor activity (Izmenenie vodno-solevogo obmena pri ogranichenii dvigatel'noi aktivnosti). V. P. Krotov. *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper. 15 p. 7 refs.* In Russian.

Study of the effect of prolonged hypokinesia (up to 45 days) on the nature of the variation of the water and salt metabolism in rabbits confined in a specially designed cage. At the end of the first day of restricted motor activity a dilution of the blood plasma was already noted, as well as a tendency toward a decrease in the hematocrit number and in the hemoglobin concentration in the blood. During the following three weeks a redistribution of water between the plasma and erythrocytes occurred. The sodium and potassium concentration in the plasma decreased as the enforced hypokinesia continued. Data obtained regarding total body fluid and the pattern of its redistribution between different phases suggest that sharp diminution of motor activity for 45 days induces no dehydration in rabbits and that significant body losses (up to 25%) which occurred during the experiment can be ascribed to reduced synthesis of tissue proteins and their accelerated decay. Judging from the mineral metabolism parameters, no distinct signs of adaptation of the animal organism to prolonged hypokinesia were observed. A.B.K.

**A70-44658 #** The effect of a prolonged deprivation of sleep on the GABA-shunt (Der Einfluss von langdauerndem Schlafentzug auf den GABA-shunt). G. Schäfer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper. 6 p.* In German.

Study of the effect produced by the deprivation of REM-sleep, which is the type of sleep characterized by a high degree of brain activity and maximal muscle relaxation, on the gamma-aminobutyric acid (GABA) concentration in the organism. Mice were deprived of REM-sleep for 70 hr. During these tests normal air for breathing was supplied to one group of mice. A second group received pure oxygen while carbon dioxide was absorbed. A third group of mice was kept with pure oxygen and not subjected to the locomotion preventing sleep in the other two groups. GABA, glutamate, and in some cases glutamine were determined in the animals. It was found that the GABA level increased by about 20% in animals deprived of sleep, while the simultaneous breathing of pure oxygen caused a further increase of about 5%. The breathing of oxygen in animals not subjected to locomotion led to an increase of 12% in the GABA level. G.R.

**A70-44665 \* #** Life support systems for biological flight experiments. Charles A. Wilson and Bonne C. Look (NASA, Ames Research Center, Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz,*

*West Germany, Oct. 4-10, 1970, Paper. 37 p.*

Description of problems encountered in the development of life support systems for the BIOSATELLITE project and SKYLAB A mission to satisfy the varied and demanding requirements of 20 different biological experiments. The success of BIOSATELLITE II and III demonstrated that the life support systems were capable of meeting all the requirements. The living organisms that made up the experiment payloads introduced unique requirements that affected many aspects of the program. Possible toxic effect on the biology had to be considered in the selection of material for hardware development. Control of manufacturing processes to prevent contamination was inaugurated, and conditioning of flight hardware that came in contact with the organism became a standard procedure which established a new concept that old used hardware was the best flight hardware. The normal space vehicle launch procedure was adjusted to meet both time- and environment-critical aspects of the experiments. Special recovery procedures had to be perfected to accommodate the perishable nature of the payloads. The two experiments being developed for the SKYLAB A mission represent a transition since, although they are part of a manned mission, man is not a participant. The experiments are integrated into the manned environment but function independently. M.M.

**A70-44678 #** Relative importance of various biological parameters in rescuing astronauts (Importance relative des différents paramètres biologiques pour le sauvetage des cosmonautes). R. Grandpierre (Bordeaux, Université, Bordeaux, France). *International Astronautical Federation, International Astronautical Congress, 21st, Konstanz, West Germany, Oct. 4-10, 1970, Paper. 6 p.* In French.

Discussion of the possibility of monitoring certain biological parameters of astronauts under conditions of prolonged space flight. It is noted that, in addition to recording the respiratory rhythm and the cardiac rhythm the latter preferably by one of the standard derivations of the EEG, it is necessary to determine the oxygen consumption, which is an excellent indicator of the energy expenditure. This parameter must be complemented by those indicating the quantity and quality of the circulating blood, in theory, the Sa O<sub>2</sub> of the arterial blood and the cardiac flow rate. The global EEG is highly recommended in spite of its physiological inaccuracy. The latter may be complemented by an electrooculogram and an electromyogram placed on a bending muscle of one of the upper limbs. A.B.K.

**A70-44699 #** Some consequences of the dependence of the threshold intensity difference on the pulse duration (Einige Konsequenzen der Abhängigkeit der Intensitätsunterschiedsschwelle von der Impulsdauer). Josef Krútel' (Slovenská Akadémia Vied, Fyzikálny Ústav, Bratislava, Czechoslovakia). *Fyzikálny Časopis*, vol. 20, no. 3, 1970, p. 170-175. 10 refs. In German.

Discussion of the present knowledge concerning the dependence of the threshold intensity difference for sine tones on the pulse duration, and the possibility of interpreting this difference from the standpoint of the dynamic properties of hearing. Pulse sequences are considered in which the two pulses to be compared follow in succession without any time interval. It is shown that in the perception of discernible intensity degrees the same mechanism most probably prevails which is also responsible for the impression of loudness, which indicates that, in principle, an integration process with a time constant of approximately 30 ms takes place. This process, however, is found to appear only in the pulse duration range from 10 to 120 ms; for pulse durations in excess of 120 ms, the tone pulses regarding their perceptibility are to be considered as stationary, while in the range below 10 ms a qualitative change in the discernibility mechanism seems to take place. In this range, no integration at all seems to occur. O.H.

**A70-44700 #** A contribution to the determination of the characteristics of hearing according to information theory (Ein Beitrag zur Bestimmung der informationstheoretischen Charakteristiken des Gehörs). Josef Krútel' (Slovenská Akadémia Vied, Fyzikálny Ústav, Bratislava, Czechoslovakia). *Fyzikálny Časopis*, vol.

20, no. 3, 1970, p. 188-191. 13 refs. In German.

Discussion of the properties of hearing according to information theory, in terms of primary subjective properties of sound signals. Nonsteady sound signals which represent the major source of information are considered, and fundamental relations are derived for their discernibility with regard to parameters which are known to affect their discernibility - i.e., intensity, duration, and frequency. Equations are further derived which yield, from the point of view of information theory, useful relations by means of which it is possible to determine at least the basic properties of the ear as an organ receiving information. O.H.

**A70-44776** An isochromic change in the bleaching of rhodopsin. Theodore P. Williams (Florida State University, Tallahassee, Fla.). *Vision Research*, vol. 10, July 1970, p. 525-533. 15 refs. PHS Grant No. 9 R01 EY 00479-03.

Study of the bleaching of rhodopsin yielding evidence for the existence of an intermediate, the production of which is not accompanied by any detectable color change. The evidence obtained derives from three sources. The first source is experimental and involves the use of stoichiometry to demonstrate that the ordinary mechanism of bleaching, comprised of traditional intermediates, cannot account for all of the molecules involved. The second, still experimental, shows that the traditional mechanism cannot explain pH effects that are found and, therefore, cannot be correct. The third source is based on the work of other investigators and shows that the existence of an additional intermediate helps to answer certain unsolved problems. M.V.E.

**A70-44777** Visual acuity during ocular tracking movements as a function of illumination density of the field of vision (Sehschärfe bei Augenfolgebewegungen in Abhängigkeit von der Gesichtsfeldleuchtdichte). D. Methling (Deutsche Akademie der Wissenschaften, Institut für Optik und Spektroskopie, Berlin, East Germany). *Vision Research*, vol. 10, July 1970, p. 535-541. 12 refs. In German.

Investigation of the influence of the illumination density of the field of vision on dynamic visual acuity during horizontal ocular tracking movements. Almost identical effects were found for static and for dynamic visual acuity up to angular velocities of 80 deg/sec. In both cases, acuity reaches a maximum around 1000 cd/sq m. It is known that dynamic visual acuity decreases with growing angular velocities, and this is often linked with the hypothesis attributing a steep drop in contrast to large relative movements of the retinal image. However, for the investigated range of angular velocities up to 80 deg/sec, it is not believed that the acuity reduction is caused by a decreasing contrast attributable to relative movements of the retinal image. M.V.E.

**A70-44778** Discriminatory perceptibility of various orientations of Landolt ring orifices during ocular tracking movements (Über die unterschiedliche Erkennbarkeit von Landoltringöffnungen verschiedener Lage bei Augenfolgebewegungen). D. Methling (Deutsche Akademie der Wissenschaften, Institut für Optik und Spektroskopie, Berlin, East Germany). *Vision Research*, vol. 10, July 1970, p. 543-548. 7 refs. In German.

Investigation of the influence of relative movements of the retinal image on the perceptibility of various orifice orientations of a Landolt ring. Threshold differences for various orifice orientations of a Landolt ring are found to increase with the angular velocity of the image on the retina. Differences depend on the direction of movement. Differences between horizontal and vertical movement seem to be due to a different tracking behavior of the eye for each of these directions. Scaling of subjective impressions gives the same results as threshold measurements. M.V.E.

**A70-44779** Sensitization by annular surrounds - Spatial summation properties. Davida Y. Teller, Charles F. Matter, and W. Daniel Phillips (Washington, University, Seattle, Wash.). *Vision Research*, vol. 10, July 1970, p. 549-561. 22 refs. PHS Grant No. NB-08070.

Comparison of the spatial aspects of sensitization effect properties with those of the properties of a source of threshold changes - namely, the presence of large background fields of light (field adaptation). Westheimer (1965) has shown that the rod threshold at the center of a 45 min adapting disk can be lowered by adding light to the surrounding annular region. In the experiment reviewed, the total flux within the annular region was held constant, while its spatial distribution was varied. The flux is shown to be less effective in lowering the threshold when concentrated in some part of the annular area than when distributed homogeneously over it. M.V.E.

**A70-44780** Perceptual suppression of afterimages. David W. Kennard, R. W. Hartmann, D. P. Kraft, and B. Boshes (Northwestern University, Evanston, Ill.). *Vision Research*, vol. 10, July 1970, p. 575-585. 14 refs. Research supported by the Blum Hovler Foundation.

Discussion of the results of measurements of the suppression of consecutive afterimages resulting from ocular movements. Two types of afterimages were defined. The emissive type were suppressed with eye movements, whereas the transductive type were not suppressed. Suppression followed the smallest possible voluntary (saccadic) movements. Involuntary movements of greater than 30 min of arc consistently produced suppression, and suppression was also observed following movements of less than 6 min. The duration of suppression periods increased with the amplitude of voluntary movements up to an amplitude of 5 deg, above which it appeared constant. Duration of suppression increased with increased time intervals between successive eye movements. Eye movements made during a suppression period prolonged the period of suppression, but each additional movement appeared to produce less effect than those preceding it. Suppressive capacity was markedly reduced by rapid, continuous eye movements, but a small, irreducible capacity for suppression remained. M.V.E.

**A70-44781** A stroboscopic stereophenomenon. David N. Lee (Cornell University, Ithaca, N.Y.). *Vision Research*, vol. 10, July 1970, p. 587-593. 7 refs. Research supported by the Boston City Hospital; Contract No. Nonr-1866(52).

Investigation of the nature and essential features of a binocular pairing phenomenon. When a target, oscillating with pendulum-like motion in a frontal plane and illuminated by a stroboscope flashing at about 20 Hz, is binocularly viewed with an attenuating filter over one eye, the target appears to move in depth along a shallow horizontal elliptical path. The apparent depth shift of this target was measured for several interocular luminance differences. The phenomenon cannot be explained in the same way as the well-known Pulfrich phenomenon; the two phenomena are basically different. The phenomenon under consideration appears to be due to a neural interaction (possibly a lateral inhibition) between the successively changing binocular inputs. M.V.E.

**A70-44782** Time course of perception probability under prolonged testing at various eccentricities. Lucia Ronchi (Istituto Nazionale di Ottica, Arcetri, Italy). *Vision Research*, vol. 10, July 1970, p. 605-607. 7 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Investigation of the effects of prolonged testing at various eccentricities on time changes in perception probability. An emmetropic observer is exposed for 40 min to a stimulus flashed at a given point of the dark-adapted retina on a dark background, lasting 100 msec, and exploring the visual field by varying eccentricity in steps of 5 deg. The interflash interval is 2 sec. Perception probability, evaluated for each 30 sec presentation, has been plotted vs time. These plots reveal that, during the course of session, a decrement in performance is taking place. Whatever the theoretical explanation of performance decrement under prolonged viewing, it seems beyond question that the 'constancy' of the stimulus represents the main factor. M.V.E.

**A70-44786 \*** Glucose metabolism and chronic acceleration. J. W. Evans and J. M. Boda (California, University, Davis, Calif.).

*American Journal of Physiology*, vol. 219, Oct. 1970, p. 893-896. 35 refs. Grant No. NGR-05-004-008.

Experimental investigation in which single-comb white leghorn chickens were exposed to 1.75, 2.5, or 3 G for 24 weeks prior to plasma glucose determinations. Plasma glucose concentrations were unchanged by the intensity or duration of the gravity field. Exposure to 3 G shortened the glucose half-life and increased the flux and utilization rates compared with noncentrifuged controls. It was found that chickens exposed to chronic acceleration increase their glucose utilization to help meet the increased energy requirement.

M.M.

**A70-44787 \*** Blood gases in hamsters during hypothermia by exposure to He-O<sub>2</sub> mixture and cold. W. A. Volkert and X. J. Musacchia (Missouri, University, Columbia, Mo.). *American Journal of Physiology*, vol. 219, Oct. 1970, p. 919-922. 12 refs. Grant No. NGR-26-004-021.

Measurements of blood PO<sub>2</sub>, PCO<sub>2</sub>, and pH in the hamster *Mesocricetus auratus* at various stages of hypothermia. With decreases in body temperatures there were parallel falls in venous PO<sub>2</sub> and PCO<sub>2</sub> levels. Similarly, arterial PCO<sub>2</sub> was much reduced at body temperatures of 10 and 6 C. At the low body temperature arterial PO<sub>2</sub> did not show a reduction, and hemoglobin remained fully saturated. Blood pH was relatively similar at all body temperatures.

M.M.

**A70-44788** Pulmonary arterial and venous response to cooling - Role of alpha-adrenergic receptors. Shlomo Stern (Hadassah University Hospital, Jerusalem, Israel) and Karl Braun (Hebrew University, Jerusalem, Israel). *American Journal of Physiology*, vol. 219, Oct. 1970, p. 982-985. 24 refs. Research supported by the Hebrew University.

In five anesthetized artificially respired open-chest dogs, total-body hypothermia by ice-water immersion induced a significant rise in pulmonary venous resistance in addition to the increase in the resistance on the arterial side of the pulmonary circulation. Pretreatment with propranolol in five other dogs did not affect the changes induced by cooling in the pulmonary circulation. In five other dogs, pretreated with phenoxybenzamine, the increase in the pulmonary venous resistance was completely abolished, while the rise in resistance on the arterial side was reduced in part. We conclude, therefore, that the pulmonary venoconstriction, and part of the pulmonary arterial constriction induced by hypothermia, are mediated through the alpha receptors of the sympathetic nervous system.

(Author)

**A70-44789** Radiosensitivity of mice exposed to various temperatures and low-dose rate radiation. H. Levan, R. E. Haas, S. Stefani, and E. Reyes (U.S. Veterans Administration Hospital, Hines; Chicago Medical School; Illinois, University, Chicago, Ill.). *American Journal of Physiology*, vol. 219, Oct. 1970, p. 1033-1035. 17 refs.

Study of the effect of three ranges of temperature (4, 16, and 26 C) on the radiosensitivity of CF sub 1 male mice exposed to low-dose rate (0.2 R/min) gamma radiation. The animals were maintained in each temperature before, during, and following lethal radiation exposure (1000 to 1500 R). The results show that radiation mortality is significantly delayed and reduced in mice kept in low environmental temperature.

(Author)

**A70-44790** Amino acid catabolism in environmental extremes - Effect of temperature and calories. B. K. Whitten, R. F. Burlington, M. A. Posiviata, C. M. Sidel, and G. R. Beecher (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Kansas State University, Manhattan, Kan.). *American Journal of Physiology*, vol. 219, Oct. 1970, p. 1046-1049. 26 refs.

Experimental investigation of the effect of temperature extremes on several parameters of hepatic amino acid catabolism in rats exposed to 6 and 35 C for 48 hr. Cold-exposed animals lost weight due to a relative caloric deficit. Heat-exposed animals ate less and lost weight due to an absolute caloric deficit. Therefore experimental animals were compared to an ad libitum-fed as well as a restricted-fed

control group. Most of the observed changes in amino acid catabolism in hepatic tissue from animals acutely exposed to 6 or 35 C for 48 hr could be attributed to either a relative or absolute caloric deficiency.

M.M.

**A70-44838** The calcium metabolism problem in space medical science. William Richard Douglas (Rigshospitalet, Copenhagen, Denmark). *Space Life Sciences*, vol. 2, Sept. 1970, p. 151-157. 24 refs.

The currently frustrating problem of discrepancies between the nonsignificant calcium metabolic balance reports and the radiologic indications of bone loss in astronauts is discussed in reference to clinical data derived from human subjects with their musculoskeletal system immobilized by plaster casts. The pertinent literature is cited, the biochemical profile of environmentally induced osteoporosis is presented, the various concepts of calcium metabolism are reviewed, the clinical chemistry with radiologic findings on the Gemini astronauts are discussed, and the weightlessness syndrome is related to calcium utilization in the body. Hormones are assessed as relatively active in calcium absorption, in bone resorption, and in accelerating metabolic activity. Enzymes are portrayed as behaving somewhat passively in calcium metabolism disorders. It is concluded that the results of research now in progress may clear up the problem of whether the densitometric results are in error or whether there occur intraskeletal transfers of bone mineral not detected by balance investigations.

(Author)

**A70-44839** The relation between eardrum failure and blast-induced pressure variations. Clayton S. White, Donald R. Richmond (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.), and I. G. Bowen. *Space Life Sciences*, vol. 2, Sept. 1970, p. 158-205. 30 refs. AEC Contract No. AT (29-1)-1242; Contract No. DA-49-146-XZ-372.

Determination of eardrum failures associated with exposure to atypical and typical blast wave forms in incidental observations of the ears of more than 490 animals during a series of field and laboratory experiments designed to study overall blast effects. It was found that when the incidence of eardrum rupture is related to the various elements of the measured pressure-time curves, the association is not the same for the two types of wave shapes. Besides suggesting that tolerance is higher for slow- than for fast-rising wave forms, the findings demonstrate a wide variability in the magnitude of the overpressures required to rupture the eardrum. Within the limits of the data available, the quantitative differences are noted and discussed with emphasis on the apparent wide variability in tolerance and a proposed explanation for this finding. It is pointed out that, although the results are limited strictly to the mammalian species studied, it is likely that the eardrum of man also is sensitive to the shape and character, as well as the magnitude and duration, of the blast wave.

M.M.

**A70-44840 \*** A miniature respiratory minute volume sensor for the flight environment. Charles E. Lewis, Jr. and Terrence W. Rezek (NASA, Flight Research Center, Edwards, Calif.). *Space Life Sciences*, vol. 2, Sept. 1970, p. 206-218. 9 refs.

A miniature respiratory rate and volume sensor has been developed and flight qualified at the Flight Research Center. This device weighs only 172 grams, is sufficiently rugged to perform in the flight environment, and small enough to be worn as an integral part of the pilot's personal equipment. The safe operation of this system in an hyperbaric, pure oxygen atmosphere, is demonstrated. Details for the fabrication of the system are described. Operational experience over a two year period is reported.

(Author)

**A70-44841 \*** Microbial sterilization in ultra-high vacuum and outer space - A kinetic comparison. J. P. Brannen (Sandia Laboratories, Albuquerque, N. Mex.). *Space Life Sciences*, vol. 2, Sept. 1970, p. 219, 220. 5 refs. NASA-supported research.

Examination of the correlation between microbial dieoff in ultrahigh vacuum and in outer space. It is shown that from a kinetic viewpoint, D values obtained under ultrahigh vacuum, 10 to the

minus 6th torr, are not appreciably different from those obtained under 10 to the minus 17th torr, the pressure of outer space, provided that the microorganisms are being sterilized only by a first-order chemical reaction. O.H.

A70-44842 \* Chemical evolution and the origin of life. Martha W. West (San Jose State College, San Jose, Calif.) and Cyril Ponnampuruma (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Space Life Sciences*, vol. 2, Sept. 1970, p. 225-288.

Comprehensive bibliographic guide to the literature published through 1969 dealing with chemical evolution and the origin of life. Emphasis is placed on experimental and theoretical material dealing directly with the concepts of chemical evolution and the origin of life. Arrangement of the almost 1600 bibliographic items is alphabetical by author with earliest reference first. M.M.

A70-44847 Motions of a liquid in a pulsating bulb with application to problems of blood flow. Robert T. Jones (Avco Everett Research Laboratory, Everett, Mass.). *Medical and Biological Engineering*, vol. 8, Jan. 1970, p. 45-51. Navy-supported research.

Demonstration of the possibility of using potential flows of the form  $\phi = (ax \text{ to the second power} + by \text{ to the second power} + cz \text{ to the second power})f(t)$  to represent motions produced in pulsating bulbs. While the initial bulb shape may be arbitrary, sequential shapes are related by affine transformations. Two components appear in the distribution of pressure, one dependent on the instantaneous velocity, and the other on the acceleration. For flows with stationary streamlines the inertial impedance is that of a simple mass, and is proportional to the first moment of the actual mass of fluid contained within the bulb. Examples treated are: (1) expanding and collapsing circular cylinders, and (2) elliptical cylinders in which the perimeter is held constant. The thickness of the pulsatile laminar boundary layer is found to be approximately 1 mm for conditions in the vicinity of the heart. M.M.

A70-44848 A photon-coupled amplifier for measuring and recording physiological signals. M. Bracale and M. Marsico (Napoli, Università, Naples, Italy). *Medical and Biological Engineering*, vol. 8, Jan. 1970, p. 103-105. Research supported by the Fondazione Ugo Bordoni.

Description of a new circuit for a photon-coupler biomedical amplifier. The circuit makes it possible to obtain a high coupling voltage transfer ratio with a minimum number of active components and a high SNR. In addition, the introduction of a photon coupling in a typical biomedical amplifier is useful for the reduction of the number of R-C couplings. M.M.

A70-44859 Simulation in respiratory physiopathology. *Periodic autooscillations and ventilation (Simulation en physiopathologie respiratoire - Auto oscillations et ventilation périodiques)*. Gérard Matisse (IGBM, Laboratoire de Recherche, France) and Jacques Lacoste (Nancy, Université, Nancy, France). *Automatisme*, vol. 15, Sept. 1970, p. 379-384. 12 refs. In French.

Development of a mathematical model which simulates human respiratory physiopathology. The proposed model is based on the hypothesis that the ventilation/pulmonary exchange system can be the seat of stable autooscillations, so that the ventilatory automatism then appears as a consequence of the global structure of the system and of the values of its parameters, without implying the necessity of a central automatism. The usefulness of such a model in investigations of pathological cases is illustrated. A.B.K.

A70-44862 # Simulation of the blood circulatory system by means of an analog computer (Modelování systému krevního oběhu pomocí analogového počítače). Josef Nevrlý, František Klimeš (Podnik Výpočetní Techniky, Brno, Czechoslovakia), and Bohumil Bednařík (II Chirurgická Klinika, Brno, Czechoslovakia). *Auto-*

*matize*, vol. 13, Sept. 1970, p. 243-246. In Czech.

Description of a method of simulating the blood circulatory system by means of an analog computer with the objective of overcoming some difficulties involved in examining some interdependences of the hemodynamic values and to define some of their characteristics. A simplified block diagram of blood circulation is presented which indicates the values examined. It is shown that if the interdependences between the respective values are known, the circulatory system can be described by mathematical equations which represent a mathematical model of the circulatory system. The model considered (i.e., Warner's model of the cardiovascular system) includes a set of differential and algebraic equations which approximately describe the dynamic behavior of the circulatory system. This set of equations can be simultaneously solved by means of an analog computer, so that an electronic model of the circulatory system is obtained. The application of this model is illustrated on a practical example. A block diagram of an analog computer for simulating blood circulation, and charts showing the behavior of the hemodynamic values obtained by modeling, are presented. O.H.

A70-44864 Glutamate and gamma-aminobutyric acid in brain. K. Krnjević (McGill University, Montreal, Canada). *Nature*, vol. 228, Oct. 10, 1970, p. 119-124. 97 refs. Research supported by the Canadian Medical Research Council.

Discussion of evidence which shows that the amino acids L-glutamate and gamma-aminobutyric acid (GABA) are essentially agents of communication and not just elements of an alternate metabolic pathway. Aspects of the excitatory action of glutamate are examined, and the function of glutamate as a transmitter is discussed. Some derivatives of glutamate and of GABA are considered. Mechanisms of metabolism involving GABA are investigated, giving attention to the release of GABA during inhibition. G.R.

A70-44870 Absence of the pigments of photosystem II of photosynthesis in heterocysts of a blue-green alga. Joseph Thomas (Bhabha Atomic Research Centre, Bombay, India). *Nature*, vol. 228, Oct. 10, 1970, p. 181-183. 13 refs.

Attempt to determine whether heterocysts in vivo contain c-pycocyanin (c-PC) and the other pigments comprising photosystem II and whether, in the absence of one or more of these, photosystem II is functional in heterocysts. The microspectrophotometric technique was used. Comparison of the in vivo pigment composition of normal cells and heterocysts indicates that heterocysts lack a functional photosystem II. F.R.L.

A70-44874 Blockade of arousal from hibernation by inhibition of norepinephrine synthesis in the golden hamster. Dale D. Feist (California, University, Berkeley, Calif.). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Oct. 1, 1970, p. 1117-1125. 13 refs. NIH Grants No. 1-F1-GM-32,590; No. NB-06296.

Experimental investigation of the effect of inhibition of norepinephrine (NE) synthesis on the triggering and maintenance of arousal in the hibernating golden hamster. The dependence of the initiation and/or maintenance of sympathetic activity necessary for arousal upon newly synthesized NE, which might be responsible for a blockade of normal arousal from hibernation, was examined. The experiments are described and their results are discussed. O.H.

A70-44997 \* Energy generation and utilization in hydrogen bacteria. L. Bongers (Martin Marietta Corp., Research Institute for Advanced Studies, Baltimore, Md.). *Journal of Bacteriology*, vol. 104, Oct. 1970, p. 145-151. 36 refs. Contract No. NASw-1596.

Quantitative determination of the effects of H<sub>2</sub>, O<sub>2</sub>, and CO<sub>2</sub> limitations on the growth rate and the interaction of catabolic and anabolic activity in autotrophically growing *Hydrogenomonas eutropha*. Energy-yield measurements showed that the oxidation of 1 mole of H<sub>2</sub> yields the equivalent of 2 moles of adenosine triphosphate for H. eutropha, and that at least 5 moles of this high-energy phosphate is required for the conversion of 1 mole of CO<sub>2</sub> into cellular constituents. M.M.

A70-45022 International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970. 331 p. In English and Russian. Price of four volumes, \$108.

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Some mechanisms responsible for the reduction of orthostatic stability in experiments with simulated weightlessness (Nekotorye mekhanizmy snizheniia ortostaticheskoi ustoichivosti v eksperimentakh s imitatsiei nevesomosti). I. D. Pestov (Akademiia Nauk SSSR, Moscow, USSR), p. 81-90. 14 refs. (See A70-45025 23-04)

Experimental biological life support system based on continuous cultivation of algae and tests of human confinement in this system for many days (Eksperimental'naia biologicheskaiia sistema zhizneobespecheniia, osnovannaia na nepreryvnom kul'tivirovanii mikrovdoroslei i opyt mnogosutochnogo prebyvaniia cheloveka v etoi sisteme). I. I. Gitel'zon, L. V. Kirenskii, I. A. Terskov, G. M. Lisovskii, B. G. Kovrov, F. Ia. Sid'ko, Iu. N. Okladnikov, M. P. Antoniuk, V. N. Belianin, and M. S. Rerberg (Akademiia Nauk SSSR, Moscow, USSR), p. 91-100. (See A70-45026 23-05)

Water-salt metabolism during space flight (Vodno-solevoi obmen pri kosmicheskikh poletakh). I. S. Balakhovskii (Akademiia Nauk SSSR, Moscow, USSR), p. 101-113.

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The sensitivity of neuroretina in conditions of high altitude hypoxia. M. P. Popescu (Medical Pharmaceutical Institute, Bucharest, Rumania), M. Stefan, and I. Pintilie (Medical Aviation Centre, Bucharest, Rumania), p. 123-125. (For abstract see issue 23, page 4354, Accession no. A68-44226)

##### General bioastronautics.

Physiological influences of high oxygen respiration in closed environmental systems. H. Saiki (Jikei University, Tokyo, Japan), p. 127-146. (For abstract see issue 23, page 4355, Accession no. A68-44233)

Space ionizing radiation as a problem in space missions. C. J. Clemedson (Swedish Armed Forces, Stockholm, Sweden), p.

147-170. (For abstract see issue 23, page 4355, Accession no. A68-44234)

An implantable bioinstrumentation system. J. J. Konikoff (General Electric Co., King of Prussia, Pa.), p. 171-180. (For abstract see issue 23, page 4360, Accession no. A68-44219)

Bioradiotelemetric equipment for cardiovascular studies in various conditions. G. Benetato, R. Vranceanu, and V. Ionescu (Academia Română, Bucharest, Rumania), p. 181-191. (For abstract see issue 23, page 4354, Accession no. A68-44230)

Space synthetic diets (Sinteticheskaia pishcha v kosmicheskoi polete). A. S. Ushakov, Iu. G. Nefedov, V. G. Vysotskii, and A. N. Kozlova (Akademiia Nauk SSSR, Moscow, USSR), p. 193-197. (See A70-45027 23-05)

On the biological effect of high energy protons on cells of the intestinal epithelium (O kharaktere biologicheskogo deistviia protonov vysokikh energii na kletki kishchnogo epiteliia). V. M. Mastrukova and A. D. Strzhizhovskii (Akademiia Nauk SSSR, Moscow, USSR), p. 199-203. (See A70-45028 23-04)

Concepts of crew rescue from a tumbling spacecraft. J. G. Barnby (IIT Research Institute, Washington, D.C.), p. 205-216. (For abstract see issue 23, page 4482, Accession no. A68-44227)

Latest developments for EVA space operations. P. W. van Schaik (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio), p. 217-229. (For abstract see issue 23, page 4360, Accession no. A68-44242)

Revolving space vehicle stability requirements for perpetual-motor tasks. J. F. Brady and B. D. Newsom (General Dynamics Corp., San Diego, Calif.), p. 231-253. (For abstract see issue 23, page 4482, Accession no. A68-44228)

Stability of artificial ecological systems (Ob ustoichivosti iskusstvennykh ekologicheskikh sistem). A. B. Rubin (Akademiia Nauk SSSR, Moscow, USSR), p. 255-258. (See A70-45029 23-04)

The United States Biosatellite. R. M. Crane and O. Klima (General Electric Co., Philadelphia, Pa.), p. 259-271. (For abstract see issue 23, page 4482, Accession no. A68-44232)

Some results of radiobiological investigations carried out on the Kosmos 110 satellite (Nekotorye itogi radiobiologicheskikh issledovaniia, provedennykh na ISZ 'Kosmos-110'). V. V. Antipov, N. L. Delone, M. D. Nikitin, G. P. Parfenov, and P. P. Saksionov (Akademiia Nauk SSSR, Moscow, USSR), p. 273-298. 27 refs. (See A70-45030 23-04)

A70-45023 Life support requirements for the second decade of manned space flight. W. M. Helvey, R. B. Jagow, and J. M. Smith (Lockheed Missiles and Space Co., Sunnyvale, Calif.). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 1-24. 5 refs.

Review of the life support requirements for the second decade of manned space flight, and description of laboratory development efforts in regenerative CO<sub>2</sub> removal and reduction, oxygen generation, water reclamation, and food production relative to weight, volume, power, development status, and applicability to future manned space missions. The advantages of using regenerative life support equipment are shown in terms of additional weight and volume available for payload experiments and/or reduction in launch weight, and in terms of cost effectiveness. Integrated systems, evaluated in manned-chamber testing, are reviewed, problems to be overcome are described, and potential solutions are presented. Orbital flight experimentation that must precede operational use of regenerative systems is described relative to performance, control, maintenance and repair. A concept for orbital flight hardware is described which could serve as one of the most important steps in meeting life support requirements for the second decade of manned space flight. (Author)

A70-45024 Closed water exchange in a two-loop biotechnical life support system for humans (Zamknutyi vodoobmen v dvukhzhvennoi biologo-tekhnicheskoi sisteme zhizneobespecheniia

cheloveka). L. V. Kirenskii, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskii, B. G. Kovrov, F. Ia. Sid'ko, V. N. Belianin, R. I. Kuz'mina, Iu. N. Okladnikov, M. P. Antoniuk, and M. S. Rerberg (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 51-61. 8 refs. In Russian.

Experimental data for a closed-loop life support system which employs algae and bacteria cultures to recycle water in addition to the function of regenerating the atmosphere. A balanced medium consisting of human urine and mineral additives is described for continuous cultivation of algae. This medium permitted an intense flow-through process of regeneration for human liquid wastes, with up to 90 percent recirculation. Toxicological, chemical, and microbiological analyses show the suitability of the regenerated water for human consumption. Prolonged closure of the water regeneration loop in this man-algae system did not show any irreversible effects or nonequilibrium processes which would preclude continuous long-term operation. Satisfactory results were obtained in 30-day life support experiments involving water and atmospheric regeneration. T.M.

**A70-45025** Some mechanisms responsible for the reduction of orthostatic stability in experiments with simulated weightlessness (Nekotorye mekhanizmy snizheniia ortostaticheskoi ustoiichivosti v eksperimentakh s imitatsiei nevesomosti). I. D. Pestov (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 81-90. 14 refs. In Russian.

In 41 tests with 18-hr immersion (18 subjects) it was found that both compensated and noncompensated forms of orthostatic insufficiency (with and without collapse) involved the same changes in water metabolism and thus could not be defined only by the level of the organism dehydration. Orthostatic collapse develops more often in subjects showing instability of autonomic functions. It may be prevented by pharmacological stimulants (strychnine, caffeine, phenamine). One of the mechanisms of functional compensation in an upright posture is probably a nervous-reflex. The 70-day long bed rest experiment (16 subjects) showed reflexation of the vessels of lower extremities which partly compensates for the orthostatic changes. Maintaining the normal tone of those vessels by means of occlusive femoral cuffs increases the blood depot capacity and orthostatic disturbances. When using femoral cuffs, the negative effect probably prevails over those for which it is designed (water metabolism and cardiac activity normalization). (Author)

**A70-45026** Experimental biological life support system based on continuous cultivation of algae and tests of human confinement in this system for many days (Eksperimental'naia biologicheskaiia sistema zhizneobespecheniia, osnovannaia na nepreryvnom kul'tivirovanii mikrovdoroslei i opyt mnogosutochnogo prebyvaniia cheloveka v etoi sisteme). I. I. Gitel'zon, L. V. Kirenskii, I. A. Terskov, G. M. Lisovskii, B. G. Kovrov, F. Ia. Sid'ko, Iu. N. Okladnikov, M. P. Antoniuk, V. N. Belianin, and M. S. Rerberg (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 91-100. In Russian.

Experimental evaluation of a biotechnical life support system based on the mutual equilibration of the human metabolism and a technically controlled algae culture (*Chlorella vulgaris*). Thirty-day experiments demonstrate complete balancing of human and algae gas metabolisms by appropriate selection of the nutrient medium for the algae and control of the human nourishment rations within physio-

logically optimal limits. Measurements of blood composition, body weight, and oxygen and carbon dioxide contents did not reveal any abnormal effects in subjects exposed to the photosynthetically regenerated atmosphere. The same system was used in other experiments involving both water and atmospheric regeneration. T.M.

**A70-45027** Space synthetic diets (Sinteticheskaia pishcha v kosmicheskom polete). A. S. Ushakov, Iu. G. Nefedov, V. G. Vysotskii, and A. N. Kozlova (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 193-197. In Russian.

An application of synthetic diets composed of pure nutrients is described. They can be used: to study the food requirements of man exposed to stress effects; to determine the nutritive value of new food sources obtained through the biological and physicochemical synthesis; and to supplement stored foods of limited weight and volume with pure nutrients, providing a well balanced nutrition. Future plans of supplying space crew members with synthetic diets are also discussed. (Author)

**A70-45028** On the biological effect of high energy protons on cells of the intestinal epithelium (O kharaktere biologicheskogo deistviia protonov vysokikh energii na kletki kishechnogo epiteliia). V. M. Matriukova and A. D. Strzhizhovskii (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 199-203. In Russian.

The present communication summarizes studies on the mitotic activity, degree of chromosome aberration and number of cells in cryptal and villi sections of the intestinal epithelium of mice exposed to a total irradiation with 50, 240 and 660 MeV protons within the dose range of 200-750 rads. Marked changes of the above mentioned indices, which recovered as a rule during the 9 day period, were observed. The biological effect of high energy protons shows no significant changes with the energy increase from 50 to 660 MeV. In most cases the RBE values were within the range of 0.6 to 0.9. Qualitative differences in the biological effect of protons and X-rays were also discovered. (Author)

**A70-45029** Stability of artificial ecological systems (Ob ustoiichivosti iskusstvennykh ekologicheskikh sistem). A. B. Rubin (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 255-258. In Russian.

Analysis of mass exchange processes of complex biological life support systems on the basis of mathematical models for system dynamics. It is shown that a stationary state where system parameters change periodically with time is possible during nonlinear interaction between separate system elements. The electron transport chain in photosynthesis serves as a model for elucidating the main factors determining the stability of a system with consecutive mass exchange processes. The stability can be increased by introducing additional mass pools and feedbacks in the system. T.M.

**A70-45030** Some results of radiobiological investigations carried out on the Kosmos 110 satellite (Nekotorye itogi radio-biologicheskikh issledovaniia, provedennykh na ISZ 'Kosmos-110'). V. V. Antipov, N. L. Delone, M. D. Nikitin, G. P. Parfenov, and P. P. Saksonov (Akademiia Nauk SSSR, Moscow, USSR). In: International Astronautical Federation, Congress, 19th, New York, N.Y., October 13-19, 1968, Proceedings. Volume 4 - Bioastronautics. (A70-45022 23-05) Edited by Michał Łunc. Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo Naukowe, 1970, p. 273-298. 27

refs. In Russian.

Results of Kosmos 110 satellite experiments concerning the effects of radiation on lysogenic bacteria *E. coli* K-12, spiderwort spores, dry seeds of certain higher order plants, various chlorella strains, and a whole plant of *Tradescantia paludosa*. The integral dose of cosmic radiation attained 12 rad, with a mean dose of about 500 mrad/day. Most of the dose was not due to primary cosmic radiation but to the earth's radiation belts. The influence of weightlessness in this experiment was maintained for about 22 days. The biological effectiveness of the space flight factors was evaluated with the aid of physiological, cytogenetic, genetic, and microbiological techniques. Comparison is made with the results of previous Vostok and Voskhod spacecraft experiments which involved lower radiation doses and shorter durations of weightlessness. T.M.

**A70-45076 #** Effect of intense pulsed noise on the auditory organ of animals (Vozdeistvie sil'nogo impul'snogo shuma na organ slukha zhiivotnykh). N. I. Ivanov. *Voenno-Meditsinskii Zhurnal*, July 1970, p. 24-27. In Russian.

Description of experiments in which 25 cats were exposed to single 1-sec or 3-sec sequences of white noise pulses of 124 to 135 db or to the 124-to-156 db noise of a jet engine. The time-variable diverse effects of exposures on the biocurrents of the cochlea of the experimental cats are discussed. The results of the study are in agreement with the results of previous studies of Aleksandrov and Ivanov (1966, 1969). V.Z.

**A70-45077 #** Determination of optimum bed rest time schedules from some physiological data (Opredelenie optimal'nykh srokov postel'nogo rezhima po nekotorym fiziologicheskim pokazateliam). A. A. Mikhailenko. *Voenno-Meditsinskii Zhurnal*, July 1970, p. 34-37. In Russian.

Study of changes in the motor function of a group of 6 subjects confined to bed for extended periods of time in an attempt to determine optimum bed rest periods for cardiovascular patients. The reaction of the subjects to hypokinesia was determined by neurological observations and dynamometric, electromyographic and myogenic-tonus tests. Certain changes in the motor physiology of the subjects were observed already during the first days of bed rest, reaching their highest intensity at the end of a two-week period. Individual approach is recommended in prescribing bed rest periods for patients. V.Z.

**A70-45078 #** Effect of hypodynamia on the state of the external respiratory function under different microclimatic conditions (Vliianie gipodinamii na sostoiianie funktsii vneshnego dykhaniiia v razlichnykh mikroklimaticeskikh usloviakh). P. O. Viazitskii and S. D. Kumanichkin. *Voenno-Meditsinskii Zhurnal*, July 1970, p. 38-40. In Russian.

Investigation of the condition of the external respiratory function in a group of 8 healthy young male persons subjected for a period of 6 days to hypodynamia in a seating position in a small chamber at convenient temperature, at 35 C and 90% humidity, and at 8 C. The capacity of the lungs, the minute respiratory volume, the oxygen requirement and absorption level, and oxygen metabolism adaptation were measured in the subjects before and after exposures to physical stresses. It is found that exposure to these microclimatic conditions does not affect the penetrability of the hyaline membrane and that the changes in the external respiratory function after physical stresses are more pronounced in a convenient microclimate than under microclimatic strains. A careful analysis indicated that these changes were related to the state of the cardiovascular system. V.Z.

**A70-45079 #** Estimation of sea sickness from some hemodynamic data (Otseñka bolezni ukachivaniia po nekotorym pokazateliam gemodinamiki). E. V. Lapaev. *Voenno-Meditsinskii Zhurnal*, July 1970, p. 57-60. In Russian.

Description of experiments in which hemodynamic tests were performed on a group of 18 healthy young individuals who were

subjected to cumulative 15-min Coriolis acceleration or to 30-min swinging. The changes in the minute and systolic blood volumes after exposures were insignificant in subjects who showed no sea sickness symptoms and were significant in those who developed such symptoms. In most of the latter, subjective complaints were accompanied by a substantial reduction of the minute and systolic blood volume. V.Z.

**A70-45080 #** Decompression disorders after exposures to a 'safe pressure' or a 'safe altitude' (Dekompressionnyye rasstroistva posle prebyvaniia pod 'bezopasnym davleniem' ili na 'bezopasnoi vysote'). M. P. Elinskii. *Voenno-Meditsinskii Zhurnal*, July 1970, p. 60-63. 8 refs. In Russian.

Review of published studies concerning the occurrence of decompression disorders after exposures high underwater to pressures and low pressures at altitudes considered generally safe. Considerations are given in support of the contention that such disorders may occur more frequently than commonly believed. An experiment on cats and several cases of such disorders are mentioned to corroborate this view. Special attention is given to the possibility of embolia when the passage from high-to-normal pressure is not gradual enough. V.Z.

**A70-45081 #** Effect of oxygen inhalation on the pressure in the central artery of the retina (Vliianie dykhaniiia kislorodom na davlenie v tsentral'noi arterii setchatki). L. I. Starcha. *Voenno-Meditsinskii Zhurnal*, July 1970, p. 63-65. In Russian.

Description of experiments in which the systolic and diastolic pressure was measured in the central artery of the retina in a group of 28 healthy young men (mostly deep-sea divers) during the inhalation of 88 to 99% oxygen in 20-25 min alternation with air for a total period of 2 hr. Higher systolic and diastolic pressures were established in the artery of the subjects during the inhalation of oxygen at atmospheric pressure. V.Z.

**A70-45082** Determination of regional cerebral cortical blood flow using a heat clearance technique. B. D. Cameron (Wellcome Surgical Research Institute, Glasgow, Scotland). *Physics in Medicine and Biology*, vol. 15, Oct. 1970, p. 715-722. 6 refs.

A heat clearance method is described for measuring regional cerebral cortical blood flow, involving the injection of a small amount of cool saline into the cerebral circulation. Blood flow is estimated from the slope of the subsequent thermal clearance curve, temperature being measured by a small thermistor probe situated under the dura in contact with cerebral cortical tissue. The method is compared with the well established technique involving Kr 85 and a correlation coefficient of 0.89 is obtained. The heat clearance technique, however, has the added advantages that the cost of tracer and monitoring equipment is small and that probes may be chronically implanted. (Author)

**A70-45102** The influence of homogeneous magnetic fields on the growth of *Micrococcus denitrificans* (Die Wirkung eines homogenen Magnetfeldes auf das Wachstum von *Micrococcus denitrificans*). Wolfram Thiemann and Erich Wagner (Kernforschungsanlage Jülich GmbH, Jülich, West Germany). *Zeitschrift für Naturforschung, Teil b*, vol. 25b, Sept. 1970, p. 1020-1023. 8 refs. In German.

The influence of strong homogeneous magnetic fields in the range of 5000 to 8000 gauss on the growth of *Saccharomyces cerevisiae* and *Micrococcus denitrificans* was studied. In the case of yeast growing under nearly anaerobic conditions an inhibition of growth rate was observed in the beginning of incubation while some hours later the growth accelerated and surpassed the control. *M. denitrificans* on the other hand grew with the same rate as the controls during the first 2-3 hours of experiment; thereafter the magnetic field resulted in a significant acceleration of growth rate measured by a 5.8 to 13.3% increase of oxygen consumption after 5-6 hours run of experiment. Until now only inhibition of bacterial growths by magnetic fields is reported elsewhere in the literature. (Author)

**A70-45121 #** Effectiveness of individual protective devices in groups exposed to aircraft noise (Sull'efficacia dei mezzi di protezione individuale nelle collettività esposte ai rumori d'aereo). T. Marullo and G. Mazza. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Apr.-June 1970, p. 179-193. 26 refs. In Italian.

Description of the results of a survey of individual protective devices against aircraft noise in three groups of personnel exposed to noise from F-104s, C-119s, and AB 47-Js. The results obtained led to the determination of the phonometric values of work environments and of the effectiveness of protective ear plugs. It was ascertained that ear plugs provide good protection for personnel working in the vicinity of C-119s and AB 47-Js, whereas they are inadequate in personnel who use and maintain F-104s which have a sound pressure level of up to 144 dB. Devices useful to prevent the damages caused by ear plug inadequacies are suggested. M.M.

**A70-45122 #** Clinical, radiological, and functional determination of obstructive lung diseases in legal medicine (Accertamento clinico, radiologico e funzionale delle malattie polmonari ostruttive in medicina legale). G. Janigro and P. Rota. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Apr.-June 1970, p. 194-217. In Italian.

Experimental investigation performed on 15 Air Force subjects afflicted with obstructive lung diseases such as chronic bronchitis, chronic diffuse emphysema, and bronchial asthma. The subjects underwent physical, radiological, and functional examinations of the respiratory system with or without administration of bronchospasmolytic drugs. A comparative examination of the results of the various tests is carried out, and considerations are made on the varying significance of the physical, radiological, functional, and pharmacological study of the respiratory system for every condition considered, from the standpoint of a medicolegal diagnosis. M.M.

**A70-45123 #** Problem of the psychological screening of pilot trainees - Initial results of the application of the Rorschach test to a group of pilot trainees (Sul problema della selezione psicologica degli allievi piloti - Primi risultati relativi all'applicazione del test di Rorschach su un gruppo di allievi piloti). F. Sparvieri. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Apr.-June 1970, p. 218-238. 17 refs. In Italian.

Investigation of the existence, in a group of pilot trainees taking the Rorschach test, of statistically significant correlations between certain parameters of the test, and the learning or failure to learn how to fly. It was found that thirteen parameters were correlated. The significance of this corroborates the notion that the capacity of resistance and struggle against the heightening of instinctive drives makes it easier for pilot trainees to learn how to fly. M.M.

**A70-45124 #** Current aspects and future prospects of aviation psychiatry (Attualità e prospettive della psichiatria aeronautica). L. Longo. (*Società Italiana di Psichiatria, Congresso, 30th, Milan, Italy, Oct. 1968.*) *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Apr.-June 1970, p. 239-249. 14 refs. In Italian.

Discussion of relevant aspects of current aviation psychiatry and its future prospects, including its extension and evolution toward an ever increasing range of scientific and technical problems and space characterization. The etiopathogenesis of the various factors involved in a pilot's fatigue, states of anxiety, and flying phobias is briefly discussed, together with criteria for screening pilots as well as Air Force officers. M.M.

**A70-45125 #** Some toxic aspects of monomethylhydrazine (MMH) - Brief survey (Su alcuni aspetti tossici della monometilidrazina (MMH) - Rassegna sintetica). G. Paolucci. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Apr.-June 1970, p. 250-264. 9 refs. In Italian.

Survey of knowledge acquired regarding the toxicity of the missile propellant monomethylhydrazine (MMH). Tests carried out on animals have shown that there are no appreciable changes in

respiratory quotient and caloric metabolism, whereas changes have been recorded in the metabolism of glycogen, fatty acids and urea. MMH acts on the blood causing moderate hemolysis, anemia and the formation of methemoglobin; by determining the latter it is possible to derive indirectly the amount of substance absorbed. The clinical manifestations are convulsions, vomiting, diarrhea, urinary disturbances and irritations of the conjunctival and mucous membranes. Anatomic-pathological and histological tests have shown congestive and hemorrhagic troubles in the lungs and liver, turbid swelling in the epithelium of the renal tubules and subarachnoid hemorrhages. In the long run the substance diminishes the intellectual capacity, as has been shown in macaques. M.M.

**A70-45160** Analysis of 'boosted lubrication' in human joints. D. Downson, V. Wright (Leeds University, Leeds, England), and A. Unsworth. *Journal of Mechanical Engineering Science*, vol. 12, Oct. 1970, p. 364-369. 15 refs.

Mathematical analysis of squeeze-film action under conditions of boosted lubrication of human joints. The analysis demonstrates that any process which leads to an increase in concentration of hyaluronic acid and hence in the viscosity of synovial fluid as the squeeze-film action takes place, will lead to an increase in the squeeze-film time. When the available experimental evidence on the effect of concentration of hyaluronic acid upon viscosity is utilized, it becomes apparent that the role of lubricant enrichment in the boosted lubrication mechanism is considerable. This point is illustrated by an example in which the booster squeeze-film is found to be more than two orders of magnitude greater than the normal squeeze-film time. The results strongly support the view that a form of squeeze-film action peculiar to human joints and known as boosted lubrication is capable of providing a valuable mechanism for the preservation of effective fluid-film lubrication. The results are found to be in general accord with existing experimental evidence. O.H.

**A70-45327** Double crew continuous flying operations - A study of aircrew sleep patterns. D. W. Atkinson, R. G. Borland, and A. N. Nicholson (RAF, Air Support Command, Pewsey, Wilts.; RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1121-1126. 5 refs.

Continuous flying operations, in which crew sleep aboard the aircraft instead of sleeping at route stations, provide an operational capability independent of positioned crews. Such missions may lead to sleep difficulties and it is concluded from two missions operated by Royal Air Force Air Support Command that the optimum duration is 48 hours. In the case of a fast strategic transport aircraft this provides a world-wide capability. (Author)

**A70-45328** Skeletal function and weightlessness - A mechanism for hypogravic skeletal atrophy. David Stubbs (Missouri, University, Columbia, Mo.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1126-1128. 10 refs.

Recent data from manned space flights has shown a marked demineralization of bone. Such data could be expected as a result of Wolff's law which correlates bone structure and imposed strain. Presented is a mechanism of bone maintenance as a feedback control system which, when operating under reduced gravity conditions, would predict the observed skeletal atrophy - and furthermore, a plateau would be reached after which no further skeletal loss would occur. (Author)

**A70-45329** Blood alcohol concentrations as affected by combinations of alcoholic beverage dosages and altitudes. E. Arnold Higgins, John A. Vaughan, and Gordon E. Funkhouser (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1129-1132. 8 refs.

This study established blood alcohol levels in man at 12,000 ft with and without supplemental oxygen and at 20,000 ft with supplemental oxygen. At 2.50 ml of 100 proof bourbon/kg body



weight, subjects exhibited a lower blood alcohol level at 12,000 ft without supplemental oxygen than at 20,000 ft with supplemental oxygen. A difference in blood alcohol levels was not seen with 1.25 ml of 100 proof bourbon/kg body weight. It was established that dehydration effects alone could not account for these findings. The effect of breathing a normal oxygen mixture could not be ascertained with the data collected. An increased mobility of the gastrointestinal tract caused by the high alcohol concentration and the increased motility attributable to the lowered barometric pressure could increase the absorption rate of the alcohol at 20,000 ft with the high dose, thereby contributing to higher blood alcohol levels. (Author)

**A70-45330 # Illusions of pitch induced by centripetal acceleration.** J. W. Wolfe and R. L. Cramer (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1136-1139. 6 refs.

Eight basic airmen and 17 experienced jet pilots were exposed to five different levels of centripetal acceleration under two separate conditions. Trials were given with and without illumination and while the subject was facing toward or away from the center of rotation. Subjects were required to position themselves to the subjective horizontal plane under each of these conditions. The illusion of pitch developed rapidly and showed little change or adaptation over a 4-minute time interval. Both the inexperienced basic airmen and the experienced jet pilots were equally susceptible to the illusion of pitch induced by the acceleration; there were no significant differences between the two groups. Primary sensory input appeared to be from the otoliths and the subjects' responses appeared to be linearly related to the resultant force for the five levels tested. (Author)

**A70-45331 Prevention of heat syncope by the inflation of cuffs around the legs or around the lower abdomen.** Esar Shvartz (Negev Institute for Arid Zone Research, Beersheba, Israel). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1143, 1144. 10 refs. Research supported by the Ministry of Education and Culture.

Study in which five young men who had previously fainted in an orthostatic heat-test (40 C, 26% relative humidity) and one subject who had shown acute orthostatic weakness in the same test were given two additional 20-minute tilt table tests in the same climatic conditions. Pneumatic cuffs inflated to 62 mm Hg were applied to the legs and to the lower abdomen in each test, respectively. In three subjects both methods prevented syncope and in a fourth subject only cuff application to the legs prevented it. In the other two subjects syncope occurred earlier in the abdominal cuff tests. These results suggest that heat syncope is caused by blood pooling in the vascular beds of the legs and the splanchnic areas, and that in prevention of heat syncope cuff application to the legs is somewhat more effective than cuff inflation applied to the lower abdomen. (Author)

**A70-45332 Influence of photoperiod on food and water intake in rats.** E. L. Besch (Kansas State University, Manhattan, Kan.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1145-1148. 11 refs. Contract No. AF 44(620)-68-C-0020.

The influence of photoperiod on food and water intake was investigated in male, Sprague-Dawley rats exposed to two types of artificial days - LD 12:12 and LD 2:2. Food and water intake were measured for each animal for each day and at various times during the day. The methods for measuring food and water intake gave highly reproducible results. These results indicate that there is an endogenous circadian food and water intake rhythm under periods of LD 12:12 which persists during LD 2:2. Moreover, there appears to be a transient exogenous photoperiodic influence and phase shift for food intake following a change to LD 2:2. This shift appears to involve a slow and fast stage. Thus, the endogenous but not the exogenous feeding rhythm of rats seem to be correlated with their activity patterns. (Author)

**A70-45333 Pilot heart rate during in-flight simulated instrument approaches in a general aviation aircraft.** A. Howard Hasbrook and Paul C. Rasmussen (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). (*Aerospace Medical Association, Annual Meeting, 41st, St. Louis, Mo., Apr. 27-30, 1970.*) *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1148-1152. 10 refs.

Eight instrument rated pilots with flying experience ranging from 600 to 12,271 hours each flew ten simulated ILS instrument approaches in a single engine, general aviation aircraft equipped with a primary flight display arranged in a conventional 'T' configuration. Continuous heart rate data were recorded during each approach. Approaches were flown consecutively at approximate ten-minute intervals, with a one-minute in-flight rest period prior to each approach. Principal findings were: heart rate increased significantly during each approach; mean increase in heart rate during the approaches was 5.2 beats per minute (BPM) and was of a relatively constant magnitude for each of the ten approaches. The overall mean heart rate level decreased on successive approaches for a total of 11.0 BPM for the ten approaches. Results are discussed in terms of response to stress introduced by the demands of the task. (Author)

**A70-45334 Distribution and disappearance rates of infused cortisol in acute hyper- and hypocalcemic dogs.** S. F. Marotta (Illinois, University, Chicago, Ill.) and C. Lau (California, University, Berkeley, Calif.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1153-1157. 28 refs. Research supported by the University of Illinois; Contract No. NR-101-580.

The disappearance rates and volumes of distribution of infused cortisol were obtained from analyses based on an open two-compartment model in acutely prepared hypercalcemic (calcium gluconate infusion), hypocalcemic (ethylenediaminetetraacetate infusion), and normocalcemic dogs. No significant differences in volumes of distribution, rate constants to and from the two compartments and metabolic clearance rate were observed among the groups. There were some indications that hypercalcemia altered the half-life and secretory rate of cortisol. (Author)

**A70-45335 Artifact suppression in indirect blood pressure measurements.** John M. Lagerwerff and Robert S. Luce (Lockheed Missiles and Space Co., Sunnyvale, Calif.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1157-1161. 8 refs.

Use of the fact that each Korotkow-sound is always preceded by its causative sequence of electrical cardiac events in order to significantly reduce the incidence of false triggering of the blood pressure readout circuits. The circuit described utilizes the differentiated R-wave of a reference ECG to open an adjustable-delay, variable-width gate, shortly before the corresponding K-sound is expected. The circuit eliminates false triggering of the systolic and diastolic blood pressure readout circuits during approximately 90% of each cardiac cycle when measurements are being taken on highly active subjects, and prevents random triggering completely when the blood pressure cuff is deflated. The artifact suppression characteristics of the circuit are such that it would allow the indirect measurement of arterial blood pressure from highly active experimental subjects, or from an astronaut working in a full pressure suit on the lunar surface without the necessity of interrupting his activities. F.R.L.

**A70-45336 \* # Decompression sickness and measured levels of exercise on simulated Apollo missions.** Domenic A. Maio, Thomas H. Allen, and Richard W. Bancroft (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1162-1165. 8 refs. NASA Contract No. T-82170.

Investigation of the possible influence of simulated Apollo flight and lunar surface explorations on incidence of decompression sickness. Briefly stated, the various exposures of 19 men started with three hours of 'shirtsleeve' exposure to O<sub>2</sub> at 'ground level.' Next, this was rapidly changed to either 60:40::O<sub>2</sub>:N<sub>2</sub> or 80:20::O<sub>2</sub>:N<sub>2</sub> at 5 psia. Four hours later, the next decompression was to 3.5 psia O<sub>2</sub>

for 2 hours during which there were four hours of 'rowing' for 4 min interspersed with three intervals of mark time. The measured rate of oxygen utilization during rowing ranged from 1.2 to 1.8 liter per min STPD, depending on lean body mass. 'Bends' did not occur after decompression from 14.5 to 5 psia. There was a lesser incidence of bends after decompression to 3.5 psia O<sub>2</sub> from 5 psia 80:20 than from 60:40::O<sub>2</sub>:N<sub>2</sub>. There was no correlation between the grade of bends and peak levels of energy expenditure resulting from rowing at 12 strokes per min against an identical tension. (Author)

**A70-45337 \*** Parenteral administration of fluids as the sole source of hydration - Application in space (weightless) environment. George T. Ray, R. R. Burton, and J. R. Beljan (California, University, Davis, Calif.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1166-1169. 19 refs. Contract No. NAS 2-5245.

Parenteral administration of fluids as the sole source of hydration was found to be well-tolerated in adult domestic fowl for a period of at least thirty days. Animals hydrated in this manner exhibited no significant deviations in body mass or relative lymphocyte counts. The approximate fluid dose and concentration (as % NaCl) required to maintain an adult male Single Comb White Leghorn chicken was determined. The combination of restraint with parenteral hydration was well-tolerated. The birds appeared quite normal on a clinical basis. Restrained birds did, however, exhibit modest reductions in body mass and relative lymphocyte counts accompanied by statistically significant increases in adrenal organ weights when compared with nonrestrained controls. Thus, the combination of restraint and parenteral hydration would appear to produce a mild stress response though this was not clinically obvious. (Author)

**A70-45338** Hyperbaric enhancement of Coxsackievirus infection in mice. E. V. Orsi, R. Mancini, and J. Barriso (Seton Hall University, South Orange, N.J.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1169-1172. 16 refs. Contract No. N 00014-68-A-0340-0001.

Study in which sixteen-day-old female CFW mice were inoculated intraperitoneally with either 0.25 ml of saline, uninfected HEp-2 supernatant or similar supernatant containing about 1,500,000 TCD sub 50 per ml of Coxsackievirus B-1. Some mice received these inoculations prior to exposure to 100% oxygen at 3 atm abs for 15 minutes following hyperbaric exposure. Other infected mice were kept at a normal atmosphere. Appropriate uninfected hyperbaric and normal pressure controls were included. By 72 hours twice as many hyperbaric and infected mice died than with infection alone. Virus assay of heart and brown fat also disclosed significantly ( $P = 0.02$ ) greater amounts of virus with hyperbarism provided that infection followed oxygenation. Exposure of the host to hyperbaric oxygen before infection not only exacerbates virus induced host pathology but also enhances virus synthesis. (Author)

**A70-45339** Low incidence of bends following renitrogenation in an altitude training profile. Durward L. Rhodes (U.S. Navy, Naval Training Device Center, Orlando, Fla.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1173-1176. 19 refs.

Study in which a population of 4400 flight personnel was exposed to reduced atmospheric pressure employing a low-pressure-chamber training flight profile. Subjects ranged in age from 18 to 45 years and were categorized as designated aviators, advanced jet flight students, and passengers. Without lengthy denitrogenation, and following exposure to the stress of hypoxia followed by exposure to 3.46 psia at simulated 35,000 feet concomitant with positive pressure breathing equivalent to 10 to 12 in. H<sub>2</sub>O, incidence of bends rated no more severe than grade I was less than 0.5% among the population of 4400 subjects. It is concluded on the basis of the reported work that lengthy time-and-money consuming denitrogenation may not be required to preclude incidence of bends among subjects exposed to simulated altitudes no higher than 35,000 feet for brief periods. Further, the practice of exposing subjects to the

stress of hypoxia prior to ascents to higher simulated altitudes for brief periods may not be as hazardous as originally thought. (Author)

**A70-45340 \*** Effects of hyperoxia on white blood cells. I - In vivo changes in the total white blood cell counts of normal rats. C. Kent Osborne, L. H. Brubaker, and C. E. Mengel (Missouri, University, Columbia, Mo.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1176-1179. 18 refs. PHS Grants No. CA-11447-01; No. FR-5387-07; Contracts No. NAS 9-9209; No. NAS 9-9417; No. N 00014-67-A-0003.

Examination of the effect of hyperbaric oxygen (OHP) on WBC damage and lysis. Adult male Sprague-Dawley chow-fed rats were exposed to 100% O<sub>2</sub> (OHP) or room air (AHP) at 4-atm pressure for 90 min. Rats exposed to OHP showed a significant decrease in total WBC count from 13,520/ to 9180/cu mm. In contrast, rats exposed to AHP had no significant change (13,040 to 11,360). The absolute granulocyte count showed no significant change, but the absolute lymphocyte count declined significantly in rats exposed to OHP (11,900 to 6600), in contrast to those exposed to AHP (11,000 to 9500). Neither OHP or AHP resulted in hemolysis. Splenectomy and/or administration of vinblastine sulfate had no influence on these changes. Rats given hydrocortisone showed a lymphocyte decrease of similar magnitude to those exposed to OHP. Adrenalectomy abolished the decrease in lymphocyte count caused by OHP. These data demonstrate that rats exposed to hyperoxia (and not 4-atm pressure alone) show a decrease in the total WBC count. This decrease is a selective effect on the absolute number of lymphocytes. The results are consistent with the hypothesis that OHP causes a reduction in lymphocyte count by a stress response mediated by adrenocorticosteroids and not by a direct toxic effect on the cell. (Author)

**A70-45341 \*** Motion sickness produced by head movement as a function of rotational velocity. Earl F. Miller, II and Ashton Graybiel (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1180-1184. 8 refs. NASA Contract No. T-81633.

To measure the stressor stimulus effect of rotational velocity in terms of the number of the standardized head tilt movements required to evoke a common severity level of symptoms characterizing motion sickness, sixteen young healthy subjects were rotated in a laboratory (Stille) rotational chair at various velocities within a range suitable for each subject and the limits of 1.0 to 30.0 rpm. Standardized 90 deg head movements were executed at each test velocity until the preselected and quantitatively determined motion sickness endpoint of moderate (M IIA) or severe (M III) malaise was reached. When individual ability to make head movements without evoking symptoms was exceeded, the derived average stressor effect (E factor) of each head movement varied directly and, in log-log terms, linearly with rotational velocity. These data provide the basis for grading individual susceptibility to Coriolis (motion) sickness with a single numerical score as well as define the high rate of change of Coriolis stressor effect as a function of rotational velocity, which may find practical application for specifying rotational rates of space stations. (Author)

**A70-45342** Gravity and perinatal organ growth. Arthur H. Smith and Russell R. Burton (California, University, Davis, Calif.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1184-1186. 32 refs.

Newly hatched chicks exhibit a selective hypertrophy of extensor muscles involved in locomotion and postural maintenance. The effect is of short duration, being complete in three days of terrestrial existence. It is considered that these changes represent an adaptation to earth gravity in an organism which had developed in a buoyant state. (Author)

**A70-45343** Self-calibrating technique for measurement of continuous-wave laser beam power density distributions. James C. Rock and James L. Unmack (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, Oct. 1970, p.

1187-1189. 6 refs.

A photographic film dosimetry technique is presented which can be used to determine the power density distribution of a continuous wave laser beam operating in the visible or near visible wavelengths. This technique was developed at the United States Air Force School of Aerospace Medicine to provide the medical service with a means with which to survey operational laser systems. In use, a white target is placed so as to intercept the beam, and a sequence of photographs is taken at constant shutter speed and decreasing f/stops (increasing aperture). Plots of the locus of any selected transmission ratio in successive images of the beam are the iso-intensity contours for the beam power density distribution. The usefulness of the technique can be extended by placing a spike filter over the camera lens to prevent broad spectrum ambient illumination from exposing the film while allowing narrow spectrum laser energy through. (Author)

**A70-45344** Aeromedical consultation service case reports - Occipital migraine. Paul L. Richter and William H. King (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1190-1192. 14 refs.

Migraine presenting as pain in the occipital region can be a difficult diagnostic problem. Three illustrative cases evaluated at the USAF School of Aerospace Medicine are reviewed. In two, sub-arachnoid hemorrhage was initially suspected. In the third, symptoms had been attributed to labile hypertension or spasm of cervical musculature. Factors supporting the diagnosis of migraine and influencing the disposition regarding flying status are discussed. (Author)

**A70-45345** Effects of alcohol on memory and its implications for flying safety. Ralph S. Ryback (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1193-1195. 39 refs.

Alcohol most severely disrupts short-term memory in man; this is briefly presented in terms of social drinking, state-dependent learning, alcohol amnesia, the Wernicke-Korsakoff syndrome, and pathological alcoholic intoxication. The implications of the latter are discussed in terms of flying safety. (Author)

**A70-45347 \*** Hazards of the G-suit in lower extremity thrombophlebitis. James Roman (NASA, Flight Research Center, Edwards, Calif.; Oregon, University, Portland, Ore.), C. E. Lewis, Jr. (NASA, Flight Research Center, Biomedical Programs Div., Edwards, Calif.), and William H. Allen (NASA, Flight Research Center, Edwards; California, University, Los Angeles; Long Beach Memorial Hospital, Long Beach, Calif.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1198, 1199. Grant No. NGR-38-003-015.

Trauma is widely accepted as an etiologic factor in venous thrombosis and thrombophlebitis of the lower extremities. Because of the frequent participation of military pilots and test pilots in athletic activities, the incidence of venous thrombosis of the extremities may be expected to be significant in this population. This group is likely to fly high performance vehicles and, therefore, likely to use the g-suit. On theoretical grounds, use of the g-suit in the face of recent venous thrombosis in the lower extremities should be hazardous. This problem is considered in this paper. (Author)

**A70-45348 \*** Apparatus for kinetic studies of the reactions of air revitalization chemicals with water vapor and gaseous carbon dioxide. A. W. Petrocelli and A. Capotosto, Jr. (General Dynamics Corp., Electric Boat Div., Groton, Conn.). *Aerospace Medicine*, vol. 41, Oct. 1970, p. 1203, 1204. 6 refs. Contract No. NASw-559.

Apparatus is described for kinetic studies of the pertinent air revitalization reactions of 'active chemicals' used for air regeneration in closed environments. This apparatus has been employed to confirm certain stoichiometries, to elucidate reaction mechanisms, to determine the extent of conversion of the air revitalization chemicals, and to relate the observed respiratory quotient to that

required for man in a closed environment. The apparatus was designed to simulate the conditions of a closed environment such as a space cabin. (Author)

**A70-45373** Acoustic reflex effect in the case of pulse loading (Die Wirkung des Akustischen Reflexes bei Impulsbelastung). S. Müller (Dresden, Technische Universität, Dresden, East Germany). *Acustica*, vol. 23, no. 4, 1970, p. 223-229. 15 refs. In German.

Investigation of the effectiveness of the immunizing action attributed to the acoustic reflex in cases of impulsive noise. Three different methods of measurement have been applied in the course of the investigation, and their results are discussed. Against impulsive noises, as they occur in practice, any utilization of the protective action of the acoustic effect seems rather problematic, because the prestimulation it requires is in itself potentially harmful and must be administered with extreme care and accuracy, lest the remedy prove worse than the disease. M.V.E.

**A70-45403** Generation of Cherenkov light flashes by cosmic radiation within the eyes of the Apollo astronauts. G. G. Fazio (Smithsonian Astrophysical Observatory and Harvard College Observatory, Cambridge, Mass.), J. V. Jelley, and W. N. Charman (Atomic Energy Research Establishment, Harwell, Berks., England). *Nature*, vol. 228, Oct. 17, 1970, p. 260-264. 13 refs.

It is proposed that the primary cosmic radiation is responsible for the light flashes observed by astronauts in translunar flight. Cherenkov radiation may be an important or even the dominant mechanism. An alternative mechanism is the direct excitation of the retina by cosmic ray particles. (Author)

**A70-45406** Evidence for a new haemoglobin chain (zeta-chain). Grayson L. Capp, Demetrios A. Rigas, and Richard T. Jones (Oregon, University, Portland, Ore.). *Nature*, vol. 228, Oct. 17, 1970, p. 278-280. 12 refs. AEC-PHS-supported research.

Consideration of the possibility of a new human embryonic hemoglobin, first indicated by Drescher and Kunzer (1954). Evidence is presented that the x-chain described by Capp et al. (1966, 1967) is in fact a new human hemoglobin chain, here designated as the zeta-chain. F.R.L.

**A70-45407** Nitrification and induction of nitrate reductase in nitrogen-deficient algae. Erich Kessler and Heinz Oesterheld (Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Nature*, vol. 228, Oct. 17, 1970, p. 287, 288. 12 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Confirmation of the findings of Morris and Syrett (1963, 1965) that, in *Chlorella* grown in ammonium, nitrate reductase is formed after the nitrogen source has been exhausted. It is also shown that when nitrogen is deficient, cellular nitrogen compounds are oxidized to nitrate and nitrite which, in turn, induce the synthesis of nitrate reductase. F.R.L.

**A70-45493 #** Shock stimulation of the respiration center of the medulla oblongata (O shokovyykh razdrzheniikh oblasti dykhatel'nogo tsentra prodolgovatogo mozga). I. A. Keder-Stepanova, V. A. Ponomarev, and A. N. Chetaev (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 193, July 21, 1970, p. 734-736. 5 refs. In Russian.

Discussion of experiments aimed at a more thorough study of the mechanism governing the respiration rhythm, in view of a distinct connection between data obtained by the authors and data obtained by Burns and Salmoiraghi (1960), using a completely different approach. The experiments were performed with 27 decerebrated or anesthetized cats, whose respiration center of the

medulla oblongata was subjected to maximal shocks (shock which no longer increased with increasing stimulation) applied with a platinum electrode to the dorsal surface. A comparison between data obtained for short point stimulations of the medial section and data obtained for shock stimulations leads to the following two conclusions, which however should be treated with great caution. First, the effects responsible for changes from inspiration to expiration and vice versa (change of phase effect), which are characteristic for short and for weak shock stimulations may be considered to be of the same nature (to involve the same process). It may be assumed that this process has no connection with afference nor neuron fatigue, but is connected in some way with the behavior of the medial section. Second, the observed effect that maximum shock stimulation always causes expiration is positively not connected with afference, and that possibly this effect may not be directly associated with the change of phase effect. V.P.

A70-45496 # Cis-trans-isomerization of cinnamoyl-alpha-chymotrypsin under the effect of light and modeling of molecular mechanisms of visual reception (Tsis-trans-izomerizatsiia tsinnamoiil-alpha-khimotripsina pod deistviem sveta i modelirovanie molekuliarnykh mekhanizmov zritel'noi retseptsi). I. V. Berezin, S. D. Varfolomeev, and K. Martinek (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 193, Aug. 1, 1970, p. 932-935. 9 refs. In Russian.

Description of a procedure by which it proved possible to obtain a cis-cinnamoyl-alpha-chymotrypsin which constitutes a relatively stable acyl derivative of chymotrypsin which does not exhibit enzymic activity. Practically no deacylation of this acyl enzyme occurs even at the pH-optimum of catalytic action of chymotrypsin. Illumination of this solution by UV light leads to trans-stereoisomerization of the chromophore cis-cinnamoyl group. This leads to the formation of trans-cinnamoyl-alpha-chymotrypsin which constitutes a labile acyl enzyme. In the pH-optimum of the catalytic action of chymotrypsin, it deacylates rapidly, this process being accompanied by liberation of trans-cinnamic acid from the free enzyme. The photo-induced formation of the free enzyme from cis-cinnamoyl-alpha-chymotrypsin is merely the initial act of photo-reception in the given system. A photoreceptor model is proposed which also contains an internal amplification source of the initial light signal. V.P.

A70-45506 Navigation in terrain-following flight. Stanley M. Soliday (North American Rockwell Corp., Columbus, Ohio). *Human Factors*, vol. 12, Oct. 1970, p. 425-433. 5 refs. Contract No. AF 33(657)-13798.

This study investigated the problem of navigation in low-altitude, high-speed, terrain-following flight. Tests were made in a four-degree-of-freedom flight simulator that had an out-of-cockpit television presentation synchronized with it in such a way that a subject seemed to be flying over a landscape with freedom to climb, descend, and change course at will. Twelve experienced jet pilots flew 48 one-and-one-half-hour missions using several combinations of navigational and terrain-following displays in two different types of simulated aircraft. The results showed that the pilots navigated with much greater efficiency when they had information from a simulated inertial guidance system than when they did not have this information. They navigated better in mountainous terrain when they used a head-up display for terrain-following than when they used conventional in-cockpit instruments for terrain-following, and they navigated better in the aircraft that had the more desirable handling qualities. (Author)

A70-45507 Experimental evaluation of a visual detection model. Charles P. Greening and Melvin J. Wyman (North American Rockwell Corp., Autonetics Div., Anaheim, Calif.). *Human Factors*, vol. 12, Oct. 1970, p. 435-445. 6 refs.

A fixed-base simulation experiment was performed to gather visual air-to-ground target recognition performance data for comparison with predictions from the Autonetics Detection Model. Color motion picture imagery obtained during a low-altitude flight was used to simulate the observer's forward view. Observer performance

was measured in terms of probability and range of correct target recognition. The Autonetics Detection Model incorporates parameters related to the target, the environment, and the observer. In generating theoretical predictions from the model, values of all parameters were specified independently of the data obtained in the experiment. No curve fitting techniques were used to improve the fit between the empirical and theoretical curves. Results indicated a close relationship between the obtained performance data and the model predictions. A product-moment correlation of +0.53, significant at the 0.001 level, was obtained between the empirical and theoretical 50% recognition ranges. (Author)

A70-45508 Tracking performance as a function of precision of electrocutaneous feedback information. Thomas R. Schori (South Dakota University, Vermillion, S. Dak.). *Human Factors*, vol. 12, Oct. 1970, p. 447-452. 7 refs.

Although it has been demonstrated that cutaneous informational displays can be used effectively in certain types of systems, little is known of the characteristics of such displays that may affect performance. The present investigation was designed to determine which of three degrees of preciseness of electrocutaneous feedback information results in the most accurate tracking performance for each of two levels of task difficulty. Contrary to expectations, the most precise (continuous) error information did not result in the best performance. On both levels of task difficulty, the best performance resulted when error information of an intermediate preciseness was used. (Author)

A70-45509 The evaluation of mental stress through the analysis of parotid fluid. Robert L. Street, Harpal Singh, and Paul N. Hale, Jr. (Texas A & M University, College Station, Tex.). *Human Factors*, vol. 12, Oct. 1970, p. 453-455.

This study investigates the utilization of the 17-hydroxy-corticosteroid (17-OHCS) level in the parotid fluid as a measure of mental or emotional stress. Twelve graduate students were subjected to three levels of mental stress, and the results of the chemical analysis of the parotid fluid indicate that there is a definite relationship between mental or emotional stress and the 17-OHCS level. (Author)

A70-45510 # Derivation and validation of the automated readability index for use with technical materials. Edgar A. Smith and J. Peter Kincaid (USAF, Human Resources Laboratory, Wright-Patterson AFB, Ohio). *Human Factors*, vol. 12, Oct. 1970, p. 457-464. 11 refs.

The utility of technical materials is influenced to a marked extent by their reading level or readability. This article describes the derivation and validation of the Automated Readability Index (ARI) for use with technical materials. The method allows for the easy, automatic collection of data as narrative material is typed on a slightly modified electric typewriter. Data collected includes word length (a measure of word difficulty) and sentence length (a measure of sentence difficulty). Appropriate weightings of these factors in a multiple regression equation result in an index of reading difficulty. Uses of the index for evaluating and controlling the readability of large quantities of technical material are described. (Author)

A70-45511 Flickerless regeneration rates for CRT displays as a function of scan order and phosphor persistence. Amanda B. Dill and John D. Gould (IBM Corp., Thomas J. Watson Research Center, Yorktown Heights, N.Y.). *Human Factors*, vol. 12, Oct. 1970, p. 465-471. 16 refs.

The effects of two variables on the regeneration rates required to prevent flicker on CRT displays were investigated in this computer-automated experiment. The two variables were the sequential order in which the display was scanned (e.g., horizontal, vertical, or pseudo-random scanning) and the persistence of the phosphor on the display. Twenty-one different scan orders and two phosphors (P-12 and P-38) were used. Results showed that flickerless

regeneration rates depended principally upon phosphor persistence; scan order had only a minor influence. The main effect of random and pseudorandom scanning was to reduce the disturbing effects of display flicker when it did occur, rather than to reduce significantly the regeneration rate at which flicker did not occur. (Author)

**A70-45512 Accuracy of interpolation between scale graduations.** Edwin Cohen and Richard L. Follert (Singer Co., Link Div., Binghamton, N.Y.). *Human Factors*, vol. 12, Oct. 1970, p. 481-483.

This study is concerned with the accuracy with which subjects can interpolate the position of a pointer or index between two scale graduations. Each of 20 subjects estimated the position of a mark on each of 99 5-in. linear, ungraduated scales. Estimates were given in units over the range 0-100 units. The median error was only 1.5% of the distance between the two marked graduations. Accuracy was greatest at the ends and middle of the scale. The data indicate that interpolation of fifths and even tenths will provide accuracy satisfactory for most situations. (Author)

**A70-45513 Operator-mounted controllers for precision tracking.** Dennis L. Price (North American Rockwell Corp., Autonetics Div., Anaheim, Calif.). *Human Factors*, vol. 12, Oct. 1970, p. 485-491, 14 refs.

This study explored the feasibility of using hand-held and leg-mounted controllers for precision tracking tasks. The hand-held device was a thumb-actuated pressure controller; the leg-mounted device was a conventional displacement stick. Two experiments were undertaken. The first was conducted in a static-based facility to explore the effects of control sensitivity and controller type on tracking performance. The second was carried out in a dynamic-motion simulator to examine the effects of buffeting on tracking, and to continue the comparison of controllers. The dynamic environment was that of a light aircraft under various wind gust conditions. Results indicated that there was no significant difference in tracking performance between the two types of controllers or the two sensitivity levels, except when a lag-lead transfer function was introduced. As expected, tracking performance was inversely related to severity of buffeting. It was concluded that either controller could be considered for use in precision tracking tasks from light aircraft subjected to light or moderate wind gust conditions. (Author)

**A70-45514 The readability of segmented and conventional numerals.** D. W. Plath (North American Rockwell Corp., Autonetics Div., Anaheim, Calif.). *Human Factors*, vol. 12, Oct. 1970, p. 493-497, 12 refs.

The objective of this research was to compare the readability of slanted and vertically segmented numerals with the readability of the numeral design recommended in most human engineering guides. The specific variable investigated was the accuracy with which the numbers could be read at three exposure times. Results indicated that the readability of the slanted segmented numerals was no better than that of the vertical segmented numerals. Both forms of segmented displays were significantly inferior to the conventional numerals in readability. It was concluded that segmented displays, as presently designed, should not be used where accuracy is critical and exposure time is severely limited. (Author)

**A70-45515 Validity of expert judgments of performance time.** William J. Burger, William B. Knowles, and Joseph W. Wulfbeck (Dunlap and Associates, Inc., Santa Monica, Calif.). *Human Factors*, vol. 12, Oct. 1970, p. 503-510, 7 refs.

An apparatus and a method for validating estimates of performance time and reliability against empirical measures of human performance time and reliability are described. Measures of performance time were obtained on five tasks and were correlated with estimates of performance times obtained from eight judges in a previous study. Median observed and estimated performance times were highly correlated ( $r$  equal to .98,  $p$  less than .01). Estimates of maximum performance time corresponded to the 95th to 100th

percentiles of the observed distribution of performance time, but estimates of minimum performance time were high and scattered over the lower percentiles. The significant validity coefficient suggests the feasibility of using estimates of performance time, at least for some simple tasks, in system-analytic models when empirical data are lacking and are too expensive to obtain. (Author)

**A70-45568 Biomedical use of lasers - Present state and future prospects (Biomedizinische Anwendung von Lasern - Gegenwärtiger Stand und Zukunftsaussichten).** Marc Bruma. *Laser*, vol. 2, Sept. 1970, p. 57-59. In German.

Discussion of certain biomedical applications of lasers from the standpoint of the interaction between the laser and the biological target. The role played by the various components of this interaction in the surgical process is noted in the case of eye surgery and tumor treatment. The characteristics of a new laser system for clinical research built at the Centre National de la Recherche Scientifique in Paris are summarized. The thermal effects of pulsed laser radiation and the ionization effects of a Q-switched high-power ruby laser on a biological target are illustrated. A.B.K.

**A70-45569 Use of lasers in surgery (Anwendung von Lasern in der Chirurgie).** T. M. Cunningham (Department of Scientific and Industrial Research, Auckland, New Zealand) and D. W. Hill (Royal College of Surgeons, London, England). *Laser*, vol. 2, Sept. 1970, p. 60-63, 7 refs. In German. Research supported by the Winston Churchill Trust of New Zealand.

Discussion of the surgical applications of various types of lasers. The use of pulsed ruby lasers in the treatment of cancerous tissue and in ophthalmology is reviewed. Cases where the use of continuous lasers in the visible range is advantageous are cited. The nature of the cutting effect of the CO<sub>2</sub> laser on tissues is summarized, and a comparison is made between treatment by CO<sub>2</sub> laser and by conventional rf diathermy. The design of a typical surgical CO<sub>2</sub> laser system is described, as well as the design of a laser beam manipulator. Factors governing the choice of focusing lens are considered, and some safety measures are recommended. A.B.K.

**A70-45619 \* Altered gravitational field effects on the fertilized frog egg.** R. S. Young (NASA, Washington, D.C.), P. H. Deal, K. A. Souza, and O. Whitfield. *Experimental Cell Research*, vol. 59, Feb. 1970, p. 267-271, 14 refs.

*Xenopus laevis* and *Rana pipiens* eggs were centrifuged under various conditions after fertilization. The fertilized egg is most sensitive to altered gravitational fields before first cleavage and abnormalities so induced are typical of the time period of centrifugation. Thus, abnormalities in embryos centrifuged at 40 g for 15 min during the first 35 min after fertilization, were confined to a twinning phenomenon. (Author)

**A70-45620 \* Hypotensive effects of chlordiazepoxide, amobarbital and chlorpromazine on behaviorally induced elevated arterial blood pressure in the squirrel monkey.** Herbert Benson, J. Alan Herd, W. H. Morse, and R. T. Kelleher (Harvard University, Boston; New England Regional Primate Research Center, Southborough, Mass.). *Journal of Pharmacology and Experimental Therapeutics*, vol. 173, no. 2, 1970, p. 399-406, 15 refs. Research supported by the Medical Foundation; PHS Grants No. HE-09154; No. MH-02094; No. MH-07658; Grant No. NGR-22-007-137.

Experimental investigation of the hypotensive and behavioral effects of chlordiazepoxide, amobarbital and chlorpromazine in unanesthetized squirrel monkeys whose mean arterial blood pressure had been increased by environmental means. Each monkey had been trained to press a key under a fixed-ratio schedule of termination of a stimulus associated with noxious stimuli and had developed marked, persistent elevations of mean arterial blood pressure during the behavioral experiments. All three drugs decreased the rates of responding and mean blood pressure. M.M.

**A70-45633 #** Investigation of the effects of ganglerone and quaterone on certain physicochemical indices of arterial blood (Izuchenie deistviia ganglerona i kvaterona na nekotorye fiziko-khimicheskie pokazateli arterial'noi krovi). S. A. Mirzoiian, E. S. Gabrielian, and E. A. Amroian (Erevanskii Meditsinskii Institut, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 50, no. 3, 1970, p. 182-186. 13 refs. In Russian.

Experimental data for the influence of the cholinolytic agents ganglerone and quaterone on certain indicators of the acid-base balance in the arterial blood of cats. It is shown that quaterone and ganglerone affect the respiratory component of the acid-base balance in arterial blood. Tables list observed changes in partial oxygen and carbon dioxide pressures, pH, actual and standard bicarbonate concentrations, total carbon dioxide, base excess, buffer base, and hemoglobin. A ganglerone dose of 1 mg/kg substantially increases the arterial carbon dioxide tension. It also changes the concentration of hydrogen ions but does not significantly affect the remaining factors. Quaterone also increases the arterial carbon dioxide pressure and reduces the oxygen tension. T.M.

**A70-45675 \*** Blood velocity measurements in intact subjects. O. C. Morse and J. R. Singer (California, University, Berkeley, Calif.). *Science*, vol. 170, Oct. 23, 1970, p. 440, 441. 5 refs. Contract No. NAS 8-1581.

Venous blood velocities in intact human forearms can be measured by the use of nuclear magnetic resonance techniques. In essence, two separated coils are placed over the vein, and the arm is held in a magnetic field. Radio frequency energy in one coil 'flips' over the protons in the blood stream, and the second coil detects the arrival of the 'flipped' protons. Human blood in vivo and in vitro has a nominal nuclear magnetic resonance relaxation time of 0.4 second. (Author)

**A70-45801** Comparison of medial growth of human thoracic and abdominal aortas. Harvey Wolinsky (Yeshiva University, Bronx, N.Y.; Chicago, University, Chicago, Ill.). *Circulation Research*, vol. 27, Oct. 1970, p. 531-538. 35 refs. Research supported by the Health Research Council of New York; PHS Grants No. HE-12766; No. HD-00674.

Recent morphologic studies of adult mammalian thoracic and abdominal aortic segments have shown that the adult human abdominal aorta deviates significantly from the usual pattern of medial lamellar architecture. In the present study medial growth of these two aortic segments from prenatal life to adulthood was compared in terms of medial architecture and calculated tangential tension levels. During prenatal life, these parameters were very similar in the two segments. However, the postnatal increase in the medial thickness of the thoracic segment was due mainly to the addition of lamellar units which increased in number from 35 to 56; only a minor contribution was made by increased thickness of each unit which changed from 0.012 to 0.017 mm. The converse was true for the abdominal segment; the number of lamellar units increased only from 25 to 28, but lamellar unit thickness increased strikingly from 0.012 to 0.026 mm. Calculated wall stress was similar in the two segments throughout growth, but tension per lamellar unit became disparate in the segments during the first decade of life, culminating in unusually elevated values in the adult human abdominal aortic media. (Author)

**A70-45802** Role of specific glycopeptides of human serum lipoproteins in the activation of lipoprotein lipase. Richard J. Havel, Virgie G. Shore, Bernard Shore, and Dennis M. Bier (California, University, San Francisco; California, University, Livermore, Calif.). *Circulation Research*, vol. 27, Oct. 1970, p. 595-600. 19 refs. AEC-supported research; PHS Grant No. HE-06285.

Investigation of the activity of specific glycopeptides, isolated from very low density and high density lipoproteins, in an incubation mixture containing lipoprotein lipase from cows' milk and 1.8 mg triglyceride per ml. It is found that specific glycopeptides are

required for the action of lipoprotein lipase on emulsified triglycerides. It is suggested that these glycopeptides are important components of the mechanism for extrahepatic utilization of plasma triglycerides. Z.W.

**A70-45803** Hypertensive mechanisms; National Heart Foundation, Conference, Canberra, Australia, January 27-30, 1970, Proceedings. *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970. 297 p.

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**A70-45804** Transmitter economy of sympathetic neurones. Laurence B. Geffen, Bruce G. Livett (Monash University, Clayton, Australia), and R. A. Rush (Oxford University, Oxford, England). (National Heart Foundation, Conference on Hypertensive Mechanisms, Canberra, Australia, Jan. 27-30, 1970.) *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970, p. II-33 to II-39. 28 refs. Research supported by the National Heart Foundation and the National Health and Medical Research Council of Australia.

Description of a model of sympathetic transmission in which the capacity of sympathetic nerves to maintain transmitter liberation under various stresses is dependent on rapid regulatory mechanisms such as mobilization of stores, acceleration of synthesis, reuptake of transmitter, and long-term changes involving enzyme and vesicle synthesis and transport. The distribution and transport of various components of the synaptic vesicles within the sympathetic neurone are studied, with emphasis on noradrenaline and the specific vesicle proteins chromogranin A and dopamine-beta-hydroxylase. Potential hypertensive mechanisms arising from a disordered life cycle of the vesicles are considered. T.M.

**A70-45805** The neurogenically maintained component in hypertension. Frederick Horace Smirk (Otago, University, Dunedin, New Zealand). (National Heart Foundation, Conference on Hypertensive Mechanisms, Canberra, Australia, Jan. 27-30, 1970.) *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970, p. II-55 to II-63. 34 refs. Research supported by the New Zealand Medical Research Council; NIH Grant No. HE-10942.

Discussion of experimental studies of the neurogenically maintained component of blood pressure which is caused by the autonomic nervous system's activity both in hypertension and in normotension. There is an important neurogenically maintained component of blood pressure in a subject at horizontal posture which is usually much larger in hypertension than in normotension. The neurogenically maintained component is involved in the production of hypertensive disease, and effective treatment by sympatholytic agents depends on the reduction of this component's magni-

tude. Rats with spontaneous genetic hypertension and rats with experimental renal hypertension have both neurogenically and not neurogenically maintained components, with the neurogenically maintained component being larger in the genetic hypertensive rats. Immun sympathectomy decreases the rise of blood pressure with age and prevents the development of hypertension in rats. T.M.

**A70-45806 Genetic and autonomic factors in inherited hypertension.** Edward L. Phelan (Otago, University, Dunedin, New Zealand). (*National Heart Foundation, Conference on Hypertensive Mechanisms, Canberra, Australia, Jan. 27-30, 1970.*) *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970, p. II-65 to II-74. 32 refs. Research supported by the Medical Research Council of New Zealand; NIH Grant No. HE-10942.

Results of crossbreeding experiments with hypertensive and normotensive pure lines of New Zealand strain rats, confirming the polygenic nature of blood pressure inheritance. Data show that the inheritance of blood pressure is probably controlled by several genes acting additively. The values of the estimated genetic contribution to the blood pressure are 60% for males and 52% for females. An important conclusion drawn from the present findings is that the state of activity of the sympathetic nervous system is not constant throughout the life of a genetically hypertensive rat; it may play different roles in the development and maintenance of hypertension. T.M.

**A70-45807 Regulation of vascular smooth muscle contraction - Changes in experimental hypertension.** David F. Bohr (Michigan, University, Ann Arbor, Mich.) and Michael Sitrin. (*National Heart Foundation, Conference on Hypertensive Mechanisms, Canberra, Australia, Jan. 27-30, 1970.*) *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970, p. II-83 to II-90. 20 refs.

Recent evidence bearing on the following control points for vascular smooth muscle contraction is reviewed: contractile protein, energy metabolism, excitation-contraction coupling, excitation. A study of the vascular smooth muscle of the femoral artery from rats with DCA hypertension demonstrated that it differs from similar muscle from control animals in that it has an increased tendency to develop spontaneous rhythmicity; it responds to lower concentrations of epinephrine, KCl, and CaCl<sub>2</sub>; and the maximum tension it is able to develop is less. It cannot be determined whether these changes are the cause or the result of the hypertension. (Author)

**A70-45808 Viscoelastic properties of conduit arteries.** B. S. Gow (Sydney, University, Sydney, Australia). (*National Heart Foundation, Conference on Hypertensive Mechanisms, Canberra, Australia, Jan. 27-30, 1970.*) *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970, p. II-113 to II-122. 39 refs.

Study of arterial viscoelasticity in dogs anesthetized with pentobarbitone by recording and analyzing pressure and corresponding diameter waves. The viscoelastic properties of normal arteries are described, and the changes which occur in elasticity during the early stages of hypertension are outlined. The frequency dependence of viscous and elastic moduli is characterized for the range from 0 to 16 Hz for pressure and diameter oscillations. Data show the effects of vasoconstriction and vasodilatation on the elastic modulus and volume distensibility of the femoral artery of the living dog. The hemodynamic consequences of changes in vasomotor tone in the walls of conduit arteries are also discussed with regard to normal dogs and dogs in the early stages of hypertension. T.M.

**A70-45809 Arterial hemodynamics in hypertension.** Michael F. O'Rourke (St. Vincent's Hospital; New South Wales, University, Sydney, Australia). (*National Heart Foundation, Conference on Hypertensive Mechanisms, Canberra, Australia, Jan. 27-30, 1970.*) *Circulation Research*, Supplement no. 2, vol. 27, Oct. 1970, p. II-123 to II-133. 35 refs. Research supported by the National Heart Foundation of Australia.

Description of mechanisms responsible for alterations in arterial hemodynamics in hypertension. Hypertension results from increased

peripheral resistance, but the major changes in the pulse are a consequence of the accompanying decrease in arterial distensibility whether this is due to the elevated mean pressure by itself or to degeneration of the normal components of the arterial wall. Decreased distensibility increases characteristic impedance in the ascending aorta, and through its effects on wave velocity causes a shift of impedance curves to higher frequencies. This disturbs the normally favorable relationship between the components of the ventricular ejection wave and the impedance presented to the ventricle, resulting in increased pulsatile energy losses in the vascular system. At the same time, there are changes in the harmonic components of the ascending aortic pressure wave which lead to increased amplitude and characteristic alterations in contour. T.M.

**A70-45836 # The forebrain participation in the suppression reaction during stimulation of the caudate nucleus in rats and cats (Rol' lobnykh otdelov golovnogo mozga pri podavlenii slozhnore-flektornykh reaktsii u krys i koshek).** N. N. Oleshko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 953-962. 30 refs. In Russian.

Stimulation of the caudate nucleus was shown in experiments on rats and cats to suppress complex reflex motor responses to distant stimuli. In rats, unilateral prefrontal lobotomy at the corpus striatum level either increases the threshold of the suppression reaction (TSR) or abolishes the suppression function of the caudate nuclei. In cats, unilateral prefrontal lobotomy at the posterior sigmoid gyrus and anterior margin of the caudate nucleus' head levels either increases the TSR or abolishes the suppression function of the caudate nuclei. On the intact side, the suppression function preserves completely. Singular destroying of the posterior half of the caudate nucleus, of the amygdala, of the claustrum or putamen does not affect the suppression function of the caudate nuclei in rats. The TSR increases after simultaneous complete destruction of the above subcortical structures. The inferior levels of the c. n. s., the basal ganglia and the thalamus included, do not avail the suppression reaction during stimulation of the caudate nuclei in rats and cats. The forebrain directly participates in the process of the suppression function of the caudate nuclei. (Author)

**A70-45837 # Investigation into the pathways of the short-latency reticulo-cortical responses (Issledovanie putei rasprostraneniia korotkolatentnykh retikulo-korkovykh otvetov).** L. V. Loskutova (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 963-966. 18 refs. In Russian.

In acute experiments on cats, the pathways of the short-latency reticulo-cortical responses were studied (RCRI and RCRII). The thalamic unspecific nuclei and those of the hypothalamus were destroyed. When the posterior hypothalamus nuclei had been ipsilaterally destroyed (Mm), RCRI and RCRII disappeared but were still observed on the contralateral side. Similar results were obtained after destruction of the lateral hypothalamic nucleus and ablation of the capsula interna. RCRII was also abolished by destruction of the center median (CM) of the thalamus while RCRI was still continually recorded, being reduced by 30-50%. The RCRI and RCRII were concluded to spread along the Mm - HL - CI. Some of the collaterals of this main pathway from the midbrain reticular formation pass, supposedly, via the center median. (Author)

**A70-45838 # The auditory cortex projections to the caudate nucleus and probable role of the nucleus as an associative subcortical area (Proektsii slukhovoï kory na khvostatoe iadro i vozmozhnaia rol' poslednego kak assotsiativnoi podkorkovoi zony).** V. A. Otellin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 967-972. 30 refs. In Russian.

Projections of every single area in the cat auditory cortex to the caudate nucleus were studied by the Nauta-Gigax's method. The projections were shown to be topographically organized in oral-

caudal, dorso-ventral and medio-lateral directions with overlaps in certain areas of the nucleus. As a matter of data obtained, the structure of the caudate nucleus and its connections are supposed to be similar to structure and functions of cortical associative areas where specific sensory, somesthetic and somatomotor fields are overlapping. (Author)

**A70-45839 #** Influence of the mesencephalic reticular formation on the forebrain and interbrain in chronic and acute experiments (Vliianie mezencefalicheskoi retikuliarnoi formatsii na strukturu perednego i promezhutochnogo mozga). Iu. S. Borodkin, V. A. Krauz, and N. A. Losev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 973-978. 9 refs. In Russian.

Influence of the midbrain reticular formation on dynamics of behavior, epileptiform and EEG responses to threshold stimulation of the cortex, hippocampus, amygdala, unspecific thalamic nuclei and caudatum, was studied. In rabbits with implanted electrodes, threshold stimulation of the midbrain reticular formation increased the cortical and caudate activity while overthreshold stimulation depressed it. The threshold and overthreshold stimulation of the mesencephalic reticular formation decreased the hippocampal and amygdal activity and activity of the unspecific thalamic nuclei. Isolation of the forebrain and interbrain from the caudal sections of the reticular formation promotes an increase in excitability of the limbic structures and suppression of the cortex and caudatum. A complete isolation of the forebrain and interbrain structures from the mesencephalic reticular formation leads to a sharp decrease in their excitability. (Author)

**A70-45840 #** Interaction between the posterior lateral thalamic nucleus and the specific afferent systems (Vzaimodeistvie zadne-lateral'nogo iadra talamusa so spetsificheskimi afferentnymi sistemami). A. S. Batuev and L. A. Vasil'eva (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 979-987. 17 refs. In Russian.

The bilateral oligosynaptic connections between CGL and CGM and the posterior lateral thalamic nucleus (LP) were shown in cats under chloralose anesthesia with aid of the evoked potentials recording during the electric or adequate stimulation. According to the evoked potential latency, both CGL and CGM can serve as a relay system for the impulsion, which produces the evoked response to the flash and click in LP. The conditioning electric stimulus applied to CGL or CGM in combination with testing adequate stimulation reveals the decrease in the electric response amplitude in LP. The conditioning stimulation of LP with rectangular electric stimuli reveals the same changes in CGL and CGM preferably in the later evoked response components. Simultaneously, the primary cortical response components are decreased in the visual and acoustic cortical projection areas. These changes only occur under the chloralose anesthesia and are absent under the nembutal. The lateral associative thalamic nucleus is considered to be one of the most important apparatus of the integrative interrelation between the visual and acoustic analysers. (Author)

**A70-45841 #** Activity of sympathetic-adrenal system during muscular work depending on the organism adaptation to it (Aktivnost' simpato-adrenalovoi sistemy pri myshechnoi deiatel'nosti v zavisimosti ot adaptirovannosti k nei). A. L. Gorokhov (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 1002-1007. 19 refs. In Russian.

In experiments on white rats and in observation on sportsmen, the sympathetic-adrenal system (SAS) of the trained organism during muscular activity was found to be more responsive than that of the untrained organism. In trained sportsmen, muscular work of maximal and submaximal intensity caused significant activation of adrenal link of the SAS, while the muscular work of long duration caused rather more significant activation of sympathetic link of the SAS. Emotional excitation in a starting state caused significant increase in the SAS activity with relatively more considerable activation of adrenal link of the SAS. (Author)

**A70-45842 #** On the carbon dioxide participation in the control of brain local circulation (O roli uglekisloty v regulatsii zonal'nogo krivoobrashcheniia v kore golovnogo mozga). N. M. Ryzhova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 1020-1025. 14 refs. In Russian.

In cats and rabbits under urethane anesthesia, circulation in the occipital cortical area was studied by thermo-electric method. A gap of an isolated fragment of the carotid or femoral artery was measured with aid of a perfusion pump. To prevent the carbon dioxide effect on the brain vessels, diamox was i. p. administered. Increase in circulation in the visual cortex due to a light stimulation was prevented by the diamox administration. Direct vaso-dilating CO<sub>2</sub> effect on the vascular smooth muscle tone was observed in the gap-measuring experiments. The principal role of the carbon dioxide is suggested for regional increase in circulation on cortical activation. (Author)

**A70-45843 #** Carbon dioxide effect on the oxygen tension in different myocardium areas during local myocardium ischemia (Vliianie uglekisloty na napriazhenie kisloroda v raznykh zonakh miokarda pri mestnoi ishemii). N. V. Sanotskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 1033-1042. 17 refs. In Russian.

In chronic experiments on 8 dogs, effect of hypercapnia on the oxygen tension was polarographically studied in 3 myocardium areas: an ischemic area, and adjacent to it area and a far-off area from 1 hour to 35 days after ligation of the coronary artery. Different effects of hypercapnia on the oxygen tension was observed in the different myocardium areas: the oxygen tension increased in the intact myocardium area; it increased or did not change at all during 3-5% carbon dioxide inhalation in the ischemic area while it decreased in this area during 7-20% carbon dioxide inhalation; the oxygen tension changes during hypercapnia were less constant in the area adjacent to the ischemic one. The inverted reaction of the oxygen tension in the ischemic area during hypercapnia was supposed to be related to altered reactivity of the vessels in the ischemic myocardium area. (Author)

**A70-45844 #** The esophageal swallowing pattern (K analizu motornoj funktsii pishchevoda). N. A. Frizen (Dorozhnaia Bol'nitsa Severnoi Zheleznoi Dorogi; Meditsinskii Institut, Yaroslavl, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 1043-1048. 8 refs. In Russian.

The esophageal swallowing pattern was studied by the method of intraluminal pressure recordings in the esophagus. The longitudinal and circular muscular layers of the esophagus were found to contract independently. The mode of their contraction depended upon the negative thoracic pressure influence on the breast part of the esophagus. The first negative wave of the esophageal swallowing pattern coincided with the second phase of swallowing and was due to relaxation of the pharyngo-esophageal sphincter and the part of interior esophageal sphincter above the diaphragm. The first phase of the second positive wave is due to the contraction of the longitudinal muscular layer of the esophagus. The second phase of this wave reflects the increasing intraluminal pressure due to the approaching from above third wave of peristaltic contraction. The rate of propagation of the third peristaltic wave was found to be very slow at the level of the aortic narrowing of the esophagus. (Author)

**A70-45845 #** Effect of the adrenocorticotrophic hormone on oxygen tension in the kidney (Vliianie adrenokortikotropnogo gormona na napriazhenie kisloroda v pochke). V. I. Korkach (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, July 1970, p. 1055-1058. 21 refs. In Russian.

Study of the temperature, oxygen partial pressure, and blood flow in the gastrocnemius muscle in rabbits after ACTH administration in dosages of 10 units per 1 kg of weight against the background of phenetole amine and netalid blockade of the adrenergic receptors and atropin, amysil, and spasmolytin blockade of the cholinergic



receptors. Neither of these two kinds of blockade prevented changes in temperature, oxygen partial pressure, and blood flow due to ACTH in the skeletal muscles. (Author)

**A70-45983** Vital issues in computing decompression schedules from fundamentals. I - Critical supersaturation versus phase equilibration. B. A. Hills (Duke University, Durham, N.C.). *International Journal of Biometeorology*, vol. 14, June 1970, p. 111-131. 92 refs.

A general review has been made of the vital issues which must be answered before any equation for predicting the occurrence of decompression sickness can be derived from fundamental physical and physiological experience. The evidence for the presence of a gas phase during a decompression which proves asymptomatic is discussed in detail. This queries the basic assumption inherent in calculation methods underlying the standard diving tables that there is a critical limit to the true supersaturation of a tissue by gas beyond which cavitation occurs. The evidence would seem more compatible with the formation of this gas phase for a much lower degree of supersaturation, if any, its presence not becoming manifest as symptoms during decompression provided its relative volume is not permitted to exceed a pain-provoking threshold. (Author)

**A70-45985 #** Studies of the structure of methemoglobin complexes - Equilibria of boundary forms of different electron configurations (Untersuchungen zur Struktur von Methämoglobin-komplexen - Gleichgewichte von Grenzformen unterschiedlicher Elektronenkonfiguration). J. Blanck and W. Scheeler (Greifswald, Universität, Greifswald, East Germany). *Acta Biologica et Medica Germanica*, vol. 25, no. 1, 1970, p. 29-39. 28 refs. In German.

Determination of temperature difference spectra on complexes of metmyoglobin (horse) and of methemoglobin of man and tubifex tubifex with the ligands F(-), OCN(-), SCN(-), SeCN(-), NO2(+), N3(-) CN(-), H2O (acidic form) and OH(-) (alkaline form). It is shown that the components are present as mixtures of ligand-specific boundary structures with five or one unpaired electron (high-spin or low-spin structure). The mixture ratio is determined by the ligand and the species-specific protein. Increased temperature leads to the formation of high-spin bands (about 650 to 600 nm and about 500 nm), reduced temperature favors the low-spin form (about 575 nm and about 540 nm) in the equilibrium. The magnitude of the temperature effect and the spin character of the compound proved to be closely correlated. The spectra of high- and low-spin complexes are almost independent of temperature; most drastic changes occurred with compounds ranging between the extreme types - i.e., with an equilibrium composition of 1:1. The structures of the boundary forms are discussed especially with regard to protein. (Author)

**A70-45986 #** Effect of nervous inhibition on the behavior of a b-wave in an electroretinogram in the case of flash sequences (Der Einfluss der nervösen Hemmung auf das Verhalten der b-Welle im Elektroretinogramm bei Serienbelichtungen). H. Berger (Jena, Universität, Jena, East Germany). *Acta Biologica et Medica Germanica*, vol. 25, no. 1, 1970, p. 115-126. 37 refs. In German.

Revision of the conclusion of a previous study that depending on the conditions of stimulation the changes in the b-wave behavior on a retinogram taken with a sequence of flashes may be either monotonic or have the form of a buildup process. It is demonstrated by experiment that these b-wave behavior patterns can also shift from one form into the other continuously. Further support is given to the supposition that the variations in the amplitude of a b-wave are partially caused by nervous inhibition during exposures to sequences of flashes. V.Z.

**A70-45987 #** Alpha-rhythm of EEG and the preferred tapping frequency (Alpha-Rhythmus im EEG und Vorzugsfrequenz des Tapping). N. Roth and F. Klingberg (Leipzig, Universität, Leipzig, East Germany). *Acta Biologica et Medica Germanica*, vol. 25, no. 1, 1970, p. 189-191. 10 refs. In German.

Description of experiments in which the alpha-rhythm of EEG was studied in a group of 15 male and female subjects instructed to tap with little rods against a surface at the maximum frequency they could keep up for a period of 3 min. The purpose of the experiments was to determine the process in the central nervous system which is responsible for the reduction of the maximum tapping frequency to a certain preferred frequency observed in all subjects after a period of 30 to 60 sec. The relation between the alpha-rhythm and the preferred tapping frequency of the subjects is discussed. V.Z.

**A70-45988 #** Mineralocorticoids and sweat gland function. K. Gibiński, L. Giec, S. Nowak, and F. Kokot (Śląska Akademia Medyczna, Katowice, Poland). *Acta Biologica et Medica Germanica*, vol. 25, no. 1, 1970, p. 201-205. 18 refs. Research supported by the Polska Akademia Nauk.

Description of experiments in which groups of male subjects were given various doses of DOCA or 10 g NaCl during a 9-day hospitalization on a standard diet containing 6 to 7 g NaCl. The subjects were exposed for 2 hr to temperatures of 48 (dry bulb) or 36 (wet bulb) deg C on the second and the last day of the experiments, and Na, K and Cl were determined in their sweat and urine after exposures. A similarity, but no close relation, is established between the desoxycorticosterone action on the kidneys and sweat glands of the subjects. V.Z.

**A70-45998** Effect of induced hypothermia and rewarming on renal hemodynamics in anesthetized dogs. F. Karim and H. Reza (Jinnah Postgraduate Medical Center, Karachi, Pakistan). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Oct. 15, 1970, p. 1153-1163. 24 refs.

Study of the effects of hypothermia and rewarming on renal hemodynamics in eight anesthetized dogs. The glomerular filtration rate, renal blood flow, osmolar clearance, U/P osmolarity, and mean arterial blood pressure decreased, and the filtration fraction, hematocrit ratio, and free water clearance increased when the esophageal temperature was lowered to 28 C. Urine volume first increased and later decreased as hypothermia developed. On rewarming, mean arterial blood pressure, the filtration fraction, and osmolar clearance returned to their normal values one hour after the temperature had reached 37 C. However, the glomerular filtration rate, renal blood flow, hematocrit ratio, U/P osmolarity, and the concentrating power of the kidney did not return to normal even one hour after the precooling temperature had been reached. M.V.E.

**A70-45999** The alterations of protein metabolism of the brain cortex induced by anticipation stress and ACTH. B. Jakoubek, B. Semiginovský, M. Kraus, and R. Erdossová (Československá Akademie Věd, Fysiologický Ústav, Prague; Karlova Univerzita, Plzeň, Czechoslovakia). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Oct. 15, 1970, p. 1169-1179. 20 refs.

Investigation of brain cortical tissue amino acid uptake changes in rats expecting painful stimulation or treated with ACTH. This investigation was to answer the question whether - and to what extent - the changed hormonal balance can influence the metabolism of the central nervous system. The results demonstrate that both stress and ACTH are capable of altering the uptake of amino acids into brain cortical slices. It follows that stress induced changes in hormonal balance influence the protein metabolism of the central nervous system. These hormonal systems should be taken into account when investigating the relationship between the learning process or effect of the stimulation of specific receptors, on the one hand, and altered protein metabolism, on the other. M.V.E.

**A70-46000** Bioastronautics and extraterrestrial life (Bioastronáutica y vida extraterrestre). Horacio Marco Moll. *Revista de Aeronáutica y Astronáutica*, vol. 30, Sept. 1970, p. 663-673. In Spanish.

Consideration of biological exploration of space as a possible means of determining the origin of life on the earth. Russian and

American experiments with probes and satellites are briefly outlined, and attention is given to the possibility of life on Venus, Mars, and Jupiter. The possibilities of extraterrestrial life are closely related to profound structural changes of life material which, on those planets, might be discovered. F.R.L.

**A70-46076** The shape and movements of the human left ventricle during systole - A study by cineangiography and by cineradiography of epicardial markers. Ian G. McDonald (St. Vincent's Hospital, Melbourne, Australia). *American Journal of Cardiology*, vol. 26, Sept. 1970, p. 221-230. 43 refs.

Study of the shape and movements of the human left ventricle during systolic contraction, carried out to obtain more accurate information required both for refinement of tests of myocardial function and for planning of cardiac surgical techniques. The shape of the left ventricular cavity and the movements of the mitral valve, aorta, and coronary arteries were studied in cineangiograms obtained from normal subjects and patients with coronary arterial disease, mitral stenosis or, atrial septal defect. Movements of the left ventricular epicardial surface were studied by postoperative cineradiography of radiopaque markers previously attached during closed mitral valvotomy. The pre-ejection and ejection phases of systole were identified from the simultaneously recorded phonocardiogram, apex cardiogram, indirect carotid pressure tracing, and electrocardiogram. The results are discussed and analyzed. O.H.

**A70-46077** Influence of the timing of atrial systole on mitral valve closure and on the first heart sound in man. Pravin M. Shah, David H. Kramer, and Raymond Gramiak (Rochester, University; Strong Memorial Hospital, Rochester, N.Y.). *American Journal of Cardiology*, vol. 26, Sept. 1970, p. 231-237. 23 refs. Research supported by the Genesee Valley Heart Association, the Hochstetter Fund, and the Ernest L. Woodward Fund; NIH Grants No. HE-5500; No. HE-3966.

Study of the role of atrial systole in mitral valve closure and the interrelations between the timing and rate of mitral valve closure and the timing and amplitude of the first heart sound. Simultaneous recordings of electrocardiogram, phonocardiogram, indirect carotid pulse and pulsed ultrasound cardiogram of the anterior mitral leaflet obtained in patients with heart block were examined. The results show that atrial systole alone can bring about closure of the mitral valve in man and that the amplitude of the first sound is related to the timing of the valve closure in relation to ventricular systole rather than to rate and amplitude of valve cusp movements alone. O.H.

**A70-46078** Tracking performance on a visual display apparently vibrating at one to ten hertz. Jo H. F. Huddleston (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Journal of Applied Psychology*, vol. 54, Oct. 1970, p. 401-408. 27 refs.

Study in which 20 subjects performed compensatory two-dimensional tracking on a visual display. This was viewed through a periscope, the lower mirror of which was oscillated about an axis so as to impose apparent vertical vibration on the display. The vibration frequency range from 1 to 10 Hz was explored, at (double) amplitudes of 2 and 4 deg. The decrement due to apparent vibration was frequency-dependent, being greatest at those frequencies (3 to 5 Hz) where a changeover in viewing technique was taking place. Over this range, progressively, reflexive eye pursuit is abolished, and a virtual image at the limit of vibration excursion becomes usable. Data from eye movement studies on an additional group of six subjects corroborate this. (Author)

**A70-46103** Compensatory cardiovascular responses during an environmental cold stress, 5 C. Peter B. Raven, Isao Niki, Thomas E. Dahms, and Steven M. Horvath (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 417-421. 23 refs. Grant No. AF AFOSR 69-1653.

Study of the cardiovascular responses of man during a standardized environmental cold stress consisting in a two-hour exposure of 11 male Caucasians to 5 C, 70% relative humidity. The test data obtained were compared with control data obtained in an ambient environment of 28 C, 45% relative humidity. The cardiac output, stroke volume, (A-V)O<sub>2</sub> difference, mean blood pressure, and heat production were all found to be elevated above the control values during the cold exposure. In all cases the increases were greatest during the second hour of exposure when a state of equilibrium was approached. Heart rate remained constant throughout the cold exposure. In the last hour of exposure, the decrease in the total peripheral resistance was significantly different from control values. The primary mechanism involved in supplying oxygen to the shivering muscles was through an increase in cardiac output primarily due to an elevation in stroke volume. However, the initial needs for oxygen were partially balanced by an increased arteriovenous oxygen difference which attained its highest value at the end of the first hour and did not change during the remainder of the cold exposure. The findings suggest that the cardiovascular system responds to the increased tissue oxygen consumption in cold ambient environments by increasing the stroke volume while the heart remains depressed. O.H.

**A70-46104** Pressure-volume curves of air- and liquid-filled excised lungs - Surface tension in situ. H. Bachofen (New York, State University, Buffalo, N.Y.), J. Hildebrandt, and M. Bachofen (Firland Sanatorium, Seattle, Wash.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 422-431. 57 refs. Research supported by the Washington State Heart Association; NIH Grant No. HE-12596-01.

Discussion of pressure-volume curves obtained by air filling followed by liquid filling including deflation curves, reinflation curves from several end-expiratory levels, and tidal volume loops of different amplitude and midvolume. The effects of cycling rate, aging of the preparation, and choice of fluid and filling sequence were examined. From each set of air and saline data an area-surface tension relationship was calculated corresponding to the volume maneuver. When compared to published gamma-A loops from surface-balance measurements or extracts, certain features were revealed: (1) the hysteresis area obtained in situ does not depend on cycling rate as it does in vitro; (2) the initial rate of fall of surface tension (gamma) with change of area is higher in situ; (3) gamma on reexpansion does not rise sharply toward its maximum value, but rather is displaced by a relatively small amount; and (4) a widened hysteresis and knee were obtained if the reexpansion commenced from below approximately half peak lung volume. This knee might be due in part to geometrical alterations and some small airway closure. It occurred at a calculated gamma of 20-30 dynes/cm. M.V.E.

**A70-46105** Distribution of pulmonary blood flow and ventilation during forward (+G<sub>x</sub>) acceleration. David H. Glaister (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 432-439. 25 refs.

Determination of the distribution of 1 and 2 liters of air inspired from residual volume, and of the pulmonary blood flow at end-tidal inspiration, in supine subjects at rest and during exposure to forward acceleration, by xenon 133 and lung scanning. At +5 G<sub>x</sub>, the anterior lung margin was unperfused in some subjects and the extreme back of the lung was unventilated in all subjects, the average relative ventilation-perfusion ratio ranging from 6:1 to 0:1 down the lung's inertial axis. Blood flow per unit lung volume increased steadily from front to back, the rate of increase being dependent upon acceleration. In contrast, blood flow per alveolus rose to a maximum in the midlung and then declined to one-third the peak value, both the rate of increase and decrease being modified by acceleration. The discrepancy between the two flow indices at +5 G<sub>x</sub> is attributed to regional differences in alveolar size, and these differences can also account for the ventilatory findings. (Author)

**A70-46106** Dependence of oxygen consumption on circulation in normovolemic and hypovolemic dogs. D. F. J. Halmagyi and M. Kennedy (Sydney, University, Sydney, Australia). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 440-443. 16 refs. Research supported by the National Heart Foundation of Australia.

Comparative study of oxygen transport, arterial resistance, and O<sub>2</sub> consumption in normovolemic and hypovolemic dogs. Oxygen transport and O<sub>2</sub> consumption were linearly related in normovolemic, but in hypovolemia this relationship was shifted to the right, suggesting more efficient O<sub>2</sub> exchange between blood and tissues. On the other hand, the linear relationship between systemic arterial resistance and O<sub>2</sub> consumption was similar in both normovolemic and hypovolemic animals, suggesting the role of precapillary sphincters in determining O<sub>2</sub> exchange in shock. Subjected to multiple regression analysis, O<sub>2</sub> extraction ratio in shock was shown to be determined by O<sub>2</sub> transport, blood pressure, and blood temperature. It is concluded that the mechanism of maintaining total body O<sub>2</sub> consumption in low flow states is similar to that described for regional circuits and that reduced O<sub>2</sub> uptake in shock has no specific predictive value. (Author)

**A70-46107** Effects of hypoxia on voluntary response time to peripherally located visual stimuli. John L. Kobrick and E. Ralph Dusek (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 444-448. 11 refs.

Response times of 10 subjects to the randomly ordered flashes of 48 stimulus lights distributed throughout the visual field were obtained during 3.5-hr exposures to each of four hypoxic conditions (sea level, 13,000 ft, 15,000 ft, 17,000 ft). Analysis of variance of the results indicated systematic increases in response time and variability due to hypoxia, stimulus peripheralization, and their interaction. Response time decrements became maximal within the 1st hr of exposure, and showed little recovery, but occurred at a slower rate than typical physiological indices of hypoxia display, suggesting that perceptual compensations occurred to minimize response decrements for a time. The results clearly indicate the strong effects of hypoxia on visual perceptual processes. (Author)

**A70-46108** Serum electrolyte changes after marathon running. Leslie I. Rose, Dennis R. Carroll, Stephen L. Lowe, Emil W. Peterson, and Kenneth H. Cooper (USAF, Aerospace Medical Laboratory and Department of Pathology, Lackland AFB, Tex.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 449-451. 25 refs.

Serum electrolytes were obtained before and immediately upon completion of the Boston marathon (26.2-mile run). There was a significant increase noted in serum sodium and serum potassium. A significant decrease was noted in serum magnesium. No change was found in either serum calcium or serum chloride. The possible significance of these findings is discussed. (Author)

**A70-46109** Cardiovascular dimensions and moderate physical training in young men. M. H. Frick, A.-L. Sjögren, J. Peräsalo, and S. Pajunen (University Central Hospital, Helsinki, Finland). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 452-455. 29 refs. Research supported by the International Society of Cardiology.

Investigation of changes in cardiovascular dimensions in young men subjected to moderate physical training consisting of an average daily excess activity of 2 hr over a period of 2 months. The experimental results support the hypothesis that the initial response to physical training is not a change in cardiovascular dimensions, and indicate that fixed cardiovascular dimensions despite training in middle and old age may be due to training which is inferior to the trainability of the subjects. M.M.

**A70-46110** Exercise at ambient and high oxygen pressure at high altitude and at sea level. K. Klausen (Copenhagen, University, Copenhagen, Denmark), D. B. Dill (Nevada University, Boulder City, Nev.), and S. M. Horvath (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 456-463. 46 refs. NSF-supported research; PHS Grant No. GM-15693; Grant No. AF AFOSR 69-1653.

Submaximal and maximal exercise tests have been carried out on 12 male subjects during 2 to 6 weeks acclimatization to an altitude of 3800 m. Control experiments were carried out at sea level before and after the stay at altitude. The following functions were measured: pulmonary ventilation, oxygen consumption, CO<sub>2</sub> output, heart rate, arterial blood pressure, and blood lactate concentration. The hypoxic 'oxygen drive' on the arterial chemoreceptors was eliminated by having the subjects breathe 100% O<sub>2</sub> during the last 10 min of the submaximal tests. In the maximal tests the subjects breathed O<sub>2</sub> every second experiment. It was found that a 'hypoxic drive' persists almost unchanged even after 6 weeks of acclimatization both on the respiratory and on the circulatory centers. However, O<sub>2</sub> breathing at altitude never did bring the pulmonary ventilation back to the sea-level value, which indicates that other 'acclimatization factors' are contributing to the control of the above-mentioned functions at altitude. The possible nature of these acclimatization factors is discussed. (Author)

**A70-46111** Resistance to two-phase gas-liquid flow in airways. S. W. Clarke, J. G. Jones, and D. R. Oliver (Queen Elizabeth Hospital; Birmingham, University, Birmingham, England). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 464-471. 24 refs.

It is shown that the resistance to airflow through a tube simulating a human airway is markedly increased when viscous liquid is present on the tube walls. The liquids used are sputum and two polymeric solutions having properties broadly similar to those of sputum. Attention is focused on methods of measurement of the apparent viscosity of the liquids; the most important single factor is the shear rate at which the apparent viscosity is measured. The greatest increase of flow resistance is shown to occur when waves form on the liquid surface; wave formation occurs at lower gas flow rates for thicker liquid layers and lower liquid viscosities. Viscoelastic properties possessed by the liquid may have considerable bearing on the overall flow resistance. The relevance of the results to the case of flow in human airways is discussed in some detail. The thin liquid layers present in healthy lungs probably have a negligible effect on flow resistance, but in endobronchial disease a large proportion of the total flow resistance is likely to stem from the presence of disturbed liquid layers. (Author)

**A70-46112** Effect of vagal blockade on regulation of breathing in conscious dogs. Eliot A. Phillipson, Robert F. Hickey, Cedric R. Bainton, and Jay A. Nadel (California, University, San Francisco, Calif.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 475-479. 14 refs. NIH Grant No. HE-06285.

Study in three conscious dogs of the influence of the vagus nerves on resting arterial CO<sub>2</sub> tension, on apneic threshold arterial CO<sub>2</sub> tension, and on the ventilatory responses to hypercapnia, hypoxemia, exercise, and hyperthermia. It was found that intact vagus nerves are required for a normal ventilatory response to hypercapnia and to hypoxemia in dogs, but not for the response to mild exercise and to hyperthermia. M.M.

**A70-46113** Regional dispersion of volume-to-ventilation ratios in the lung of man. Yoshihiro Suda, C. J. Martin, and A. C. Young (Ferland Sanatorium; Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 480-485. 20 refs. Research supported by the Seattle Foundation; NIH Grant No. HE-01892.

Study of the dispersion of volume-to-ventilation ratios within anatomical divisions of man's lung, using an analog simulation of the expired nitrogen concentrations. Regional gas samples were obtained through a small catheter system while the subject breathed oxygen. All anatomical divisions sampled showed a wide dispersion of volume-to-ventilation ratios in normal man and in patients with obstructive pulmonary syndromes. Altering body position did not result in a predictable change in the dispersion within upper or lower lobe units or the mean value for the dispersion. The difference between apical and basilar units was not affected by body position. The range of dispersion was greater in all units for patients with obstructive syndromes than in normal subjects. Possible causes of the large dispersion differences found in the smallest, as well as the largest, lung volumes include variations in the size of lung units, or the stress, or the stress-strain relationships. M.M.

**A70-46114 Stratified dead space in excised perfused lungs.** Denise J. Strieder, Benjamin A. Barnes, Barry W. Levine, and Homayoun Kazemi (Massachusetts General Hospital; Harvard University, Boston, Mass.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 486-492. 25 refs. Research supported by the Hartford Foundation; PHS Grants No. R 01-HE-09994; No. T 11-HE-5767.

Estimation, in excised dog lungs, ventilated and perfused, of changes in stratified dead space (VD) from changes in total VD, alveolar VD, and anatomic VD while ventilation and blood flow were varied independently. Stratified VD decreased with increasing transpulmonary pressure, while anatomic and alveolar VD increased. All three components rose with increasing tidal volume. Only stratified VD rose with increasing breathing frequency. Stratified VD was unaffected by regional changes of local ventilation/perfusion ratios. In situ, however, its distribution should vary with varying distribution of regional lung volume and regional tidal volume. Even in lungs of normal structure, stratified VD is as significant as alveolar VD. M.M.

**A70-46115 Effect of food and water deprivation on surface activity of lungs of rats.** Edmund E. Faridy (Manitoba, University, Winnipeg, Canada). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 493-498. 19 refs. Research supported by the Medical Research Council of Canada, the Canadian Tuberculosis and Respiratory Disease Association, and the Children's Hospital of Winnipeg Research Foundation.

Experimental investigation of the effects of deprivation of food or water, or both, on the mechanical properties of lungs in albino rats. The experimental results indicate that starvation and dehydration influence the mechanical properties of the lung. It is postulated that the effects are due to an altered balance between production and loss of surface-active material. M.M.

**A70-46116 Effect of hypothalamic temperature waveforms on peripheral blood flow in the baboon.** K. G. Kastella and A. C. Brown (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 499-507. 23 refs. NIH Grants No. GM-00739-13; No. FR-00166; Contract No. AF 33(615)-69-C-1306.

This study was designed to determine the dynamic relationship between hypothalamic temperature and peripheral blood flow in the unanesthetized baboon (*Papio anubis*). With a water-perfused thermode various temperature waveforms were applied to the hypothalamus. Brain temperature was monitored simultaneously by two thermocouples, one located at the tip of the thermode and the other in the hypothalamus 2 mm posterior to the thermode tip. An electromagnetic flowmeter, implanted on the terminal portion of the descending aorta, was used to measure blood flow. In some animals, arterial pressure was also monitored by a chronic indwelling catheter. Blood flow was influenced by hypothalamic temperature changes over the frequency range of 0.001-0.01 Hz. Analysis indicated that the system was relatively linear and could be approximated by second-order transfer function with time delay. Changes in environ-

mental temperature affected the value of the time constants but not the form of the transfer function. Simultaneous measurements of pressure and flow indicate that flow changes did not result from pressure changes. (Author)

**A70-46117 A chronically implantable thermode for production of hypothalamic temperature waveforms.** K. G. Kastella (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 508-510. 5 refs. NIH Grants No. GM-00739-13; No. FR-00166.

Description of a water-perfused thermode system which can be used to produce various periodic hypothalamic temperature waveforms. The system can produce sinusoidal hypothalamic temperatures with a peak-to-peak amplitude of 8 C over the frequency range from 0.001 to 0.02 Hz. Both sinusoidal and square-wave temperature wave shapes are illustrated. (Author)

**A70-46118 Generation of sinusoidal fluid pressures of relatively high frequency.** John E. K. Foreman (Western Ontario, University, London, Ontario, Canada) and Kenneth J. Hutchison (Belfast, Queen's University, Belfast, Northern Ireland). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 511-516. 21 refs. Medical Research Council of Canada Grants No. MA-1834; No. ME-2575.

Two sinusoidal fluid pressure generators, driven by electromagnetic vibrators, are described, both having automatic frequency scanning and amplitude writeout facilities. The upper frequency limits were 5,000 and 20,000 Hz. Harmonic distortion was less than 3% at frequencies between 20 and 1,000 Hz, and a pressure amplitude of 50 mm Hg around a mean pressure of 100 mm Hg; it was of similar magnitude at frequencies between 1,000 and 20,000 Hz when the pressure amplitude was 8 mm Hg. The amplitude frequency and damping characteristics of some currently available medical pressure transducers were determined. The upper frequency limit of sinusoidal pressure stimuli which could be applied to isolated arterial segments was 200 Hz. (Author)

**A70-46119 A direct photosensor technique to measure capillary blood cell motion.** Paul F. Stiller (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 517-520. 6 refs. Research supported by the Cornell Aeronautical Laboratory.

Techniques are described for the use of subminiature transistor photodevice arrays to sense and record the passage of the formed elements of the blood in selected capillaries. Transistor photodevices were installed in direct line with the optical system of a standard research microscope and used with ordinary incandescent transillumination to record in vivo capillary blood flow. A superimposed view of the microscopic image of the capillary flow and the sensor traces were recorded on video tape and color motion picture film, permitting the comparison of the cell type and the resulting electronic signal. Modification of the shape of the sensitive surface of one of the photodevices resulted in signal shaping, permitting identification of individual cells. (Author)

**A70-46120 A simple method for evaluation of cardiac output computers.** R. J. Mills and F. Moran (Royal Infirmary, Glasgow, Scotland). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 521, 522.

A method is described for the evaluation of cardiac output computers. A simple electronic circuit was designed to generate simulated indicator-dilution curves. Eighty simulated curves were stored on magnetic tape and this data was presented to each of three cardiac output computers under investigation. A comparison was made of the output of each computer with the result of manual analysis of the simulated curve. The magnitude of the differences between the manual and the computer analysis was small in each case but varied with the make of computer. (Author)

**A70-46121 #** Hand-held device to measure finger (thumb) strength. K. H. E. Kroemer and E. M. Gienapp (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 526, 527.

A device that measures the force exerted by the thumb, or fingers, is described. This device is hand-held, easily calibrated, and is adjustable to various hand sizes and digit positions. Thumb strength data from 31 male subjects is reported. (Author)

**A70-46122** Error analysis of a recording system for measuring pulmonary pressure-volume curves. D. G. Frazer, R. A. Rhoades, and W. S. Adams (Pennsylvania State University, University Park, Pa.). *Journal of Applied Physiology*, vol. 29, Oct. 1970, p. 534-537. 19 refs. PHS Grant No. AP-00022-06; NIH Grant ES-00335.

Determination of the accuracy of a system developed for providing continuous pressure-volume (P-V) curves of excised lungs. Errors due to nonlinearities and hysteresis of the system were examined at different rates of air infusion and liquid infusion. Results show that the greatest errors for air infusion occurred at midvolume and midpressure ranges and decreased with the lower infusion rate. During liquid infusion errors in the system due to nonlinearities and hysteresis were more pronounced at the higher infusion rate because of the viscosity of the liquid. M.M.

**A70-46139** Sunlight-induced pyrimidine dimers in human cells *in vitro*. J. E. Trosko, D. Krause, and M. Isoun (Michigan State University, East Lansing, Mich.). *Nature*, vol. 228, Oct. 24, 1970, p. 358, 359. 25 refs. AEC-supported research.

Description of the formation of pyrimidine dimers in human cells induced by normal exposures to natural sunlight containing no detectable wavelengths shorter than 290 nm. It is found that the quantity of pyrimidine dimers formed during 5 hr of exposure is equivalent to approximately 600 ergs/sq mm of 2650 Å UV light. These empirical findings support the findings and hypothesis of Harm (1969) that sunlight-induced lesions in DNA are the same as those made by 254 nm irradiation. Z.W.

**A70-46140 \*** Hibernation and the production of glycerol in the Ichneumonidae. Richard M. Duffield and John H. Nordin (Massachusetts, University, Amherst, Mass.). *Nature*, vol. 228, Oct. 24, 1970, p. 381. 9 refs. NASA-supported research.

Study of the overwintering ability of a group of closely related species of Ichneumonidae. Specimens were collected from Massachusetts and Ohio during all seasons. Following a period at room temperature in the laboratory all specimens were cold stressed at 4°C for 3 weeks. It was found that only hibernating species were capable of low-temperature induced glycerol accumulation. The possible physiological functions of glycerol as a cryoprotective agent are discussed. Z.W.

**A70-46145 \*** Regulation of synthesis of early enzymes of p-hydroxybenzoate pathway in *Pseudomonas putida*. Keiichi Hosokawa (California, University, Berkeley, Calif.). *Journal of Biological Chemistry*, vol. 245, Oct. 25, 1970, p. 5304-5308. 13 refs. Research supported by the University of California; NIH Grant No. GM-12932-04; Grant No. NGR-05-003-020.

Description of the induction of p-hydroxybenzoate hydroxylase and of protocatechuate oxygenase in the beta-ketoadipate pathway in *Pseudomonas putida*. It is shown that the specificities of induction of the first two enzymes of the p-hydroxybenzoate pathway in *P. putida* are very high. The only really effective inducer of p-hydroxybenzoate hydroxylase is its substrate, p-hydroxybenzoate, although low levels of activity can be induced by a few other aromatic acids. Protocatechuate oxygenase, the second enzyme of the pathway, is induced with more or less equal effectiveness either by protocatechuate or by p-hydroxybenzoate. G.R.

**A70-46146 \*** Biosynthesis of heme in the vitamin E-deficient rat. Hari S. Murty, Priscilla I. Caasi, Sherry K. Brooks, and P. P. Nair (Sinai Hospital of Baltimore, Inc., Baltimore, Md.). *Journal of Biological Chemistry*, vol. 245, Oct. 25, 1970, p. 5498-5504. 47 refs. NIH Grants No. AM-02131; No. 5SO-1FR-05478-08; Contract No. NAS 9-9715.

Discussion of experiments indicating the existence of a defect in heme synthesis in the vitamin E-deficient rat. The results presented show that vitamin E deficiency leads to a decrease in the ability of the bone marrow to synthesize delta-aminolevulinic acid. In contrast, the locus of the defect in the liver seems to be at the step involving the formation of porphobilinogen. G.R.

**A70-46213** A new method for determination of the systolic blood pressure in conscious rats. Keld Hermansen (Pharmacia A/S, Copenhagen, Denmark). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Nov. 1, 1970, p. 1233-1237. 5 refs.

Description of a new method for measuring the systolic blood pressure in conscious rats, based on detection of the arterial pulse wave peripherally to an occluding cuff by means of a photoconductive cell. The method has proved to fulfill the practical requirements of simplicity and speediness and to be much more effective than the previously employed method based on plethysmographic registration of the tail volume. O.H.

**A70-46224 \*** Peristaltic transport in circular cylindrical tubes. Chin-Hsiu Li (Case-Western Reserve University, Cleveland, Ohio). *Journal of Biomechanics*, vol. 3, Oct. 1970, p. 513-523. 7 refs. Grant No. NGL-36-003-088.

A long wave approximation is adopted to analyze the problem of peristaltic pumping in a circular cylindrical tube. Analytical and closed form solutions up to the second-order approximation in sigma (ratio of mean tube radius to the wavelength) are presented. Criteria for negative value to appear in the mean velocity profiles are established. Comparison is made between the results for the two-dimensional channel and for the axisymmetric tube. Qualitatively the transport phenomenon of the fluid is similar for both configurations. The quantitative difference indicates that the possibility for the backward flow occurring in the core region of the stream is much higher for the case of cylindrical tubes than for the case of two-dimensional channels. The results also show that the axial pressure gradient (averaged over one period) does not vary in the radial direction of the tube. The inertia effects of the fluid and the effects of large but finite wavelength are shown to enhance the backward flow near the axis of symmetry. (Author)

**A70-46230 \* #** Conformational model of active transport. John H. Young, George A. Blondin, G. Vanderkooi, and D. E. Green (Wisconsin, University, Madison, Wis.). *National Academy of Sciences, Proceedings*, vol. 67, Oct. 1970, p. 550-559. Grant No. NGL-50-002-001.

A model of active transport of monovalent cations in mitochondria is developed. The model is based on the coupling of electron transfer to the generation of a metastable protein conformation which in turn leads to the generation of an asymmetric surface charge, a membrane potential, and a redistribution of diffusible ions across the inner mitochondrial membrane. The ions at all times move spontaneously down an electrochemical potential gradient in this model so that there is no need to invoke the concept of an ion pump. It is shown that a wide variety of experimental facts can be rationalized in terms of the present model. (Author)

**A70-46231 \* #** Fluorescent probes of biological membranes. Alan S. Waggoner and Lubert Stryer (Yale University, New Haven, Conn.). *National Academy of Sciences, Proceedings*, vol. 67, Oct. 1970, p. 579-589. 35 refs. NSF Grant No. GB-19055; NIH Grant No. GM-16708; Grant No. NGR-07-004-118.

Description of the design, synthesis, and properties of new fluorescent probes which can be inserted into biological macromolecules to reveal such structural and dynamic facets as proximity, rational mobility, and polarity. Anthroly stearic acid, dansyl phosphatidyl ethanolamine, and octadecyl naphthylamine sulfonic acid are readily incorporated into bilayer vesicles composed of phosphatidyl choline. These probes exhibit selective affinity for different transverse regions of phosphatidyl choline bilayers. T.M.

**A70-46232 \* #** Biology of the precambrian genus *Kakabekia* - New observations on living *Kakabekia barghoorniana*. B. Z. Siegel and S. M. Siegel (Hawaii, University, Honolulu, Hawaii). *National Academy of Sciences, Proceedings*, vol. 67, Oct. 1970, p. 1005-1010. 4 refs. Grant No. NGR-12-001-042.

Comparative study of the fossil genus *Kakabekia* and a living species *Kakabekia barghoorniana* Siegel, cultured from Alaskan soil samples. Morphological comparisons, particularly of mantle variations, show that fossil and living populations overlap in many details. Cytochemical tests demonstrate that living *Kakabekia* has no storage forms of lipid or polysaccharide and no phenoloxidase. Some individuals (19 to 33%) contain heme enzymes but most do not; hence they cannot utilize O<sub>2</sub> even in air. T.M.

**A70-46233 #** Reciprocal hunger-regulating circuits involving alpha- and beta-adrenergic receptors located, respectively, in the ventromedial and lateral hypothalamus. Sarah Fryer Leibowitz (Rockefeller University, New York, N.Y.). *National Academy of Sciences, Proceedings*, vol. 67, Oct. 1970, p. 1063-1070. 11 refs. Research supported by Hoffmann-La Roche; PHS Grant No. MH-13189.

Attempt at localization of the alpha and beta hunger-regulating systems within specific areas of the hypothalamus by varying the anatomical site of injection of several different alpha- and beta-adrenergic drugs in rats. The injection of adrenergic and adrenergic drugs directly into the brain through permanently implanted cannulas has yielded results showing that food consumption in the rat is regulated by a hypothalamic alpha-adrenergic 'hunger' system and a hypothalamic beta-adrenergic 'satiety' system. It is found that the medial hypothalamus is sensitive only to the alpha drugs, the lateral hypothalamus is sensitive only to the beta drugs, and the perifornical region is sensitive to both the alpha and beta drugs. T.M.

**A70-46275 \*** A psychrometric chart for physiological research. Alan B. Chambers (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 29, Sept. 1970, p. 406-412. 11 refs.

The thermodynamic properties of moist air of interest to physiologists are defined and a graphic technique for describing their interrelationship (a psychrometric chart) is presented in units appropriate to physiological research. A psychrometric chart for a standard atmosphere at sea level is included. Uses for the chart in physiological research are discussed and are illustrated by two detailed examples. The effect of altitude on the parameters depicted by the psychrometric chart is outlined. (Author)

**A70-46343 #** Photographic representation of anomalous retinal correspondence. J. Lang and A. Würth (Zürich, Universität, Zurich, Switzerland). *Ophthalmic Research*, vol. 1, no. 2, 1970, p. 88-93. 14 refs.

Description of a method of photographic representation of anomalous retinal correspondence. The localization center of anomalous correspondence is determined by means of a Zeiss Fundus camera. The photographic method provides a helpful basis for the discussion of concepts of anomalous correspondence. M.M.

**A70-46344 #** Biochemical heterogeneity of the corneal glycosaminoglycans. S. Saliternik-Givant and E. R. Berman (Hebrew University, Jerusalem, Israel). *Ophthalmic Research*, vol. 1, no. 2,

1970, p. 94-108. 32 refs.

Description of a procedure for the extraction and purification of corneal glycosaminoglycans under mild conditions and without the use of proteolytic enzymes. Nearly 85% of the stromal glycosaminoglycans was solubilized by homogenization of the fresh tissue with water and 0.1 M potassium carbonate at 4 C in a VirTis homogenizer. Proteins not associated with the glycosaminoglycans were removed by passing the extracts through SE-Sephadex columns. The keratan sulfates were then separated from the chondroitin sulfates by treatment with ammonium sulfate, and each of the fractions was then chromatographed separately on DEAE-Sephadex. Chemical analyses showed that the two populations of stromal glycosaminoglycans are highly heterogeneous. The four species of chondroitin sulfate differed from one another mainly in sulfate content, with the ratio sulfate/galactosamine varying from 0.43 to 0.89. The principal amino acids in the chondroitin sulfate-peptide molecule were glutamic acid, serine, glycine, and aspartic acid. Seven species of keratan sulfate, with ratios of sulfate/glucosamine varying from 0.92 to 1.70, were isolated. M.M.

**A70-46345 #** Binocular fundus reflectometry. J. A. Oosterhuis, R. B. Bakker, and K. M. van den Berge (Amsterdam, Universiteit, Amsterdam; Leiden, Rijksuniversiteit, Leiden, Netherlands). *Ophthalmic Research*, vol. 1, no. 2, 1970, p. 109-123. 27 refs.

This paper describes a technique of binocular simultaneous fundus reflectometry in rabbits and man, using a 'low vacuum' contact lens with a built-in light source and a cadmium sulphide photo-cell. At a high sensitivity level the fundus plethysmogram can be recorded. Fundus reflectometry further enables recording of the decrease of light reflection after intravenous dye injection. In patients with unilateral carotid occlusion even small differences in arm-fundus circulation time between both sides could be measured. (Author)

**A70-46346 #** Determination of the wet and dry weight of iris, ciliary body and choroid in man and in different animal species. Chia-der Wu, H. K. Müller, O. Hockwin, and E. Noll (Bonn, Universität, Bonn, West Germany). *Ophthalmic Research*, vol. 1, no. 2, 1970, p. 124-128. 6 refs.

Wet and dry weights of iris, ciliary body and choroid of ox, calf, pig, rabbit, guinea pig and human eyes have been measured. The comparison of the percental weight distribution of the three tissues of the uveal tract shows considerable species differences. The increase in weight of iris, ciliary body and choroid of bovine eyes is strongly correlated to the aging of the animal. (Author)

**A70-46348 \*** The biology of cartilage. II. Delbert E. Philpott and Philip Person (NASA, Ames Research Center, Moffett Field, Calif.; U.S. Veterans Administration, Hospital, Brooklyn, N.Y.; U.S. Marine Biological Laboratory, Woods Hole, Mass.). *Journal of Morphology*, vol. 131, Aug. 1970, p. 417-430. 11 refs.

Preliminary characterization of squid head cartilage in terms of its light- and electron-microscopic appearance, amino-acid composition, and X-ray diffraction pattern. Head cartilage from the squid strongly resembles vertebrate hyaline cartilage. The tissue is characterized by the presence of irregularly shaped cells suspended in an abundant matrix. Each cell gives off extensions which ramify by a network of channels throughout the matrix. T.M.

**A70-46374 \*** Sonic boom effects on the organ of corti. Deborah A. Majeau-Chargois, Charles I. Berlin, and Gerald D. Whitehouse (Louisiana State University, New Orleans, La.). (*American Laryngological, Rhinological, and Otological Society, Meeting, Nassau, Jan. 12, 1970.*) *The Laryngoscope*, vol. 80, Apr. 1970, p. 620-630. 7 refs. NIH-supported research; Grant No. NGL-19-001-024.

Evaluation of damage to the auditory mechanism in guinea pigs subjected to controlled sonic booms. In all 24 guinea pigs exposed to the sonic booms, damage was restricted to the apical turn of the cochlea, leaving the other turns normal. Hair cell damage was mainly restricted to the outer rows of hair cells with less damage to the inner row. A significant observation is that the Preyer reflex remains unchanged after exposure to sonic booms, even when tested within 15 minutes of exposure. This is very important, because it demonstrates that damage is behaviorally unobservable even though it is very evident when examined histologically. It is pointed out that, if an extrapolation should be made to the human, we might expect no impairment of auditory function following sonic boom exposure, despite the fact that hair cells have been damaged. M.M.

**A70-46391 # Theory of functional systems (Teoriia funktsional'noi sistemy).** P. K. Anokhin (I. Moskovskii Meditsinskii Institut, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 1, Jan.-Mar. 1970, p. 19-54. 46 refs. In Russian.

Critical review of the main premises of a scientific trend which has come to be called the 'system approach to biology' and the 'general theory of systems.' System formulations used in different scientific disciplines are subjected to a detailed analysis, and the line of demarcation separating these formulations from the theory of functional systems is indicated. For the first time, a general strategy for carrying out research work on the basis of a functional system is given as a methodological principle. It is concluded that excessive theorization of the 'system approach' in recent years has led to a departure from the main purpose of the entire system trend, which is to create a conception which would make it possible to perform a physiological experiment on the new system basis and to provide a broader treatment of the data obtained. A number of specific key mechanisms of a system ('the operational architectonics of a functional system') are proposed, which as a whole constitute a conceptual bridge between the system level and the extremely subtle analytical processes of biological systems. By means of this improvement of the 'system approach' the main purpose of this important scientific trend is realized. A.B.K.

**A70-46392 # The juxtaglomerular apparatus (Iukstaglomeruliarnyi apparat).** Kh. M. Markov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 1, Jan.-Mar. 1970, p. 94-110. 141 refs. In Russian.

Consideration of the present status of the problem of the structural and functional organization of the juxtaglomerular apparatus of the kidneys (the apparatus responsible for the synthesis and secretion of renin). The importance of the two main components of this apparatus - the juxtaglomerular cells of the afferent glomerular arteriole and the macula densa of the ascending canaliculus - is indicated, as well as their morphological features and their close functional interrelation. The main intrarenal (perfusion pressure and intracanalicular changes in sodium concentration) and extrarenal (sympathetic nervous system, concentration of angiotensin in the blood, etc.) factors controlling the secretion of renin by the kidneys are discussed. A.B.K.

**A70-46393 # Neurophysiological mechanisms of trace phenomena (Neirofiziologicheskie mekhanizmy sledovykh iavlenii).** L. L. Voronin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 1, Jan.-Mar. 1970, p. 111-136. 157 refs. In Russian.

Systematic review of the existing literature data concerning membrane and synaptic mechanisms of prolonged (lasting at least one or several seconds after cessation of the stimulus) trace changes in the activity of neurons of different formations. Such phenomena come under the definition of memory in the broad sense of this word. It is suggested that under certain conditions the trace changes in question can become stable prolonged shifts. Simplified experimental situations (so-called cellular learning analogs) the study of which appears to be most promising at the present time for understanding memory mechanisms are considered. A.B.K.

**A70-46410 \* Cortisol is secreted episodically by normal man.** Leon Hellman, Fujinori Nakada, Joseph Curti, Elliot D. Weitzman, Jacob Kream, Howard Roffwarg, Steven Ellman, David K. Fukushima, and T. F. Gallagher (Montefiore Hospital and Medical Center, New York, N.Y.). *Journal of Clinical Endocrinology and Metabolism*, vol. 30, Apr. 1970, p. 411-422. 24 refs. Research supported by the American Cancer Society; NIH Grants No. CA-07304; No. FR-53; Grant No. NGR-33-023-032.

Results of two studies conducted to demonstrate the intermittent nature of cortisol secretion in man. In the first study, the emphasis was on the secretory activity of the adrenals during the early morning hours while the subject was asleep. It was demonstrated that cortisol was secreted episodically and that the secretory intervals were separated by periods when no cortisol whatsoever was put into the blood. The second study was designed to examine adrenal secretory activity by measurement of the plasma cortisol level at 20-min intervals throughout a 24-hr sleep-wake cycle. This study demonstrated that the episodic secretory activity of the adrenals continued throughout the waking day as well as during the morning hours of sleep. T.M.

**A70-46411 \* Photosystem II and O<sub>2</sub> evolution.** G. M. Cheniae (Martin Marietta Corp., Research Institute for Advanced Studies, Baltimore, Md.). *Annual Review of Plant Physiology*, vol. 21, 1970, p. 467-498. 120 refs. AEC Contract No. AT(30-1)-3706; Contract No. NASw-1592.

Discussion of some data concerning photosystem II and oxygen evolution that have appeared since publication of reviews by Boardman (1968) and Kok and Cheniae (1966). Results obtained regarding the kinetics of oxygen evolution are examined including figures concerning the relative yield of oxygen per flash, normalized to steady-state value. Proposed models for oxygen evolution are examined. Chlorophyll absorption changes related to system II are investigated and relations between chloroplast structure and oxygen evolution are explored. The photo-oxidation of compounds other than water by system II is considered and catalysts and cofactors on the oxidant side of system II are discussed. G.R.

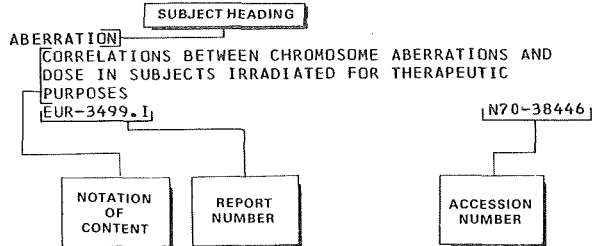
**A70-46413 Psychological aspects of the training of pilots (Psychologische Aspekte der Ausbildung von Piloten).** K. Steininger. (*Arbeitswissenschaftliche Kongress, 16th, Hamburg, West Germany, Mar. 26-28, 1969.*) *Arbeit und Leistung*, vol. 24, no. 6, 1970, p. 2-8. 13 refs. In German. (OFVLR-SONDOR-53)

Discussion of the training of German Lufthansa pilots taking into consideration the aspects of the training which are intended to produce pilots capable to withstand the many stresses to which the pilot of a modern aircraft is subjected. The qualifications of airline pilot candidates and the program of their training is discussed. Objectives of pilot training and criteria for pilot selection are considered. The function of training as a continuing selection process is examined, and causes for failure in basic training are analyzed. It is found that lack of resistance against the continuous stresses of the pilot profession is a predominant factor in the premature withdrawal of pilots from active service. Therefore, it is one of the objectives of pilot training to produce pilots who are able to perform well under the physical, mental, emotional, and social stresses to which an airline pilot is subjected. G.E.

# Subject Index

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Water and salt metabolism changes during prolonged hypokinesia of rabbits, noting blood plasma dilution, hematocrit number and hemoglobin concentration reduction, etc  
A70-44656  
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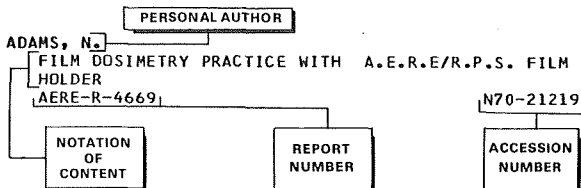
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## L

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Sublimation effects on viability of frozen microorganisms  
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Piston device for producing known constant positive pressure within lungs by using thoracic muscles  
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Closed loop life support system employing algae and bacteria cultures to recycle water in addition to atmospheric regeneration  
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Human body heat production and transfer through convection, radiation and evaporation under normal and reduced atmospheric pressure  
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Electrolyte changes after marathon running noting increase in serum sodium and serum potassium  
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Indirect blood pressure measurements using motion artifact suppression circuit based on K-sound electrocardiography  
A70-45335
- LUNC, H.  
Astronautics - IAF Conference, New York, October 1968, Volume 4, Bioastronautics  
A70-45022
- LYON, J. H.  
Over water aircraft accident investigation aids for greater survival, improved location searches and faster recovery of essential parts  
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Sonic boom effects on guinea pigs Corti organ, comparing auditory damage in cochlea with hair cell damage  
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Neutron activation analysis studies, including sample handling, tissue analyses, and rat activation experiments  
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Hyperbaric oxygen effects on Coxsackievirus infection in mice  
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Cerebral blood flow measurement and methods using radioactive isotopes  
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Prolonged hypodynamia effects on stability of psychic functions  
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Remote controlled physiological data monitoring and transmission system  
[AD-710594] N70-43100

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Structure and function of juxtaglomerular apparatus of kidneys controlling synthesis and secretion of renin  
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Infused cortisol disappearance rates and distribution volumes in hyper-, hypo- and normocalcemic dogs  
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External audio signal effect on vigilance performance and physiological parameters [AD-709088]  
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Photon-coupled biomedical amplifier for measuring and recording physiological signals  
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Human lung volume-to-ventilation ratios regional dispersion, using expired nitrogen concentrations analog simulation  
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Light effect on cis-trans-isomerization of cinnamoyl-alpha-chymotrypsin, considering molecular modeling of visual reception  
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Morphological analysis program of MIND system [AD-709176]  
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Ear protection for persons exposed to various jet aircraft noise environments  
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Tables of runway visual range values as function of transmittance and various values of pilots illuminance threshold and light targets [FAA-FD-70-58]  
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Mice intestinal epithelium, investigating high energy protons irradiation effect on cells  
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Mathematical model simulating human respiratory physiopathology, based on hypothetical stable autooscillations dependence on ventilation/pulmonary exchange system  
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Oxidative phosphorylation and oxygen consumption during hyperoxia in mitochondria preparations and tissue homogenates from white rat liver  
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Spatial aspects of sensitization effect properties compared to background light fields, lowering rod threshold at center by light addition to surrounding annular region  
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Ear protection for persons exposed to various jet aircraft noise environments  
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Examining mechanism for transfer of aerospace technology to biomedical problems [NASA-CR-114242]  
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Calculated human radiation dosage from galactic cosmic rays [HASL-228]  
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- MCDONALD, I. G.  
Human left ventricle shape and movements during systolic contraction, using cineangiography and cineradiography of epicardial markers  
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Flotation device for infants and small children incorporating life support and survival capabilities for aviation and marine applications  
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Optimum acceleration profile for minimum severity index in injuries sustained by human subject  
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Three-axis controller operated by hand-wrist motion for yaw, pitch, and roll control [NASA-CASE-XAC-01404]  
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Hyperoxia effects on rats in vivo white blood cell counts  
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Visual acuity during ocular tracking movements as function of field illumination density  
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Electronic simulation of indicator-dilution curves for comparative evaluation of cardiac output computers  
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Electronic simulation of indicator-dilution curves for comparative evaluation of cardiac output computers A70-46120
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Radiation hazard calculations for supersonic aircraft altitudes produced by energetic solar flare of 23 Feb. 1965 [NASA-CR-110774]
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Bibliography on planetary quarantine [NASA-CR-114112]
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Intact human forearm venous blood velocity measurements, using nuclear magnetic resonance techniques
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Vagus nerve blockage effect on arterial carbon dioxide tension and breathing regulation in dogs
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Human cortisol intermittent secretion during early morning sleep and sleep-wake cycle, examining adrenal activity
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Oxidative phosphorylation and oxygen intake during circulatory hypoxia in mitochondria of liver and brain in rats subjected to acute ischemia
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Hibernation and glycerol production in wasps Ichneumonidea, discussing possible physiological cryoprotective function
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- NOWAK, S.  
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Binocular fundus reflectometry and plethysmography in rabbits and man after dye injection and in patients with carotid occlusion  
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Blood urea content during prolonged immobilization  
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Hyperbaric oxygen effects on Coxsackievirus infection in mice  
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Hyperoxia effects on rats in vivo white blood cell counts  
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Investigating environmental control and life support systems for space shuttle vehicles  
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Digital computer control of artificial hemodialysis by kidney machine  
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Neuromuscular function changes under effects of prolonged hypodynamia  
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Monomethylhydrazine /MMH/ missile propellant toxicity, describing symptoms and effects on blood and intellectual capacity  
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Cosmos 110 satellite experiments concerning radiation effects on lysogenic bacteria and plants  
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External proton beam measurements on variable energy cyclotron  
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Discrete stochastic optimal control model of human operator in single-loop compensatory/pursuit tracking situation  
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Gas liquid chromatographic method for quantitative analysis of phenylalanine in serum  
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N70-41224
- PECORARO, J. N.  
Integrated regenerative life support manned tests for space laboratory design and development  
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Anatomical and dynamic model for gas mixing in lung alveoli during inspiration-expiration process  
N70-40867
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Hemodynamic changes during prolonged hypokinesia  
N70-42857
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Cardiovascular dimensions changes and heart volume in physically trained young men, comparing with response in old age  
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Gas liquid chromatographic method for quantitative analysis of phenylalanine in serum  
[NASA-CR-113875]  
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Crashworthiness and biomechanics of both air and ground vehicle impact  
N70-42123
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Squid head cartilage properties in terms of light and electron microscopic appearance, amino acid composition and X ray diffraction  
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Orthostatic stability reduction in experiments with simulated weightlessness, investigating functional compensation mechanisms  
A70-45025
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Electrolyte changes after marathon running noting increase in serum sodium and serum potassium  
A70-46108
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Graphical link between operator and digital computer using CRT display and light-pen input system during automatic electronic circuit design  
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Air revitalization chemicals reactions with water vapor and gaseous carbon dioxide, describing

- apparatus for kinetic studies A70-45348
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Semiconductor thermometer for skin temperature differences using resistance bridge, transistor amplifier and thermistors A70-44317
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Inherited hypertension genetic and autonomic factors, discussing rats crossbreeding for genetic contribution ratio in males vs females, age effects, etc A70-45806
- PHILLIPS, W. D.  
Spatial aspects of sensitization effect properties compared to background light fields, lowering rod threshold at center by light addition to surrounding annular region A70-44779
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Vagus nerve blockage effect on arterial carbon dioxide tension and breathing regulation in dogs A70-46112
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Squid head cartilage properties in terms of light and electron microscopic appearance, amino acid composition and X ray diffraction A70-46348
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Chemical methods for nuclear submarine atmosphere purification [AD-709896] N70-42535
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Readability of segmented numerals under critical accuracy and limited exposure time, comparing with conventional displays A70-45514
- PONNAMPERUMA, C.  
Bibliographical guide for literature concerning chemical evolution and origin of life A70-44842
- PONOMAREV, V. A.  
Respiration rhythm mechanism from medulla oblongata electric shock stimulation in cats, considering inspiration-expiration phase shift relation to neuron fatigue A70-45493
- POSIVIATA, M. A.  
Extreme environmental temperature effects on hepatic amino acid catabolism in rats attributed to caloric deficiency A70-44790
- PRICE, D. L.  
Pilot hand-held and leg-mounted controllers for precision tracking from aircraft under buffeting tested in static and dynamic motion simulator A70-45513
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Cinecoronary arteriographic investigation of chest pain patients, establishing correlations of clinical symptoms, coronary artery narrowing, arterial lesions, serum cholesterol levels, etc A70-43948
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Morphology of pulmonary circulation and airways using bronchial casts N70-40863
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Three-axis controller operated by hand-wrist motion for yaw, pitch, and roll control [NASA-CASE-XAC-01404] N70-41581
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- RAMSKILL, E. A.  
Chemical methods for nuclear submarine atmosphere purification [AD-709896] N70-42535
- RASHUSSEN, P. G.  
Pilot heart rate during in-flight simulated ILS approaches in general aviation aircraft A70-45333  
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Remote controlled physiological data monitoring and transmission system [AD-710594] N70-43100
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Combat proficiency of F-4 pilot and navigator second seat crewmembers [AD-709728] N70-41684
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Human cardiovascular compensatory responses to environmental cold stress, relating heart stroke to increased oxygen consumption A70-46103
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Space environment husbandry, examining chickens stress response to restraint and parenteral hydration A70-45337
- RAZAVI, H.  
Cinecoronary arteriographic investigation of chest pain patients, establishing correlations of clinical symptoms, coronary artery narrowing, arterial lesions, serum cholesterol levels, etc A70-43948
- READ, R. B., JR.  
Ecology and thermal inactivation of microbes in and on interplanetary space vehicle components [NASA-CR-113870] N70-41163
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Determining effects of environment on accumulation of biological burden on spacecraft during assembly [NASA-CR-110875] N70-43096
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Piston device for producing known constant positive pressure within lungs by using thoracic muscles [NASA-CASE-XMS-01615] N70-41329
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Temperature effect on radiation tolerance of mice exposed to low dose rate gamma radiation, noting mortality delay in low temperature environment A70-44789
- REZA, H.  
Hypothermia and body rewarming effects on renal hemodynamics in anesthetized dogs A70-45998
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Miniature respiratory minute volume and rate sensor as pilot personal equipment in flight environment A70-44840
- RHOADES, R. A.  
Recording system errors for measuring pulmonary pressure-volume curves of excised lungs A70-46122
- RHODES, D. L.  
Bends incidence in altitude training, examining denitrogenation role A70-45339
- RICHMOND, D. R.  
Mammalian eardrum failure due to blast induced pressure variations, examining wave shape, character, magnitude and duration effects A70-44839
- RICHTER, P. L.  
Occipital migraine in flying personnel, discussing diagnosis and flight status disposition A70-45344
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Living organisms physiological death as biological problem, discussing hypotheses, theories and facts A70-44225
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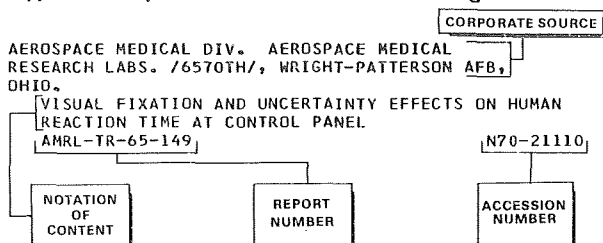




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Surface interval providing safety against decompression sickness between underwater weightlessness simulation and flight altitude ascent  
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- JOINT PUBLICATIONS RESEARCH SERVICE, WASHINGTON, D. C.  
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- Individual and collective intellect, cognition, and technology  
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- Noise measurement and analysis in percentile band with legal liability in industries  
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Coronary sinus blood flow measurement using thermoelement probe  
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Annotated bibliography of literature related to man and animals in closed ecological systems and simulated space environments  
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Relationship between noisy drift, corrective drift, and smooth pursuit eye movements  
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Effects of gravitational and inertial forces on cardiovascular and respiratory dynamics  
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Research and development on man-machine integration and aeromedical technology requirements for space shuttles  
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- MEDICAL RESEARCH COUNCIL, LONDON /ENGLAND/.  
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- MIAMI UNIV., CORAL GABLES, FLA.  
Experimentally derived explanations of some aspects of the origin of life  
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- NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.  
Review and recommendations for biological investigations in space environment  
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- NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, HOPPETT FIELD, CALIF.  
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Nonequilibrium thermodynamic model of ion transport in three-compartment system  
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- NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.  
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- NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MANNED SPACECRAFT CENTER, HOUSTON, TEX.  
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Clostridium perfringens dissemination from humans and culture media
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NATIONAL LENDING LIBRARY FOR SCIENCE AND TECHNOLOGY, BOSTON SPA /ENGLAND/.  
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NATIONAL PHYSICAL LAB., TEDDINGTON /ENGLAND/.  
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Acceleration effects on renal blood flow of dogs
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NEW ENGLAND DEACONESS HOSPITAL, BOSTON, MASS.  
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Respiratory fluctuations of oxygen tension in central vessels of dogs during ventilation
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Literature review on flight visual illusion hazards
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SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.  
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Digital simulation and automatic EEG analyzer design for processing sleep data
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SCRIPTA TECHNICA, INC., WASHINGTON, D. C.  
Transactions on human reactions to prolonged immobilization
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Modeling weightlessness effects on humans on basis of prolonged immobility
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Bed rest studies to determine prolonged hypodynamia effects on humans
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- OAK RIDGE NATIONAL LAB., TENN.  
Radiation hazard calculations for supersonic aircraft altitudes produced by energetic solar flare of 23 Feb. 1965
- [NASA-CR-110774] N70-42232

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prolonged bed rest  
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MASS.  
Planktonic Foraminifera distributions near North  
Atlantic Current  
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- STANFORD UNIV., CALIF.  
Heuristically guided search and chromosome  
mapping  
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cardiovascular parameters of flow pressure in  
arteries  
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circulatory stresses  
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analysis of phenylalanine in serum  
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- T
- TECHNISCHE HOCHSCHULE AACHEN /WEST GERMANY/.  
Fluid dynamics of artificial heart valve flow  
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to prosthetic devices  
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- Mathematical models for pulsating blood flow  
through arterial branches and wave propagation  
in blood vessels  
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- TECHNISCHE UNIV., BERLIN /WEST GERMANY/.  
Effects of alkali elements and isotopes on  
membranes of unicellular algae  
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- TECHTRAN CORP., GLEN BURNIE, MD.  
Microscopic and cultural detection of  
microorganisms related to peripneumonia  
pathogens  
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mineral metabolism of rabbits  
[NASA-TT-F-13375] N70-42664
- Developing air regeneration systems in spacecraft  
by photosynthesis of unicellular algae  
[NASA-TT-F-13377] N70-42666
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Trajectory calculations for suspended particles in  
Newtonian tube flow  
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- TEXAS NUCLEAR CORP., AUSTIN.  
External proton beam measurements on variable  
energy cyclotron  
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- TEXAS UNIV., HOUSTON.  
Effects of laser radiation on receptor function in  
human and primate eyes  
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- TORONTO UNIV. /ONTARIO/.  
Analysis of describing function of human operator  
controlling system of one degree of freedom  
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- TOULOUSE UNIV. /FRANCE/.  
Cerebral blood flow measurement and methods using  
radioactive isotopes  
N70-40871
- TRANSLATION CONSULTANTS, LTD., ARLINGTON, VA.  
Reactivity to transverse accelerations and  
radioprotectants  
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- TULANE UNIV., NEW ORLEANS, LA.  
Long term effects of gamma-or X-radiation on  
cerebral cortex of prenatal rats  
[ORO-3832-8] N70-42816
- U
- UNITED AIRCRAFT CORP., WORMLEIGH, COBN.  
Simulation studies for evaluating integrated  
vertical display devices using hypothetical tilt  
wing vehicle  
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Electron paramagnetic resonance spectra of thiyl  
free radicals in irradiated biological systems  
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- UTRECHT STATE UNIV. /NETHERLANDS/.  
Effect of gamma radiation in collagen solutions

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V

VIRGINIA UNIV., CHARLOTTESVILLE.

Examining mechanism for transfer of aerospace  
technology to biomedical problems  
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W

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