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# AEROSPACE MEDICINE AND BIOLOGY

**A CONTINUING BIBLIOGRAPHY**

**WITH INDEXES**

**(Supplement 97)**

**JANUARY 1972**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

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# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

(Supplement 97)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during December 1971.



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**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

WASHINGTON, D.C.

JANUARY 1972

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 276 reports, articles, and other documents announced during December 1971 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, irregular supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects 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 is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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

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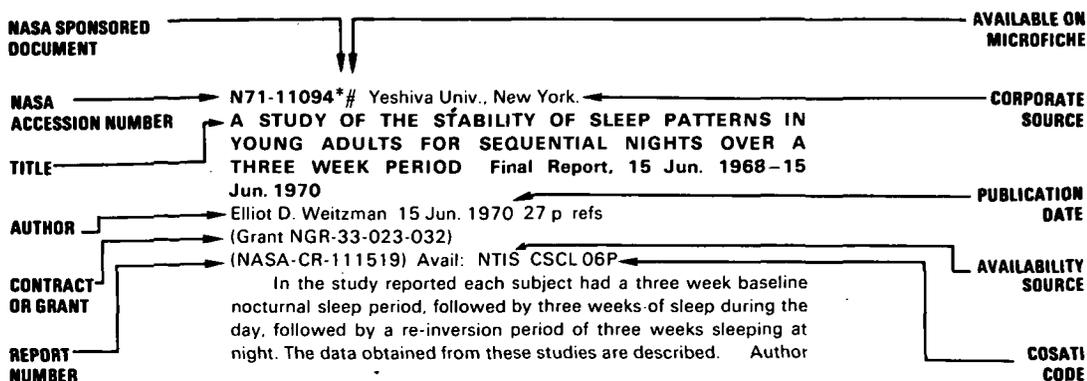
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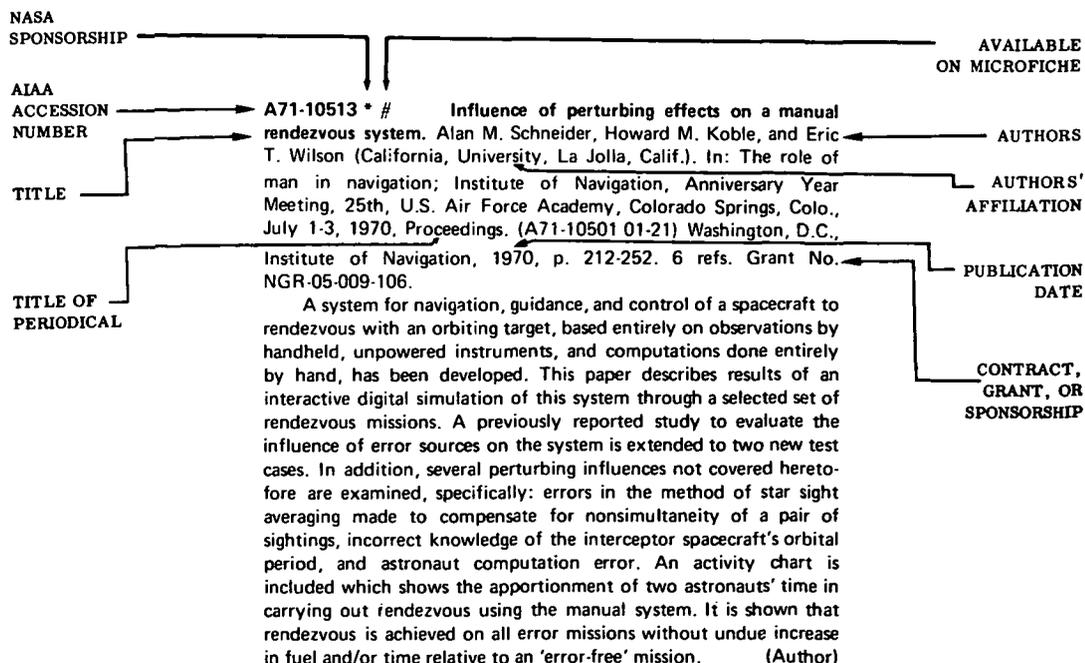
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## TYPICAL CITATION AND ABSTRACT FROM STAR



## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY



A Continuing Bibliography (Suppl. 97)

JANUARY 1972

## IAA ENTRIES

**A71-42899 \*** The influence of central search task luminance upon peripheral visual detection time. Joseph R. Zahn (San Jose State College, San Jose, Calif.) and Richard F. Haines (NASA, Ames Research Center, Moffett Field, Calif.). *Psychonomic Science*, vol. 24, Sept. 25, 1971, p. 271-273. 12 refs.

Twenty subjects were exposed to a wide range of luminances (8.5, 55, 792, 6,800 fL) of a centrally located diffuse white search panel. Each subject attempted to detect the onset of seven randomly presented test lights (90, 60, 30 deg of arc left and right of 0 deg of arc along the horizontal meridian) concurrently with a continuous search task. The findings suggest that the visual field constricts with an increased central panel luminance. This is shown by an increased peripheral detection time (DT) and by more undetected peripheral test lights, even though the difficulty of the central search task was held constant. These results on the effect of an environmental stressor (high luminance) upon peripheral DT are related to findings from previous investigations as well as various applied situations.

(Author)

**A71-42900** Probability processing and diagnostic search - 20 alternatives, 500 trials. Robert G. Mills (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Psychonomic Science*, vol. 24, Sept. 25, 1971, p. 289-292. USAF-supported research.

Investigation of the capability of subjects for processing probability information in performing a diagnostic search task similar to troubleshooting. Six subjects searched among 20 components in a series circuit to isolate a single component failure per trial. Failures were generated according to 10 alternative probability-of-component-failure distributions (D). The results indicate that: (1) distributions of predictions tend to match actual D in shape and location but exhibit certain characteristics; (2) probability of correct prediction is low and is influenced by D; (3) search strategies are suboptimal but 'logical' and to some extent predictable; and (4) in some instances, search strategy appears to be related to predictions.

M.M.

**A71-42910** Fatal civil aircraft accidents: Their medical and pathological investigation. P. J. Stevens. Bristol, John Wright and Sons, Ltd.; Baltimore, Williams and Wilkins Co., 1970. 215 p. 372 refs. \$16.75.

This book is an account of the experience gained in pathological investigation of victims of fatal accidents to British registered

aircraft. The relevant literature is reviewed, and the place of medical and pathological investigation at the present time and in the future is discussed. Special emphasis is laid upon the need for this to be a routine part of every investigation, since only thus can be reduced the chance of important evidence being lost. The subject matter is dealt with in three main sections: public transport aviation accidents, light aircraft accidents, and glider accidents. A fourth section is devoted to the problems of multipassenger aircraft accidents as a special type of mass disaster. Some 74 fatal flying accidents were investigated by the author. Many illustrations, tables of accident statistics, and an extensive list of references are included. It is considered that the book will be of importance to airline operators, aircraft designers, and designers of safety equipment. F.R.L.

**A71-42928 #** Functional diagnostics in the ophthalmologic aviation medicine (Funktionsdiagnostik in der ophthalmologischen Luftfahrtmedizin). Ingeborg Lehweß-Litzmann. *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 7, no. 8, 1971, p. 375-378, 374. 7 refs. In German.

An important function of aviation medicine is to ensure that the visual faculties of pilots are adequate for the handling of the aircraft. On the other hand pilots should, for economic reasons, be retained in their profession as long as any possible deterioration regarding their faculties, as it occurs with advancing age, does not interfere with the demands of their job. A simple anatomic supervision of the eye and its performance is not sufficient for the objectives of aviation medicine. It is important to know whether in the case of certain impairments the ability of the pilot to respond properly can be maintained because of compensating factors. The new methods of aviation medicine make use of modern developments including electronic time interval measurement, electronic storage, and study of the cortical response. G.R.

**A71-42980 #** Extended launch windows for ground-based rescue missions. Wayne A. Fey (Aerospace Corp., El Segundo, Calif.). *American Astronautical Society and American Institute of Aeronautics and Astronautics, Astrodynamics Specialists Conference, Ft. Lauderdale, Fla., Aug. 17-19, 1971, AAS Paper 71-304*. 19 p. 5 refs.

The success probability of the launch of a ground-based rescue vehicle should be greatly increased if launch windows could be extended from minutes to several hours. An analysis of 22 launch vehicle holds showed that 11 holds were less than 1 hour, and 19 holds were less than 3 hours. Conventional rendezvous techniques - either direct ascent or in-plane - theoretically imply that a launching should occur at a specific instant, although in practice a launch window of minutes can be obtained. A bi-elliptic rendezvous technique which combines the maneuvers for plane change and phasing to reduce the performance requirements was selected to achieve a maximum launch window. Launch windows of 1 to 2 hours are shown for a 5800-lb rescue capsule launch by a Titan IIC vehicle. A 3-hour launch window was found possible for a capsule weight of 4000 lb. (Author)

**A71-43108** Parameters of alpha activity during the performance of motor tasks. H. Scheich and O. Simonova (Max-Planck-Institut für Psychiatrie, Munich, West Germany). *Electroencephalography and Clinical Neurophysiology*, vol. 31, Oct. 1971, p. 357-363. 15 refs.

The results reported are based on an investigation of two independent groups of normal student volunteers. Group A was tested during the performance of a number of motor tasks while the persons were sitting in a chair with their eyes open. The tasks involved turning a handle and swinging a leg. Subsequently the tasks were repeated with closed eyes. Group B had to perform 2.5 min of walking on the spot without haste. On the basis of the results a distinction could be made between two groups of subjects with different alpha indices during rest. A corresponding change of alpha index was observed during simple motor performances. The alpha indices of all individuals were more similar during motor activity than the alpha index during rest. The response type was the same in experiments with open and closed eyes. G.R.

**A71-43109** Effects of prolonged bed rest on EEG sleep patterns in young, healthy volunteers. Ralph S. Ryback and Oliver F. Lewis (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Electroencephalography and Clinical Neurophysiology*, vol. 31, Oct. 1971, p. 395-399. 25 refs. USAF-sponsored research.

The bed-rest study involved eight subjects, 18-24 years of age, and was divided into control, experimental, and recovery phases of 5, 5, and 6 weeks, respectively. During the bed-rest period, four subjects continued to exercise on the total body ergometer while confined to bed, while the remainder acted as controls. All subjects, except for the controls during the bed-rest period, performed 600 kcal of exercise a day. Results are expressed as mean percent change from baseline values and mean percentage of total sleep time. G.R.

**A71-43110** Facilitation of stereoscopic depth perception by a relative-size cue in ambiguous disparity stereograms. Mark B. Fineman (Yeshiva University, New York, N.Y.). *Journal of Experimental Psychology*, vol. 90, Oct. 1971, p. 215-221. 8 refs.

It was proposed that the cue of relative size may facilitate depth perception in accordance with a crossed or uncrossed disparity in stereograms in which both tendencies are equally represented. A concurrent concept was that the latency associated with the perception of depth in random-dot stereograms may be due, in part, to a cue conflict between binocular disparity and relative size. Six Ss were given eight presentations of five stereographic stimuli, in which disparity was ambiguous but relative size was systematically altered and were tested for direction of depth preferences and response latency. Both the relative-size effects and an uncrossed disparity bias were evidenced in the data. The latter effect was attributed to binocular rivalry between dissimilar elements in the stereoscopic half-fields. It was concluded that depth cue relationships are more complex than had been suggested by simple dominance theories. (Author)

**A71-43111** Analysis of contrast effects in loudness judgments. Lawrence E. Melamed and Willard R. Thurlow (Wisconsin University, Madison, Wis.). *Journal of Experimental Psychology*, vol. 90, Oct. 1971, p. 268-274. 13 refs.

A recent experiment evaluated the relative contributions of a pooled adaptation level and nonsensory processes in the formation of contrast effects in loudness judgments using both a category scale and a maximally extensive, number-response language. The results indicate that obtaining a contrast effect is not dependent on certain restrictive features of the category-judgment language. However, the formal properties of the contrast effect were found to be characteristically different from those derived from a sensory interpretation of its origin. A memory-shift interpretation of S's judgments is presented. (Author)

**A71-43112 \*** Pupillary responses during a short-term memory task - Cognitive processing, arousal, or both. David A.

Johnson (Oklahoma State University, Stillwater, Okla.). *Journal of Experimental Psychology*, vol. 90, Oct. 1971, p. 311-318. 16 refs. NSF Grant No. GY-6929; Grant No. NsG(T)-67-52.

To assess the sensitivity of the pupil response to shifts in processing load, pupillograms of experimental Ss were obtained during a short-term memory task that included a signal to forget part of the material. A highly significant postsignal cycle of dilation-constriction was present in the pupillograms of the experimental Ss and absent in those of control Ss for whom the signal had no meaning. The results were seen to lend some support to cognitive interpretations of pupillary change. However, such interpretations proved inadequate to account for some of the data, and certain nonprocessing motivational explanations are offered. It was concluded that pupil changes ascribed to information processing may be frequently confounded with motivational effects. (Author)

**A71-43113** Presentation modality as an encoding variable in short-term memory. Ronald H. Hopkins, Richard E. Edwards, and James R. Gavelek (Washington State University, Pullman, Wash.). *Journal of Experimental Psychology*, vol. 90, Oct. 1971, p. 319-325. 22 refs.

The phenomenon of release from proactive interference is used to investigate the differential encoding of auditory and visual materials in a short-term store. The results of the experiment include the finding that a visual-to-auditory shift in modality produces a release from proactive interference, but an auditory-to-visual shift does not. M.V.E.

**A71-43117** Bradycardia, increased cardiac output, and reversal of pulmonary hypertension in altitude natives living at sea level. Francisco Sime, Dante Peñaloza, and Luis Ruiz (Peruvian University, Lima, Peru). *British Heart Journal*, vol. 33, Sept. 1971, p. 647-657. 21 refs. PHS-Army-supported research.

Eleven healthy young men native to high altitude underwent hemodynamic studies at their original place of residence and after two years' residence at sea level. The aim was to determine the long-term effects of the suppression of the hypoxic stimulus upon heart rate, cardiac output, and pulmonary artery pressure of highlanders. For comparative purposes the influence of oxygen inhalation at high altitude was also studied. The heart rate fell at sea level and bradycardia was seen in most of the cases. Cardiac output increased moderately with the descent to sea level. At both altitudes exertion caused a similar increase in cardiac output which was related to the increase in heart rate rather than to stroke index which did not show significant variations. The observations emphasize the importance of the structural characteristics of the pulmonary vessels of highlanders in the mechanism of high altitude pulmonary hypertension. M.M.

**A71-43118** Ultrasonic evaluation of anatomical abnormalities of heart in congenital and acquired heart diseases. Motonao Tanaka, Toshihiko Neyazaki, Shigemi Kosaka, Haruo Sugi, Sutemi Oka, Toshiaki Ebina, Yoshio Terasawa, Kinjiro Unno, and Keiko Nitta (Tohoku University; Sendai Kosei Hospital, Sendai, Japan). *British Heart Journal*, vol. 33, Sept. 1971, p. 686-698. 29 refs.

Attempts have been made to apply ultrasono-cardiotomography to patients with congenital and acquired heart disease. Ultrasono-cardiotomography makes it possible to obtain a clear cross-section picture of the heart and large vessels in patients with various heart diseases as well as in normal subjects. Abnormalities in anatomical structure such as hypertrophy of the myocardium, enlargement of the cardiac chambers, and septal defects at atrial or ventricular levels can also be seen. The findings from ultrasono-cardiotomograms are in good agreement with those found in the resected mitral valve. Changes in tissue, such as verrucae or degeneration, can be seen, and the technique is clinically useful in detecting morphological and anatomical abnormalities in various heart diseases. M.M.

**A71-43142** Spontaneous rhythms in physiological control systems. B. W. Hyndman, R. I. Kitney, and B. McA. Sayers (Imperial College of Science and Technology, London, England). *Nature*, vol. 233, Oct. 1, 1971, p. 339-341. 8 refs. Research supported by the Medical Research Council and the Leverhulme Trust.

Description of an explanation for the spontaneous and broadly repetitive fluctuations which the mean arterial blood pressure in man undergoes with a typical period of about 10 sec. It is suggested that the spontaneous fluctuations in peripheral blood flow are due to adjustments in the cutaneous circulation by the thermoregulatory system. With the body core temperature at 37 C, thermal variations in the extremities are handled by the peripheral system. Selective entrainment occurs when a periodic thermal stimulus is applied, implying that the thermoregulatory system operates on a similar nonlinear basis to the blood pressure control system. M.M.

**A71-43143** Elimination of the response to gravity of lettuce seedlings. A. Berrie (Glasgow, University, Glasgow, Scotland). *Nature*, vol. 233, Oct. 1, 1971, p. 347-350. 14 refs.

Description of experiments in which it was found that 3-4 prime chlorophenyl 3-methoxy phthalide (I) modifies the growth of lettuce seedlings. It is shown that the growth of radicles of treated seeds was reduced by about 20% while the growth of hypocotyls was reduced by about 40%. It is pointed out that a possible point of action of (I) on the geotropic response is the statolith, which many people think is a central feature in the perception of gravity (Audus, 1969; Wilkins, 1966). The reversal by gibberellic acid (GA) of the slight growth inhibition caused by (I) in the roots and hypocotyls suggests that (I) competes with endogenous GA for the site of action of this hormone. M.M.

**A71-43148** Equilibrium and orientation of the pilot (Equilibrio y orientación del piloto). Pedro Gómez Cabezas (Ministerio del Aire, Madrid, Spain). *Revista de Aeronáutica y Astronáutica*, vol. 31, July 1971, p. 508-516. In Spanish.

A perfect equilibrium for the pilot is obtained when he is able to fly his aircraft in every aerodynamically feasible position. This equilibrium involves a recognition by the pilot of his position with regard to the aircraft. Orientation in the air is related to a consciousness of the pilot of the direction and position of the aircraft in relation to fixed geographical points. The physiological systems connected with the sensory perception of equilibrium on the ground and in the air are examined. The conditions to which the pilot is subjected in the air can cause disturbances concerning the proper integration of the various sensory perceptions involved. It is important to consider these possibilities in the examination and selection procedure for future pilots. The training of pilots required to avoid spatial disorientation is discussed together with problems of orientation in the state of weightlessness during space flights. G.R.

**A71-43216 #** Dosage of erythropoietic activity in the polycythemic mouse as a result of intermittent hypobaric hypoxia (II dosaggio dell'attività eritropoietica nel topo policitemico per ipossia ipobarica intermittente). C. Peschle, G. Mastroberardino, L. Mancini (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), and F. Rossanigo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 3-15. 8 refs. In Italian.

Description of the dosing technique used in this investigation of mice. This highly sensitive and specific technique allows a quantitative dosage of erythropoietin (or ESF). The lines of dose and effect regression have a straightforward course in the doses used in the investigation, and are specifically parallel even if obtained with different materials. The specificity of the technique is confirmed by the use of anti-ESF immunity serums. M.M.

**A71-43217 #** Investigations of the mechanism responsible for erythropoietic hyperactivity as a result of hypobaric hypoxia

(Indagini sul meccanismo determinante l'iperattività da ipossia ipobarica). C. Peschle, F. Rossanigo (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), G. F. Sasso, and G. Mastroberardino. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 16-23. 9 refs. In Italian.

Evaluation of the percentage incorporation of (59)Fe in the peripheral erythrocytes of polycythemic mice as a result of intermittent hypobaric hypoxia following the inoculation of exogenous erythropoietin or following an appropriate hypoxic stimulus. The curves of erythropoietic activity nearly overlap. In addition, the administration of an immunity serum with anti-erythropoietic activity eliminated almost completely the erythro-stimulating effect of hypoxia. It seems to be proved, therefore, that the erythropoietic hyperactivity present over 24 hrs following a hypoxic stimulus depends essentially on the hyperincretion of erythropoietin. M.M.

**A71-43218 #** Research on extrarenal production of erythropoietin - Preliminary investigations on binephrectomized animals subjected to hypoxia (Ricerca sulla produzione extrarenale dell'eritropoietina - Indagini preliminari su animali binefrectomizzati e sottoposti ad ipossia). C. Peschle, F. Rossanigo (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), G. F. Sasso, G. Mastroberardino, and F. Lippardini. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 24-31. 7 refs. In Italian.

Study of the behavior of erythropoietin (ESF) in binephrectomized rats subjected to hypobaric hypoxia at different intervals after removal of the kidneys. The plasmatic rate of ESF was evaluated in polycythemic mice as a result of intermittent hypobaric hypoxia on the basis of the percentage incorporation of (59)Fe in peripheral erythrocytes. The erythropoietic response has been found to be significant in rats subjected to hypoxia immediately after binephrectomy, although it is far lower than in normal hypoxic animals. It is pointed out that the moderate but significant production of erythropoietin in hypoxic and binephrectomized animals is due to the ESF-generating activity of the renal erythropoietic factor residual in the circulating plasma or in extrarenal tissue deposits after kidney removal. M.M.

**A71-43219 #** Vertebral distortion in acrobatic flight - Clinical and medico-legal considerations (Distorsione vertebrale in volo acrobatico - Considerazioni cliniche e medico-legali). G. Rotondo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 32-53. 24 refs. In Italian.

Description of a case of cervical vertebral distortion which occurred during flight to a pilot of a G 91 jet. This particular rachidian injury is not frequent and therefore cannot be defined as typical as to its high location or type of distortion trauma. Its pathogenic mechanism, its clinical and radiological picture, and the related significant medico-legal aspects are analyzed. Emphasis is placed on measures for preventing these professional vertebral injuries which may have disabling consequences. M.M.

**A71-43220 #** Behavior of serotonin metabolism in helicopter pilots (Comportamento del metabolismo della serotonina in piloti di elicottero). G. Paolucci and G. Blundo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 83-92. 6 refs. In Italian.

Serotonin changes through its final metabolic product, 5-hydroxyindolacetic acid, which is eliminated with urine, were studied in helicopter pilots. From a comparison of the values recorded before and after flight, in instructors (many hours of flight), intermediate group (fair number of flight hours), and trainees (few hours of flight), it was found that flight in itself does not affect the metabolism of this substance, since the values 'before' and 'after' did not change in any of the three groups. There is, however, a significant overall decrease in the excretion of 5-hydroxyindolacetic acid in the trainees both before and after flight. This warrants the

thinking that the change is to be attributed to the particular emotional state that precedes and lasts throughout the flight in the unskilled who have still to reach the state of absolute tranquility that only experience and mastery of the craft bring with time. M.M.

**A71-43221 # Problem of the psychological screening of pilot trainees - Study of affective stupor as a reaction to the colored plates of Rorschach test in a group of pilot trainees (Sul problema della selezione psicologica degli allievi piloti - Studio sulle stupore affettivo di fronte alle tavole colorate del test di Rorschach in un gruppo di allievi piloti).** F. Sparvieri. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 93-100. In Italian.

Investigation, in a group of 52 pilot trainees, of the existence of statistically significant correlations between signs of neurosis, as shown by the experience of affective stupor during administration of the Rorschach test, and learning to fly. The results obtained were found to be negative, confirming the idea that the possible existence of neurotic conditions was not a serious obstacle to learning to fly in the subjects examined. M.M.

**A71-43222 # Problem of the psychological screening of pilot trainees - Early results of the administration of the Minnesota Multiphasic Personality Inventory (MMPI) to a group of pilot trainees (Sul problema della selezione psicologica degli allievi piloti - Primi risultati dell'applicazione del Minnesota Multiphasic Personality Inventory /MMPI/ su un gruppo di allievi piloti).** F. Sparvieri and E. De Angelis. *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 101-110. 13 refs. In Italian.

Investigation, in a group of 94 pilot trainees, of the existence of statistically significant correlations between the results of the administration of the MMPI test to the subjects and their learning to fly. A correlation, negative and statistically significant, was found only in the case of the results for scale K. This confirms the idea that the characteristic feature of defensiveness was an obstacle to learning to fly in the sample examined. M.M.

**A71-43223 # Man and his relationships with the environment and with the control of space vehicles (L'uomo ed i suoi rapporti con l'ambiente e con il governo dei veicoli aerospaziali).** A. Scano (Scuola Militare di Sanità Aeronautica, Italy). *Rivista di Medicina Aeronautica e Spaziale*, vol. 34, Jan.-June 1971, p. 111-137. In Italian.

Discussion of design criteria adopted in providing aircraft pilots and astronauts with suits and on-board equipment suitable to enable them to survive their environment. The principal physiologic problems existing in the environment of a space vehicle are discussed, together with techniques for their solution. Other problems considered are water recovery in a space vehicle, the weightlessness problem, the maintenance of an adequate pressure and temperature in the cabin, muscular work during extravehicular activity, the confinement problem, emotional reactions, and survival and rescue in space. M.M.

**A71-43230 # Procedures utilized by Lufthansa German Airlines in conducting training programs.** R. Reese (Deutsche Lufthansa AG, Cologne, West Germany). In: Annual Corporate Aircraft Safety Seminar, 16th, Washington, D.C., April 19, 20, 1971, Proceedings. Arlington, Va., Flight Safety Foundation, Inc., 1971, p. 37-45.

The objective of the Lufthansa Pilot School is to train pilots in accordance with the ICAO Recommendations as well as the existing German Regulations for Personal Licensing and Aviation Law in order to provide them with the licenses needed to operate as a commercial pilot. Applicants for the school have to pass a 5-day entrance examination before admission. The examination includes Link trainer tests in order to establish the applicant's ability to solve

multiple problems simultaneously and to test his stereoscopic conception. The successful applicant is offered a training contract, in which he commits himself to work for Lufthansa for at least four years. At school each student receives 300 hours of flight training, 1300 hours of ground instruction, and 70 hours of Link trainer instruction. The student leaves school after 22 months of training. G.R.

**A71-43232 # Circadian rhythm medical facts for pilots.** Stanley R. Mohler. In: Annual Corporate Aircraft Safety Seminar, 16th, Washington, D.C., April 19, 20, 1971, Proceedings. Arlington, Va., Flight Safety Foundation, Inc., 1971, p. 55-57.

Aviation activities require a high state of alertness for safe aircrew performance. Alertness varies with respect to the sleep-wake cycle. Medical evidence shows that the probability of making mistakes significantly increases during those times when the individual is accustomed to sleeping but, for various reasons, elected to undertake certain duties. In order that the individual may adjust to the time of destination, the International Civil Aviation Organization has perfected a formula which for transmeridional flights takes into consideration the number of time zones traversed. It is recommended that aviation personnel and passengers should plan to avoid undertaking challenging duties for at least 24 hours following lengthy east-west trips. G.R.

**A71-43244 \* Origin of organic matter in early solar system. III - Amino acids: Catalytic synthesis.** Daisuke Yoshino, Ryoichi Hayatsu, and Edward Anders (Chicago, University, Chicago, Ill.). *Geochimica et Cosmochimica Acta*, vol. 35, Sept. 1971, p. 927-938. 31 refs. Grant No. NGL-14-001-010.

When carbon monoxide, hydrogen, and ammonia are allowed to react at 200 to 700 C in the presence of nickel, alumina, or clay catalysts, amino acids are found among the products in yields of 0.01 to 0.10%. Purines, pyrimidines, and hydrocarbons are also formed. Identifications were made by using an amino acid analyzer. Although some contamination has occurred, the following amino acids appear to have been definitely synthesized: glycine, alpha-alanine, beta-alanine, sarcosine, aspartic acid, glutamic acid, arginine, histidine, lysine, and ornithine. Evidence is less conclusive for leucine, isoleucine, valine, and proline. T.M.

**A71-43245 \* Origin of organic matter in early solar system. IV - Amino acids: Confirmation of catalytic synthesis by mass spectrometry.** Ryoichi Hayatsu, Edward Anders (Chicago, University, Chicago, Ill.), and Martin H. Studier (Argonne National Laboratory, Argonne, Ill.). *Geochimica et Cosmochimica Acta*, vol. 35, Sept. 1971, p. 939-951. 30 refs. AEC-supported research; Grant No. NGL-14-001-010.

Catalytic synthesis of the following amino acids from CO, ND<sub>3</sub> and D<sub>2</sub> has been confirmed mass spectrometrically: glycine, alanine, aspartic and glutamic acids, histidine, lysine, ornithine, and tyrosine. Contamination was ruled out by use of deuterated reactants. It appears that this reaction (a variant of the Fischer-Tropsch synthesis) can produce most of the amino acids seen in meteorites, along with hydrocarbons, purines and pyrimidines. It may have been an important process for the production of prebiotic organic matter in meteorites and planets. (Author)

**A71-43299 Model representation of the biomechanical system 'man-operator' acted upon by random vibrations.** B. A. Potemkin and K. V. Frolov (Gosudarstvennyi Nauchno-Issledovatel'skii Institut Mashinovedeniia, Moscow, USSR). (*Akademiia Nauk SSSR, Doklady*, vol. 197; Apr. 21, 1971, p. 1284-1287.) *Soviet Physics - Doklady*, vol. 16, Oct. 1971, p. 280-282. 8 refs. Translation.

The dynamic characteristics of the human body subjected to random vibrations are determined experimentally as a function of

the changes in the working position, with a view toward studying the dynamic properties of the operator/machine system and constructing mechanical models of the machine-operator body. The study is limited to the vibrations of the human body in the sitting position, treating it as a linear mechanical system. Allowance is made for changes in the system parameters, depending on level of muscular tension and on the position of the spine in space. The frequency characteristics of the human body are plotted, and mechanical models for various positions are constructed. V.P.

**A71-43354**      **Control and regulation of the human motor system.** Gerald L. Gottlieb and Gyan C. Agarwal (Rush-Presbyterian-St. Luke's Medical Center, Chicago, Ill.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-1, Oct. 1971, p. 379-383. 10 refs. NSF Grant No. GK-17581.

Description of an additional mechanism which can play a role in the control of the human motor system. This mechanism is control of the gain of the stretch reflex loop. Experimental evidence for the existence of this mechanism is given, and its significance discussed. Not only are the control system dynamics strongly affected, but an additional feature is that the computations required of the central nervous system are simplified. M.M.

**A71-43390 #**      **Physical fitness and fatigue in aircrew members.** Bryce O. Hartman (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). In: Annual Corporate Aircraft Safety Seminar, 15th, San Antonio, Tex., May 11-13, 1970, Proceedings. Arlington, Va., Flight Safety Foundation, Inc., 1970.

8 p.

Flying fatigue is frequently considered to be a contributory factor in 'pilot' error accidents. Fatigue in flying falls into two overlapping and interdependent operational categories, including cumulative (chronic) fatigue and acute single mission skill fatigue. Cumulative fatigue occurs when physical and psychological recovery between repeated missions is incomplete. Skill fatigue has become more of a problem with increased cockpit hours. A number of steps for reducing fatigue are discussed. G.R.

**A71-43525 \***      **Studies of the electron transport chain of extremely halophilic bacteria.** V. Michael M. Lieberman and Janos K. Lanyi (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Biochimica et Biophysica Acta*, vol. 245, 1971, p. 21-23. 29 refs.

Cytochrome oxidase from an extremely halophilic bacterium requires up to 5.0 M NaCl for maximal activity and stability. Differences in effectiveness among various salts in promoting enzyme activity were observed, but a minimal activity (about 30%) could be supported by all salts tested including MgCl<sub>2</sub> and spermine at relatively low concentrations. The enzyme activity in the presence of low concentrations of MgCl<sub>2</sub> was shown to be more dependent on pH but less sensitive to hydrophobic bond-breaking agents. The results suggest that hydrophobic forces predominate in promoting the major portion of the enzyme activity in the presence of high NaCl concentrations, while charge-shielding promotes partial enzyme activity in the presence of MgCl<sub>2</sub>. M.M.

**A71-43545**      **Circadian rhythm - Population of interacting neurons.** Jon W. Jacklet and Jeffrey Geronimo (New York, State University, Albany, N.Y.). *Science*, vol. 174, Oct. 15, 1971, p. 299-302. 16 refs. Research supported by the State University of New York; PHS Grant NS-08443.

The circadian rhythm in the frequency of compound action potentials recorded from the isolated eye of *Aplysia* is a consequence of interactions among the cells of the retinal population. As the population number is reduced to a critical 20%, progressively shorter circadian periods and ranges are expressed. Below the critical number, the population oscillates at ultradian frequencies. (Author)

**A71-43546**      **Anomalous retinal pathways in the Siamese cat - An inadequate substrate for normal binocular vision.** Ronald E. Kaili, Sonal R. Jhaveri, and Whitman Richards (MIT, Cambridge, Mass.). *Science*, vol. 174, Oct. 15, 1971, p. 302-305. 18 refs. Research supported by the Alfred P. Sloan Foundation.

All major retinal pathways in the Siamese cat are abnormal, with almost total crossing of the projections to the pretectum and superior colliculus. These projections represent a marked disruption in the customary neural substrate for binocular vision, which implies a consequent impairment in stereoscopic depth perception. Crossed eyes, commonly seen in the Siamese cat, may therefore arise from a neuroanatomical defect in the primary visual pathways. (Author)

**A71-43547**      **Pineal function in sparrows - Circadian rhythms and body temperature.** Sue Binkley, Edward Kluth, and Michael Menaker (Texas, University, Austin, Tex.). *Science*, vol. 174, Oct. 15, 1971, p. 311-314. 19 refs. NIH Grant No. HD-03803-02.

Deep body temperature of the house sparrow, *Passer domesticus*, was monitored continuously by radio telemetry. Pinealectomy abolished the normal circadian rhythm of body temperature in constant darkness, and significantly altered the amplitude of body temperature rhythms entrained to light cycles. The body temperature minima of pinealectomized birds never fell as low as those of unoperated birds regardless of the light conditions; the temperature maxima of both normal and pinealectomized birds were higher in light than in darkness. In sparrows the pineal organ is essential to the normal function of the biological clock controlling both activity and body temperature rhythms and may be directly involved in thermoregulation. (Author)

**A71-43548**      **Color- and edge-sensitive channels in the human visual system - Tuning for orientation.** Richard Held and Stefanie R. Shattuck (MIT, Cambridge, Mass.). *Science*, vol. 174, Oct. 15, 1971, p. 314-316. 18 refs. NIH Grant No. MH-07642.

After subjects scanned red stripes tilted clockwise off vertical and green stripes tilted equally but counterclockwise, vertical test stripes appeared tilted counterclockwise when red but clockwise when green. As the angle between scanned and test stripes was increased from 0 to 75 deg, the magnitude of the tilt aftereffect rapidly increased to a peak between 10 and 15 deg and then dropped close to zero at about 40 deg, a result consistent with narrowly tuned edge-sensitive channels. (Author)

**A71-43581 #**      **Retinal neurons of cats (Neirony setchatki koshki).** E. G. Shkol'nik-Iarros (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 199, July 1, 1971, p. 238-241. 13 refs. In Russian.

A great variety of ganglion cells differing in sizes and dendrite spans were established in neurons from 52 retinas of kittens and young and adult cats. The large span and density of branching amacrine cell protrusions and the great diversity of ganglion cells, containing neurons with unilateral dendrite branches, are noted as characteristic features of the feline retina. V.Z.

**A71-43582 #**      **Triggering and neurochemical mechanisms of thermoregulation under conditions of hyperoxia (O puskovykh i neirokhimicheskikh mekhanizmaxh termoregulatsii v usloviakh giperoksii).** I. I. Antonov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 199, July 1, 1971, p. 245-247. In Russian.

Experiments on intact rabbits exposed to hyperoxia under increased ambient pressures showed temperature increases in various sections of the cerebrum during the initial 4 to 5 min of exposure, followed by temperature decreases in the cortical and subcortical formations at later stages of the exposure period. In rabbits with inactivated respiratory tract acceptors these temperature reactions had similar but slower developing trends. V.Z.

**A71-43814 \*** Microbiological-sampling of returned Surveyor III electrical cabling. M. D. Knittel, R. H. Green (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), and M. S. Favero (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.; U.S. Public Health Department, Phoenix, Ariz.). In: Lunar Science Conference, 2nd, Houston, Tex., January 11-14, 1971, Proceedings. Volume 3. Cambridge, Mass., MIT Press, 1971, p. 2715-2719. 7 refs.

A piece of electrical cabling was retrieved from the Surveyor III spacecraft by the crew of Apollo 12 and subjected to microbiological analysis for surviving terrestrial microorganisms. The experiment was done in a sealed environmental chamber to protect against contamination. No viable microorganisms were found on the wiring bundle samples. (Author)

**A71-43815 \*** Surveyor III - Bacterium isolated from lunar-retrieved TV camera. F. J. Mitchell (NASA, Manned Spacecraft Center, Lunar Receiving Laboratory, Houston, Tex.) and W. L. Ellis (Brown and Root-Northrop, Houston, Tex.). In: Lunar Science Conference, 2nd, Houston, Tex., January 11-14, 1971, Proceedings. Volume 3. Cambridge, Mass., MIT Press, 1971, p. 2721-2733. 14 refs.

Selected components of the unmanned Surveyor III spacecraft which had remained on the lunar surface for 2-1/2 years were collected and returned to earth by the crew of Apollo 12. A bacterium, *Streptococcus mitis*, was isolated from a sample of foam taken from the interior of the retrieved TV camera. The available data suggests that the bacterium was deposited in the camera prior to the Surveyor III spacecraft launch. The authors suggest that lyophilizing conditions existing during prelaunch vacuum testing and later on the lunar surface may have been instrumental in the apparent survival of this microorganism. (Author)

**A71-43864 #** Short-term central fatigue as a cause of the psychological refractory period (Kurzzeitige zentrale Ermüdung als Ursache der Psychologischen Refraktärzeit). Manfred Amelang (Hamburg, Universität, Hamburg, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 18, no. 3, 1971, p. 359-366. 8 refs. In German.

Attempt to ascertain the reason for the delay in the time required to react to the second of two signals presented in succession in comparison with the time required to react to the same signal when presented alone. The results of an experiment performed to determine whether short-term central fatigue is a cause of the lengthened reaction time of the second signal when the interstimulus interval is equal to or greater than the reaction time of the first signal are cited. It was assumed that the delay in the reaction time of the second signal increases with the complexity of the first reaction. Therefore the number of alternatives possible for the first reaction task was varied (single reaction, two- and four-choice reaction), while keeping the influence of different degrees of practice or skill of the fingers used constant under different conditions. The second task was always a three-choice reaction. In four time intervals after the end of the first reaction the mean value of the reaction time of the second signal for eight subjects was all the higher, the more alternatives were possible in the previously executed first reaction, thus confirming the recovery time hypothesis. A.B.K.

**A71-43865 #** Proactive reaction inhibition as an indicator of intensity variations of immediate memory retention phenomena (Proaktive Reaktionshemmung als Indikator für Intensitätsverläufe unmittelbarer Behaltensvorgänge). Wolfgang Moog and Henning Mührer. *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 18, no. 3, 1971, p. 485-498. 13 refs. In German.

Study of the rate of immediate forgetting by measuring the reaction time for interpolated stimuli in 20 psychology students. The subjects were required to remember two or three pairs of simple figures, each of which was shown to the subjects for 4 sec and was to

be recalled 6 sec after the exposure. During this interval, 0.1, 0.5, 2.5, 4.0, or 5.0 sec after the exposure of the figures, the subjects received the interpolating stimulus, which consisted of an acoustic signal. The subjects were required to press a key on hearing this signal. The delay in the reaction caused by a previous exposure of the simple figures to be remembered was named 'proactive reaction inhibition' (PRI). The variations of the PRI during a period of 5 sec were studied for figures of various difficulty; the variations were considered to represent an 'inhibition gradient.' In general, the PRI decreases when the time between the exposure of the stimulus to be remembered and the interpolated stimulus increases. The curves of the inhibition gradients have the same shape for both the easy and the difficult tasks, although they differ clearly in their level. A.B.K.

**A71-43870** Quantitative characterization of unit response in the visual system. Hideo Sasaki, David M. Bear, and Frank R. Ervin (Massachusetts General Hospital, Boston, Mass.). *Experimental Brain Research*, vol. 13, no. 3, 1971, p. 239-255. 18 refs. Research supported by the Digital Equipment Corp.; Contracts No. AF 33(615)-5453; No. AF 49(643)-201.

A quantitative approach to characterization of unit response in the visual system was proposed. Temporal parameters of response were analyzed by post stimulus time-histograms obtained from point visual stimulation. Explicit temporal intervals were chosen to coincide with discrete response components. By calculating net firing rate within these intervals as a function of stimulus position, quantitative receptive field maps were constructed. To estimate response between stimulated matrix mesh points, a general contouring program was described. Latency, and synchronicity - a logarithmic probability function sensitive to temporal consistency of response - were also mapped as functions of stimulus position. Representative firing rate maps morphologically resembled previously described receptive fields; latency and synchronicity maps, it is argued, allow for additional mechanistic and functional analysis of striate units. M.M.

**A71-43871** Sequential change in receptive fields of striate neurons in dark adapted cats. David M. Bear, Hideo Sasaki, and Frank R. Ervin (Massachusetts General Hospital, Boston, Mass.). *Experimental Brain Research*, vol. 13, no. 3, 1971, p. 256-272. 28 refs. Research supported by the Digital Equipment Corp.; Contracts No. AF 33(615)-5453; No. AF 49(643)-201.

A general purpose, digital computer was used to map quantitatively the receptive fields of units in cats' striate cortex. Receptive fields were studied as a function of barbiturate anesthetic level under dark adapted conditions. Responses were recorded from striate cells, both simple and complex in the sense of Hubel and Wiesel. Many cortical maps were unstable over time, especially in the presence of low voltage, fast EEG activity. Heavy barbiturate anesthesia and spontaneous spindling in the EEG markedly reduced the variability in these maps. When stability was analyzed as a function of time interval of response, initial on responses were often more stable than longer latency late on or off responses. The effects of pentobarbital, in addition to stabilization of the receptive field, included striking phase reversals in which inhibitory regions became excitatory and vice versa. M.M.

**A71-43872** Quantitative variation in striate receptive fields of cats as a function of light and dark adaptation. Hideo Sasaki, Yoichi Saito, David M. Bear, and Frank R. Ervin (Massachusetts General Hospital, Boston, Mass.). *Experimental Brain Research*, vol. 13, no. 3, 1971, p. 273-293. 27 refs. Research supported by the Digital Equipment Corp.; Contracts No. AF 33(615)-5453; No. AF 49(643)-201.

A digital computer was used to map quantitatively the receptive fields of units in cats' striate cortex. Animals were prepared under diethyl ether anesthesia, immobilized with a mixture of gallamine

triiodide and d-tubocurarine, and lightly anesthetized with pentobarbital sodium. Striate response was analyzed temporally by means of post stimulus time-histograms. From unit response at all stimulated positions, an explicit temporal interval was chosen to coincide with each discrete component of response. The qualitative categories of simple and complex striate unit were analyzed in the light of quantitatively determined receptive field maps. Receptive fields obtained under light and dark adapted conditions were contrasted with the aid of firing rate, latency, and synchronicity maps. Functional changes in striate response led to an enhancement of contrast perception and spatial acuity in light adapted conditions and the development of absolute sensitivity at the cost of resolution in darkness. M.M.

**A71-43901** Human reaction to vibration. Geoff Allen (Royal Aircraft Establishment, Farnborough, Hants., England). (Institute of Environmental Sciences, Annual Meeting, Los Angeles, Calif., Apr. 26-30, 1971.) *Journal of Environmental Sciences*, vol. 14, Sept.-Oct. 1971, p. 10-15. 21 refs.

Outline of the nature, origins, and importance of externally induced body vibration, and some of the reactions it produces. Brief reference is made to self-induced vibration. The confusion in the results of the many investigations into human reaction to vibration is illustrated. The International Standards Organization (ISO) proposed limits for vibration exposure are critically reviewed against this background. The difficulties inherent in attempting to determine human reaction are illustrated by analyzing the variables involved in a vibration test of the complex, multisystem human machine. A qualitative equation is presented, covering some of the many physical, physiological, and psychological variables involved. Reference is made to UK proposals for improvements in standards of experimentation and the need for more real-life investigations. M.M.

**A71-43904** Dimensions of visual information displays. Arthur I. Siegel and M. A. Fischl (Applied Psychological Services, Inc., Wayne, Pa.). *Journal of Applied Psychology*, vol. 55, Oct. 1971, p. 470-476. 8 refs. Contract No. N 00014-66-C-0183.

Twelve air-defense-oriented visual information displays, representing all combinations of three densities of air threat, two different primary display formats, and two conditions of information coding, were exposed to three S groups in order to determine the nature and structure of the display-observer interface. The S groups possessed different degrees of familiarity with the displays and the tactical concepts involved in their use. Independent multidimensional scaling analyses were performed on the data derived from each group. Seven dimensions, which were congruent across S groups, were isolated. The patterns of factor loadings suggested interpretation in terms of: (a) stimulus numerosity, (b) primary coding, (c) contextual discrimination, (d) structure scanning, (e) critical relationships, (f) cue integration, and (g) cognitive processing. (Author)

**A71-43905 #** Dynamics of respiratory and circulatory adaptation to muscular exercise in man - A systems analysis approach. Ove Wigertz. *Acta Physiologica Scandinavica, Supplementum*, no. 363, 1971. 32 p. 33 refs. Research supported by the Swedish Medical Research Council.

Analysis of physiological responses to supine, submaximal leg exercise using a cycle ergometer with the pedalling rate always kept constant at 60 rpm, irrespective of whether sinusoidal or other work load patterns were applied. The main objectives were to obtain quantitative measurements of the dynamic characteristics of the responses of inspiratory minute volume, heart rate, arterial O<sub>2</sub> tension, and arterial pressure in the radial artery; to compare their dynamic behavior as obtained by different work-load inputs and the dynamic behavior of respiratory and circulatory variables in the unsteady state of exercise; to explore the existence of fast components in respiratory and circulatory control during exercise; and to examine the interrelations between the responses of arterial pressure and heart rate to exercise. F.R.L.

**A71-43911 #** Some characteristics of the bundle structures of the brachial plexus and of its long branches in man and monkeys (Nekotorye osobennosti puchkovogo stroeniia plechevogo spleteniia i ego dlennykh vetvei u cheloveka i obez'iany). S. N. Kakhiani, D. L. Asatiani, and G. D. Kandelaki (Tbilisskii Gosudarstvennyi Institut Uovershenstvovaniia Vrachei, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 63, July 1971, p. 225-228. In Russian.

Slices of brachial plexus bundle structure samples taken from human and monkey corpses were examined under a microscope in a comparative study of the structural and histological differences of these tissues in man and monkeys. Numerous perineural ligaments between plexus bundles were observed in human samples while such ligaments were absent in their counterparts of monkeys. V.Z.

**A71-43912 #** Quantitative analysis of electron-microscopic alterations in the myocardium during a general hypoxia of the organism (Kolichestvennyi analiz elektronmikroskopicheskikh izmenenii miokarda pri obshchei gipoksii organizma). Z. G. Tsagareli and K. N. Dzhandieri (Akademiia Nauk Gruzinskoi SSR, Institut Eksperimental'noi Morfologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 63, July 1971, p. 229-231. In Russian.

An electron microscope was used in a study of various myocardium sections from male dogs exposed to general hypoxia for 1, 6, 15, 30 and 60 days. Mitochondrion sizes, numbers and areas and myofibril areas were determined in slices of the ventriculus and musculus papillaris from the dogs. The mitochondrion sizes and numbers were markedly greater in exposed dogs than in control dogs while the ratio between mitochondrion and myofibril areas in the slices was lower for the exposed dogs. These changes showed a maximum by the 15th day of exposure and became closer to those in control dogs by the end of exposure. V.Z.

**A71-43970** Apparent movement due to closely spaced sequentially flashed dots in the human peripheral field of vision. Marguerite Biederman-Thorson, John Thorson, and G. David Lange (California, University, La Jolla, Calif.). *Vision Research*, vol. 11, Sept. 1971, p. 889-903. 44 refs. Navy-NIH-NSF-supported research; Grant No. AF AFOSR 1335-67A.

Two dots in the peripheral field of vision, so close to one another that they are not resolved spatially when flashed together, induce a strong illusion of movement when they are flashed sequentially. Light adaptation changes the range of adequate interflash intervals. Stabilized vision, and a number of variants of the two-flash program, do not abolish the illusion whereas putative dichogeniculate presentation does. It has not been possible to rule out the view that the illusion shares a common basis with the phenomena of metacontrast and real-movement perception. M.M.

**A71-43971** Visual oculomotor control and the optomotor effect of eccentric afterimages (Über die visuelle Regelung der Okulomotorik - Die optomotorische Wirkung exzentrischer Nachbilder). G. Kommerell and U. Klein (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Vision Research*, vol. 11, Sept. 1971, p. 905-920. 51 refs. In German.

A circumscribed eccentric afterimage is presented as an object of fixation. Thus, the feedback of the eye movement control system is interrupted, allowing an easy examination of the central transfer functions. If the distance of the afterimage from the fovea centralis is more than 4 deg, a number of saccades occur. In the interval between the saccades, which lasts at least 0.2 sec, the eyes are gliding in a smooth following movement. If the distance of the afterimage from the fovea centralis is below 2 deg, there is usually a steady smooth tracking without saccades. G.R.

**A71-43972** The metrics of horizontal saccadic eye movements in normal humans. Ronald B. Weber (U.S. Veterans

Administration Hospital, Miami, Fla.) and Robert B. Daroff (Miami, University, Miami, Fla.). *Vision Research*, vol. 11, Sept. 1971, p. 921-928. 25 refs.

The metric characteristics of horizontal saccadic eye movements are defined and analyzed following electrooculographic recordings in 25 normal subjects. Small (10 deg) saccades are usually normometric, but accuracy decreases with larger amplitudes producing undershoots of the fixation targets. Approximately 20% of 20 and 30 deg saccades are transiently dysconjugate (1-3 deg) at termination. The most common dysconjugate pattern demonstrates excessive convergence due to momentary overshooting of the adducting eye or undershooting of the abducting eye. An inviolate interpretation of Hering's Law is questioned, and the mechanisms of the dysconjugacies are discussed in light of current concepts of the neurophysiology of eye movements. M.M.

**A71-43973**      **Scanpaths in saccadic eye movements while viewing and recognizing patterns.** David Noton (Colorado, University, Boulder, Colo.) and Lawrence Stark (California, University, Berkeley, Calif.). *Vision Research*, vol. 11, Sept. 1971, p. 929-942. 45 refs. Contract No. N 00014-67-A-0114-0022.

Subjects' eye movements were recorded while they viewed and then recognized patterns. Viewing conditions of marginal visibility forced the subject to fixate directly each feature to which he wished to attend. Thus his eye movements revealed the sequence of internal processing. During initial viewing the subject's eye usually scanned over each pattern following, intermittently but repeatedly, a fixed 'scanpath' characteristic of that subject viewing that pattern. When later presented with the same pattern for recognition, his first few eye movements usually followed this same scanpath. The results are consistent with a serial theory of pattern learning and recognition previously proposed. M.M.

**A71-43974**      **Flicker adaptation. I - Effect on visual sensitivity to temporal fluctuations of light intensity.** Allan Pantle (California, University, Los Angeles, Calif.). *Vision Research*, vol. 11, Sept. 1971, p. 943-952. 20 refs. PHS Grant No. 1 RO3 MH-18696-01.

Human sensitivity to temporal fluctuations of light intensity was found to be lower after adaptation to a flickering light than it was after adaptation to a steady light of the same time-average retinal illuminance. Such a difference of sensitivity defines a flicker adaptation phenomenon. The magnitude of the flicker adaptation effect was used as an index of the strength of visual interactions that occur between stimuli of different temporal frequencies. On the basis of the results obtained it is tentatively concluded that the temporal aspects of visual signals are processed by more than one visual channel or filter, each with its own frequency-response characteristic. M.M.

**A71-43975 \***      **McCullough effect analogs of two-color projections.** C. F. Stromeyer, III (Bell Telephone Laboratories, Inc., Murray Hill, N.J.). *Vision Research*, vol. 11, Sept. 1971, p. 969-978. 34 refs. NSF Grants No. GB-2728; No. GB-6712; Grant No. NGL-22-009-030.

Analog of two-color projections were produced with McCullough after-effects. McCullough after-effects were built up by viewing a black and green striped vertical grating alternating with a black and red striped horizontal grating. A black and white vertical test grating appeared red; a horizontal grating, green. Many hues of high chroma were, however, seen on a neutral test matrix of alternating vertical and horizontal gratings of various lightness and contrast when the matrix was viewed at the mesopic level or as a positive afterimage. M.M.

**A71-44053 #**      **Cytophotometric investigation of DNA in the endothelium of the human aorta (Tsitofotometriche doslidzheniia**

**DNK v endotelii aorti liudini).** V. I. Maliuk (Akademiia Nauk Ukrain'skoi RSR, Institut Zoologii, Ukrainian SSR). *Akademiia Nauk Ukrain'skoi RSR, Dopovidi, Serii B - Geologija, Geofizika, Khimii i Biologija*, vol. 33, Aug. 1971, p. 726-729. 9 refs. In Ukrainian.

Synthesis of DNA during the reproduction of the endothelium in the human aorta was investigated on 369 intact nuclei and dyed cell membrane samples. Most of the mononuclear and binuclear cells showed no proliferation and contained DNA amounts corresponding to balanced genomes. Restoration of the functional activity of the endothelium was accompanied by polyploidization of its individual cells. The abundance of polyploid cells in the mononuclear population was small and their polyploidization-level was low. V.Z.

**A71-44054 #**      **Electron-microscopic study of the central portion of *Microcystis aeruginosa* blue-green seaweed (Elektronnomikroskopichne doslidzheniia tsentral'noi zoni sin'o-zelenoi vodorosti *Microcystis aeruginosa*).** I. A. Makhanets' (Akademiia Nauk Ukrain'skoi RSR, Institut Botaniki, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrain'skoi RSR, Dopovidi. Serii B - Geologija, Geofizika, Khimii i Biologija*, vol. 33, Aug. 1971, p. 729-731. 19 refs. In Ukrainian.

The central portion of the seaweed is shown to contain a nucleoplasm with low electron density areas, fibrillar material, and inclusions of four different geometries. The absence of a well pronounced boundary between the central and peripheral portions of the seaweed is noted. Electron cytometric techniques are found to be effective in studies of the functions of these inclusions. V.Z.

**A71-44126**      **Midsystolic clicks in arteriosclerotic heart disease - A new facet in the clinical syndrome of papillary muscle dysfunction.** R. Barrett Steelman, Richard S. White, John C. Hill, John P. Nagle, and Melvin D. Cheitlin (Letterman General Hospital, San Francisco, Calif.). *Circulation*, vol. 44, Oct. 1971, p. 503-515. 25 refs.

Midsystolic clicks (MSC), or nonejection systolic clicks, were discovered in 15 patients with arteriosclerotic heart disease (ASHD). The diagnosis of ASHD was established by the presence of angina or the history of a documented myocardial infarction (MI) or both. The MSCs were recorded in 13 patients. A late systolic murmur was introduced by the MSC in four patients, and one patient had a soft holosystolic murmur. The mitral origin of the MSCs and murmurs was established by noting their change in timing and intensity following administration of vasoactive drugs. One patient underwent cardiac catheterization, and evidence of an old MI and papillary muscle dysfunction (PMD) was demonstrated. It is believed that the PMD that occurs secondary to ischemic fibrosis in ASHD permits slack chordae tendineae suddenly to become taut in midsystole and produce a snap. M.M.

**A71-44127**      **Early systolic clicks due to mitral valve prolapse.** Adolph M. Hutter, Jr., Robert E. Dinsmore, James T. Willerson, and Roman W. DeSanctis (Massachusetts General Hospital; Harvard University, Boston, Mass.). *Circulation*, vol. 44, Oct. 1971, p. 516-522. 10 refs. NIH Grant No. HEPO-6664.

Four patients had evidence that mitral valve prolapse was the etiology of isolated early systolic clicks that were 'ejection' in timing, that is, within 80 msec of the first heart sound (S sub 1). Phonocardiography demonstrated movement of the click closer to S sub 1 (three patients) with no change (three patients) or an increase in click amplitude (one patient) on inspiration. Earlier movement of systolic clicks on inspiration is a known feature of midsystolic clicks related to mitral valve prolapse but not of true aortic ejection sounds. In three patients the early systolic click showed a variable relation to the carotid upstroke, suggesting that the two events were not related. An isolated early systolic click may be due to mitral valve prolapse rather than to the usual ejection phenomena. M.M.

**A71-44128 \*** Relationship between changes in left ventricular dimensions and the ejection fraction in man. Richard P. Lewis (Ohio State University, Columbus, Ohio) and Harold Sandler (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *Circulation*, vol. 44, Oct. 1971, p. 548-557. 45 refs. PHS Grant No. HE-110504; Grant No. NGR-05-020-305.

Left ventricular length and calculated diameter were derived from angiocardiograms in 24 subjects with various heart diseases. Chamber diameter was noted to decrease an average of 27.5% from end-diastole to end-systole, and chamber length decreased 13%. Only subjects with calculations of left ventricular mass differing less than 25% from end-diastole to end-systole were accepted in order to avoid effects of spurious increases in end-systolic wall thickness on calculated diameter. Patients with localized disorders of contraction were also excluded. An extremely close linear relationship between the percentage change in diameter and the ejection fraction was demonstrated. Analysis of the radii of curvature showed that the lateral wall usually straightens during systole. However, if extreme ventricular dilation is present, the lateral-wall curvature increases with systole. The possible implications of this alteration in contraction pattern and its effect upon the ejection fraction were discussed.

(Author)

**A71-44129** S-T-segment depression with near-maximal exercise in detection of preclinical coronary heart disease. Albert A. Kattus, Charles R. Jorgensen, Ralph E. Worden, and Anthony B. Alvaro (California, University, Los Angeles, Calif.). *Circulation*, vol. 44, Oct. 1971, p. 585-595. 18 refs. Research supported by the Reschke-Binnay Memorial Research Fund; PHS Grant No. HE-11634.

Three hundred and fourteen male insurance underwriters had near-maximal treadmill exercise tests after having been evaluated for coronary risk factors. Thirty subjects developed ischemic-type S-T-segment depression during or after exercise not associated with anginal pain. The abnormal electrocardiographic response correlated significantly with elevated serum cholesterol, abnormal rest electrocardiogram, and history of cardiac symptoms; but not with smoking, high blood pressure, physical inactivity, or family history of coronary disease. In 2.5 years' follow-up there have been among the 30 ischemic responders to exercise testing three coronary deaths, four myocardial infarctions, two who developed angina pectoris, and one who had a coronary angiogram showing multiple obstructions. None of the normal responders to exercise testing has had a coronary event.

(Author)

**A71-44130** Diagnostic import of QRS notching in high-frequency electrocardiograms of living subjects with heart disease. Nancy C. Flowers (U.S. Veterans Administration Hospital, Augusta, Ga.) and Leo G. Horan (Georgia, Medical College, Augusta, Ga.). *Circulation*, vol. 44, Oct. 1971, p. 605-611. 23 refs. Research supported by the American Heart Association; PHS Grants No. HE-11667; No. HE-09495.

Ninety-two patients were studied for the occurrence of hf notching in orthogonal EKG leads X, Y, and Z obtained by hf, high speed techniques. The same patients were studied radiographically with barium, routine EKGs, hemodynamically at cardiac catheterization and, in many instances, with left ventricular angiograms. The patients with no ventricular enlargement had a mean of 2.9 notches and never exceeded a total notch count of 6. Those with single ventricular enlargement had a mean of between 5 and 6, while those with biventricular enlargement frequently exceeded 6 notches and had a mean of 8.6. The differences were statistically significant. It is concluded that notch count correlates well with the dynamic evidence of ventricular enlargement in a living population. M.M.

**A71-44131 \*** Hemodynamic evaluation of rate augmentation produced by atrial pacing and isoproterenol in the early postoperative phase of cardiac valve surgery. Paul W. Armstrong, Herman K. Gold, Mortimer J. Buckley, James T. Willerson, and

Charles A. Sanders (Harvard University, Cambridge, Massachusetts General Hospital, Boston, Mass.). *Circulation*, vol. 44, Oct. 1971, p. 649-656. 13 refs. PHS Grant No. HE-06664; Grant No. NGR-22-016-007.

The hemodynamic effects of atrial pacing were evaluated in a group of 19 patients soon after cardiac valve surgery. Atrial pacing at 30 beats/min above the control rate of 88 beats/min produced an increase in cardiac index of 600 ml/min/sq m. Isoproterenol was infused into eight of these patients to produce an increment in heart rate identical to that during atrial pacing. In these patients atrial pacing produced an increment in cardiac index of 400 ml/min/sq m as compared to an increment of 1400 ml/min/sq m produced by isoproterenol. It is concluded: (1) atrial pacing is a useful technique for augmenting the cardiac index soon after cardiac valve surgery; and (2) isoproterenol provides a greater increment in cardiac index at identical heart rates and the major portion of its effect is directly inotropic. M.M.

**A71-44237** Morphological and cytochemical studies of hypokinetic effects. V. V. Portugalov, E. I. Il'ina-Kakueva, V. I. Starostin, K. D. Rokhlenko, and Z. F. Savik (Institute of Biomedical Problems, Moscow, USSR). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1041-1049. 19 refs.

The attempt is made to determine structural and cytochemical changes in red and mixed skeletal muscles of animals exposed to hypokinesia of various duration. It is found that the direct effect of hypokinetic conditions upon the structure of striated muscles appears to involve disturbances in muscle blood supply. It is shown that skeletal muscles give evidence that decreased function or inactivity of an organ leads to serious changes in its functional state as well as its histochemical state. Animals which were returned to a normal environment after a 60-day hypokinetic test showed incomplete normalization of muscle structure and metabolism even 20 days later. M.V.E.

**A71-44238** Effects of low-grade hypoxia on performance in a vigilance situation. Vincent Fiorica, Mary Jo Burr, and Russell Moses (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1049-1055. 15 refs.

Forty male subjects participated in a study to examine the relationship between low-grade hypoxia and vigilance performance. At an altitude equivalent of 11,500 feet in a low-pressure chamber, subjects without supplemental oxygen did not respond differently from well-oxygenated subjects at the same altitude with respect to such physiologic measures as heart rate, respiratory frequency, internal body temperature, or plasma concentrations of glucose or lactate. Nor were these measures significantly different between groups studied at altitude and ground level controls. The only evidence of hypoxia observed in the altitude/room air group was in terms of a decrease in blood oxygen saturation measured with an earpiece oximeter. Vigilance performance deteriorated with time in all groups. No significant differences, however, could be detected between the hypoxic group and the well-oxygenated groups. It is concluded that a four-hour exposure to 11,500 feet of altitude has no demonstrable effect on the performance of a simple vigilance task under the conditions examined here. Because of the limitations concerning test subjects and the test used in this study, its results do not affect compliance with FAR 91.32, supplemental oxygen rule. (Author)

**A71-44239** Effect of altitude and cold acclimatization on the basal metabolism in man. C. S. Nair, M. S. Malhotra, and P. M. Gopinath (Defence Institute of Physiology and Allied Sciences, Delhi, India). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1056-1059. 15 refs.

Determination of basal metabolic rates were carried out at sea level and at an altitude of 11,000 ft on two groups of subjects for a period of 6 weeks. One group was subjected to hypoxia only for a period of 3 weeks followed by hypoxia and cold for the subsequent 3 weeks, while the other group was exposed to hypoxia and cold

simultaneously for a period of 3 weeks followed by hypoxia alone for the subsequent 3 weeks. Results indicate that simultaneous exposure to hypoxia and cold brought about an elevation of basal metabolism within a short period. On the other hand, acclimatization to hypoxia alone showed a reduction in basal metabolism. Addition of cold stress in the later phase of hypoxic acclimatization or withdrawal of cold stress in the later phase of simultaneous acclimatization to cold and hypoxia did not produce any significant changes. On the other hand, superimposition of cold on hypoxic stress in the initial phase of altitude acclimatization prevented the depression of basal metabolism. Basal metabolism on a group of highlanders showed that they had a significantly elevated metabolism as compared to lowlanders. (Author)

**A71-44240**      **Affect adjective checklist assessment of mood variations in air traffic controllers.** R. C. Smith, C. E. Melton, and J. M. McKenzie (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1060-1064. 12 refs.

Study of stress in air traffic control specialists (ATCS) using mood adjective checklists. Assuming that stress in ATCSs is related to traffic density, it was the primary purpose of the study to compare responses to an affect adjective checklist of personnel at a high traffic density tower (over 400,000 annual operations) with those of ATCSs at a moderate traffic density tower (200 to 400 thousand annual operations). Findings are discussed in terms of expected work effects and the lack of significant stress variations.

M.V.E.

**A71-44241 \***      **Comparison of the effects of 70 deg tilt and several levels of lower body negative pressure on heart rate and blood pressure in man.** F. Story Musgrave (Kentucky, University, Lexington, Ky.; NASA, Manned Spacecraft Center, Houston, Tex.), Fred W. Zechman, and Richard C. Mains (Kentucky, University, Lexington, Ky.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1065-1069. 13 refs. Contract No. AF 33(615)-67-C-1370.

Several levels of lower body negative pressure (LBNP) are compared with changes in posture from the supine to the erect position, in terms of heart rate and blood pressure. In these terms, a 70-deg tilt is found to be closely approximated by a LBNP at a level of 50 mm Hg. The finding that levels of LBNP greater than 40 mm Hg are needed to produce equivalent changes in heart rate and blood pressure is attributed to the elevation of the carotid and aortic baroreceptors above the heart which occurs during a tilt but not during LBNP. It is also found that cardiovascular phenomena, such as large shifts in blood between thoracic reservoirs and the lower extremities, may influence spatial orientation. M.V.E.

**A71-44242**      **Carbon dioxide response curves at altitude.** G. W. Gray (Canadian Armed Forces, Institute of Environmental Medicine, Toronto, Canada), D. Sinclair, A. C. Bryan (Toronto General Hospital, Toronto, Canada), and C. S. Houston (Vermont, University, Burlington, Vt.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1069-1073. 15 refs.

Ventilatory response to progressively increasing inspired CO<sub>2</sub> tensions was measured using a rebreathing technique, in 10 subjects at ground level and after exposure to an altitude of 5400 m. The subjects were pretreated with acetazolamide prior to ascent. The slope of the CO<sub>2</sub> response curves increased, and the intercept decreased significantly at altitude. One subject with severe acute mountain sickness showed a flatter CO<sub>2</sub> response curve at altitude. Additional studies were done on subjects who had been at altitude 5400 m for 4 weeks, and showed a further significant increase in slope. A study was carried out in the altitude chamber at 4300 m, which corroborated the separate effects of acetazolamide and altitude on the CO<sub>2</sub> response curve. (Author)

**A71-44243**      **Telemetry pressure and flow from the pulmonary circulation of the intact, free-ranging animal.** A. A.

Bicker, F. K. Lupo, F. Haas, and E. H. Bergofsky (New York University, New York, N.Y.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1074-1079. 5 refs. Research supported by the Health Research Council of the City of New York, the New York Heart Association, and the U.S. Department of Health, Education, and Welfare.

A specific system of instrumentation and technique is described for the transduction and transmission via telemetry of pressure and flow from the pulmonary circulation of intact, free-ranging animals. Special calibration techniques have been established to overcome difficulties in the long-term measurement of slow changes in pulmonary artery pressure to within 1-2 mm Hg. On-line data reduction techniques using an analog computer allow immediate access to calculated variables such as pulmonary vascular resistance. High speed off-line data reduction is used to provide a time-composed picture of both transduced and calculated variables. (Author)

**A71-44244**      **Aerospace physiological optics. I - Depth perception.** R. C. Karlsberg, F. S. Karlsberg, and M. Rubin (Florida, University, Gainesville, Fla.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1080-1085. 11 refs. PHS Grant No. EY-00033.

The adequacy of the conditions is questioned under which the Verhoeff test is currently administered at the Naval Aerospace Medical Institute. It has been calculated that it detects stereoability only as far as half a mile which corresponds to a stereothreshold of 16.38 seconds of arc. Because many possess a threshold as sensitive as two seconds of arc with its concomitant 4-mile stereoscopic limit, it is felt that the test conditions at the Naval Aerospace Medical Institute should be amended to allow detection of a stereothreshold as sensitive as the astronaut/aviator candidate is capable. M.V.E.

**A71-44245**      **Medical importance of long biorhythms in aeromedicine.** Hobart A. Reimann (Hahnemann Medical College; Philadelphia, Hospital, Philadelphia, Pa.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1086, 1087. 16 refs.

Discussion of a category of unrecognized or ignored mild periodic disorders that outnumber overt-form disorders and are of importance in aeromedicine. During episodes some victims are able to work without interruption but are handicapped repetitively by physiologic or psychic disturbances great enough to impair judgment and efficiency. These disturbances may impair equilibrium and vigilance at inopportune but predictable times. M.V.E.

**A71-44246**      **Effects of mechanical vibrations on the growth and development of mouse embryos.** J. A. Bantle (Eastern Michigan University, Ypsilanti, Mich.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1087-1091. 16 refs.

Investigation of the critical acceleration levels, nature of the damage caused, and days of gestation most susceptible to vibration-induced damage in mouse embryos. The results indicate that the mouse embryo is surprisingly resistant to vibration injury. The long uterine existence of the mammalian embryo probably necessitated the evolution of a very vibration-resistant developmental system. However, there are indications that mechanical vibrations at certain frequencies and accelerations could be teratogenic, but generally the major adverse effect seems to act upon the growth process through inhibition of cell division. Growth inhibition was demonstrated by significantly shorter lengths and lower weights of embryos subjected to vibration. M.V.E.

**A71-44247 #**      **Effects of combined heat, noise and vibration stress on human performance and physiological functions.** W. F. Grether, C. S. Harris, G. C. Mohr, C. W. Nixon, M. Ohlbaum, H. C. Sommer, V. H. Thaler, and J. H. Veghte (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1092-1097. 10 refs.

In a study of combined stress effects, such as those to which

crew members of aircraft and spacecraft are sometimes subjected, ten men were exposed to heat (120 F), noise (105 dB), and vibration (5 Hz, 0.30 peak g) both singly and in combination. Measurements were made of tracking ability, reaction time, mental arithmetic, visual acuity, voice communication, body temperature, heart rate, weight loss, and subjective ratings of the stress. On none of the measures were the effects of the combined stress condition more marked than the effect from the single greatest stressor. There was some evidence that the combined-stress condition was actually less disturbing to the subjects and their performance than was vibration alone. M.V.E.

**A71-44248** Deaths in survivable aircraft accidents. William H. Berner and Laurel D. Sand (U.S. Army, Board for Aviation Accident Research, Fort Rucker, Ala.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1097-1100.

Each year a number of deaths occur in U.S. Army aircraft accidents which are determined to be survivable or partially survivable as defined in reporting regulations. This paper examines the recorded causes of these deaths for a five-year period and makes observations on the incidence of such deaths as related to duty aboard the aircraft, location and type of seat occupied. The role of post-crash complications such as entrapment, fire and drowning is assessed. (Author)

**A71-44249** Implication of organophosphate pesticide poisoning in the plane crash of a duster pilot. W. Wood, J. Gabica, H. W. Brown, M. Watson, and W. W. Benson (Department of Health of the State of Idaho, Boise, Idaho). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1111-1113. Research supported by the Environmental Protection Agency.

Human vulnerability to certain pesticides is discussed in the light of the observations made in an unmistakably clear case of over-exposure to organophosphate pesticides. A duster pilot with ten years' flying experience crashed a Piper aircraft while executing a routine landing maneuver. This man had been under regular surveillance as part of a chronic exposure study. The subject's abrupt and dramatic drop in cholinesterase activity at the time of the crash and for several days thereafter provides the strongest evidence that organophosphate poisoning did indeed occur. M.V.E.

**A71-44250** Case report of death due to cardiac arrest or arrhythmia secondary to coronary arteriosclerosis in a 24-year-old aviator. John R. Anderson (National Academy of Sciences, Beeville, Tex.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1113-1115. 10 refs.

This is a case report of a 24-year-old apparently healthy aviator who died suddenly while at the controls of his aircraft. Autopsy and laboratory findings are discussed relative to the cause of death as stated in the autopsy protocol. Vagal influences thought to be responsible for initiating the agonal chain of events are discussed. Suggestions for future preventive and predictive measures are noted. (Author)

**A71-44251** Civil aeromedical standards for general-use aerospace transportation vehicles. Stanley R. Mohler and Siegfried J. Gerathwohl (FAA, Office of Aviation Medicine, Washington, D.C.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1116-1120. 11 refs.

Medical criteria are discussed such as they should be provided by aerospace medical specialists for second-generation general-use aerospace transportation vehicles. These criteria pertain to occupant selection, vehicle design features, and operational guidelines. Incorporation of these aeromedical data should result in enhanced mission efficiency and success, as well as in minimized opportunity for mission failure, accidents, and long-range adverse consequences due to human factor deficiencies. M.V.E.

**A71-44252** Continued participation in flight training as a means of reducing the general aviation accident rate - A revalidation.

John D. Dougherty (Harvard University, Boston, Mass.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1121, 1122. NIH Grant No. ES-00002.

In a previous analysis very close associations were found between the proportion of pilots participating in flight training and aircraft accident rates in general aviation. This study used the techniques of the first analysis to determine the validity of these associations in subsequent years. The correction for continued flight training no longer provided an effective prediction of the overall general aviation accident rate. The accident rate fell far below the prediction, probably on the basis of a more strict definition for an aircraft accident. The correction for recent or continued flight training continued to provide an accurate prediction of the fatal general aviation aircraft accident rate. As before, increases in the proportion of pilots recently or currently engaged in flight training were associated with a decrease in the fatal general aviation accident rate. (Author)

**A71-44253** Transport in human plasma. R. M. Navari, J. L. Gainer, and K. R. Hall (Virginia, University, Charlottesville, Va.). *Aerospace Medicine*, vol. 42, Oct. 1971, p. 1123, 1124. 11 refs.

Experimental studies were performed to establish the dependence of the diffusion in human plasma on the concentrations of the various plasma proteins, and an equation is presented to predict these values. It appears that diffusion coefficients for the normal physiological range may vary by a factor of 5 in normal plasmas, depending on the protein concentrations. (Author)

**A71-44274 \*** Brain monoamines and endocrine function. Fernando Anton-Tay and Richard J. Wurtman. In: *Frontiers in neuroendocrinology*, 1971. Edited by Luciano Martini and W. F. Ganong. New York, Oxford University Press, Inc., 1971, p. 45-66. 49 refs. PHS Grants No. AM-11237; No. AM-11709; Grant No. NGR-22-009-272.

Although only a small fraction of brain neurons appear to utilize catecholamines or serotonin as their neurotransmitter, these neurons are probably of special significance in the control of secretion from the anterior pituitary gland. A considerable amount of information is presently available about the localization and metabolism of the brain monoamines, and reasonably good methods exist for measuring biochemical indices of the physiological activity of these monoaminergic neurons. Brain norepinephrine could participate in the control of pituitary secretion by serving as the neurotransmitter input, or releasing factor output, of hypothalamic neuroendocrine transducer cells. It could also act within these cells, or act as a neurotransmitter within a nerve tract that impinges upon the hypothalamus. G.R.

**A71-44299 \*** Physiologic changes in composition and mass of total body adipose tissue. G. C. Pitts, L. S. Bull, and G. Hollifield (Virginia, University, Charlottesville, Va.). *American Journal of Physiology*, vol. 221, Oct. 1971, p. 961-966. 21 refs. PHS Grants No. A-974; No. A-893; Contract No. NAS 2-1554.

Changes in mass of adipose tissue fat, fat-free weight, solids, and water were studied. Growing guinea pigs showed increases in mass of both fat and fat-free adipose tissue through the 20th month with wide individual variations. In obese hyperglycemic mice, obese individuals feeding ad libitum showed rectilinear increases in adipose tissue solids and water as body fat increased from 23 to 41 g. The ratio water:solids remained constant. Normal littermates and obese mice reduced to the normal range of body fat showed no changes in these components as fat increased, from 1 to 9 g. Three separate studies: guinea pigs exercised, rats exercised, and rats centrifuged, yielded results consistent with those on mice. Forced treadmill exercise of rats produced a 15-g drop in body weight at the beginning of the regimen and a return to control level at termination. These changes appeared to involve body lipid only and suggested physiological regulation of total mass of body fat. (Author)

**A71-44300** Thyroidal changes in the rat during acclimation to simulated high altitude. Loren G. Martin, Grace E. Wertenberger, and Robert W. Bullard (Indiana University, Bloomington, Ind.). *American Journal of Physiology*, vol. 221, Oct. 1971, p. 1057-1063. 34 refs. Contract No. AF 44(620)-68-C-0014.

Description of an experimental study designed to demonstrate by several parameters the changes in the thyroid gland of the rat which accompany the chronic hypoxia of simulated high-altitude environments. The study demonstrates that thyroid hormone stimulation of the chronically acclimated high-altitude animal is elevated above that of sea-level controls. M.V.E.

**A71-44301 \*** Thermoregulatory responses of a hibernator to preoptic and environmental temperatures. Bill A. Williams (NASA, Ames Research Center, Moffett Field, Calif.) and James Edward Heath (Illinois, University, Urbana, Ill.). *American Journal of Physiology*, vol. 221, Oct. 1971, p. 1134-1138. 11 refs.

Ground squirrels were implanted in the preoptic hypothalamic region with water-perfused thermodes. Determination of normal metabolic curves was followed by preoptic heating and cooling at three air temperatures. Preoptic cooling at 8 and 22 C air temperatures produced similar increases in metabolism and rectal temperature, but at 33 C air temperature, rectal temperature increased almost twice as much as at the lower air temperatures. Preoptic heating caused similar decreases in metabolism and rectal temperature at air temperatures of 8 and 22 C, but at an air temperature of 33 C the metabolism and rectal temperature declined only slightly. At air temperatures below the measured thermoneutral zone, preoptic cooling produced metabolic rates expected for air temperatures approximately 10 C lower, while preoptic heating produced metabolic rates expected for air temperatures approximately 4 C higher. The variation of preoptic responsiveness at 33 C air temperature is probably due to peripheral vasomotor adjustments normally associated with thermoregulation within the thermoneutral zone. (Author)

**A71-44325** Biological aspects of radiation protection; Proceedings of the International Symposium, Kyoto, Japan, October 13-15, 1969. Symposium sponsored by the International Association for Radiation Research and the International Atomic Energy Agency. Edited by Tsutomu Sugahara (Kyoto University, Kyoto, Japan) and Otto Hug (München, Universität, Munich, West Germany). Tokyo, Igaku Shoin, Ltd.; Berlin and New York, Springer-Verlag, 1971. 268 p. \$18.90.

Proceedings of the International Symposium on the Biological Aspects of Radiation Protection held at Kyoto, Japan, in 1969. Radiobiological evidence as to the way in which the frequency of injuries from high doses is related to the frequency to be expected following exposure to low doses or at low dose rates is reviewed. The topics include the hematological and cytogenetic effects of radiation, chemical protection in mammals, fundamentals of radiation protection and recovery, and comparative individual radiosensitivity and its cellular explanation. M.M.

**A71-44359** Dosimetry of pi(-) mesons using silicon detectors and plastic scintillators. M. R. Raju, E. Lampo, S. B. Curtis, and C. Richman (California, University, Berkeley, Calif.; Texas, University, Dallas, Tex.). *Physics in Medicine and Biology*, vol. 16, Oct. 1971, p. 599-610. 20 refs. Research sponsored by the American Cancer Society, the U.S. Navy, and AEC.

Description of the dosimetry of both pi(+) and pi(-) beams, by use of semiconductor detectors and plastic scintillators. Depth-dose distributions, isodose distributions and integral and differential range curves are presented. By use of a time-of-flight system, the dosimetric information for a pure pion beam is obtained. The muon and electron contamination reduce the peak-to-plateau ratio. Pion beams of low energy give better depth-dose distributions. Nearly 50% of the dose at the peak of the depth-dose distribution of a pi(-) beam

is found, to be due to nuclear events. Depth-dose distributions measured by semiconductor detector and tissue-equivalent ionization chamber are in close agreement with each other. (Author)

**A71-44367 #** Selection of superior scanning methods for A- and B-scan ultrasonography of the eye and orbit. W. Buschmann, R. Klopp, and B. Seefeld (Charité Eye Hospital, Berlin, East Germany). *Ophthalmic Research*, vol. 2, no. 3-4, 1971, p. 149-164. 15 refs.

In order to ascertain the most suitable B-scanning technique for ultrasonography of the eye and orbit, a schematic eye was constructed for calculating the results of sound refraction. The beam deflections were calculated for linear (parallel), sector and arc (circle section) scan. Extended experimental measurements confirmed the results of these calculations. Meridional arc scans proved unequivocally superior to all other modes and gave rise to minimal distortions of the echogram due to refraction effects. M.M.

**A71-44368 #** Investigations on the influence of CO<sub>2</sub> and O<sub>2</sub> partial pressure upon the intraocular pressure in rabbits. D. Kaskel and J. Neumann (Bonn, Universität, Bonn, West Germany). *Ophthalmic Research*, vol. 2, no. 3-4, 1971, p. 211-216. 14 refs.

Investigation of the influence of different respiratory gases on the intraocular pressure (IOP) in 15 rabbits under Somnifen narcosis. During a 10-min period of exposure to the test gases, IOP and blood pressure were recorded every minute. Inhalation of 7% CO<sub>2</sub> induced a marked increase of IOP, blood pressure remaining constant. With 15% CO<sub>2</sub> the decrease of blood pressure was more marked than that of IOP. 100% O<sub>2</sub> had no influence on IOP and blood pressure. (Author)

**A71-44399 #** Application of psychophysiological indices in the practice of audiological investigations (Ispol'zovanie psikhofiziologicheskikh pokazatelei v praktike audiologicheskikh issledovani). E. M. Iuganov, Iu. V. Krylov, and V. S. Kuznetsov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaja*, July-Aug. 1971, p. 587-595. 23 refs. In Russian.

Evaluation of criteria for estimating and grading noise effects on the basis of psychophysiological indices of loudness and annoyance. It is shown that the use of indices obtained by measuring subjective responses is the only method of obtaining informative results in such practical problems as the evaluation of comfort levels for sonic booms, quantitative estimation of periodically pulsating noise, and determination of the effectiveness of sound insulation systems. Specific methods of measuring subjective reactions are described, together with research data. T.M.

**A71-44400 #** Features of human auditory adaptation to a complex action of medium intensity noise under conditions of relative isolation and hypokinesia (Osobnosti slukhovo adaptatsii pri kompleksnom vozdeistvii na cheloveka shumov srednei intensivnosti v usloviakh otnositel'noi izolatsii i gipokinezii). Iu. V. Krylov and M. V. Nefedova. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaja*, July-Aug. 1971, p. 629, 630. 8 refs. In Russian.

Monaural hearing thresholds at 500, 1000, and 1500 Hz were measured after the application of a 1000-Hz (95-dB) signal on a constant background of a 75-dB signal in subjects experiencing relative isolation and hypokinesia. Both isolation and hypokinesia tangibly affect the auditory function. This is evidenced in the development of a stable external inhibitory effect that substantially changes auditory adaptation. T.M.

**A71-44411 #** Dynamics of intercenter reactions in the brain of monkeys under conditions of lasting rhythmic photostimulation (Dinamika mezhtsentral'nykh vzaimootnoshenii v golovnom mozge obez'ian v usloviakh dlitel'noi ritmicheskoi fotostimulatsii). I. V. Danilov and N. N. Kudriavtseva (*Akademiia Meditsinskikh Nauk*

SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Aug. 1971, p. 1089-1098, 23 refs. In Russian.

The bioelectrical activity of the cortex and deep cerebral structures was recorded on a 13-channel encephalograph in 13 *Macaca rhesus* monkeys with electrodes inserted in various cortical and subcortical formations. The exposures to photostimulation lasted 5 to 30 min and the signal repetition frequencies were 9, 18, and 25 per sec. Oscillograms are plotted to show the responses of various cortical and subcortical cells to photostimuli. V.Z.

**A71-44412 #** Effectiveness of activity level shifts in working muscles during cycled work (Effektivnost' perekliuchenii urovnei aktivnosti funktsioniruiushchikh myshts vo vremia tsiklicheskoj raboty). V. V. Mikhailov, G. M. Martynov, V. V. Abrosimov, and V. B. Sergienko (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizi-cheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Aug. 1971, p. 1128-1133, 20 refs. In Russian.

Oxygen requirement was measured and electromyograms of 12 muscles and stress dynamograms were recorded in subjects during work on a veloergometer using alternately two different pedaling methods involving muscular work level shifts, rhythm changes, and stress distribution alterations. The working performance of the subjects was generally better when two different pedaling methods were used in alternation than when one pedaling method was used throughout the test. V.Z.

**A71-44413 #** Hematological characteristics of emotional stresses during a parachute jump (Gematologicheskaja kharakteristika emotsional'nogo napriazhenia pri pryzhke s parashiotom). L. T. Landorenko, N. S. Kuz'mich, and A. S. Mozhukhin (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Aug. 1971, p. 1140-1144, 11 refs. In Russian.

Changes in leucocyte, erythrocyte, and eosinophil populations were studied after a parachute jump in a group of 130 subjects having different parachute experiences. Neutrophylisis and eosinopenia with lymphopenia and monocytopenia were established after jumps. It is theorized that the hematological shifts were due to the excitation of the hypophysis-adrenal system caused by emotional stresses. V.Z.

**A71-44414 #** Water-salt metabolism in humans who were exposed to high temperature conditions after arrival from different climatic zones (Vodno-solevoi obmen u liudei, pribyvshikh v uslovia vysokoi temperatury iz razlichnykh klimaticheskikh zon). A. Iu. Iunusov, E. S. Makhmudov, and F. Islamgalieva (Akademiia Nauk Uzbekskoi SSR, Otdel Fiziologii, Tashkent, Uzbek SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Aug. 1971, p. 1198-1202, 17 refs. In Russian.

Daily requirement of liquid, urine discharge, extrarenal moisture losses, and salt contents in the blood and urine were studied over a two-year period in groups of permanent residents of the Tashkent area and of individuals newly arrived in the area from the temperate Cherkassy region in the Ukraine and from the cold Petropavlovsk region in northern Kazakhstan. Changes in all these characteristics, indicating adaptation to hot climatic conditions, are established in individuals from the Ukraine and Kazakhstan. V.Z.

**A71-44424 \*** Potassium chloride-insoluble myofilaments in vertebrate smooth muscle cells. P. H. Cooke (Boston Biomedical Research Institute, Boston, Mass.) and R. H. Chase (Harvard University, Cambridge, Mass.). *Experimental Cell Research*, vol. 66, 1971, p. 417-425, 21 refs. NSF-supported research; PHS Grants No. 5-T07-GM-00707-07; No. 5 R01 HE-05949; No. 1-S01-FR-05527; Grant No. NGR-22-007-059.

Actomyosin was extracted from avian gizzard smooth muscle. The residue was then homogenized and fractionated by differential centrifugation. Fractions of the residue that sedimented at 1000 and 13000 g were examined in negatively stained and sectioned preparations with the electron microscope. The major components of both fractions were 100-A diam filaments and fusiform dense bodies. The filaments and dense bodies closely resembled their counterparts in sectioned preparations of unextracted smooth muscle cells from *Taenia coli*. The insolubility of the 100-A diam filaments at high ionic strength and their detailed structure suggest that they are not composed of actin and myosin. Their general features indicate that they correspond to the so-called thick filaments observed in the early studies of vertebrate smooth muscle cells. M.M.

**A71-44434** Effect of age and high blood pressure on baroreflex sensitivity in man. Brian Gribbin, Peter Sleight, Richard Peto (Radcliffe Infirmary, Oxford, England), and Thomas G. Pickering. *Circulation Research*, vol. 29, Oct. 1971, p. 424-431, 31 refs.

The purpose of this study was to relate baroreflex sensitivity to age and arterial pressure in 61 male and 20 female untreated subjects, aged 19-66 years, whose mean arterial pressures ranged from 70 to 150 mm Hg. In this selected group of subjects there was no correlation between age and arterial pressure. The index of sensitivity used was the increase in pulse interval which occurs reflexly in response to a rise in systolic pressure induced by the intravenous injection of phenylephrine and is measured as the increase in pulse interval in milliseconds per mm Hg rise in systolic blood pressure. It ranged from 1.9 to 48.9 msec/mm Hg. Increasing age and arterial pressure act independently to reduce baroreflex sensitivity. Eight subjects who had normal blood pressure at the time of testing but whose pressure had been elevated in the past had reflex sensitivities significantly less than expected in persons of the same age and mean arterial pressure. The heart rate in these subjects was not significantly different from that in the controls; the heart rate of the 12 hypertensive subjects aged under 40 years was significantly faster than that of age-matched normotensive subjects but not that of older hypertensive subjects. (Author)

**A71-44464** Visual pigments in dichromats. D. E. Mitchell and W. A. H. Rushton (Florida State University, Tallahassee, Fla.). *Vision Research*, vol. 11, Oct. 1971, p. 1033-1043, 24 refs. AEC Contract No. AT (40-1)-2690; NSF Grant No. GU-2612.

Cone pigments in protanopes and deutanopes were measured by retinal densitometry, and the energy of various monochromatic lights that bleached at a fixed rate of 25% total pigment per minute was found. The same bleaching lights were matched with a fixed yellow in a bipartite field. Lights matched for bleaching were found to look equally bright to dichromats. It is concluded that the pigments measured by densitometry are visual pigments; their action spectrum coincides closely with the spectral sensitivity curves of Pitt for protanopes and deutanopes. M.M.

**A71-44465** The red/green pigments of normal vision. D. E. Mitchell and W. A. H. Rushton (Florida State University, Tallahassee, Fla.). *Vision Research*, vol. 11, Oct. 1971, p. 1045-1056, 17 refs. AEC Contract No. AT (40-1)-2960; NSF Grant No. GU-2612.

Description of an analytical anomaloscope with a wedge W controlling the intensity E of light (yellow) to be matched. A knob q controls, linearly, the red/green proportion that matches. The instrument has a useful property. Set by the protanope so that the red and green primaries look equal ('prot. mode'), matches are unaffected by the q settings, and E lambda for each lambda gives directly the protanope sensitivity curve. If the chlorolabe of the protanope was a normal pigment, normals (who need both q and W adjustments for a perfect match on lambda) would make the same W lambda settings as the protanope did. They do so exactly. So do

protonomalous although their q values are abnormal. Exactly similar results were found for deuteranopes, normals, and deuteranomalous in the 'deut. mode.' M.M.

**A71-44466** Comparison of macular pigment densities in human eyes. R. A. Bone and J. M. B. Sparrock (University of the West Indies, Mona, Jamaica). *Vision Research*, vol. 11, Oct. 1971, p. 1057-1064. 12 refs.

The optical density curve of the macular pigment has been estimated for 49 European and West Indian subjects by comparing their foveal and extrafoveal spectral sensitivities measured by the flicker technique. No significant differences in density have been observed relative to race, normal environment, age, color of skin, or color of eyes but red-haired subjects had on average a significantly higher density of macular pigment. The extinction coefficient of the pigment was the same for all subjects, and differences in density were consistent with variations in pigment concentration and/or thickness of absorbing layer. M.M.

**A71-44467** Fast retinal potential luminosity functions. Calvin K. Adams (U.S. Army, Medical Research Laboratory, Fort Knox, Ky.) and William W. Dawson (Florida, University, Gainesville, Fla.). *Vision Research*, vol. 11, Oct. 1971, p. 1135-1146. 20 refs. AEC Contract No. AT (40-1)-3599; Grant No. DA-DA-17-67-C-7118.

The adaptation dependence of hf signals (fast retinal potentials or FRPs) was analyzed from measures taken from the human cornea. Narrow-band chromatic stimuli were presented to two normal subjects under photopic, mesopic, and scotopic adaptation conditions. Signals were recorded in two pass bands, broad band, and high-pass. The results support two primary conclusions: (1) fast components (above 50 Hz) recorded from the human cornea were related primarily to photopic mechanisms; and (2) fast components deduced by analog filtering techniques gave no indication of being differentially related to any single spectral mechanisms. The relationship between conventional and FRP components is discussed, together with the mechanisms which may initiate the FRP signal. M.M.

**A71-44468** On the appearance of Mach bands in gradients of varying color. D. G. Green and M. B. Fast (Michigan, University, Ann Arbor, Mich.). *Vision Research*, vol. 11, Oct. 1971, p. 1147-1155. 20 refs. PHS Grant No. EY-00379.

Red and green triangular-wave intensity distributions were generated on cathode-ray oscilloscope tubes. The perceived brightness distribution was quantified by matching the brightness of the pattern with a narrow slit of light of the same color positioned in varying positions just below the triangular-wave field. The sensations produced by gradients of color rather than luminance were investigated by interlacing equiluminous red and green triangular gratings 180 deg out-of-phase. An illuminated slit just below the chromatic gradients was adjusted in color and brightness to produce satisfactory matches to different parts of the interlaced red and green patterns. The measurements show that bright red and green bands appear in light distributions of constant luminance and varying chromaticity. M.M.

**A71-44469** Eye movements and the afterimage. I - Tracking the afterimage. Simon Heywood and John Churcher (Oxford University, Oxford, England). *Vision Research*, vol. 11, Oct. 1971, p. 1163-1168. 17 refs.

Although subjects failed to make smooth eye movements when tracking an imaginary pendulum in the dark, when given an afterimage to track, they exhibited sustained smooth eye movements despite the absence of a moving visual stimulus. These results suggest that smooth eye movements may be a product of two processes, one

which stabilizes images on the retina, and one which inhibits saccadic behavior. M.M.

**A71-44470** The dependent variable in stabilized retinal image studies. Mark P. Cosgrove, Marty J. Schmidt, Dan D. Fulgham, and Donald R. Brown (Purdue University, Lafayette, Ind.). *Vision Research*, vol. 11, Oct. 1971, p. 1183-1187. 9 refs. NIH Grant No. HD-00909.

Description of measures of the four dependent variables of whole fade, partial fade, frequency, and duration, for two different pattern types viewed as stabilized images over a 5-min viewing session. The results show clearly that whole fade characteristics are sensitive to variations in stimulus pattern. In consideration of the significant differences in whole fade durations between pattern classes, and in view of other evidence that suprarretinal mechanisms influence whole fade behavior (Krauskopf and Riggs, 1959; Cohen, 1961), it is suggested that whole fade phenomena are the products of adaptation of complex pattern receptive fields, or at least pattern-specific mechanisms of the visual system. M.M.

**A71-44471 #** Special features of speech signals in humans subjected to transversely directed accelerations (Osobennosti rechevykh signalov pri vozdeistvii na cheloveka poperechno napravlennykh uskorenii). A. V. Nikonov and A. V. Sorokin. *Voенно-Meditsinskii Zhurnal*, July 1971, p. 60-63. In Russian.

Study of the effect of 6-g chest-to-back accelerations on the ability of the subjects to pronounce various vowel sounds, words, and short phrases. It is found that under the action of these accelerations an increase occurs in the speech rate, in the time required to pronounce vowel sounds and certain words, and in the pauses between words and phrases. A tendency to break up speech phrases into shorter fragments, thus facilitating the pronunciation of words and reducing speech distortions, is noted. The initial words of a speech phrase are pronounced more easily and with less distortions; the greatest distortions of speech signals are observed at the end of an exhalation, when a decrease in the vowel pronunciation intensity and a trembling of the voice occur simultaneously. The pronunciation of the vowels 'o' and 'ia' causes considerable difficulties. A.B.K.

**A71-44472 #** Functional diseases of the cardiovascular system (Funktsional'nye zaboлевaniia serdechno-sosudistoi sistemy). I. N. Bukhalovskii and P. V. Buianov. *Voенно-Meditsinskii Zhurnal*, Aug. 1971, p. 41-45. In Russian.

Consideration of the relation between functional disorders of the cardiovascular system and disturbances of higher nervous activity. A classification of functional diseases of the cardiovascular system proposed by Savitskii, who believes that changes in the tonus of the higher regulatory centers are responsible for functional cardiovascular disorders, is discussed. Three types of such disorders, called neurocirculatory dystonias, are distinguished. The subjective symptoms of neurocirculatory dystonia are described, the use of mechanocardiography as an important method of diagnosis of neurocirculatory dystonia is noted, and a proposed treatment by psychotherapeutic means is suggested. A.B.K.

**A71-44473 #** Study of the state of emotional stress of pilots in special flight situations (Izuchenie sostoiianiia emotsional'noi napriazhennosti letchikov v osobykh sluchaiakh poleta). V. V. Lapa. *Voенно-Meditsinskii Zhurnal*, Aug. 1971, p. 65-67. 7 refs. In Russian.

Study of the changes in certain physiological functions of pilots performing various tasks on a trainer simulating engine failures, instrument breakdowns, and other complications encountered in actual flights. It is found that a sudden change in the flight conditions (such as engine failure, instrument breakdown, etc.) leads

to a short-term quickening of the pulse, the amount of quickening being a function of the complexity of the mental problems to be solved by the pilot within a limited time. Changes in the amplitude of the biopotentials and in the nature of the skin-galvanic reaction are also noted. A.B.K.

**A71-44474 # Decompression disorders at high altitudes (Dekompressionnyye rasstroistva na bol'shikh vysotakh).** I. V. Maksimov, I. N. Cherniakov, and V. A. Glazkova. *Voennomeditsinskii Zhurnal*, Aug. 1971, p. 68-70. In Russian.

Experimental study of the possibility of preventing high-altitude decompression disorders in humans by increasing the pressure level in the oxygen equipment assembly instead of resorting to the usual prior desaturation under terrestrial conditions. It is found that after a one-hour exposure at altitudes from 15 to 40 km in an oxygen assembly with a pressure of 220 to 260 mm Hg no decompression disorders were observed in the subjects, although prior desaturation of the organism on the ground was not performed. All cases of development of high-altitude decompression disorders were noted after the total pressure in the oxygen assembly had been reduced to 140 to 170 mm Hg. Restoring the pressure to 260 mm Hg always stopped the pain. A.B.K.

**A71-44499 # Diurnal activity rhythm of cold receptors in man (Sutochnyi ritm aktivnosti kholodovykh receptorov u cheloveka).** A. V. Volodina and L. M. Kurilova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 72, July 1971, p. 7, 8. 12 refs. In Russian.

The diurnal variation in the cold-receptor activity of the human skin is shown to reach a maximum value at 5 P.M. and a minimum one at 1 A.M. The results of the study indicate clearly the existence of diurnal rhythm in the functioning of the cold receptors. M.V.E.

**A71-44500 # Cholinesterase activity and acetylcholine content in the heart during experimental adrenaline myocardiodystrophy (Aktivnost' kholinesterazy i sodержanie atsetilkholina v serdtse pri eksperimental'noi adrenalinovoi miokardiodistrofii).** M. A. Khoma (Ternopol'skii Meditsinskii Institut, Ternopol, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 72, July 1971, p. 22, 23. 8 refs. In Russian.

Experiments on rats show that, in adrenaline-induced myocardiodystrophy, changes of the acetylcholine-cholinesterase system in the heart depend on the dose of adrenaline injected. With a small dose of adrenaline, a progressive decrease in cholinesterase activity and an increase of the acetylcholine level in the restorative period are observed. With increasing adrenaline doses, a short-term rise in cholinesterase activity and some reduction in acetylcholine content take place. M.V.E.

**A71-44526 # Effects of hypokinesia on gas exchange in animals (Vliianie gipodinamii na gazoobmen zhivotnykh).** E. A. Kovalenko, V. L. Popkov, E. S. Maïlian, Iu. S. Galushko, N. V. Gordeicheva, Iu. I. Kondrat'ev, N. A. Iliushko, A. N. Potapov, L. N. Grinberg, and M. A. Seidametov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 3-8. 11 refs. In Russian.

Studies of pathogenesis under prolonged hypokinesia included total gas exchange, gas homeostasis in tissues, rate of in vivo oxygen consumption in muscles (polarographic method), tissue respiration and oxidation-phosphorylation in the skeletal muscle, myocardium, brain, and liver, as well as oxidative processes in liver mitochondria. Rats exposed to a longer hypokinesia displayed no noticeable changes in total gas exchange at early stages of the experiment and a distinct acceleration of gas exchange and regional oxygen consump-

tion in muscles by the 90th to 100th day. Changes of oxidative processes in tissues were found during the 30th to 60th hypokinetic day. The rats also showed substantial weight losses due to a muscle mass decrease. M.V.E.

**A71-44527 # Effects of monosaccharides on the reaction of formaldehyde condensation to carbohydrates (Vliianie monosakhariidov na reakttsiiu kondensatsii formal'degida v uglevody).** V. A. Uspenskaia, O. V. Krylov, and Iu. E. Siniak. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 9-16. 16 refs. In Russian.

The effect of monosaccharides of various molecular structures on the catalytic synthesis of carbohydrates from formaldehyde is investigated. Monosaccharides with the least number of carbon atoms and monosaccharides containing ketogroups are shown to have the highest capacity as cocatalysts of the synthesis. Optimal activity for arabinose, fructose, and glucose is determined. According to chromatographic data, use of monosaccharides as cocatalysts brought about no difference in the chemical composition of synthetic carbohydrates. An equation describing the effect of the concentration of an organic cocatalyst on the rate of formaldehyde condensation to carbohydrates is presented. M.V.E.

**A71-44528 # Changes in the activity of aspartic aminotransferase and mitochondrial membranes in response to accelerations (Izmenenie aktivnosti asparaginovoi aminotransferazy i mitokhondrial'nykh membran pod vliianiem uskoreniia).** L. A. Rubashkina and I. D. Ertanov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 16-20. 16 refs. In Russian.

The activity of aspartic aminotransferase is found to decrease in the serum of humans exposed to transverse accelerations of 12 g for 35 sec and of rats centrifuged at 36 g for 6 min. Exposures to accelerations of lower intensity induces increases. Changes in enzymic activity of liver homogenate fractions of animals show that aspartic aminotransferase molecules may transit from mitochondrial membranes into the blood stream during exposures to 25 g accelerations for 6 min. M.V.E.

**A71-44529 # Group analysis of impurities in regenerated water (Gruppovoi metod analiza primesei v regenerirovannoi vode).** V. A. Kriuchkov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 21-26. 5 refs. In Russian.

The composition of impurities that may contaminate water regenerated from liquid human wastes has been analyzed. The regeneration procedure, composition of contaminants, and methods of using the regenerated water are shown to diverge from standard norms. Criteria for the evaluation of regenerated water quality are presented. A method devised for estimating total contamination on the basis of group parameters is described, along with its application. A few special problems of water regeneration are discussed. M.V.E.

**A71-44530 # Investigation of the pharyngeal streptococcal flora in a sealed living space (Issledovanie streptokokkovoi flory zeva liudei v usloviakh zamknutoi sredy obitaniia).** V. I. Drozdova, R. V. Petrov, and V. M. Shilov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 26-29. 8 refs. In Russian.

The results are reviewed of a study of the pharyngeal streptococcal flora of men confined in a sealed chamber for 15 days. Microbial transfer from man to man was found to have occurred. The subjects of the experiment exhibited no significant changes in antihyaluronidase and anti-O-streptolysine tests. M.V.E.

**A71-44531 # Protection of the Soyuz-9 crew against radiation (Obespechenie radiatsionnoi bezopasnosti poleta ekipazha kosmicheskogo korablia 'Soyuz-9').** E. I. Vorob'ev, I. V. Getselev, Iu. G. Grigor'ev, V. I. Efimov, N. S. Zaitsepa, E. E. Kovalev, M. D.

Nikitin, V. N. Obridko, V. M. Petrov, M. V. Tel'tsov, and A. V. Sedov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 29-33. In Russian.

Solar activity forecasts for one month are shown to make it possible to plan effectively the protection against radiation of a spacecraft crew on long-duration space missions. Thus, radiation conditions on the Soyuz-9 spacecraft coincided completely with the forecast-based expectations and remained safe within the crew quarters throughout the mission. M.V.E.

**A71-44532 #** Correlation between the sensitivity thresholds of the cupula-endolymphatic system and the resistance to motion sickness in man (Sootnoshenie porogov chuvstvitel'nosti kupulo-endolimfaticeskoi sistemy i ustoiichivosti cheloveka k ukachivaniiu). B. I. Poliakov and A. D. Matveev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 33-38. 26 refs. In Russian.

Sensitivity thresholds to angular and Coriolis accelerations of 65 test subjects were compared with their tolerance to repeated exposures to Coriolis accelerations of special configuration. Correlation coefficients between the above parameters were established. The results obtained indicate that sensitivity threshold data of the cupula-endolymphatic system are of low prognostic significance in regard to human resistance to motion sickness. M.V.E.

**A71-44533 #** Study of the selectivity in the adaptation to Coriolis and linear accelerations (Issledovanie izbiratel'nosti privykanii k Koriolisovym i priamolineinym uskoreniiam). B. B. Bokhov, V. P. Baranova, and A. A. Guev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 38-42. In Russian.

The effect was studied of habituation to one of three tests (including Coriolis and linear accelerations) on the tolerance to the remaining two tests. The results obtained indicate a nonspecific increase in the tolerance to those tests to which no adaptation did occur. M.V.E.

**A71-44534 #** Study of the optic functions and retinal circulation in man under exposure to complex accelerations (Issledovanie zritel'nykh funktsii i retinal'nogo krovoobrashcheniia v usloviakh deistviia na organizm cheloveka kompleksnykh uskorenii). E. S. Kotova, L. A. Kitaev-Smyk, and B. V. Ustiushin. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 42-47. 18 refs. In Russian.

Review of the results of a study of retinal hemodynamics and optic functions in 30 healthy test subjects exposed to accelerations of 12 to 72 deg per sec. The tone of the retinal vessels showed regular changes, including variations in diastolic pressure of the central artery and alterations in the caliber of arteries and veins in relation to the duration and value of the accelerations, as well as to the level of adaptive processes. Optic functions proved to be fairly stable. The results obtained indicate that retinal circulation can be used as a criterion for the effect of Coriolis accelerations on the human organism. M.V.E.

**A71-44535 #** The effect of high brightness levels on the rate of eye adaptation to darkness (O vlianii bol'shikh iarkostei na skorost' temnovoi adaptatsii glaz). V. I. Kartsev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 47-49. 12 refs. In Russian.

The rate of adaptation to darkness of the central vision of both eyes following exposures to light of varying duration (1.5, 3.0, 6.0 min) and brightness (20 to 80 thousand lux) was studied on four test subjects. The central-vision response time during adaptation to darkness was found to be proportional to the brightness level during disadaptation. M.V.E.

**A71-44536 #** Dynamics of minute blood volume during prolonged hypokinesia according to data obtained by the acetylene method (Dinamika minutnogo ob'ema krovi po dannym atsetilennovogo metoda pri dlitel'nom ogranichenii myshechnoi aktivnosti). G. P. Zvonarev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 50-53. 12 refs. In Russian.

Grohlmann's acetylene method was applied to the analysis of the minute blood volume of six healthy subjects who were made to lie in bed for six months. The minute blood volume and stroke volume were found to decrease sharply at the end of the test. It is shown that the mechanism responsible for this decline of the stroke volume should not be attributed to pulse rate variations, but rather to changes in the cardiac contraction phases, blood flow rate, and circulating blood volume. The decline in minute volume is shown to result from a decrease in oxygen consumption. V.P.

**A71-44537 #** External pressure and gas exchange during passive orthostatic tests (Vneshnee dykhanie i gazoobmen pri passivnoi ortostaticheskoi probe). B. S. Katkovskii. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 54-58. 18 refs. In Russian.

A comparison of data recorded in the horizontal and vertical position revealed noticeable changes in most of the external-respiration, gas-exchange, and blood-circulation indices. It is found that only the pulse rate, respiratory volume, and respiratory ratio were affected slightly. V.P.

**A71-44538 #** Hypodynamics and hormonal activity (Gipodinamiia i gormonal'naia aktivnost'). I. V. Fedorov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 59-61. 21 refs. In Russian.

Data available in the literature concerning the production during hypodynamics of such hormones as corticosteroids, adrenalin, the adrenocorticophic hormone, the antidiuretic hormone, and 5-hydroxyindolacetic acid are reviewed. Results concerning changes in hormonal activity are discussed. V.P.

**A71-44539 #** Odorimetric appraisal of polymers used in the construction of sealed/pressurized chambers (Odorimetricheskaia otsenka polimernykh materialov, ispol'zuemykh v konstruksii germooob'emov). O. N. Shevkun, E. I. Semenenko, E. I. Kosterina, and G. A. Gaziev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 61-66. 21 refs. In Russian.

The hygienic problem of eliminating odors from polymeric structural materials that might be hazardous to human health is considered. A description is given of methods for odor threshold determination, based on both static and dynamic principles. The advantages of a modified static method are emphasized. Experimental data are presented which indicate the relationship between the odor level and the concentration of toxic compounds in the gaseous phase. O.H.

**A71-44540 #** Determination of microelements in the food rations and excretions of humans by means of extraction (Opredelenie mikroelementov v ratsionakh pitaniia i vydeleniakh cheloveka s primeneniem ekstraktsii). E. I. Pokrovskaia, O. G. Puzanova, and A. P. Tereshchenko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 66-69. 8 refs. In Russian.

Description of a method of extracting microelements from mineralized biological samples. In the proposed method the microelements are extracted from a mixture of various molar proportions of the reagents hexamethylene ammonium hexamethylene dithiocarbamate (HMA) and 8-oxyquinoline with the aid of a mixture of chloroform and isoamyl (isobutyl) alcohol solvents. A.B.K.

**A71-44541 #** A procedure for determining serotonin (5-oxytryptamine) in the whole blood of rats (K metodike opredeleniia serotoninina /5-oksitriptamina/ v tsel'noi krvi krysa). Z. S. Dolgun, S. P. Novikova, and V. S. Shashkov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 69-71. In Russian.

Description of a procedure for determining serotonin (5-NT) in small quantities of blood in series analyses of a large number of samples. In the proposed procedure the method of Snyder et al. is used to determine 5-NT in the blood, the albumins being precipitated by the method of Waalkes et al. Moreover, during the first stage of extraction of 5-NT acidic butanol is used instead of ordinary butanol. Using this method, the content of 5-NT in rats is found to fluctuate from 0.47 to 1.15 microgram/ml. A.B.K.

**A71-44542 #** Method of processing the muscular bio-electric potential input into a digital computer (Sposob obrabotki biopotentsialov myshts dlia vvoda v TsVM). V. N. Zhishko, A. A. Ignatov, V. D. Lovitskii, B. N. Sorokin, and I. S. Shadrintsev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 71-76. 5 refs. In Russian.

A system is described which performs preprocessing of muscular bio-electric potentials to single out several important characteristics. The results are put out in a form convenient for processing on a digital computer. The block diagram of the system is given and discussed. The amplitude, frequency, and time-domain analysis of the electromyogram signals is described. V.P.

**A71-44543 #** Use of automatic gain control in systems recording biological functions (Primenenie avtomaticheskoi regulirovki usileniia v sistemakh registratsii fiziologicheskikh funktsii). A. N. Kozlov, V. A. Degtiarev, V. G. Voloshin, and V. S. Markov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 76-79. In Russian.

Description of a transistorized AGC circuit designed for use with an ultrasonic Doppler-cardiogram recording system. The ultrasonic Doppler-cardiogram signal has a very complex structure and a wide frequency spectrum. The signal level can change by factors of 3 to 5 which hinders the discrimination of cardiac activity phases during recording. The proposed circuit makes it possible to retain the characteristic signal changes between the cardiac phases in the presence of strong level fluctuations. T.M.

**A71-44544 #** Study of vestibular reactivity with the aid of galvanic current (Issledovanie vestibuliarnoi reaktivnosti s pomoshch'iu gal'vanicheskogo toka). R. R. Galle and L. N. Gavrilova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 79-83. 20 refs. In Russian.

Vestibular reactivity to galvanic currents is investigated using the principle of discrete excitation by increasing stimuli underlying van Egmond's (1948) cupulometry method. Plots of excitability curves based on stabilographic indices are presented. The results obtained confirm the positive value of this alternative method of vestibulometry. M.V.E.

**A71-44545 #** Coordination structure of arbitrary movements in humans upon stimulation of the horizontal semicircular canals by angular accelerations (Koordinationnaia struktura proizvol'nykh dvizhenii cheloveka pri razdrzhenii gorizonta'lnykh polukruzhnykh kanalov uglovymi uskorenieniami). I. F. Chekirda and F. A. Solodovnik. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 83-86. 14 refs. In Russian.

Results of the use of the photocyclogrammetry method to study the coordination structure of arbitrary movements of the human hand during stimulation of the vestibular apparatus. The use of the cyclogrammetric method for this purpose is shown to be promising,

especially in the case of stimuli of small and medium magnitude. It is established that adequate stimulation of the horizontal semicircular canals by a negative angular acceleration of small, medium, or large magnitude leads to a complication of the coordination structure of arbitrary movements. The performance of the final result of the action under conditions of stimulation of the vestibular apparatus is achieved by preserving the main waves determining the structure of the movements and by means of central (secondary) correction signals. A.B.K.

**A71-44546 #** Morphological changes in the vascular structure of the brain resulting from transverse accelerations (O morfologicheskikh izmeneniiakh v sosudistoi sisteme golovnoego mozga v rezul'tate vozdeistviia poperechnykh uskorenienii). T. I. Ivanova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, July-Aug. 1971, p. 86-88. 11 refs. In Russian.

Morphological analysis of the state of the brain vessels in dogs subjected to repeated cumulative action of transverse accelerations of large magnitudes (20 to 40 g). Crude structural disturbances of the brain arteries with ruptures of the walls and the formation of hematomas are noted and are attributed to the occurrence of additional mechanical forces acting on the vascular wall. The increase in the intracranial pressure due to the deterioration of the venous outflow from the cranial cavity leads to a pronounced venous stasis with dilatation of the venous stems and stretching of the venous wall, with separation of the fibers and disintegration of the wall layers. A.B.K.

**A71-44547 #** Correlation connections of induced activity in a human trace reflex (Korrelatsionnye svyazi vyzvannoi aktivnosti pri sledovom reflekse u cheloveka). K. K. Monakhov and L. K. Rumiantseva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 21, July-Aug. 1971, p. 718-723. 13 refs. In Russian.

The formation of a trace motor reflex in response to an acoustic stimulus with verbal reinforcement is studied in healthy subjects. Cross-correlation connections between the induced activity of auditory and motor areas are determined by means of flashes presented at different periods of the trace pause. The highest coefficient of cross-correlation was obtained for the period preceding the motor response, and the lowest in the middle of the trace pause. The results obtained are discussed from the viewpoint of the functional connections among the brain structures involved in the formation of the conditioned reflex. M.V.E.

**A71-44548 #** Images evoked by verbal stimuli and their hereditary antecedents (Obrazy, vyzvaemye slovesnymi razdrzhiteliami, i ikh nasledstvennaia obuslovlennost'). L. G. Pervov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 21, July-Aug. 1971, p. 738-745. 51 refs. In Russian.

Reviewed data on eye movements in the direction of presented stimuli and of visual images evoked by verbal stimuli underlie a technique devised and applied for the purpose of probing the possibility of a contribution of hereditary factors to image formation. The results of studies using this technique on a group of monozygotic twins (MT), another group of dizygotic twins (DT), and a control group were subjected to appropriate mathematical processing, whereupon they confirmed the presence of such hereditary factors in image formation. A significant intrapair similarity of reactions in the MT group, a significant dissimilarity between the MT and the control groups, and an absence of any significant difference between the DT and the control groups were instrumental in providing the confirmation. M.V.E.

**A71-44549 #** Averaged evoked potentials of the human cortex in response to visual stimuli (Usrednennyye vyzvannyye po-

tentsialy kory na emotsional'nye zritel'nye razdrazhiteli u cheloveka). E. A. Kostandov and Iu. L. Arzumanov (Tsentral'nyi Nauchno-Issledovatel'skii Institut Sudebnoi Psikhiiatrii, Moscow, USSR). *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, July-Aug. 1971, p. 811-819. 29 refs. In Russian.

Averaged evoked potentials (AEP) in adults were recorded from the vertex and occipital areas of the scalp with the aid of a computer. Separate words, neutral and emotional, were used as stimuli. The most permanent AEP component in response to photic verbal stimuli was found to be the late positive wave with some 300 msec latency. In one and the same experiment, AEPs with almost similar parameters were recorded in response to various neutral words. The role is discussed of local activation, induced from the limbic brain structures, in the genesis of the positive AEP component. M.V.E.

**A71-44550 #** Interaction of evoked and background activities in a 'self-zeroing' neuron model (Vzaimodeistvie vyzvannoi i fonovoi aktivnosti na modeli neirona 's zanuleniem'). I. G. Sokolov, R. M. Meshcherskii, V. L. Kashkovskii, and Ia. Sh. Smotritskii (Akademiia Nauk SSSR, Institut Vysheii Nervnoi Deiatel'nosti i Neirofiziologii; Moskovskii Inzhenerno-Ekonomicheskii Institut, Moscow, USSR). *Zhurnal Vysheii Nervnoi Deiatel'nosti*, vol. 21, July-Aug. 1971, p. 836-843. 16 refs. In Russian.

An experimental study of the interaction of evoked and background activities was performed upon a computerized neuron model with 'self-zeroing,' i.e., return to zero of the membrane potential. The results obtained indicate that evoked neuron activity may not only repeat or transform the frequency of rhythmic stimulation, but may also have the form of the background activity. At some relations between neuron thresholds, rhythmic and random sequences of impulses and frequency of rhythmic impulses, stimulation by rhythmic pulses is found to lead to a manifestation of subthreshold activity. At other relations among these parameters, random input impulses lead to a display of subthreshold rhythmic stimulation. M.V.E.

**A71-44562** Local oxygen tension field in the glomus caroticum of the cat and its change at changing arterial PO<sub>2</sub>. H. Acker, D. W. Lübbers (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany), and M. J. Purves (Bristol, University, Bristol, England). *Pflügers Archiv*, vol. 329, no. 2, 1971, p. 136-155. 26 refs.

The distribution of oxygen tension has been measured in the carotid body of 97 cats using platinum microelectrodes. Evidence for damage to carotid body tissue or blood vessels was found only in seven cats, taking into consideration measurements of chemoreceptor afferent discharge in the sinus nerve. Eleven carotid bodies were histologically controlled, two showed obvious damages of the puncture. The results obtained provide some evidence that blood flow through the carotid body is far from homogeneous. The various mechanisms which may be involved are discussed. G.R.

**A71-44592 #** An experimental satellite medical network for scarcity areas. Albert Feiner (Lister Hill National Center for Biomedical Communications, Bethesda, Md.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 8th, Washington, D.C., Oct. 25-28, 1971, Paper 71-1003*. 7 p. Members, \$1.50; nonmembers, \$2.00.

Adequate medical services to areas isolated by geographic and climatic conditions can be achieved by substituting reliable communications for the physician's physical presence. To prove this thesis, a network interconnecting villages and hospitals has been installed in Alaska. The network utilized ATS-1 and very simple VHF terminals to provide a voice circuit for medical consultations. Initial tests indicate that the satellite link permits timely treatment of emergencies, reduces the anxiety level of the aide by removing the need for personal judgment in emergencies and fosters a greater rapport between communicants - things which were not possible with HF radio. (Author)

**A71-44622 #** Fluid dynamics in a large arterial bifurcation. Czeslaw M. Rodkiewicz (Alberta, University, Edmonton, Alberta, Canada) and Darrel H. Howell. *AIAA Journal*, vol. 9, Nov. 1971, p. 2284-2286. 9 refs. National Research Council of Canada Grant No. NRC A-4198.

The primary objective of the study is to investigate the effect of varying the significant dimensionless parameters on the manner in which the flow divides at a bifurcation. The results obtained indicate that the heart, activated by an impulse from the brain, can produce a particular pulse rate of a given amplitude and selected Reynolds number so that more blood may be supplied to the preferential area of the human body. G.R.

**A71-44719 #** Investigation of the resistance of some Arthropoda to explosive decompression and low pressure (Doslidzhennia stiiakosti deiakikh vidiv chlenistonogikh do vibukhovoii dekompresii ta znizhenogo tisku). V. Ia. Lukhanin (Akademiia Nauk Ukrain'skoi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 17, July-Aug. 1971, p. 520-526. 18 refs. In Ukrainian.

The resistance of some species of Arthropoda (Daphnia, crawfish, wood lice, cockroaches, flies, and ants) to explosive decompression was studied, and the causes of death in these experiments were investigated. Survival time was determined mainly by the degree of hypoxia. The appearance of tissue emphysema had no significant influence on resistance. M.V.E.

**A71-44720 #** Mechanisms of the development of postsynaptic de- and hyperpolarization potentials in cortical neurons during low-frequency stimulation of thalamic structures (O mekhanizmakh razvitiia de- i giperpolarizatsionnykh postsinapticheskikh potentsialov v korkovykh neironakh pri nizkochastotnoi stimulatsii talamicheskikh struktur). M. E. Gvilava (Tbilisskii Gosudarstvennyi Universitet; Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Klinicheskoi i Eksperimental'noi Nevrologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 63, Aug. 1971, p. 433-436. 7 refs. In Russian.

These mechanisms were studied in wakeful cats when KCl-filled micros and macroelectrodes were used for delivery of 1f pulses into the sensorimotor section of their cortex. Oscillograms of intracellular reactions to stimuli are given, suggesting the important role of the inhibitive interneurons in the organization of postsynaptic potentials. V.Z.

**A71-44777** Effect of temperature on cutaneous venomotor reflexes in man. Ralph S. Zitnik, Ettore Ambrosioni, and John T. Shepherd (Mayo Clinic and Mayo Foundation; Minnesota, University, Rochester, Minn.). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 507-512. 25 refs. NIH Grants No. HE-13081; No. HE-5883.

The effects of alterations in local and central body temperature on cutaneous venomotor reflexes were studied in man. Changes in venous wall tension were monitored by measuring the pressure in the dorsal veins of the hand during temporary arrest of the hand circulation. Local heating of the hand veins from 34 to about 42 C diminished or abolished the reflex venoconstriction in response to a deep breath, mental arithmetic, or ammonia inhalation. More intense depression of venomotor reflexes was obtained by increasing the temperature of the body core from 36.6 to 38.4 C while maintaining the temperature of the hand veins constant (about 34 C). At comfortable ambient temperatures with the onset of supine leg exercise, there is a reflex constriction of the skin veins and a decrease in skin blood flow. As exercise is continued and body temperature increases, the constriction of the skin veins lessens as skin blood flow increases. When the body temperature is increased before exercise is commenced, the skin veins do not constrict. The attenuation or abolition of cutaneous venomotor reflexes by thermal stress emphasizes that the cutaneous veins, like the resistance vessels of the skin, play a primary role in temperature regulation. (Author)

**A71-44778 Pulmonary diffusing capacity at high altitude.** J. S. Guleria, J. N. Pande, P. K. Sethi, and S. B. Roy (All-India Institute of Medical Sciences, New Delhi, India). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 536-543. 22 refs.

Apparent pulmonary diffusing capacity for carbon monoxide (DL sub CO) was determined by the steady-state technique in 30 lowlanders at sea level and on the 2nd, 5th, and 10th day of ascent to an altitude of 3,658 m. Also studied were 38 lowlanders with a prolonged stay at high altitude, 25 highlanders, and 16 highlanders after 6 weeks of deacclimatization at sea level. From the results obtained it would appear that the greater pulmonary diffusing capacity of high-altitude natives may be either genetically determined or the consequence of hypoxic stimulus to lung growth in the early postnatal life. M.M.

**A71-44779 \* Circadian variations in thermal and metabolic responses to heat exposure.** Michael A. Little and John A. Rummel (New York, State University, Binghamton, N.Y.; NASA, Manned Spacecraft Center, Environmental Physiology Laboratory, Houston, Tex.). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 556-561. 27 refs.

Measurement of circadian variations in body temperature, heart rate, metabolic rate, and water loss during moderate heat exposures (46 C atmospheric temperature, 31% relative humidity) of 1 hr. Eight healthy subjects of European origin were tested at 0400, 0800, 1200, 1600, 2000, and 2400 hr on separate days. Each subject was tested in a postabsorptive state while reclining nude in a constant-temperature chamber. Circadian rhythmicity was observed, both before (24 C atmospheric temperature, 50% relative humidity) and during the heat exposure for rectal and skin temperatures, heart rate, metabolic rate, and water loss. A least-squares spectral analysis was applied to the data to determine amplitude and phase of best-fit periodic functions. Period was held constant and assumed to be 24 hr because of the cross-sectional nature of the data. Peak amplitude or acrophase responses prior to and at the end of the heat exposures fell between 1600 and 2000 hr. Minimum responses generally occurred between 0400 and 0800 hr. Rectal and mean weighted skin temperatures displayed amplitude camping during the course of the heat exposure. (Author)

**A71-44780 Effect of chronic exposure to hypoxia on ventilatory response to CO2 and hypoxia.** H. V. Forster, J. A. Dempsey, M. L. Birnbaum, W. G. Reddan, J. Thoden, R. F. Grover, and J. Rankin (Wisconsin, University, Madison, Wis.; St. Vincent's Hospital, Leadville, Colo.). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 586-592. 19 refs. NIH Grants No. FRO-00249; No. HE-5626; Grant No. DA-DA-17-68-C-8013.

Ventilatory response to hypoxia and CO2 was studied in: (1) 10 sea-level residents (lowlanders) before, during, and after a 45-day sojourn at 3,100-m altitude; (2) 9 adolescents born at sea level but residing for the past 2-15 years at 3,100 m (altitude-residing lowlanders); and (3) 9 natives of 3,100 m. The highlanders were less responsive to both stimuli than the sojourning lowlanders (100%) and less responsive to hypoxia (45-65%) and as responsive to CO2 as the prealtitude lowlanders. Comparing the data obtained with previous findings suggests that with chronic exposure to hypoxia changes in ventilatory response to hypoxia and CO2 occur in the following manner: (a) an initial increase in response to both stimuli; (b) return to sea-level status in response to both stimuli; (c) loss of response to hypoxia if chronic exposure is begun during childhood; and (d) degree of desensitization influenced by duration and intensity of chronic exposure. M.M.

**A71-44781 Effects of age on plasma aldosterone levels and hemoconcentration at altitude.** R. C. Jung, D. B. Dill, R. Horton, and S. M. Horvath (Nevada, University, Boulder City, Nev.; Southern California, University, Los Angeles; California, University, Santa

Barbara, Calif.). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 593-597. 18 refs. NSF-supported research; PHS Grants No. GM-15693-02; No. HE-13476; Grant No. AF AFOSR 69-1653.

Total blood volume, red cell and plasma volume, and plasma aldosterone levels were measured on a group of four young and four older subjects at sea level and altitude. Red cell volumes were unchanged; however, there was a reduction in plasma volume in both groups with the young subjects showing a slightly greater reduction. Plasma aldosterone levels were reduced in the older subjects but remained at sea-level or higher values in the younger subjects upon ascent to altitude. It is concluded that plasma aldosterone levels and, therefore, probably secretion rates may be affected by age and that plasma volume may be similarly affected by age. The changes in these values at altitude appear to be delayed in physiologically older individuals. Possible mechanisms for this discrepancy with age are discussed. It is suggested that caution should be used in analyses and interpretation of body fluid changes and hormonal secretory values at altitude unless these are age correlated and plasma hormone levels analyzed rather than urine excretory concentrations. (Author)

**A71-44782 Measurement of uneven distribution of pulmonary blood flow to CO diffusing capacity.** Richard W. Hyde, Matthew G. Marin, Richard I. Rynes, George Karreman, and Robert E. Forster (Rochester, University, Rochester, N.Y.; Pennsylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 605-612. 35 refs. Research supported by the Southern Tier Heart Association; NIH Grants No. HE-10324; No. HE-13397.

Description of a method for assessing uneven DL/Qc (DL is the diffusing capacity, Qc the pulmonary blood flow) by measuring the rate of uptake of 4% CO from the alveolar gas during breathholding. It was found that, since uneven DL/Qc did not increase in the sitting position, uneven Qc secondary to gravitational forces is probably not the major cause of uneven DL/Qc. Possible mechanisms for the observed uneven DL/Qc include anatomical variation in capillary length, pulsatile Qc, pulsatile capillary volume, and uneven distribution of Qc within terminal airways secondary to sequential ventilation. M.M.

**A71-44783 \* Miniature battery-operated electromagnetic flowmeter.** Thomas B. Fryer and Harold Sandler (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 31, Oct. 1971, p. 622-628. 22 refs.

An electromagnetic flowmeter system has been described which contains some new unique operational features. This system uses a commercially available electromagnetic flow cuff and specially designed battery operated electronics. Small size and low power operation were the primary objectives of the system design in order to allow acquisition of data from unrestrained animals. Laboratory experiments have demonstrated good results in obtaining calibrations in vitro, in acute animal studies, and in chronic animal preparations. Good results have also been obtained in electronic vs mechanical zero flow calibrations. (Author)

**A71-44886 Physical and radiobiological studies on artificial earth satellites (estimating the radiation hazard of space flights) (Fizicheskie i radiobiologicheskie issledovaniia na iskusstvennykh sputnikakh zemli /k otsenke radiatsionnoi opasnosti kosmicheskikh poletov/).** Edited by Iu. G. Grigor'ev and E. E. Kovalev. Moscow, Atomizdat, 1971. 200 p. In Russian.

Experimental data obtained on earth satellites are compared with literature data reflecting the results of physical and medicobiological investigations in space. The results of a study of the radiation conditions in space along the routes of artificial earth satellites are presented, and the principles of calculation of admissible radiation doses and physical shielding of spacecraft are outlined. An estimate is made of the radiation hazard and of the admissible cosmic radiation levels for humans and various biological objects.

The results of experiments on the combined effect of radiation and other space flight factors on animals, higher and lower plants, unicellular organisms, and model biochemical systems are evaluated. The future prospects of physical and radiobiological studies on artificial earth satellites are considered.

A.B.K.

**A71-44889 # Studies concerning protection against cosmic radiation (Issledovaniia po zashchite ot kosmicheskikh izluchenii).** V. E. Dudkin, E. E. Kovalev, S. S. Skvortsov, L. N. Smirenniy, and A. I. Vikhrov. In: Physical and radiobiological studies on artificial earth satellites (estimating the radiation hazard of space flights).

Moscow, Atomizdat, 1971, p. 51-75. 18 refs. In Russian.

Consideration of the interaction between cosmic radiation particles and radiation shielding and tissue material, and results of experimental studies of methods of ensuring radiation protection on manned spacecraft. The attenuation of high-energy protons in radiation shielding material is evaluated, the formation of a radiation dose in body tissue is examined, and an analysis is made of the high-energy proton dose behind a radiation shield and of the passage of heavy cosmic radiation nuclei through shielding material and tissue. The results of experimental studies of the attenuation and accumulation of cosmic radiation in spacecraft radiation shielding material during space flight are compared with calculated values of the radiation levels to which the crews of manned spacecraft are exposed. The results of measurements of the proton and neutron spectra at altitudes from 200 to 400 km are cited.

A.B.K.

**A71-44890 # Special features of the biological action of cosmic radiation and normalization of the admissible dose level (the performance of radiobiological experiments in space) (Osobennosti biologicheskogo deistviia kosmicheskogo izlucheniia i normirovanie urovnia dopustimykh doz /k provedeniiu radiobiologicheskikh eksperimentov v kosmose/).** Iu. G. Grigor'ev, V. G. Gorlov, Iu. P. Druzhinin, V. I. Efimov, B. A. Markelov, G. F. Nevskaiia, S. A. Raevskaiia, and Iu. V. Farber. In: Physical and radiobiological studies on artificial earth satellites (estimating the radiation hazard of space flights).

Moscow, Atomizdat, 1971, p. 76-113. 120 refs. In Russian.

Study of the specific nature of the action of cosmic radiation in combination with other space flight factors for the purpose of obtaining more accurate estimates of the admissible dose levels. Some approaches to the normalization of admissible levels of radiation action on manned spacecraft crews are outlined. A clinical-experimental evaluation is made of the effect of prolonged radiation action on dogs. The significance of nonuniformity of irradiation of the organism in estimates of admissible dose levels in dogs is illustrated. A study is made of the diurnal rhythms of radiosensitivity of the organism. The significance of recovery processes in estimating the radiation hazard of space flights is assessed.

A.B.K.

**A71-44891 # Combined biological action of ionizing radiation and other space flight factors (results of flight experiments) (Kombinirovannoe biologicheskoi deistvie ioniziruiushchikh izlucheniia i drugikh faktorov kosmicheskogo poleta /rezul'taty poletnykh eksperimentov/).** V. N. Benevolenskii, D. F. Gertsuskii, Iu. G. Grigor'ev, I. V. Konstantinova, M. G. Petrovnin, N. I. Rybakov, and N. L. Fedorova. In: Physical and radiobiological studies on artificial earth satellites (estimating the radiation hazard of space flights).

Moscow, Atomizdat, 1971, p. 114-198. In Russian.

Experimental study of the modifying effect of nonradiative space flight factors on the manifestation of radiation damage in the presence of various types of irradiation. The studies described were performed on four satellites with flight durations lasting from 8 to 22 days and concern cytogenic disturbances of somatic cells in dogs,

disturbances of their sexual function, and changes in their hemopoiesis; changes in the rate of growth and development of various types of plants; the induction of bacteriophages on lysogenic bacteria and the antiinduction properties of certain radioprotectors; changes in the growth of yeast cells; and changes in the specificity of antigens and enzyme preparations.

A.B.K.

**A71-44977 # Simultaneously recorded retinal and cortical responses to patterned stimuli.** John C. Armington, Thomas R. Corwin, and Robert Marsetta (Northeastern University, Boston, Mass.). *Optical Society of America, Journal*, vol. 61, Nov. 1971, p. 1514-1521. 32 refs. PHS Grant No. 1 R01-EY-0759-04.

The method of stimulus alternation was used to record simultaneously electroretinograms (ERGs) and visually evoked cortical potentials (VECPs) to stimuli of differing luminance and pattern. Stimuli consisted of checked and striped patterns with a variety of spatial frequencies. ERGs of approximately equal amplitudes were elicited by patterns of the same spatial frequency regardless of pattern. ERG amplitude decreased monotonically with increasing spatial frequencies of the patterns. Simultaneously recorded VECPs were consistently larger for checked patterns than for striped patterns of equal spatial frequency. The largest VECPs were seen with checked patterns having spatial frequencies of approximately 1 cycle/deg of visual angle: frequencies both higher and lower than this value produced smaller responses.

(Author)

**A71-44978 # Theoretical eye model with aspherics.** W. Lotmar (Swiss Office of Weights and Measures, Wabern, Switzerland). *Optical Society of America, Journal*, vol. 61, Nov. 1971, p. 1522-1529. 19 refs. NIH Grant No. NB-03638-05.

A model for the human eye is proposed, similar to Gullstrand's well-known 4-radius model, however with the front surface of the cornea and the back surface of the crystalline lens taken to be rotationally symmetric aspherics. Whereas for the cornea a polynomial is used based on experimental data of Bonnet, a second-order parabola was tentatively adopted for the back surface of the lens. This model results in slight spherical undercorrection, in agreement with experimental findings. On the other hand, the sine condition is not well satisfied, probably due to neglect of the shell structure of the lens. By ray tracing, astigmatism and coma as well as the meridional and sagittal focal lengths were computed up to a visual angle of 90 deg. Calculations were also made for the same model preceded by a plano-concave contact lens (Goldmann 3-mirror contact glass), showing that this combination results in considerably reduced astigmatism.

(Author)

**A71-44979 # Spatial and luminance determinants of the increment threshold under monoptic and dichoptic viewing.** Joseph I. Markoff (Honeywell, Inc., Saint Paul, Minn.) and Joseph F. Sturr (Syracuse University, Syracuse, N.Y.). *Optical Society of America, Journal*, vol. 61, Nov. 1971, p. 1530-1537. 32 refs. PHS Grant No. NB-06618.

The shape of the dichoptic spatial-excitability function is measured at four retinal positions and two adaptation levels and is compared to similarly obtained monoptic curves. For any given retinal position, monoptic and dichoptic peaks are found to occur over the same conditioning field diameter. Many other findings are reviewed and interpreted.

M.V.E.

**A71-45057 # Cortex potentials in humans evoked by emotional visual stimuli (Vyzvannye potentsialy kory cheloveka na emotsional'nye zritel'nye stimuly).** E. A. Kostandov and Iu. L. Arzumanov (Institut Sudebnoi Psikhologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 199, July 11, 1971, p. 497-500. 10 refs. In Russian.

Study of the special features of averaged evoked potentials recorded from the vertex and the occipital region of the human

cranium upon the presentation of visual verbal stimuli possessing identical physical energy but differing with respect to the semantic content of the particular stimuli which are neutral or emotionally meaningful to the subject. It is found that averaged evoked potentials were recorded from the vertex and occipital region of all subjects upon presentation of verbal light stimuli. However, the form of the potentials was different in different individuals. In some subjects the averaged potential consisted of six or seven negative and positive oscillations, which quite often terminated in an alpha postdischarge. In other subjects two negative and two positive components were constantly recorded. In still others only a slow positive oscillation with a latent period of about 300 msec was recorded. A.B.K.

**A71-45065 #** Certain peculiarities of respiratory regulation in highland natives (O nekotorykh osobennostiakh regulatsii dykhaniiia urozhentsev vysokogor'ia). I. S. Breslav and N. N. Kariiev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 199, July 21, 1971, p. 730-732. 10 refs. In Russian.

Comparative study of the respiratory reactions of lifelong residents of a high-mountain region of the USSR and more recently arrived residents of this region to short-term inhalation of gas mixtures with different oxygen partial pressures. A distinct difference between the two groups is noted with respect to their reactions to a change in the oxygen concentration in the inhaled mixtures. A hypoxic mixture caused a rapid increase in lung ventilation in the recent arrivals, while the lifelong residents reacted to this mixture with a more gradual but more stable increase in the minute respiration volume. Inhalation of hyperoxic mixtures, on the other hand, was accompanied in the case of the recent arrivals by an initial decrease in lung ventilation, while the lifelong residents reacted immediately by an increase. A.B.K.

**A71-45066 #** Various postsynaptic potentials in adjacent synapses in certain multiinnervated (tonic) fibers of eye muscles (O razlichnykh postsinapticheskikh potentsialakh v sosednikh sinapsakh u nekotorykh mnozhestvennoinnervirovannykh /tonicheskikh/volonkon glaznykh myshts). D. P. Matiushkin (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 199, July 21, 1971, p. 733-736. 5 refs. In Russian.

Determination of the relation between the parameters of postsynaptic potentials arising in adjacent synaptic regions of a tonic fiber of an external eye muscle. The experiments were performed on the tonic fibers of the upper musculus obliquus in rabbits. A special study was made of the time parameters (the rise time and the half-life) of the main (largest-amplitude) and supplementary (smaller-amplitude) postsynaptic potentials. It is found that in some of the investigated fibers (about 23%) the time parameters of main and supplementary postsynaptic potentials approximately coincide, while in other fibers (77%) main and supplementary postsynaptic potentials differ essentially with respect to time parameters. A.B.K.

**A71-45067** The analysis of respiratory sinus arrhythmia using spectral analysis and digital filtering. Baxter F. Womack (Texas, University, Austin, Tex.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-18, Nov. 1971, p. 399-409. 11 refs. Contract No. AF 44(620)-71-C-0091.

Investigation of the following aspects of respiratory sinus arrhythmia: (1) development of a mathematical model relating respiration to those variations that it causes in heart rate; (2) the use of digital filtering techniques to attenuate fluctuations in heart rate which are due to respiration; and (3) development of methods that use only heart rate to obtain information about respiration. A linear model is used to approximate the relationship between lung volume and heart rate during normal breathing. Segments of controlled-rate normal breathing are analyzed using spectral analysis techniques to

compute appropriate model parameters for a given subject. Simulations are implemented using the fast Fourier transform, whereby the model accepts normal respiration as its input and develops an instantaneous heart-rate function that is compared with the actual heart rate from a subject. M.M.

**A71-45085 #** Excretion of catecholamines and of their 'precursors' in railroad men during nighttime and daytime work (Ekskretsiia katekholaminov i ikh predshestvennikov pri operatorskoi rabote v nochnoe i dnevnoe vremia). E. Sh. Matlina, V. N. Vasil'ev, and T. V. Brodskaia (Akademiia Nauk SSSR, Laboratoriia Problem Upravleniia Funktsiiami v Organizme Zhivotnykh i Cheloveka; Ministerstvo Putei Soobshcheniia, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, July 1971, p. 1027-1031. 14 refs. In Russian.

In 25 healthy railroad men, adrenaline and noradrenaline excretion was found to be lower than in a control group. Daytime work induces practically no changes in urine catecholamine excretion in railroad men, but the reserves of the sympathetic-adrenal system decrease. No restoration of these reserves occurs during the first day of rest after daytime work. During nightwork, noradrenaline excretion is higher than normal. M.V.E.

**A71-45109 #** A method of functional modeling of biochemical systems (Metod funktsional'nogo modelirovaniia biokhimi-cheskikh sistem). G. V. Voronin and E. G. Larskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 199, Aug. 11, 1971, p. 1192-1195. 5 refs. In Russian.

Development of a method of functional modeling of biochemical systems on the basis of a set of certain functional properties common to all enzymes and enzyme transformations. A functional analog of an enzyme/substrate system possessing a set of such properties is synthesized, using an integrator based on an operational amplifier as the substrate storage analog and a pulse generator based on an amplifier and a relay as the enzyme analog. It is shown that the proposed method makes it possible to model enzyme systems of any configuration and to study the behavior of biochemical systems with both fixed and variable functional structures. A.B.K.

**A71-45124 \*** Installation and use of the microscope within a gastight glove box. Charles W. Boylen (NASA, Ames Research Center, Moffett Field, Calif.). *Applied Microbiology*, vol. 21, June 1971, p. 1089, 1090.

The adaptation of a high-resolution phase-contrast microscope for glove box use, which allows the stage and focusing knobs in the glovebox, although oculars and camera remain outside, is described. (Author)

**A71-45140 #** Visual masking effects in single units of the cat striate cortex. Tosaku Nikara (Iwate Medical University, Morioka, Japan). *Japanese Journal of Physiology*, vol. 21, Apr. 1971, p. 119-132. 19 refs.

Investigation of the visual masking phenomenon in terms of single cell activity in the cat's striate cortex by means of three modes of light stimulation: a slit of light stimulus, a diffuse flash of light stimulus, and a combination of these two. Only single cells responding well to a moving slit of light and having the distinct axis of receptive field were used for the analysis. These cells were classified into four groups by using flashing stationary slit of light stimulus: ON, ON-OFF, OFF, and an unclassified type. The responses to the combined stimuli were observed in half the ON-type cells and all the ON-OFF-type cells but never in the OFF-type cells. The early response varied in firing pattern from unit to unit, and the latency tended to increase with increase in background luminance. The late response was observed in every cell of the ON and ON-OFF types. The results are discussed with reference to psychophysical studies on visual masking effects. M.M.

**A71-45150 \*** Inhaled ozone as a mutagen. I - Chromosome aberrations induced in Chinese hamster lymphocytes. R. E. Zelac, H. L. Cromroy, W. E. Bolch, Jr., B. G. Dunavant, and H. A. Bevis (Florida, University, Gainesville, Fla.). *Environmental Research*, vol. 4, Aug. 1971, p. 262-282. 117 refs. AEC Contract No. AT (40-1)-3599; Grant No. NsG-542; Contract No. N 00228-68-C-2658.

Chinese hamsters were exposed in two groups of four to UV-generated ozone for 5 hours at 0.2 ppm. Exposure-adjusted break frequencies for chromosome aberrations produced in circulating blood lymphocytes were the quantitative indicator of damage. Inhaled ozone produced 0.00167 breaks/cell-(ppm min), agreeing well with data from in vitro exposure of human cells. Directly extending this animal study to the human case, presently permitted ozone exposures would be expected to result in break frequencies that are orders of magnitude greater than those resulting from permitted radiation exposures. G.R.

**A71-45197 #** Solar activity and phenomena in the biosphere (Solnechnaia aktivnost' i iavleniia v biosfere). M. N. Gnevyshev and K. F. Novikova. *Zemlia i Vselennaia*, July-Aug. 1971, p. 33-36. In Russian.

The effect of solar activity on the biosphere is discussed. The topics include the relation between the solar and geomagnetic indexes on the one hand and the medico-biological indexes on the other, experiments with dogs and rabbits kept in capacitors or inside solenoids, and clinico-statistical evidences of the effects of solar activity on the human organism. The existence of a team of scientists who study the sun-vs-biosphere problem at the Astronomical Council of the USSR Academy of Sciences is noted. V.Z.

**A71-45382 \*** Rapid delayed luminescence from chloroplasts: Kinetic analysis of components - The relationship to the O<sub>2</sub> evolving system. Kenneth L. Zankel (Martin Marietta Corp., Research Institute for Advanced Studies, Baltimore, Md.). *Biochimica et Biophysica Acta*, vol. 245, 1971, p. 373-385. 13 refs. AEC Contract No. AT (30-1)-3706; Contract No. NASw-2183.

Delayed luminescence from saturating flashes given to isolated chloroplasts was measured in the time range of 65-800 microsec with the following results: (1) three distinct components having decay half times of approximately 10, 35 and 200 microsec could be detected; (2) the yields of both the 35- and 200-microsec delayed luminescence components oscillate with a period of four, in phase with oscillations of O<sub>2</sub> yield; (3) 3-(3,4-dichlorophenyl)-1,1-dimethylurea (DCMU) abolished the 10- and 200-microsec components and the oscillatory behavior of the 35-microsec component; and (4) the 35- and 200-microsec components are not directly influenced by System I. The properties shown by the DCMU isolated 35-microsec component are described. M.M.

## STAR ENTRIES

N71-36453\*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex. PROCEEDINGS OF THE 1970 MANNED SPACECRAFT CENTER ENDOCRINE PROGRAM CONFERENCE Aug. 1971 148 p refs Conf. held at Houston, Tex., 5-7 Oct. 1970 (NASA-TM-X-58068) Avail: NTIS CSCL 06P

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8. HORMONAL CONTROL OF CALCIUM METABOLISM J. T. Potts, Jr. (Mass. Gen. Hosp., Boston) 21 p refs

9. PEPTIDE HORMONES IN URINE D. H. Nelson and J. E. Bethune (Univ. of Southern Calif., Los Angeles) 10 p

10. PRELIMINARY RESULTS OF ACTH RADIOIMMUNOASSAY B. O. Campbell (Baylor Univ., Houston, Tex.) 11 p refs

N71-36454\*# Baylor Univ., Houston, Tex. Nuclear Medicine Section.

RED-CELL-MASS AND PLASMA-VOLUME CHANGES OBSERVED IN ASTRONAUTS ON THREE GEMINI AND THREE APOLLO MISSIONS

Philip C. Johnson *In* NASA Manned Spacecraft Center Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 11 p refs Avail: NTIS CSCL 06P

Nuclear-medicine procedures were performed for three Gemini and three Apollo missions. Because these studies are the only nuclear-medicine procedures ever performed for crews who have been in a weightless environment, it is not possible to

compare these results with any others. The nuclear-medicine studies were assigned to these missions as one part of the medical operational support required to guarantee the safety of the crews. Because these were operational studies rather than research studies, the number of data points was limited to the minimum number that was absolutely necessary to guarantee crew safety. The missions studies have included both the high oxygen/zero nitrogen atmosphere of the Gemini Program and the somewhat lower oxygen/partial nitrogen atmosphere of the non-lunar landing Apollo missions. Specimens have been obtained at the Manned Spacecraft Center, at the Kennedy Space Center, and aboard the recovery carriers. The Apollo data included ground-based controls. Author

N71-36455\*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex. HEMATOLOGY RESULTS ON GEMINI AND APOLLO MISSIONS

Craig L. Fischer and Stephen L. Kimzey *In* its Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 14 p refs Avail: NTIS CSCL 06P

Summaries are presented of what was known about red cell mass and plasma volume based on the Gemini Program. The hematological and biochemical programs for Apollo are described. Hematological evaluation of Apollo flights has shown the very strong, protective, and active effects of the nitrogen in the spacecraft cabin environment. The biochemical program data indicate: (1) A postflight hyperglycemia is regularly observed as the result of an increased release of catecholamines that are secondary to the stress of entry. (2) Serum-cholesterol and uric acid levels generally decline during the flights. (3) A transient postflight decrease in LDH 3 (associated with an increase in LDH 4) is often observed. (4) A transient postflight decrease in total serum carbon dioxide has been observed in the one crew (Apollo 13) tested for this parameter. A.L.

N71-36456\*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

REVIEW OF ENDOCRINE RESULTS: PROJECT MERCURY, GEMINI PROGRAM, AND APOLLO PROGRAM Carolyn S. Leach *In* its Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 16 p refs

Avail: NTIS CSCL 06P

Results of endocrine control of body fluids and electrolytes during Mercury, Gemini, and Apollo missions are reviewed. It is pointed out that the effect of endocrine control associated with space flight is just now being considered in depth. Although it is not believed that the changes observed constitute any immediate danger to the crewmen, it is thought that this adaptation to a weightless state costs energy and uses reserves, a situation that places homeostatic mechanisms at the edge of safety margin; furthermore, a severe stress beyond this weightless state would prove a difficult challenge for these control mechanisms. The second area of endocrine investigation (the qualification of stress) has been equally productive. The measurement of adrenal hormone activity has provided assessment of each crewman's response to the space flight environment. However, more data are needed for a prediction of postflight response on the basis of preflight values; and, only when samples are taken during the flight, will this correlation be complete. These examinations will not be possible until the earth orbital Skylab missions scheduled for 1973. Author

N71-36457\*# Baylor Univ., Houston, Tex. Coll. of Medicine. REVIEW OF METABOLIC AND ENDOCRINE STUDIES ON THE GEMINI 7 MISSION

Harry S. Lipscomb *In* NASA, Manned Spacecraft Center Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 4 p ref Avail: NTIS CSCL 06P

This study was planned within the rigorous constraints of the technical characteristics of the mission itself. For this reason, it was a formidable research task to ensure that adequate collection of samples was obtained and that adequate preflight and postflight followup studies were conducted properly. The primary goal of these studies was to measure changes, if any, that may have been produced by the period of zero gravity in space on total body metabolism related both to the musculoskeletal and endocrine systems. Within the broad limits of precision of this first metabolic study in space, changes in mineral and hormonal balance were sufficiently modest to support, from the metabolic point of view, the decisions that a voyage to and return from the moon would be medically safe. It is believed that more careful scrutiny must be given to the insistence on exercise on a regular basis as an integral part of the space flight to prevent predicted calcium losses in urine and the subsequent destruction of bone. Equally important, changes in red blood cell mass and changes in blood pressure maintenance and regulation will require scrupulous attention.

Author

**N71-36458\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**JOINT AMES RESEARCH CENTER/MANNED SPACECRAFT CENTER STUDY: DIURNAL VARIATION IN ADRENOCORTICAL AND THYROID FUNCTION DURING PROLONGED BEDREST**

Joan Vernikos-Danellis *In its Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 14 p refs*

Avail: NTIS CSCL 06P

In an effort to collect preliminary information about changes in the endocrine system of man during prolonged exposure to hypokinesic conditions and to postural changes and confinement, cortisol, thyroxine, and tri-iodothyronine blood levels were determined during a 56-day bedrest study. The data indicate that altering the hydrostatic pressure for long periods of time causes a reduction in the circulating hydrocortisone rhythm amplitude, increases in thyroid hormone levels, and a desynchronization of thyroid rhythms with light as well as steroids. The dissociation of the thyroid rhythms from both the hydrocortisone rhythm and the light-and-activity schedule, and the prompt reassociation of the two rhythms in the postbedrest ambulatory period suggest that the thyroid rhythm may be posture dependent. The fact that a vigorous exercise program did not prevent or correct the heart rate, temperature, and endocrine changes induced by 56 days of absolute bedrest, indicates that corrective measures other than exercise should be sought.

A.L.

**N71-36459\*** New York State Univ., Syracuse. Upstate Medical Center.

**RADIOIMMUNOASSAY OF ANTIDIURETIC HORMONE**

Myron Miller *In NASA Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 19 p refs*

Avail: NTIS CSCL 06P

Work conducted on the development of a radioimmunoassay system for urinary antidiuretic hormone (ADH) and its application in the study of man in space is presented. The data highlight some of the features of the assay and some of the evidence that demonstrates that changes in urinary ADH excretion occurs after physiological stimulation and that these changes can be measured. The assay system uses an antibody that was developed by immunizing rabbits with lysine vasopressin, which is one amino acid different from arginine vasopressin, the natural ADH of man. The methodology for determination of urinary ADH was evidently verified by the studies performed. Urine can be concentrated to raise the level of ADH in the specimen to the level of sensitivity of the assay. By using this technique, it is possible to measure quantitatively changes in urinary ADH excretion that would be expected to occur in response to the physiological stimuli and thus make possible study of the role of ADH in water regulation.

A.L.

**N71-36460\*** Harvard Univ., Boston, Mass. Medical School.  
**HUMAN VASOREGULATION BY RENIN, ANGIOTENSIN, AND ALDOSTERONE**

Edgar Haber *In NASA Manned Spacecraft Center Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 16 p refs Prepared in cooperation with Mass. Gen. Hospital*

Avail: NTIS CSCL 06P

Human physiological studies, using the radioimmunoassays for angiotensin 1 and 2 are discussed along with the development of a radioimmunoassay technique for aldosterone. It is anticipated that future studies combining these methods in human investigation will yield insights into vasomotor regulation.

A.L.

**N71-36461\*** Massachusetts General Hospital, Boston. Endocrine Unit.

**HORMONAL CONTROL OF CALCIUM METABOLISM**

John T. Potts, Jr. *In NASA Manned Spacecraft Center Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 21 p refs*

Avail: NTIS CSCL 06P

Three analytical techniques are of particular interest in the study of calcium and bone metabolism; these techniques are the assays for parathyroid hormone, calcitonin, and vitamin D. Discussion is limited to the current methods of assay and the uses to which the assays might be put.

Author

**N71-36462\*** University of Southern Calif., Los Angeles. School of Medicine

**PEPTIDE HORMONES IN URINE**

Don H. Nelson and John E. Bethune *In NASA Manned Spacecraft Center Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 10 p*

Avail: NTIS CSCL 06P

The program of studying peptide hormones in urine was initiated as part of an overall investigation of the effects of space flight on bone metabolism as related to a pituitary-adrenal stress and parathyroid hormone (PTH) secretion. Because it was evident that only urine samples would be available (for some time in the future), it was proposed to develop suitable methods for assaying PTH and adrenocorticotropic hormone (ACTH) in urine as measures of stress and parathyroid function. Progress in assaying these two peptides is summarized.

Author

**N71-36463\*** Baylor Univ., Houston, Tex. Dept. of Biochemistry.

**PRELIMINARY RESULTS OF ACTH RADIOIMMUNOASSAY**

Bonnie O. Campbell *In NASA Manned Spacecraft Center Proc. of the 1970 Manned Spacecraft Center Endocrine Program Conf. Aug. 1971 11 p refs*

Avail: NTIS CSCL 06E

The use of radioimmunochemical assay for ACTH in this research program is to establish the capability for routine analysis of human plasma levels of corticotrophin while performing three groundbased studies: (1) Circulating plasma levels of ACTH to be measured directly to establish base-line values of normal ACTH secretion obtained under various nonstress situations. (2) Normal ACTH values obtained under restful conditions to be analyzed in real time for circadian variation and correlated with available cortisol values that would indicate an underlying circadian rhythm in the total pituitary-adrenal axis. (3) The limits of the radioimmunochemical assay in determining the stressed state as opposed to base-line or nonstress values are considered, as well as the effect of stress situation on the circulating plasma levels.

Author

**N71-36464\***+ California Univ., Los Angeles. Dept. of Psychology.

**BRAIN MECHANISMS OF AROUSAL, ATTENTION AND PERCEPTION** Terminal Report, 1 Jul. 1968 - 30 Jun. 1971  
Donald B. Lindsley Jun. 1971 5 p refs  
(Grant NGL-05-007-049)

(NASA-CR-122941) Avail: NTIS CSCL 06P

The results are briefly described of continuing research on the neural mechanisms underlying visual perception, arousal, attention, vigilance, and decision processes in man, cat, and monkey. Most of the studies involved the use of cats and monkeys, as it was necessary to deal with subcortical structures by means of recording and stimulating electrodes maneuvered by stereotaxic techniques directly to the deeper regions of the brain. Research on man consisted of a study of the three major electrical phenomena of the brain that could be recorded from the outside of the skull by means of electrodes on the scalp. These include: (1) the spontaneous electroencephalogram with its alpha waves and other activity; (2) the average evoked potentials which normally cannot be seen in the EEG proper; and (3) the contingent negative variation, or slow potential shift associated with anticipation or expectancy. D.L.G.

**N71-36465\***# California Univ., Los Angeles. Dept. of Chemistry.

**PREPARATION OF TUMOR SPECIFIC BORON COMPOUNDS. 1: IN VITRO STUDIES USING BORON LABELED ANTIBODIES AND ELEMENTAL BORON AS NEUTRON TARGETS**

M. Frederick Hawthorne, Richard J. Wiersma, and Mitsuo Takasugi [1971] 28 p refs /ts Contrib. No. 2878  
(Grant NGL-05-007-003)

(NASA-CR-122925) Avail: NTIS CSCL 06E

The diazonium salt of 1-(4-aminophenyl)-1,2-dicarba-closododecaborane(12) has been incorporated into anti-bovine serum albumin and antibody proteins specific to human and mouse histocompatibility antigens. The incorporation of the boron-label (natural isotopic abundance) into the antibody is sufficient to cause specific cellular destruction when subjected to neutron radiation in vitro. It has also been demonstrated that particulate boron (natural isotopic abundance) is incorporated into Walker 256 cells which can be specifically destroyed with neutron radiation. These results suggest that the concept of incorporating boron into proteins which exhibit marked tumor-specificity is of great potential for use in neutron-capture therapy. The potential use of boron-containing compounds in cancer therapy is based on the unique nuclear property of the boron-10 nucleus to absorb thermal neutrons. This approach to cancer therapy is based on the liberation of high-energy fission fragments following neutron capture. Author

**N71-36466\***# Scientific Translation Service, Santa Barbara, Calif.

**ESSAY ON LIFE [ENSAYO A LA VIDA]**

Felipe Leon Leyva Oct. 1971 31 p Transl. of Mexican book.  
(Contract NASw-2035)

(NASA-TT-F-13964) Avail: NTIS CSCL 06P

The efforts of medical science to study and control the aging process over the centuries are described. The results of research on human life are presented, and it is indicated that these results made it possible to invigorate the cells comprising the human body and to thus achieve perfect health. The processes on earth are described, followed by a description of the human body including its cells and the brain. It is postulated that the source of human health and energy lies in the electricity which the body receives from space. Electricity was supplied to the body in the form of a fluid reactivating combustion in the human system and strengthening the cells, thus improving bodily conditions. Author

**N71-36467\***# Minnesota Univ., Minneapolis. Div. of Environmental Health.

**ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE** Semiannual Progress Report, Jun. 1970

Irving J. Pflug Jun. 1970 109 p refs

(Grant NGL-24-005-160)

(NASA-CR-122088; SAPR-4) Avail: NTIS CSCL 06M

The long term survival rates of *Bacillus subtilis* var. niger spores on glass and stainless steel surfaces, under temperatures less than 90 C and varying humidity conditions, are investigated. The effects of dry heat and chemical approaches in a closed system are also investigated. Attempts were made to measure box-to-box variations at several temperature-humidity conditions. Results indicate little change in box to box conditions; under temperature and humidity conditions, it was found that there is a significant change in survival rate with time. Experiments were carried out in distilled and buffered distilled water. Little difference was observed in the survival rates between the two waters. E.H.W.

**N71-36468\***# National Communicable Disease Center, Atlanta, Ga. Epidemiology Program.

**GERMICIDAL ACTIVITY OF ETHYLENE OXIDE**

Oct. 1969 4 p refs

(NASA Order R-11-004-001)

(NASA-CR-122089; PR-14) Avail: NTIS CSCL 06M

Sampling efforts using millipore filters to collect naturally occurring airborne microflora are reported. Natural contamination from 7620 cu ft of air, on 114 filters, was exposed to ethylene oxide gas while a collection from 1980 cu ft of air, on 30 filters, served as control samples. The control filters and the gas-exposed filters were incubated both aerobically and anaerobically. The surface colonial growth was counted and recorded with the aid of a binocular dissecting microscope. Viable particle counts on the control filters ranged from 10 to 122 per filter with a mean of approximately 80 as determined by aerobic methods of cultivation. Anaerobic cultivation produced counts ranging from 0 to 6 viable particles per filter with a mean of approximately 2 per filter. Filters exposed to ethylene oxide and incubated for 14 days did not demonstrate a survival of microorganisms. Another study involving the exposure of anaerobic spores to gaseous ethylene oxide is also reported. D.L.G.

**N71-36469\***# Scientific Translation Service, Santa Barbara, Calif.

**HEAT: BIOLOGICAL EFFECTS, OCCUPATIONAL HYGIENE SIGNIFICANCE AND POSSIBILITIES OF PROTECTION. DRINKING DURING HIGH TEMPERATURE WORK [HITZE: BIOLOGISCHE WIRKUNGEN, ARBEITSHYGIENISCHE BEDEUTUNG UND SCHUTZMOEGELICHKEITEN]**

Karl Heinz Richter Washington NASA Oct. 1971 10 p  
Transl. into ENGLISH from Staatsverlag der Deutschen Demokratischen Rep. (Berlin) 1966 p 177-184

(Contract NASw-2035)

(NASA-TT-F-14002) Avail: NTIS CSCL 06S

Advantages of various types of liquids offered to workers working under hot conditions (miners, fire fighters, steelworkers) are compared. Frequency and amount of liquid intake by each group are reported. A new liquid for this purpose (Contherm) is described. Author

**N71-36470\***# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

**FLOW DILUTION EFFECT ON BLOOD COAGULATION IN VIVO**

Chia-lun Hu 15 Sep. 1971 27 p refs

(Contract NAS7-100)

(NASA-CR-122929; JPL-TM-33-490) Avail: NTIS CSCL 06E

A simple model of enzyme reactions and the flow dilution change of the reactions are discussed. First, the complex reactions in blood coagulation are discussed and weighed.

Second, two controlling chemical reactions, the prothrombin-to-thrombin conversion and the inactivation of thrombin, both of which have significant positive and negative feedbacks, are selected. It is seen then, that the reaction rates of both these reactions will decrease as thrombin concentration is decreased by flow dilution. But the positive rate decreases more (because of the autocatalyzation of the prothrombin-thrombin conversion) than the negative rate. Therefore, when flow dilution increases, the overall reaction direction can be switched from the positive (procoagulative) direction to the negative (anticoagulative) direction; thus the in vivo coagulation is regulated and confined. This physical picture is analytically investigated by solving the modified Michaelis-Menton's enzyme rate equations. The effect of varying the antithrombin concentration is also investigated. The background and the physics of this analysis are extensively discussed. Author

**N71-36471#** Staatliche Zentrale fuer Strahlenschutz, Berlin (East Germany).

**RESULTS OF RADIATION PROTECTION MONITORING IN THE BIOSPHERE OF FALLOUT RADIOACTIVITY IN THE GERMAN DEMOCRATIC REPUBLIC, 1969 [ERGEBNISSE DER STRAHLENSCHUTZUEBERWACHUNG DER BIOSPHERE AUF FALLOUT-RADIOAKTIVITAET IN DER DEUTSCHEN DEMOKRATISCHEN REPUBLIK]**

F. Moldenhawer and U. Schulze-Wollgast Jan. 1971 50 p refs In GERMAN; ENGLISH summary (SZS-1/71) Avail: AEC Depository Libraries

In 1969 the results of fallout monitoring showed a further decrease of Sr-90 and Cs-137 contamination of nearly all environmental samples. On the average the concentration of Sr-90 decreased more heavily than that of Cs-137. The decrease of Sr-90 contamination of fallout, several plants (lucern, rye and wheat grain, potatoes) and milk was most marked. The Cs-137 contamination of several plants (turnip, lucern, potatoes) decreased too, whereas that of milk, total diet, grass and rye grain was unchanged in comparison with 1968. Author (NSA)

**N71-36472\*#** Translation Consultants, Ltd., Arlington, Va. **TERRESTRIAL ORGANISMS SURVIVE IN SIMULATED JUPITER ATMOSPHERE [IRDISCHE ORGANISMEN UEBERLEBEN IN SIMULITERTER JUPITERATMOSPHAERE]**

E. Koch Washington NASA Oct. 1971 9 p refs Transl. into ENGLISH from Sterne Weltraum (West Germany), v. 10, Mar. 1971 p 72-74

(Contract NASw-2038) (NASA-TT-F-13944) Avail: NTIS CSCL 06M

It is pointed out that the present reducing atmosphere of the giant planets is very similar to the terrestrial atmosphere at the time of the origin of life on earth. Bacteria which use methane as a source for carbon are discussed, and the chemical reactions involved are examined. Investigations regarding an adaptation of various microorganisms to a methane-ammonia-hydrogen atmosphere are considered including tests in which plants such as the Euphorbia xylophyloides, Euphorbia hermentiana, and Euphorbia cladestina were kept for two months in such an atmosphere. It was found that many microorganisms at the plants had survived the imposed conditions and had even multiplied. Studies with a one-celled alga and with the aquatic plant Elodea are also discussed. Author

**N71-36473\*#** Techtran Corp., Glen Burnie, Md. **DETERMINATION OF TRACE ELEMENTS IN SERUM AND URINE WITH FLAMELESS ATOMIZATION [BESTIMMUNG VON SPURENELEMENTEN IN SERUM UND URIN MIT FLAMMENLOSER ATOMISIERUNG]**

B. Welz et al Washington NASA Oct. 1971 15 p refs Transl. into ENGLISH from Z. Anal. Chem. (East Germany), v. 252, 1970 p 111-117

(Contract NASw-2037)

(NASA-TT-F-13983) Avail: NTIS CSCL 06E

A graphite tube furnace for flameless atomic absorption spectroscopy (AAS) and its application in the analysis of biological materials is described. The values obtained for copper in twelve sera are in good agreement with colorimetric results and flame AAS. The sample volume needed for one determination is only 2 microliters of serum. Several other possible applications for the determination of trace elements and for working with minimum sample volumes are discussed. Author

**N71-36474#** Cornell Univ., Ithaca, N.Y. **[PHOTOSYNTHETIC ENERGY CONVERSION] Annual Progress Report, 1 Sep. 1970 - 31 Aug. 1971** Roderick K. Clayton Aug. 1971 8 p refs (Contract AT(30-1)-3759) (NYO-3759-18) Avail: NTIS

Indications of electron transport in photosynthetic reaction centers in Rhodospseudomonas spheroides are reported. Factors cited include absorbancy changes, light and chemically induced bleaching of P870, electron acceptor pools, metal chelators, bacteriopheophytin, and the inhibition of photochemistry and fluorescence in reaction centers at pressures up to 6000 atm. Investigations with antibodies and with viruses which infect photosynthetic bacteria are also cited as well as experiments concerning photosynthetic membranes and energy conservation. J.M.

**N71-36475#** Pennsylvania State Univ., University Park. **FIELD ION SHADOW PROJECTION MICROSCOPE AND OTHER FIM TECHNIQUES FOR VIEWING BIOMOLECULES** Final Report

Erwin W. Mueller Apr. 1971 20 p refs (Contract AT(30-1)-3851)

(NYO-3851-10) Avail: NTIS

The utilization of the atomic resolution capability of the field ion microscope for viewing biomolecules was investigated with various modifications of the conventional FIM techniques. The shadow projection method was found to yield insufficient resolution due to the inevitable penetration of the high field into the object space. A second method was the sandwiching of biomolecules between the tip surface and a pressed-on metal foil, with subsequent controlled field evaporation of the covering metal layer. The method proved useful for the study of adhesion of different metals, but no molecules were seen. A third method provided a strong bonding of biomolecules by pressing them into close contact with the tip surface. Various molecular spot patterns were observed and found to conform to expectations when specimens of known structure were used. Author

**N71-36476#** McDonnell-Douglas Astronautics Co., Newport Beach, Calif. Astropower Lab. **PATTERN RECOGNITION OF EEG TO DETERMINE LEVEL OF ALERTNESS** Technical Progress Report, 15 Nov. 1969 - 14 May 1970

William B. Martin Jun. 1970 29 p

(Contract N00014-68-C-0277)

(AD-726473; DAC-60538-S4; TPR-4) Avail: NTIS CSCL 06/16

The report documents the work accomplished during the fourth reporting period in applying the principles of pattern recognition technology to the analysis of EEG. Several additional sleep scoring decision systems were investigated. Most classifications are performed satisfactorily. However, no reliable single channel frequency relationships have been discovered for separation of Stage 1 and REM. Also the transitional nature of Stage 3 patterns leads to confusing these patterns with Stage 2 or Stage 4. Cluster analysis was applied to frequency indicators derived from an overnight sleep record. Selection of clusters independent of human scoring demonstrated well defined groupings for awake, Stage 1 and REM combined, Stage 2 and

Stage 4. Stage 3 patterns were split between the Stage 2 and Stage 4 clusters. Sleep scoring decision systems based upon frequency analysis of a single channel of EEG have been designed for each of two Tektite I aquanauts. Author (GRA)

**N71-36477#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**ALCOHOL AND DISORIENTATION-RELATED RESPONSES. 2: NYSTAGMUS AND VERTIGO DURING ANGULAR ACCELERATION**

David J. Schroeder Apr. 1971 27 p refs  
 (FAA-AM-71-16) Avail: NTIS

The effect of alcohol ingestion on both vertigo and nystagmus responses to angular stimulation is discussed. Responses were obtained with and without visual fixation, and with the alertness of the subjects controlled. When recorded in total darkness, the nystagmic response to rotatory stimulation was suppressed by the alcohol. When visual fixation was allowed, a high-frequency, low-amplitude nystagmus to rotation was obtained following alcohol ingestion; there was little or no response prior to drinking. This apparent enhancement of the response was not due to an increase in vestibular sensitivity but, rather, to the suppressive effect of alcohol on the ability of the subject to maintain adequate visual fixation. Vertigo sensations resulting from the rotatory stimuli evidenced only slight declines following alcohol ingestion. Author

**N71-36478#** Joint Publications Research Service, Washington, D.C.

**RESEARCH EXPERIENCE IN THE COORDINATION OF GROUP CONTROL**

A. I. Nazarov 14 Sep. 1971 66 p refs Transl. into ENGLISH of the booklet "Opyt Issledovaniya Koordinatsii Gruppovogo Upravleniya" Moscow Univ. Publ. House, 1970 p 3-68 (JPRS-54046) Avail: NTIS

The coordinating mechanism for group control of a multiconnected system is studied by considering nerve formations in living organisms up to the neuron level. It is shown that the multiconnectiveness of nerve formations is ruled by specialization and systematicity. Tests of perceiving images stabilized relative to the retina and modeling of psychological coordination mechanisms result in a principle of autonomy that controls the structure and parameters of multiconnected systems so that the controlled quantities do not influence each other. A homeostatic system is used to examine coordinated control mechanisms that include feedback functions of a human operator in a tracking process. G.G.

**N71-36479#** Joint Publications Research Service, Washington, D.C.

**BIOGEOMETRY: USE OF GENERAL PURPOSE DIGITAL COMPUTERS FOR ANALYSIS OF BIOLOGICAL STRUCTURES**

G. R. Ivanitskiy et al 13 Sep. 1971 37 p refs Transl. into ENGLISH of the publ. "Geometriya Zhivogo" Moscow, Znaniye Publishing House, 1971 p 1-32 (JPRS-54035) Avail: NTIS

Methods of investigating the geometry of living organisms using modern automation equipment and computer techniques are discussed. A system for automatic analysis of chromosomes is developed and illustrated with one typical example. Author

**N71-36480#** Joint Publications Research Service, Washington, D.C.

**PROPHYLACTIC VITAMINIZATION WITH PYRIDOXINE CONTAINING COMPOUNDS AS A MEANS OF PREVENTING VESTIBULAR DISTURBANCES**

E. V. Lapayev et al 14 Sep. 1971 9 p refs Transl. into ENGLISH from *Gigiena i Sanit.* (Moscow), no. 5, 1971 p 30-34 (JPRS-54048) Avail: NTIS

The significance of prophylactic vitaminization with the purpose of preventing vestibular disturbances was studied in an intermediate climate zone (Moscow) and in a hot climate (Samarkand) in winter and summer. In both climate zones the diet of 98 healthy individuals, aged 19 to 45 was identical in content of the basic assimilated substances and vitamins. The amounts of N(1)-methylnicotinamide, riboflavin, thiamine, 4-pyridoxic acid, and pyridoxine eliminated with the urine were used as indices to describe the state of the body's vitamin supply. The blood's pyridoxine content was determined microbiologically. The functional state of the vestibular analyzer was evaluated by means of the NKUK (continual coriolis acceleration accumulation) test and a rotating test using electronystagmography, and recording the duration of the illusion of counterrotation on the basis of subjective reports. For vitaminization, a complex including vitamin A, B1, B2, B6, PP, C; P, E, pantothenic acid, folic acid, and vitamin B12 was administered for eight days. Observations on 98 individuals are given. A reduction of vestibular stability during the summer was observed, when air temperature attained 40-41 C. Author

**N71-36481#** Texas Technological Univ., Lubbock.

**OPTIMAL WORK-REST SCHEDULES UNDER PROLONGED VIBRATION**

R. Dudek, M. M. Ayoub, and M. A. El-Nawawi [1970] 28 p refs Submitted for publication (Contract DAAD05-69-C-0102) (AD-726974) Avail: NTIS CSCL 05/5

Research was conducted for the purpose of studying the performance and recovery characteristics of men when subjected to low-level, whole-body vertical sinusoidal vibration for durations of one to two hours. Several male subjects performed a vertical compensatory tracking task using a CRT display according to three work-rest schedules under both normal and vibratory environments. The vibratory environment was that of vertical sinusoidal vibration with frequency of 5 cps and an amplitude of 0.08 inches resulting in an acceleration intensity of approximately 0.20 g. The working period was divided into equal intervals during which performance was continuously monitored. Decrement of performance was measured using absolute error score. Results and conclusions are presented regarding performance decrement and recovery under varying work-rest schedules. Optimum work-rest schedules and implications of control tasks under a vibratory environment are discussed. Author (GRA)

**N71-36482\*#** Translation Consultants, Ltd., Arlington, Va.  
**MULTIPLE MOLECULAR SHAPES OF LACTATE DEHYDROGENASE (LDH) IN THE LYMPHOCYTES OF FETAL AND ADULT THYMUSES AND SPLEENS [FORME MOLECOLARI MULTIPLE DELLA LATTATO-DEIDROGENASI (LDH) NEI LINFOCITI TIMICI E SPLENICI FETALI ED ADULTI]**

P. M. Mannucci et al Washington NASA Sep. 1971 11 p refs Transl. into ENGLISH from *Minerva Med.* (Turin), v. 57, 1966 p 997-999 (Contract NASw-2038) (NASA-TT-F-13991) Avail: NTIS CSCL 06P

The activity of isoenzymes of lactate dehydrogenase (LDH) in fetal, neonatal, and adult human thymus and spleen lymphocytes were studied by electrophoretic and chromatographic methods. Cell preparations are outlined as well as LDH dosages. The multiple molecular shapes of LDH in the lymphocytes are discussed. J.M.

**N71-36483\*#** National Aeronautics and Space Administration, Washington, D.C.

**THE MICROBIOLOGIC CHARACTERIZATION OF SOIL TYPE [DIE MIKROBIOLOGISCHE CHARAKTERISIERUNG VON BODENTYPEN]**

W. Loub Oct. 1971 38 p refs Transl. into ENGLISH from *Bodenkultur* (Vienna), v. 11, 1960 p 38-70 (NASA-TT-F-13907) Avail: NTIS CSCL 08M

Soil types were characterized by microbiological sampling at monthly intervals, for at least one year, of various horizons of a cut at the site, down to a depth of about 50 cm. By plotting the numerical results of these cycles of mass changes, curves were obtained which give characteristic pictures of the soil types.

Author

**N71-36484#** California Univ., Los Angeles.  
**STUDIES ON MAGNETIC FIELD EXPOSURES OF DROSOPHILA MELANOGASTER AND PELVETIA FASTIGIATA**

Nancy Ann Posch (Ph.D. Thesis) 1970 145 p refs  
 (Grant MH-06415)

Avail: NTIS

A brief synopsis of the physics of magnetism and a discussion of the magnetic properties of biological materials are presented, in addition to a selected review of previous investigations into the biological effects of magnetic fields, as well as a discussion of hypothetical mechanisms to account for those effects. Two organisms were investigated. Pupae of the fruit fly, *Drosophila melanogaster*, were treated for brief periods by a magnetic probe, producing a magnetic field of high flux density and steep gradient. A method of permitting simultaneous exposure of numerous pupae to a magnetic field of high flux density and large values of magnetic field gradient is described. No effect of this treatment was found in the exposed organisms or their progeny. Embryos of the marine alga, *Pelvetia fastigiata*, were exposed to fields produced by a large electromagnet. The experiments indicated that the magnetic field produced a growth inhibition of embryonic development everywhere in the magnetic field, but the extent of growth inhibition increased as a function of increased field gradient.

Author

**N71-36485#** Syracuse Univ., N.Y.  
**PRODUCTION OF AIR IONS AND OZONE BY BARLEY TIPS UNDER ELECTRIC FIELDS**

Demetrios George Hademenos (Ph.D. Thesis) 1970 139 p refs  
 Sponsored in part by NSF

Avail: NTIS

The effects of electric fields on the rate of growth of plants is discussed. An experiment involving the influence of air ions and ozone on various green plants is described. Charts are presented to show differences in growth rate under controlled conditions for various types of plants.

P.N.F.

**N71-36486#** Techtran Corp., Glen Burnie, Md.  
**THERMAL REGULATION DURING PHYSICAL EXERCISE: BEHAVIORAL APPROACH [THERMOREGULATION PENDANT L'EXERCICE MUSCULAIRE: APPROCHE COMPORTEMENTALE]**

M. Cabanac et al Washington NASA Sep. 1971 4 p refs  
 Transl. into ENGLISH from J. Physiol. (Paris), v. 62, suppl. 3, 1970 p 355-356

(Contract NASw-2037)

(NASA-TT-F-13972) Avail: NTIS CSCL 06P

The effects of exercise on the elevation of body temperature in the human body are discussed. During exercise periods, under controlled conditions, the subjects were permitted to vary the temperature of a cooling system to maintain the most agreeable temperature. On the basis of the experiments it is concluded that the human thermoregulatory apparatus is set for a constant temperature.

Author

**N71-36487#** Joint Publications Research Service, Washington, D.C.

**CHARACTERISTICS OF ELECTRIC RESPONSES OF THE COCHLEAR NUCLEI IN VESPERTILIONIDAE AND RHINOLOPHIDAE TO ULTRASONIC STIMULI WITH DIFFERENT FILL FREQUENCIES**

A. G. Vasilyev 27 Sep. 1971 11 p refs Transl. into ENGLISH

from *Neyrofiziologiya* (USSR), v. 3, no. 4, 1971 p 379-385  
 (JPRS-54133) Avail: NTIS

Summated electrical responses and action potentials of single neurons of the cochlear nuclei were studied in *Vespertilionidae* and *Rhinolophidae*. In both species of bats, the neuronal responses were similar to those recorded in the cochlear nuclei of other mammals. *Rhinolophidae* represent an exception insofar as three specific types of neurons were found in them: (1) neurons responding to frequencies up to 78 kilocycles or to the range of 80-90 kilocycles; (2) neurons reacting within the range of 40-90 kilocycles but insensitive to stimuli of 78-80 kilocycles; and (3) neurons which have a response change from tonic to phasic with changing fill frequency. The neurons of *Rhinolophidae* displayed maximum discrimination for frequencies within the range of 70-90 kilocycles.

Author

**N71-36488#** Joint Publications Research Service, Washington, D.C.

**EFFECTS OF ACCELERATION, HYPOKINESIA AND LOW CALORIE NUTRITION ON THE HUMAN ORGANISM**

B. S. Katovskiy et al 22 Sep. 1971 11 p refs Transl. into ENGLISH from *Vopr. Pitaniya* (Moscow), no. 4, 1971 p 55-59  
 (JPRS-54104) Avail: NTIS

Six healthy subjects participated in a study of the effects of centrifugal acceleration and hypokinesia on the organism. The examinees were kept on a daily diet of 1800 calories/kilo. Extensive clinical-physiological investigations were conducted and then the examinees were rotated on the centrifuge (8 units -- 2 minutes) and were kept for 15 days on strict bed rest. At the end of the stay in bed, the examinees were again rotated on the centrifuge and the observations repeated. The combined effect of reduced nutrition, hypokinesia and crosswise-oriented accelerations caused several obvious functional disturbances of the central and peripheral nervous systems, blood circulation, respiration, neuro-muscular apparatus, especially pronounced during loading tests. It is assumed that the basic factor which causes unfavorable changes in the organism is hypokinesia but the limiting of nutrition and the effect of acceleration are concomitant effects.

Author

**N71-36489#** Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Inst.

**COLOR DEFECTIVE VISION AND DAY AND NIGHT RECOGNITION OF AVIATION COLOR SIGNAL LIGHT FLASHES**

Jo Ann Steen and Mark F. Lewis Jul. 1971 15 p refs  
 (FAA-AM-71-32) Avail: NTIS

Comparisons of the efficiency of each of seven tests of color defective vision in predicting performance under day and night conditions are reported. In general, the commercial tests were less efficient in predicting performance at night than in the daytime. This reduction in efficiency may be attributed to an increase in the false alarm rate of each test.

Author

**N71-36490#** National Aeronautics and Space Administration, Washington, D.C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 92)**

Aug. 1971 120 p refs  
 (NASA-SP-7011(92)) Avail: NTIS CSCL 06E

Subject coverage 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. Each entry consists of a standard citation accompanied by its abstract.

Author

**N71-36491\***+ National Aeronautics and Space Administration, Washington, D.C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 93)**

Sep. 1971 107 p refs

(NASA-SP-7011(93)) Avail: NTIS CSCL 06E

Subject coverage 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. Each entry consists of a standard citation accompanied by its abstract. Author

**N71-36492\*#** Loewy (Raymond)/Snaith (William), Inc., New York.

**EARTH ORBITAL SPACE STATIONS: HABITABILITY STUDY Final Report, Jan. 1970 - Mar. 1971**

Mar. 1971 149 p

(Contract NASw-2058)

(NASA-CR-122924) Avail: NTIS CSCL 05E

Design concepts for Skylab space station are presented. Facilities for crew accommodation are emphasized. Subjects discussed are: (1) food preparation, (2) sanitation, (3) garments and garment storage, (4) artificial gravity, and (5) extravehicular activity. P.N.F.

**N71-36493\*#** General Dynamics/Fort Worth, Tex. Convair Aerospace Div.

**DETERMINATION OF MEAN OPERATING LIFE AND SHELF LIFE FOR THE RADIATION SURVEY METER AND PERSONAL RADIATION DOSIMETER BATTERY PACKS**

31 Jul. 1971 32 p ref

(Contract NAS9-11515)

(NASA-CR-115189; FZK-382) Avail: NTIS CSCL 06R

Tests to determine the mean operating life of four types of battery packs for use in two types of Apollo radiation measuring instruments, the personal radiation dosimeter (PRD) and the radiation survey meter (RSM) were completed. This battery pack operating life test was conducted to determine if the battery packs presently being used in the PRD and RSM units on the short Apollo missions (10 days) would operate properly for the much longer (56 days) Skylab missions. The results of these tests proved conclusively that the presently used PRD battery pack containing eight BA-1006/U mercury cells will not operate properly for the 56-day Skylab mission, but these tests also show that a battery pack containing eight PX-625 mercury cells will operate throughout the Skylab mission. Results also show that the two RSM battery packs that now contain eight RM-625R mercury cells each will not operate the RSM properly for a 56-day Skylab mission and neither will any of the other three types of mercury cells tested. Author

**N71-36494\*#** National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

**AEROSPACE RELIABILITY APPLIED TO BIOMEDICINE**

V. R. Lalli and D. J. Vargo 1971 26 p refs Presented at the Electron. Systems Conv., Washington, 6-8 Oct. 1971

(NASA-TM-X-67942; E-6621) Avail: NTIS CSCL 06B

An analysis is presented which indicates that the reliability and quality assurance methodology selected by NASA to minimize failures in aerospace equipment can be applied directly to biomedical devices to improve hospital equipment reliability. The space electric rocket test project is used as an example of NASA application of reliability and quality assurance methods. By analogy a comparison is made to show how these same methods can be used in the development of transducers, instrumentation and complex systems for use in medicine. Author

**N71-36495\*#** Concept Applications, Ltd., Hempstead, N.Y.

**HABITABILITY SYSTEM ENVIRONMENTAL REQUIREMENTS AND DESIGN GUIDELINES FOR GROUP STABILITY**

Henry E. Bender and John Fracchia Aug. 1971 68 p refs

(Contract NAS9-10998)

(NASA-CR-115179) Avail: NTIS CSCL 05K

Guidelines and recommendations for habitability design are formulated to facilitate individual and group stability. These findings are based on reviews of previous studies involving persons in various terrestrial environments. Considerations were given to the NASA group model and properties of such a group. Author

**N71-36496\*+** Darling (R.E.) Co., Inc., Tucson, Ariz.

**RESEARCH AND DEVELOPMENT OF UMBILICAL HOSE ASSEMBLY CONCEPTS FOR MANNED SPACE FLIGHT INCLUDING DESIGN VERIFICATION TEST REPORT REDAR-RTR-351 Final Report**

W. A. Sylvester, R. C. Dougherty, and R. E. Darling, Jr. 30 Jul. 1971 55 p

(Contract NAS9-10396)

(NASA-CR-115157; REDAR-RBB-204) Avail: NTIS CSCL 06K

Several construction approaches using a variety of materials were evaluated to obtain a substantially improved umbilical hose assembly and PLSS oxygen and water hose. Flexibility and prevention of delamination were overriding design criteria. Author

**N71-36497\*+** Darling (R.E.) Co., Inc., Tucson, Ariz.

**FINAL CONFIGURATION SELECTED FOR THE UMBILICAL HOSE ASSEMBLY AND LCG WATER SYSTEM**

L. C. Fox 16 Jun. 1971 63 p

(Contract NAS9-10396)

(NASA-CR-115158; REDAR-RTR-351) Avail: NTIS CSCL 06K

This testing program verified the final design configuration of a new umbilical hose assembly. An add-on to the contract resulted in the development, construction, and design verification testing of the three hose assemblies used in the LCG water system. All of the hose assemblies successfully completed the design verification test program. The only damage to any hose assembly was an end cuff puncture of one umbilical hose assembly by the outside wire helix end during the 166 pound tensile load on a single leg bent 90 deg. Author

**N71-36498\*#** International Business Machines Corp., Gaithersburg, Md. Federal Systems Div.

**BREATHING METABOLIC SIMULATOR Final Report**

16 Jul. 1971 22 p refs

(Contract NASw-2032)

(NASA-CR-122948; FSC-71-5133) Avail: NTIS CSCL 06B

The breathing metabolic simulator, designed to simulate the breathing and metabolic parameters relevant to the test and evaluation of breathing and life support equipment is described. Variable breathing rate, depth, and wave form are provided, as well as temperature control, functional residual capacity adjustment, and maintenance of humidity in the exhaled breath. Metabolic controls include variable oxygen consumption and carbon dioxide production resulting in a variable respiratory exchange ratio. Since the breathing metabolic simulator models all of the relevant breathing and metabolic functions, it can be used for calibrating and validating mechanical and gaseous pulmonary function test procedures. Author

**N71-36499#** Atomic Energy of Canada, Ltd., Chalk River (Ontario).

**HEALTH PHYSICS INSTRUMENTATION**

George Cowper 1971 27 p

(AECL-3864) Avail: NTIS

Design features and operating characteristics of several radiation instruments for support of radiation protection are described. The instruments covered include a multipurpose survey meter, an alpha contamination monitor, a portable contamination monitor, high range gamma survey meters, beta radiation dose rate meters, and a portable tritium monitor as well as installed and area monitors, a criticality monitor, hand and foot monitors, automatic analyzers for tritium in urine and water, and an iodine-in-air monitor. A single channel scintillometer, health physics scaler, and personal dosimeters are also included. J.M.

**N71-36500#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

**THE EFFECTS OF DISPLAY GAIN AND SIGNAL BANDWIDTH ON HUMAN CONTROLLER REMNANT**  
Final Report, 1 Jun. 1969 - 15 Aug. 1970

William H. Levison Wright-Patterson AFB, Ohio AMRL Mar. 1971 169 p refs

(Contract F33615-69-C-1684)

(AD-727057; BBN-1968; AMRL-TR-70-93) Avail: NTIS CSCL 05/8

A study was conducted to investigate visual sources of human controller remnant and to determine how various display and viewing parameters affect remnant. Principal experimental variables were display gain and signal bandwidth. Both foveal and peripheral viewing of the display were explored. The results of this study indicate that controller remnant can be modelled adequately as an equivalent vector observation noise process. The effects of display gain and signal bandwidth on controller remnant can be accounted for by an optimal-control model of the entire man-vehicle system which includes the model for observation noise. Author (GRA)

**N71-36501#** Army Foreign Science and Technology Center, Charlottesville, Va.

**CYBERNETICS EXPECTED AND CYBERNETICS UNEXPECTED**

A. I. Berg et al 13 Jul. 1971 191 p Transl. into ENGLISH from "Kibernetika Ozhidaemaya i Kibernetika Neozhidannaya" Moscow, Nauka Publ. House, 1968

(AD-726970; FSTC-HT-23-747-70) Avail: NTIS CSCL 06/4

The document is a collection of articles by Soviet and non-Soviet scientists presented as a free discussion illuminating controversial and unsolved problems in cybernetics from different viewpoints. The authors of these papers oppose those who are against cybernetics as well as those who propose to substitute cybernetics for all other concrete and abstract sciences. Many of the articles deal with needed redefinitions in the area of cybernetics, with particular application to such terms as life, psyche, thinking machines, control of life, etc. Although many different viewpoints are presented, the book contains no fantasy which contradicts science but permits exercising the imagination without which scientific research is impossible. Author (GRA)

**N71-36502#** Navy Clothing and Textile Research Unit, Natick, Mass.

**DAMAGE CONTROL SUIT SYSTEM** Progress Report

Norman F. Audet Jun. 1971 36 p refs

(AD-726698; TR-95) Avail: NTIS CSCL 06/17

The Navy Clothing and Textile Research Unit is developing a Damage Control Suit System to protect personnel in hazardous chemical, high temperature-humidity, and oxygen deficient environments. Data indicate the system will provide life support for an individual completely encapsulated from his environment for a maximum of 80 minutes at 140F, while performing light activity, and for 120 minutes at 70F, while moderately active. GRA

**N71-36503#** Air Force Systems Command, Brooks AFB, Tex. Human Resources Lab.

**QUANTIFYING HUMAN PERFORMANCE RELIABILITY**

William B. Askren and Thaddeus L. Regulinski 29 Oct. 1971 18 p refs Presented at the Psychol. in the Air Force Symp., Colo., 20-22 Apr. 1971

(AD-727766; AFHRL-TR-71-22) Avail: NTIS CSCL 05/8

Human performance reliability for tasks in the time-space continuous domain is defined and a general mathematical model presented. The human performance measurement terms time-to-error and time-to-error-correction are defined. The model and measurement terms are tested using laboratory vigilance and manual control tasks. Error and error-correction data are ordered and the underlying density functions isolated. The Weibull distribution is best fit for time-to-first-error data, and the Log-Normal distribution is best fit for time-between-errors and time-to-error-correction data. Distribution parameter values are applied to the general mathematical model, and prediction made of human performance reliability for the tasks. GRA

**N71-36504** Ohio State Univ., Columbus.

**THE DEVELOPMENT OF A PERCEPTUALLY BASED MODEL OF THE HUMAN CONTROLLER**

John Nunnelee Snider (Ph.D. Thesis) 1970 218 p

Avail: Univ. Microfilms Order No. 70-19364

An attempt was made to develop a model of the human operator which reflects known perceptual and response characteristics of man. The particular task around which this model was structured is that of the longitudinal control aspect of automobile driving. The resultant model predicts the response of the driver in controlling his vehicle as a junction of the physical relationship between his vehicle and a leading vehicle, and the ability of the driver to perceive the state of the system. The model thus predicts driver behavior in performing this task on the basis of the driver's perceptual characteristics and observed response patterns. The model was tested with a digital simulation using data describing the perceptual and response characteristics of specific subjects. It was concluded that a model of the human controller may be formulated on the basis of observable characteristics of man. Such a model overcomes many of the limitations of the servomechanism model of the human operator. Dissert. Abstr.

**N71-36505** Oregon State Univ., Corvallis.

**PARAMETER ESTIMATION IN SYSTEM MODELING USING MAN-MACHINE INTERACTION AND COMPUTER LEARNING**

John Arthur Wagner (Ph.D. Thesis) 1970 92 p

Avail: Univ. Microfilms Order No. 70-18068

An algorithm using man-machine interaction is presented to attack parameter search problems with the objective of efficiency in the parameter search. The algorithm presented uses computer learning to improve the parameter search efficiency. The algorithm is divided into a learning phase and a learned phase. In the learning phase the man teaches the computer his preferences for the model responses. Then in the learned phase the computer proceeds with the parameter search independently of the man by means of its experience acquired during the learning phase. After a period of learned model response evaluation by independent action of the computer in the learned phase the control of the parameter search process is returned to man. The problem of extracting features from model responses to train the computer is studied. A method to compare different feature extraction operations using entropy is presented. The algorithm is tested on an example oceanographic problem. Dissert. Abstr.

**N71-37631#** National Inst. of Radiological Sciences, Chiba (Japan).

**RADIOACTIVITY SURVEY DATA IN JAPAN**

Aug. 1970 15 p

(NIRS-RSD-28) Avail: AEC Depository Libraries

The data include external exposure rates due to natural radiation in the Tohoku district of Japan during 1969 and 1970; dietary data including the Sr-90 and Cs-137 contents of rice, a standard diet, and the total diet in Japan during 1968 and 1969; and the monthly deposition of Sr-90 and Cs-137 in precipitation in Japan during 1969 and 1970. The cumulative deposition for this period is also given. All data are presented in tabular form. NSA

**N71-37632\*** # Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.  
**ULTRAVIOLET SELECTION PRESSURE ON THE EARLIEST ORGANISMS**

Carl Sagan May 1971 14 p refs  
(Contract NGR-33-010-101)

(NASA-CR-123193; CRSR-446) Avail: NTIS CSCL 08F

An examination of the probable photochemistry of the primitive reducing atmosphere of the earth reveals a window, approximately bounded at 2400 Å. The solar ultraviolet flux in this 2600 Å window, delivered to unprotected organisms at the surface, corresponds to a contemporary mean lethal dose in < or = 0.3 seconds. Extreme selection pressure for ultraviolet protection must have come into being. In addition to the early evolution of pyrimidine dimer ligases, catalase and peroxidase reduction mechanisms, and photoreactivation, it is suggested that two evolutionary paths developed. In one, heterotrophs lived below the oceanic thermocline and are suggested as perhaps the ancestors of the prokaryotes. In the other, organisms living near the oceanic surface surrounded themselves with ultraviolet absorbing layers of purines and pyrimidines. The resulting organisms have dimensions of tens to hundreds of microns and are suggested to be the ancestors of the eukaryotes. Subsequent specialization of this initially inert shielding, into ribosomal RNA, may have occurred. Author

**N71-37633\*** # Cornell Univ., Ithaca, N.Y. Lab. for Planetary Studies.  
**ON ULTRAVIOLET LIGHT AND THE ORIGIN OF RIBOSOMES**

Carl Sagan and Paul Shapshak May 1971 13 p refs  
(Grant NGR-33-010-101)

(NASA-CR-123164; CRSR-446) Avail: NTIS CSCL 08F

The complex chemical changes in nucleo-peptides giving rise to contemporary ribosomes are discussed. Possible mechanisms used for the synthesis of these interactions are discussed along with the possible effects of UV light on the complex evolutionary processes involved in the interactions. E.H.W.

**N71-37634\*** # Louisiana State Univ., New Orleans. Dept. of Otorhinolaryngology.

**A STUDY OF THE RELATIONSHIPS BETWEEN THE MECHANICAL RESPONSE OF THE TYMPANIC MEMBRANE AND THE ELECTROPHYSIOLOGICAL INDICATORS OF HEARING IN THE BULLFROG (RANA CATESBEIANA)**  
Deborah A. Majeau-Chargois and Jean McDaniel Whitehead  
2 Nov. 1971 49 p refs

(Grant NGL-19-001-024)

(NASA-CR-123162) Avail: NTIS CSCL 08C

The visible mechanical response of the tympanic membrane of the bullfrog and what relation it has to the indicators of hearing determined electrophysiologically was studied. Seven subjects were presented with pure tones of varying frequency and intensity while the tympanic membrane was viewed under stroboscopic illumination. Thresholds of visible mechanical response were recorded for each frequency tested. Graphic data revealed a nonlinear relation between frequency and intensity with two definite areas of sensitive hearing. The areas of sensitive hearing corresponded to the best frequencies revealed

electrophysiologically. The range of frequencies eliciting mechanical response corresponds to the range of frequencies eliciting electrophysiological response. The size of the membrane determines the amount of intensity necessary to elicit a visible mechanical response. Author

**N71-37635\*** # National Aeronautics and Space Administration, Washington, D.C.

**CONTINUOUS MEASUREMENT OF THE ACTION OF POTASSIUM AND SODIUM WITHIN THE INTERSTICE OF MUSCLE STRIA DURING PHYSICAL EXERCISE [MESURE CONTINUE DE L'ACTIVITE DU POTASSIUM ET DU SODIUM DANS L'INTERSTICE DU MUSCLE STRIE DURANT L'EXERCICE MUSCULAIRE]**

G. Gerbert et al. Oct. 1971 3 p Transl. into ENGLISH from J. Physiol. (Paris), v. 62, no. 53. 1970 p 380  
(NASA-TT-F-13898) Avail: NTIS CSCL 08P

The levels of potassium and sodium in the interstitial fluid of muscles were continuously measured, at rest and during exercise, with ion specific glass microelectrodes. The values found and their known vasodilating effects correlate well with the functional hyperemia observed in muscles during exercise. Author

**N71-37636\*** # Scientific Translation Service, Santa Barbara, Calif.

**ON ELECTROKINETIC PHENOMENA AT BIOLOGICAL SURFACES WITH SPECIAL CONSIDERATION OF THE RED BLOOD CELLS [UBER ELEKTROKINETISCHE ERSCHEINUNGEN AN BIOLOGISCHEN GRENZFLAECHEEN UNTER BESONDERER BERUECKSICHTIGUNG DER ROTEN BLUTZELLEN]**

A. Varga Washington NASA Oct. 1971 20 p refs Transl. into ENGLISH from Wetter-Boden-Mensch, v. 4, no. 12. May 1971 p 1-16

(Contract NASW-2035)

(NASA-TT-F-14007) Avail: NTIS CSCL 08A

The electrical charge and field strength at the cell membrane of human erythrocytes are determined and their importance for modern diagnostics stressed. It was found that each red blood cell carries about 8000 elementary charges at the membrane surface. Author

**N71-37637\*** # Techtran Corp., Glen Burnie, Md.

**POPULATION GENETICS OF THE RED CELL ACID PHOSPHATASE**

G. Radam et al Washington NASA Oct. 1971 7 p refs Transl. into ENGLISH from Humangenetik (West Germany), no. 2. 1966 p 378-380

(Contract NASW-2037)

(NASA-TT-F-13989) Avail: NTIS CSCL 08P

Gene frequencies of red cell acid phosphatase have been determined in a random sample of 1188 adults of the environs of Berlin, as well as in a sample of 85 individuals from North Vietnam. The probability of exoneration, with use of the erythrocyte phosphatase test in a paternity lawsuit, amounts to 24.6% for the German population. Author

**N71-37638\*** # Translation Consultants, Ltd., Arlington, Va.  
**WATER-SALT METABOLISM DURING SPACE FLIGHT [VODNO-SOLEVOY OBMEN PRI KOSMICHESKIKH POLETAKH]**

I. S. Balakhovskiy Washington NASA Oct. 1971 15 p refs Transl. into ENGLISH from Bioastronaut., 29th Intern. Astronaut. Congr. (London), v. 4. 1970 p 101-113

(Contract NASW-2038)

(NASA-TT-F-14028) Avail: NTIS CSCL 08P

The weight loss observed during the space flight of astronauts cannot be explained by tissue decomposition, because

after the flight there was no increase of urinary nitrogen. During a water loading test on the following day after landing, astronauts V. M. Komarov and B. B. Yegorov excreted water at a slower rate than in control observations. This suggests that the weight loss was due to expelling of liquid in weightlessness. For the investigation of water and salt metabolism during space flight it is necessary to have adequate methods for blood microanalysis and for the determination of actively circulating blood volume. A method is described for the determination of sugar, chlorine, urea, cholesterol and lipid phosphorus in a single sample of 0.1 ml blood, stored in dry form on filter paper, and a technique is proposed to study the blood volume and velocity of blood mixing based on the capacity of hemoglobin for specific binding of carbon dioxide. Author

**N71-37639\*#** Translation Consultants, Ltd., Arlington, Va.  
**STATUS OF WATER-SALT METABOLISM UNDER SPACE FLIGHT CONDITIONS [SOSTOYANIYE VODNO-SOLEVOGO OBMENA V USLOVIYAH KOSMICHESKOGO POLETA]**  
I. S. Balakhovskiy et al Washington NASA Oct. 1971 18 p  
Transl. into ENGLISH from Akad. Nauk USSR (Moscow), 1971 22 p

(Contract NASw-2038)  
(NASA-TT-F-14029) Avail: NTIS CSCL 06P

The body weight loss manifested by Soviet and American astronauts after space flights was investigated. Tests confirmed that tissue decomposition was not the cause of this loss but that losses of liquid and salt through weightlessness brought this about. Author

**N71-37640\*#** San Jose State Coll., Calif. Biological Sciences Dept.

**INTERMEDIATE ELECTRON TRANSPORT IN PORPHYRID-IUM: EPR STUDIES**  
Ellen C. Weaver 1971 9 p refs Presented at the 2nd Intern. Congr. on Photosynthesis, Stress, Italy, 24-29 Jun. 1971  
(Grant NGR-05-046-008)  
(NASA-CR-123158) Avail: NTIS CSCL 06A

The photosynthetic electron transport between plant reaction centers are observed by light induced EPR signals. The signal's influence on oxidized p700 are observed; from these observations the reactions between the two systems are inferred. The effects of temperature on such reactions are also discussed. Results from the experiments compare favorably with fluorescence yield measurements. E.H.W.

**N71-37641\*#** Louisiana State Univ., Baton Rouge. Dept. of Electrical Engineering.

**A MODEL OF THE PHYSIOLOGICAL SYSTEMS OF VEGETATION**  
Murli Manohar Viswanathan and Paul M. Julich 1971 22 p refs  
(Grant NGR-19-001-024)  
(NASA-CR-123169; bull-105) Avail: NTIS CSCL 06C

The feasibility of developing a mathematical model capable of explaining the metabolic working process of a plant as a whole is discussed. The processes include photosynthetic, transpiration, CO<sub>2</sub> diffusion from the atmosphere to chloroplasts, respigation, transpiration, and stomatal. A method by which these processes maybe controlled is also discussed. E.H.W.

**N71-37642\*#** Public Health Service, Phoenix, Ariz. Applied Microbiology and Planetary Quarantine Section.  
**SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS Quarterly Progress Report, Jul. - Sep. 1971**

Martin S. Favero Sep. 1971 20 p refs  
(NASA Order W-13062)  
(NASA-CR-122844; QPR-35) Avail: NTIS CSCL 06M

Tables and graphs are presented on the effects of microbial contamination of the electronic piece parts in spacecraft. Data are also included for heat resistance testing of the sieve processed AO hanger vacuum cleaner dust; heat resistance testing of Bacillus sp.; and microbiological studies of the Apollo 15 command module. Results were compared with Apollo 11, 12, 13, and 14 modules. Slight microbial variations were observed among the modules. E.H.W.

**N71-37643\*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

**MARINER MARS 1971 POST-LAUNCH ANALYSIS OF COMPLIANCE WITH PLANETARY QUARANTINE REQUIREMENTS**

Alan R. Hoffman and Ralph J. Reichert 16 Aug. 1971 29 p  
Sponsored by NASA  
(NASA-CR-122845) Avail: NTIS CSCL 06K

An updated analysis on the probability of Mariner Mars 1971 Project contaminating Mars with viable terrestrial microorganisms is presented. The analysis includes the revisions warranted by encapsulation microbiological assays, launch and early post launch events. The updated analysis indicates that with the modified Mission A strategy, including aiming point biasing and orbit periapsis altitude selection, the planetary quarantine constraints for the Mariner Mars 1971 Mission are being satisfied. Author

**N71-37644\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**BLOCK UP AND DOWN DESIGN FOR ESTIMATING SENSORY THRESHOLDS**

Don H. Card and Michio Aoyagi Oct. 1971 31 p refs  
(NASA-TM-X-62090) Avail: NTIS CSCL 05J

The block up-down, two-alternative, forced-choice experimental design for the estimation of sensory thresholds is investigated. A mathematical model of the procedure is developed and recursion formulas are derived for bias and mean-square error of the sample average estimator. Block designs for various step sizes are compared on the basis of two measures of efficiency: (1) efficiency expressed as the reciprocal of the mean-square error of the average estimator per trial and (2) relative efficiency of the average estimator with respect to the probit estimator based on fixed stimulus levels. Author

**N71-37645#** Los Alamos Scientific Lab., N.Mex.

**EYEBURN THRESHOLDS**  
John Zinn, Ronald C. Hyer, and Charles A. Forest May 1971 9 p refs  
(Contract W-7405-eng-36)  
(LA-4651) Avail: NTIS

A series of calculations that relate to identification of minimum threshold conditions for production of retinal burns, such as may occur in the imaging of intense light sources; e.g., lasers and nuclear explosions, are reported. Consider the combined effects of optical absorption and thermal conduction in the retinal tissue for image diameters ranging from 1 to 1000 microns. Threshold energy dose levels are computed, based on the assumption that a retinal burn is the result of a temporary temperature excursion of at least 20 C. The results are compared with laboratory measurements of eyeburn threshold levels in primates and rabbits. A set of computed safe retinal dosage curves is presented, based on the assumption that temperature excursions of 5 C or less are not harmful, (5 C being the expected maximum temperature rise produced in an image of the sun). Author (NSA)

**N71-37646#** Texas Univ., Austin. Lab. of Radiation Biology.  
**[PROGRESS REPORT ON PHYSICO-CHEMICAL STUDIES OF RADIATION EFFECTS IN CELLS]**

E. L. Powers May 1971 11 p refs  
(Contract AT(40-1)-3408)  
(ORO-3408-10) Avail: NTIS

Studies were continued on water content, oxygen, and photoreversal of germicidal ultraviolet effects on spores. Studies on sensitivity of bacterial spores to heat and X radiation showed that when spores were irradiated in the wet anoxic state that maximizes survival after heat treatment, a biphasic survival curve was obtained. It was found that renaturation by fast cooling changes the conformation of the sensitive component only slightly as measured by radiosensitivity, whereas slow cooling results in two configurations, neither of which resembles the original unheated spore geometry. Author (NSA)

**N71-37647#** Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

**PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1970 TO THE USAEC DIVISION OF BIOLOGY AND MEDICINE. VOLUME 2: PHYSICAL SCIENCES. PART 2: RADIOLOGICAL SCIENCES**

J. M. Nielson Mar. 1971 97 p refs  
(Contract AT(45-1)-1830)  
(BNWL-1551-Vol-2-Pt-2) Avail: NTIS

Papers are presented on radiation physics, chemistry, and medicine. Topics discussed include radiation instrumentation, radioactive composition of the atmosphere and oceans, radionuclides in man, and radioactive fallout. K.P.D.

**N71-37648#** Oak Ridge National Lab., Tenn.  
**EXAMPLES OF ECOLOGICAL TRANSFER MATRICES**

Robert V. O'Neill Jun. 1971 26 p refs  
(Contract W-7405-eng-26)  
(ORNL-IBP-71-3) Avail: NTIS

Available literature has been surveyed for data to quantify linear, constant-coefficient models of ecological systems. In all, 23 papers were located with a total of 66 transfer matrices. The ecological systems range from 2 to 17 state variables and cover a wide spectrum of terrestrial and aquatic systems. The matrices are documented for their heuristic value and to provide a preliminary data base for the development and testing of new mathematical analysis techniques. Author

**N71-37649#** Air Force Systems Command, Wright-Patterson AFB, Ohio.

**RADIATION HAZARDS OF SPACE FLIGHTS**

19 Mar. 1971 8 p refs Transl. into ENGLISH of pamphlet for the 1970 Exhibit of Achievements of the Natl. Econ. (USSR), 1970 p 2-4  
(AD-727245; FTD-HT-23-79-71) Avail: NTIS CSCL 06/18

The article discusses cosmic radiation, different types of radiation and its effect on biological organisms, various tests carried out in flights, radiation received by the cosmonauts, and some of the protective measures. Author (GRA)

**N71-37650#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**CYCLE OF WORK AND REST FOR COSMONAUTS**

B. S. Alyakrinskii 12 Mar. 1971 7 p refs Transl. into ENGLISH of pamphlet for the 1970 Exhibition of Achievements of the National Economy (USSR) p 1-2  
(AD-727226; FTD-HT-23-81-71) Avail: NTIS CSCL 06/5

The pamphlet gives a brief outline of the basic factors affecting the diurnal work/rest cycle for spacecraft crews. It is written in popular style for distribution at the 1970 Exhibition of Achievements of the National Economy. Author (GRA)

**N71-37651#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.  
**MONOMETHYLHYDRAZINE EFFECT ON BLOOD, IN VITRO**

Harold F. Leahy Dec. 1970 18 p refs Presented at 1st Ann. Conf. on Environ. Toxicol., Fairborn, Ohio, 9-11 Sep. 1970; sponsored by SysteMed Corp. Its Paper No. 24  
(AD-727528; AMRL-TR-70-102) Avail: NTIS CSCL 06/20

A study was conducted, first to confirm previous work with respect to the identification of the hemoglobin compound formed and species difference in methemoglobin level; second, to determine the involvement of oxygen in the reaction; and third, to identify the major breakdown products of MMH in the in vitro system. Author (GRA)

**N71-37652#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**HUMAN EXPOSURE TO EEL CONCENTRATIONS OF MONOMETHYLHYDRAZINE**

James D. MacEwen, James Theodore, and Edmond H. Vernet Dec. 1970 10 p refs Presented at 1st Ann. Conf. on Environ. Toxicol., Fairborn, Ohio, 9-11 Sep. 1970; Sponsored by Systemed Corp. Its Paper No. 23  
(AD-727527; AMRL-TR-70-102) Avail: NTIS CSCL 06/20

A group of human volunteers were exposed to the tentative 90 ppm-minute dose of monomethylhydrazine to determine its suitability for actual use. The exposures were conducted by inserting the subject's head into a Rochester Chamber. The MMH concentrations, which were continuously monitored, were established and stabilized in the chamber and then the subject inserted his head for 10 minutes and his sensations were recorded. For comparative purposes, 2 concentrations of ammonia vapors (50 and 30 ppm) were established in the chamber and the same volunteers made similar observations of odor and irritability. The results of the study demonstrate that the tentative 90 ppm MMH 10 minute emergency exposure limit has an adequate safety factor and did not produce bronchospasm or severe lacrimation. It is recommended that the tentative status of this EEL be removed. GRA

**N71-37653#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**GAS CHROMATOGRAPHIC RETENTION DATA**

William H. Toliver, Sr., Sheldon A. London, and Anthony A. Thomas Dec. 1970 14 p refs Presented at 1st Ann. Conf. on Environ. Toxicol., Fairborn, Ohio, 9-11 Sep. 1970; sponsored by SysteMed Corp. Its Paper No. 19  
(AD-727523; AMRL-TR-70-102) Avail: NTIS CSCL 07/4

Gas chromatography (GC) is one of the more useful instrumental methods of analysis in biochemical research for toxicology and pollution studies. This paper discusses an approach to the solution of the problem of reproducibility of retention data. The main purpose is to present a method of reporting gas chromatographic data that is reproducible, meaningful and relatively easy to generate. In addition, two questions will be discussed: (1) What is retention data and (2) What value does it have for the toxicologist. The application of the Kovats Retention Index System to toxicology is discussed. The system relies on the basic approach of analytical chemistry of bracketing an unknown with two standards. The Kovats system has the advantage that it can describe on its scale any compound that can be chromatographed. This general index system recommends itself for use in the expression of retention data in toxicological studies. GRA

**N71-37654\*#** Kentucky Univ., Lexington. Wenner-Gren Aeronautical Research Lab.

**STRUCTURAL DEVELOPMENT OF BONE IN THE RAT UNDER EARTH GRAVITY, SIMULATED WEIGHTLESSNESS, HYPERGRAVITY AND MECHANICAL VIBRATION**

John Paul Jankovich Washington NASA Oct. 1971 155 p refs

(Grant NGL-18-001-003)  
(NASA-CR-1823) Avail: NTIS CSCL 06C

Biophysical properties of bone in the femur and tibia of the rat were measured during eight months of exposure to earth

gravity, hypergravities of 1.5, 2.0 and 2.5g, produced by continuous centrifugation, and during four months of exposure to mechanical vibration. Plaster cast immobilization of one hind leg was applied to simulate the hypodynamic state of weightlessness. Animals were successively sacrificed to determine the physical, mechanical and physiological parameters of bone. Mineralization was traced by periodic administration of tetracycline. Radiographic densitometry was employed in vivo and in vitro to follow up bone development. At earth gravity normal aging takes place while physical dimensions, density, rigidity, micro-hardness, sound conductivity, and ash content of bone increase. Bone porosity and calcium content remain constant. Rats under hypergravity have smaller rates of growth than rats at 1g. The differences are due entirely to differences in fatty tissue. Bone development as a function of age was found to be unaffected. Chronic vibration increases stiffness and microhardness of bone. In vibrated bone the active fronts of mineralization disappear and deposition becomes dispersed across the diaphysis. Immobilization significantly decreases bone density, ash and calcium content; immobilized bone becomes less porous and more brittle than normal. In the hypergravity range investigated, no significant and systematic changes were found; however, simulation of weightlessness was found to produce pronounced atrophy of bone. Author

N71-37656\*# General Electric Co., Philadelphia, Pa.  
A STUDY OF ASEPTIC MAINTENANCE BY PRESSURIZATION

D. J. Chester, J. T. Negrey, D. L. McManamin, and J. J. Shull  
Washington NASA Nov. 1971 85 p  
(Contract NAS1-10061)  
(NASA-CR-1910) Avail: NTIS CSCL 06M

Studies were performed to determine the pressure differentials required to prevent the passage of airborne microorganisms through holes in membranes acting as barriers to preserve asepsis. Analytical and experimental results showed that the effectiveness of the pressure differential is a function of the particle density, velocity and diameter. At a given particle density, it was observed that a differential pressure of .05 inches of water was sufficient to prevent passage of particles of up to 10 microns in diameter through holes of diameters up to 3000 microns when particle velocities were due only to gravitational forces. At greater particle velocities the dependence on hole diameter became more noticeable. A pressure differential .05 inches of water above the stagnation pressure was discovered to be sufficient to maintain asepsis with holes up to 1000 microns in diameter when particle velocities were less than 15 mph. Holes 20, 200, and 1000 microns in diameter were found to be associated with critical velocities of 30, 26 and 15 mph respectively, above which a marked increase in pressure differential was required to prevent penetration. Effects of temporary pressure loss were also evaluated to determine minimum penetration time. A data summary combines the results of this contract with those of the previous studies. Author

N71-37656 National Lending Library for Science and Technology,  
Boston Spa (England).

THE PROBLEM OF CREATIVENESS OF RESEARCH-  
WORKERS

R. Robin Dec. 1970 24 p Transl. into ENGLISH from  
Kodak-Pathe Bur. of Res. into Appl. Human Sci. Publ., Dec.  
1970 15 p

(NLL-Trans-746-801-(9022.401)) Avail: Natl. Lending Library,  
Boston Spa, Engl.: 2 NLL photocopy coupons

A psychotechnical analysis of the creativeness of research personnel, based on personal interviews, is presented. Tasks, working conditions, and personal qualities are discussed as well as the organizational structure, interpersonal relationships, motivations, and the possibility of failure. The dynamics of the research worker including his reactions to situations, materials, temptation, and risk and his aggressiveness and self-image are also considered. J.M.

N71-37657\*# Analytical Research Labs., Inc., Monrovia, Calif.  
A STUDY OF PHYSIOCHEMICAL FACTORS AFFECTING  
CHARCOAL ADSORPTION OF CONTAMINANTS IN  
MANNED SPACE CRAFT ATMOSPHERE Final Report  
C. L. Deuel Aug. 1971 144 p refs  
(Contract NAS9-11049)

(NASA-CR-115202; Rept-1666-F) Avail: NTIS CSCL 06K

Data generated from a study of analytical stripping procedures for compounds adsorbed on charcoal, along with time and temperature variations in thermal-vacuum stripping are presented. Comparison of six storage materials and/or containers for maintaining contaminant free charcoal is made. There is a listing of more than twenty compounds apparently formed by catalytic action of charcoal on a prepared gas mixture. Gas evolution studies from mass spectrometric examination of heated charcoal is summarized in a series of figures. A rather extensive program of development of adsorption isotherms with mathematical modeling, along with derivation of the mathematics involved is also listed. The results from application of predicted adsorption capacity of a prepared mixture indicates successful application of the mathematical modeling. There is also a brief study on the efficiency of adsorption-desorption of compounds on two charcoals of different origins as well as on 5A molecular sieve. Author

N71-37658\*# Massachusetts Inst. of Tech., Cambridge. Dept.  
of Nutrition and Food Science.

ANALYSIS OF STORAGE STABILITY OF INTERMEDIATE  
MOISTURE FOODS Final Report, 15 May 1970 - 15 Jul.  
1971

Theodore P. Labuza 15 Jul. 1971 173 p refs

(Contract NAS9-10658)

(NASA-CR-115194) Avail: NTIS CSCL 08H

The preparation of intermediate moisture foods (IMF) is examined in connection with selecting a food for astronauts without the need of rehydration. Storage studies of at least 3 months duration of several IMF items including a meat, vegetable, and fruit type product were carried out. Tables are presented for different foods and different methods of manufacture. Through control of the method of preparation these foods can be made shelf stable to microbiological decay. It was shown that, because of sorption hysteresis, a food of similar solids composition, similar water activity, but vastly different water content could be prepared by following a desorption versus an adsorption process. Packaging requirements were also determined. E.M.C.

N71-37659\*# Techtran Corp., Glen Burnie, Md.  
ON THE CORRELATION OF VISUAL-MOTOR REACTION  
TIME AND LIGHT SENSITIVITY [O SOOTNOSHENII  
VREMENI ZRITEL'NO-DVIGATEL'NYKH REAKTSIY I  
SVETOVOY CHUVSTVITEL'NOSTI]

T. N. Ushakova Washington NASA Oct. 1971 17 p refs  
Transl. into ENGLISH from Vop. Psikhologii.(USSR), no. 1, 1957  
p 97-108

(Contract NASW-2037)

(NASA-TT-F-13995) Avail: NTIS CSCL 05E

Comparison of data concerning motor reaction time and visual sensation thresholds (at the horizontal meridian of the retina) indicates the existence of a functional relationship between these indices. An increase in thresholds corresponds, as a rule, to the prolongation of related periods of visual-motor reactions. Visual acuity is based psychologically on the resolution capacity of the eye, which depends in turn on the density of light-sensitive nerve endings. The hypothesis of the action of the force wall is indirectly verified by this fact. Author

N71-37660\*# Bellcomm, Inc., Washington, D.C.  
INTRODUCTION TO THE PHYSICS OF WEIGHTLESSNESS  
G. T. Orrok and S. Shapiro 27 Sep. 1971 61 p refs  
(Contract NASw-417)

(NASA-CR-123161; TM-71-1011-6) Avail: NTIS CSCL 22A

The motion of free objects within or near spacecraft in circular orbit is discussed. The forces-gravity and drag- and

typical motions are described with emphasis on assumptions and limitations of the treatment. Solutions are given for particle trajectories. E.H.W.

**N71-37661\*#** Bellcomm, Inc., Washington, D.C.  
**THE ORIGIN OF LIGHT FLASHES OBSERVED BY APOLLO ASTRONAUTS**

M. Liwshitz 30 Sep. 1971 52 p refs  
 (Contract NASw-417)

(NASA-CR-123173; Tm-71-2015-5) Avail: NTIS CSCL 06P

Results of laboratory exposure of human subjects to several types of particulate radiation and to energetic X-rays suggest that the bulk of reported luminous phenomena are radiation-induced phosphores, that is, sensations of light due to direct interaction of ionizing radiation with nervous tissue in the retina.

Author

**N71-37662\*#** General Electric Co., Houston, Tex. Apollo Systems Dept.

**FOOD SYSTEM FOR SPACE SHUTTLE PROGRAM Final Report**

30 Apr. 1971 49 p  
 (Contract NAS9-11037)

(NASA-CR-115207; TIR-720-S-0008) Avail: NTIS CSCL 06H

The design of the space shuttle food system in the crew compartment is considered. The seven main sections of the food system are delineated as menu, measurement, storage, preparation, serving, consumption, and cleanup disposal. The performance and design criteria for each of these sections are presented. J.A.M.

**N71-37663#** Los Alamos Scientific Lab., N.Mex.  
**FILTER EFFICIENCY VERSUS PARTICLE SIZE AND VELOCITY**

Ronald G. Stafford and Harry J. Ettinger Mar. 1971 7 p refs  
 (Contract W-7405-eng-36)

(LA-4650) Avail: NTIS

Several commercial filter media were evaluated for efficiency as a function of particle size and velocity. Particle size and velocity producing minimum efficiency are different for each media and are well below single fiber theoretical predictions. Experimental efficiencies were generally higher than theoretical total mat efficiencies. Author (NSA)

**N71-37664#** Joint Publications Research Service, Washington, D.C.

**MAN IN CONTROL SYSTEMS**

1 Oct. 1971 44 p refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow); no. 10, 1970 p 9-21  
 (JPRS-54171) Avail: NTIS

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**N71-37665#** Joint Publications Research Service, Washington, D.C.

**SYSTEMS ENGINEERING ASPECT OF ENGINEERING PSYCHOLOGY**

D. I. Ageykin *In its Man in Control Systems* 1 Oct. 1971 p 1-2 ref

Avail: NTIS

A general discussion of engineering psychology as a component part of systems engineering is presented. Engineering psychology is considered to be significantly lagging behind systems engineering practices, and the cause is attributed to poor training. Three areas of development are suggested: (1) simulation procedures for joint operation of man and technical devices in which the model of human activity considers heuristics, and transition form one conceptual model to another during the training process; (2) a method of analysis and synthesis of data representation systems which involve the operator and process control algorithms; and (3) new methods for representing large volumes of information for the operator, insuring maximum use of the human characteristics. F.O.S.

**N71-37666#** Joint Publications Research Service, Washington, D.C.

**SIMULATION OF COMPLEX CONTROL SYSTEMS WITH AN OPERATOR**

V. A. Sharov *In its Man in Control Systems* 1 Oct. 1971 p 3-9 refs

Avail: NTIS

Algorithmic simulation of ergatic systems (SASES) is studied for designing control systems with an operator. The requirements of the SASES language are considered to be: (1) It must describe the behavior algorithms of the operator, and those for the operation of the computer. (2) It must be a machine oriented language. (3) It must provide the possibility of describing the system structure and the characteristics of its links. It is concluded that programming and simulation of the operator activity permit consideration of the individual and not the average characteristics of man. It results in optimizing algorithms and programs with respect to given criteria. F.O.S.

**N71-37667#** Joint Publications Research Service, Washington, D.C.

**PROCEDURE FOR ANALYSIS OF DATA REPRESENTATION SYSTEMS FOR THE MAN-OPERATOR CONTROLLING A COMPLEX AUTOMATED OBJECT**

A. G. Chachko *In its Man in Control Systems* 1 Oct. 1971 p 10-20 refs

Avail: NTIS

Procedures for applying logical and mathematical schemes to the analysis of representation systems of automated control systems are presented. Topics discussed include: analysis sequence, structure of model, characteristics of input flow, and calculation of the representation systems. Results of applying the procedure to the representation systems of a 200 megawatt boiler-turbine unit are presented. F.O.S.

**N71-37670#** Joint Publications Research Service, Washington, D.C.

**ENGINEERING-PSYCHOPHYSIOLOGICAL ESTIMATE OF LINEAR GAS-DISCHARGE DISPLAYS AS A MEANS OF COMPLEX DATA REPRESENTATION**

V. V. Pechnikov *In its Man in Control Systems* 1 Oct. 1971 p 31-36 refs

Avail: NTIS

The application of linear gas-discharge displays on control panels and mnemonic systems for data representation was studied in a group of four linear gas-discharge displays with vertical scale, and two double pointer-type indicators with circular scales. The results of psychophysiological studies of reading precision by the linear gas-discharge displays, and engineering-psychophysiological studies of complex means of representing information on a linear gas-discharge display are discussed. F.O.S.

N71-37672# Infoton, Inc., Burlington, Mass.  
**MATHEMATICS OF SYNCODERS** Final Report, 1 Dec. 1969 - 30 Nov. 1970  
 Dilip K. Matur and Ernest G. Henrichon, Jr. Mar. 1971 83 p refs  
 (Contract F33615-70-C-1198)  
 (AD-727087; AMRL-TR-70-135) Avail: NTIS CSCL 08/4

The goal of the research was twofold; first, to establish a mathematical foundation for the description of the operation of the syncoder and networks of syncoders; and second, to identify classes of problems which can be best programmed for solutions on a Syncoder Computer. No new specialized mathematics has been developed in this report. Suggestions of existing branches of mathematics were made, where appropriate, for describing certain processing capabilities of syncoder nets. Consideration was given to the processing capabilities of small and topologically deterministic nets only. Information coding in terms of average frequency of signal pulse trains was examined in detail. Networks whose state reflects the sequence of excitation at their inputs were designed. The concept of sequence detection was developed into first-arrival-time gating networks and networks capable of pattern recognition. Both deterministic and stochastic processing is suggested as the direction for the concentration of future research. Author (GRA)

N71-37673# Illinois Univ., Urbana. Biological Computer Lab.  
**NEURAL MODELLING METHODOLOGY, TECHNIQUES AND A MULTILINEAR MODEL FOR INFORMATION PROCESSING**  
 Michael G. Wilkins 29 Oct. 1971 177 p refs  
 (Contract OE-C-1-7-071213-4557; Grant AF-AFOSR-1865-70)  
 (AD-727770; UIU-ENG-70-297; AFOSR-71-2151TR; TR-19)  
 Avail: NTIS CSCL 06/4

The physiology, membrane electrophysiology and biophysics relevant to single neuron models are examined in detail, and the foundations of the structure-function concept examined. Author (GRA)

N71-37674# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.  
**ACQUISITION SLANT RANGES FOR TARGETS** Final Report  
 Herschel C. Self 29 Oct. 1971 30 p refs Presented at Remote Control Technol. Symp., Santa Monica, Calif., 20 May 1970  
 (AD-727772; AMRL-TR-70-96) Avail: NTIS CSCL 05/8

The report summarizes several studies on display systems having to do with target detection or recognition and all having implications for target acquisition slant range. It considers size, contrast and resolution as important. It is noted that large, clearly-resolved targets are often missed or are detected only at close ranges, even at helicopter speeds. A requirement of 15-20 TV lines on target and 12-20 minutes of arc angular subtense on displays is discussed for unbriefed targets. This means that only narrow ground swaths can be displayed. Percentages of unbriefed targets detected as well as acquisition ranges are noted in relation to the maximum permitted by the displayed size and resolution of the target images. Author (GRA)

N71-37675# Manned Systems Sciences, Inc., Northridge, Calif.

**STUDY OF CREW PERFORMANCE MEASUREMENT FOR HIGH-PERFORMANCE AIRCRAFT WEAPON SYSTEM TRAINING: AIR-TO AIR INTERCEPT** Final Report  
 Donald Vreuls and Richard W. Obermayer Feb. 1971 233 p refs  
 (Contract N61339-70-C-0059)  
 (AD-727739; NAVTRADEVCEEN-70-C-0059-1) Avail: NTIS CSCL 05/9

A study was undertaken to develop performance measurement and methods for deriving performance measurement for F-4J air-to-air intercept training in an envisioned adaptive and automated training environment. It was found that a combined analytic-empirical test method was mandatory for defining measurement for adaptive training. The functional relationships between measures, the tasks and the adaptive variables must be known in order to properly design an adaptive logic. Single measure feedback control for adaptive training of multi-dimensional tasks did not appear feasible. A simplified method to handle multi-dimensional measurement based on tolerance bands was suggested. Using this approach a set of candidate measures for the pilot, for the Radar Intercept Officer, and for the crew composed of both were analytically derived. Further tests of the measures were recommended. It was concluded from a measurement viewpoint that an automated weapon system trainer was feasible provided that empirical tests of the measurement relationships to the task and adaptive variables are conducted. All measurement algorithms must be tested throughout the entire operating range because idiosyncratic behavior of the trainee cannot be predicted by analysis. Author (GRA)

N71-37676# Philco-Ford Corp., Palo Alto, Calif. Western Development Labs.  
**OPERATOR PERFORMANCE AND PANEL LAYOUT FOR DISCONTINUOUS TASKS** Final Report, 1 Jan. 1969 - 1 May 1970  
 R. A. Goldbeck, K. A. Wright, and R. L. Fowler Wright-Patterson AFB, Ohio AMRL Mar. 1971 51 p refs  
 (Contract F33615-69-C-1252)  
 (AD-727791; WDL-TR-4307; AMRL-TR-70-137) Avail: NTIS CSCL 05/8

The study was a follow-on to a previous investigation on panel layout. The original study using a continuous task defined and evaluated four principles of control panel layout: sequence of use (SEQ), functional grouping (FG), location by frequency (FREQ), and location by importance (IMP). The four principles were evaluated by factorial experiments which included stress conditions and three levels of application for each of the arrangement principles. The present study replicates the original study with the exception that the continuous task was modified to make it discontinuous. Author (GRA)

N71-37677# Connecticut Univ., Storrs.  
**MAN-MACHINE SYSTEMS FOR DETECTION, RECOGNITION, TRANSMISSION AND PERCEPTION OF INFORMATION, VOLUME 1** Final Report, 15 Sep. 1969 - 31 May 1971  
 Taylor L. Booth, Herbert M. Kaufman, Michael Drillings, David P. Kennedy, and Howard A. Sholl 30 Jun. 1971 81 p refs 4 Vol.  
 (Contract N00140-70-C-0204)  
 (AD-727609) Avail: NTIS CSCL 05/10

The report describes the results of a comprehensive research effort consisting of experimental and theoretical studies to develop man-machine techniques for processing data from sonar display systems. The following basic areas were investigated: Modeling of the human operator in sequential visual detection tasks; Compact encoding of information; Automatic methods of processing sonar data; and Visual display processing. Author (GRA)

N71-37678# Connecticut Univ., Storrs.  
**MAN-MACHINE SYSTEMS FOR DETECTION, RECOGNITION, TRANSMISSION, AND PERCEPTION OF INFORMATION**

**TION, VOLUME 2 Final Report, 15 Sep. 1969 - 31 May 1971**

Taylor L. Booth, Herbert M. Kaufman, Michael Drillings, David P. Kennedy, and Howard A. Sholl 30 Jun. 1971 119 p refs 4 Vol.

(Contract N00140-70-C-0204)

(AD-727610) Avail: NTIS CSCL 05/10

The purpose of this study was to develop a mathematical model of perceptual information processing that might be applied to engineering problems involving the use of an operator in a signal/information processing task. Using as a foundation the more basic and general psychological findings a predictive model was formulated which interactively incorporated this past research. The model formulation described a means of characterizing the ability of people to use information both for discrimination and identification tasks. Information processing was considered in an independent manner. A sequential logarithmic means of processing information was proposed which not only agreed with the results of past research but also provided a reasonably accurate simulation of both response accuracy and response time during the experimental study. A Bayesian means of characterizing the behavioral adjustments of both response accuracy and response time was proposed which used a memory of past responses to learn the probabilities of the stimuli.

Author (GRA)

**N71-37679# Connecticut Univ., Storrs.**

**MAN-MACHINE SYSTEMS FOR DETECTION, RECOGNITION, TRANSMISSION, AND PERCEPTION OF INFORMATION, VOLUME 3 Final Report, 15 Sep. 1969 - 31 May 1971**

Taylor L. Booth, Herbert M. Kaufman, Michael Drillings, David P. Kennedy, and Howard A. Sholl Jun. 1971 132 p refs 4 Vol. (Contract N00140-70-C-0204)

(AD-727611) Avail: NTIS CSCL 09/4

The basic definitions of probabilistic languages and grammars are given. Derivations by such grammars are demonstrated and the probability distribution over the language generated by such a grammar is shown to have a sum-of-products form. Equivalence of probabilistic grammars is discussed and transformations on such grammars are investigated. The determination of a probabilistic grammar for a specified probabilistic language is investigated and the average word length of probabilistic languages is found. The compact encoding of probabilistic languages is investigated. The concept of information losslessness is extended to the infinite automata. Four classes of Coding Automata are defined and their operations are explained. Optimality is discussed in the coding schemes as is the type of language of the output code. The average code length of the four classes is compared.

Author (GRA)

**N71-37680# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.**

**BIOENGINEERING LIFE SUPPORT SYSTEM ON SPACE SHIPS FOR PROLONGED FLIGHTS**

5 Mar. 1971 11 p Transl. into ENGLISH from the pamphlet "Biologo-Tekhnicheskaya Sistema Zhizneobespecheniya na Kosmicheskikh Korablyakh pri Dlitelnykh Poletakh" USSR, 1970 p 2-5

(AD-727944; FTD-HT-23-92-71) Avail: NTIS CSCL 06/11

The report discusses the principles and basic components of closed-cycle life support system for long space missions. A diagram of a basic recycling system is included. Author (GRA)

**N71-37681# Council on Environmental Quality, Washington, D.C.**

**TOXIC SUBSTANCES**

Apr. 1971 33 p refs

Avail: SOD \$0.40

Existing legal authorities are inadequate to deal with toxic substances. If a substance is toxic, control must often be exercised at the point of manufacture and distribution because the variety of ways in which such substances enter the

environment and the difficulties of detecting many of them make effluent controls an ineffective mechanism. Also, standard-setting, monitoring, and control can often be done more efficiently and rationally if attention is focused on the particular substance rather than on the medium in which it may appear. Author

**N71-37682# Civil Aeromedical Inst., Oklahoma City, Okla.**  
**AURAL GLIDE SLOPE CUES: THEIR EFFECT ON PILOT PERFORMANCE DURING IN-FLIGHT SIMULATED ILS INSTRUMENT APPROACHES**

A. Howard Hasbrook and Paul G. Rasmussen May 1971 27 p refs

(FAA-AM-71-24) Avail: NTIS

Forty instrument rated commercial and ATR pilots with 250 to 12,271 flight hours each flew ten simulated ILS approaches in a single engine, general aviation aircraft. Divided into five groups, each group used a different glide slope cue display in combination with a modified T instrument panel configuration.

Two types of aural glide slope cue displays were utilized: (1) voice, and (2) Morse code signals. No significant differences were found among the five groups relative to accuracy in glide slope tracking. There was no apparent improvement with practice. The presence of aural glide slope cues resulted in the aircraft being flown slightly higher across the middle marker than when only the conventional visual display was utilized. Localizer performance showed a slight but significant initial decrease in the presence of aural glide slope cues with respect to only one performance measure. Transition from the conventional visual cross-pointer display to the aural (voice) glide slope cues was achieved with a minimum of familiarization and with no apparent difficulty. Author

**N71-37683# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.**

**SENIOR AVIATION MEDICAL EXAMINERS CONDUCTING FAA FIRST CLASS MEDICAL EXAMINATIONS**

G. K. Norwood Sep. 1971 5 p refs

(FAA-AM-71-38) Avail: NTIS

An FAA survey of the airlines and the number of first class medical certificate holders among their pilots is presented. The number of physical examinations performed by one physician is also recorded. FAA's proposal to modify medical regulations to allow airlines to use full-time or consultant physicians designated by the Federal Air Surgeon is evaluated and discussed. J.A.M.

**N71-37684 National Lending Library for Science and Technology, Boston Spa (England).**

**LIGHTNING CONDUCTOR GOWN**

A. Strazhev 13 Apr. 1971 3 p Transl. into ENGLISH from Pravda (Moscow), 11 Dec. 1970

(NLL-M-20436-(5828.4F)) Avail: Natl. Lending Library, Boston Spa, Engl.: 1 NLL photocopy coupon

A device which deviates electrostatic charges from man into the earth is described. The instrument consists of a gown with flexible electricity conducting ribbons. E.H.W.

**N71-37745# Medical and Applied Research System, Inc., Rockville, Md.**

**THE IMPACT OF AUTOMATION UPON HEALTH DELIVERY SYSTEMS IN THE 1970'S**

Neil M. Trowe /n Inform. Process. Assoc. of Israel Proc. of the Natl. Conf. on Data Process. 1970 p E35-E45

Avail: NTIS HC \$6.00/MF \$0.95

The application of computer automatic in health delivery systems, as diagnostic aid or for use in patient care is discussed on an international basis. Efficient medical information systems are able to display for any person in the file the following information: (1) a list of available information form file; (2) vital

individual administrative data; (3) critical medical data; (4) a list of in-patient care visits; (5) a list of out-patient care visits; and (6) a list of X-ray examinations. It is shown that future medical record keeping involves time-sharing rather than individual computers for each hospital or office. Great advances are also foreseen in automatic cardiovascular diagnostics and the development of computer programs for problems of differential diagnosis based on the highly complex mathematics of Bayesian probabilities. Computer use as monitor in the operating room situations is also projected. G.G.

**N71-37818#** Joint Publications Research Service, Washington, D.C.

**PRESENT STATE AND FUTURE DEVELOPMENT OF HYPERBARIC OXYGENATION**

I. V. Sultanov et al *In its* Develop. in Pressure Chamber Technol. 1 Oct. 1971 p 13-21

Avail: NTIS

Functional technical and medical advantages and disadvantages of therapeutic hyperbaric oxygenation chambers are summarized. One-person, two-person, multiple-person, and experimental pressure chambers are included. J.M.

**N71-38644#** Joint Publications Research Service, Washington, D.C.

**STUDY OF TRACE CONTAMINANTS IN MAN-EXHALED AIR**

Yu. G. Nefjodov et al *In its* 22d Intern. Astronautical Congr. 28 Oct. 1971 p 6-10

Avail: NTIS

The gas chromatography method was used together with other techniques to identify and measure trace contaminants in man-exhaled air. The air exhaled by the test subjects contained a large number of trace contaminants. They included the following toxic compounds: methanol, ethanol, acetaldehyde, acetone, methyl ethyl ketone, and amines. Investigations of man-exhaled air were made during chamber experiments, which included stress factors inherent in space missions, e.g. hypodynamia, starvation, increased temperature and humidity. The experiments demonstrated a correlation between the amount of contaminants exhaled and the effect of the stress factors. Hunger and high temperatures produced a particular effect on the qualitative and quantitative composition of the toxic compounds. Author

**N71-38645#** Joint Publications Research Service, Washington, D.C.

**PROMISING METHODS FOR WATER RECLAMATION IN SPACECRAFT LIFE SUPPORT SYSTEMS**

S. V. Chizhov et al *In its* 22d Intern. Astronautical Congr. 28 Oct. 1971 p 11-18

Avail: NTIS

An analysis of the sources of water-bearing wastes, mass flows, and their chemical composition demonstrates that most of the water can be reclaimed using the sorption technique. The technique can also be applied to the atmospheric condensate, transpiration water of higher and lower plants, water produced by electrochemical generators, condensates resulting from catalytic decomposition of hydrogen peroxide, and catalytic hydration of carbon dioxide. The problem of water regeneration from urine and wash water can be solved by evaporation in the air stream and catalytic oxidation of volatile admixtures. This method is also advantageous due to a relatively low weight of the regenerative system, a high quality of the regenerated water, and large quantity of recycled water. Author

**N71-38646#** Joint Publications Research Service, Washington, D.C.

**POSSIBLE METHODS FOR APPRAISING RELIABILITY OF LONG LIVED LIFE SUPPORT SYSTEMS**

B. A. Adamovich et al *In its* 22d Intern. Astronautical Congr.

28 Oct. 1971 p 19-36 refs

Avail: NTIS

Methods of reliability data acquisition from ground and orbital experiments during which the crew provides maintenance of the system are described. The possibility of applying accelerated tests for life support systems and for independent studies of system components is discussed. A generalized model of reliability is developed, and the necessity of complex ground-based experiments on life support systems is stressed. N.E.N.

**N71-38647#** Joint Publications Research Service, Washington, D.C.

**QUALITY EVALUATION OF ERGATIC PROCESSES IN SPACE VEHICLE CONTROL**

A. D. Korotkov et al *In its* 22d Intern. Astronautical Congr. 28 Oct. 1971 p 37-43

Avail: NTIS

A method is proposed for evaluating the work capacity of a human operator based on probability-iterative methods and the mathematical theory of linear differential transforms. The method takes into account human adaptability in the course of professional training and makes it possible to determine the probability of successful implementation of a task in the course of one control cycle under both nominal and emergency flight conditions. The high information yield of this method is supported by a number of experiments. Author

**N71-38648#** Joint Publications Research Service, Washington, D.C.

**PSYCHOLOGICAL ASPECTS OF ADAPTIVE BEHAVIOR IN COMPLEX SPATIAL ENVIRONMENTS**

V. I. Myasnikov et al *In its* 22d Intern. Astronautical Congr. 28 Oct. 1971 p 44-48

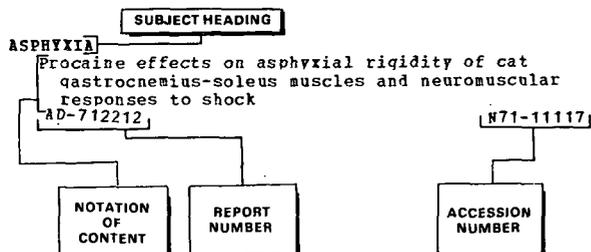
Avail: NTIS

An experiment is described for determining the possibility of observing man's spatial activity under psychologically difficult conditions of a modified postural-motor regime. Inexperienced volunteers and experienced divers and parachutists, 21 to 35 years old, stood on platforms of limited area 18 and 10 m above ground. The subjects attempted to maintain a vertical position on the platform while retaining and excluding visual control, and maintaining an equilibrium body position during turning and moving of the support. The motions and sensations of those subjects having difficulty maintaining erect posture are described, and three variants are defined. N.E.N.

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- Annotated bibliography and indexes on Aerospace Medicine and Biology - Aug. 1971  
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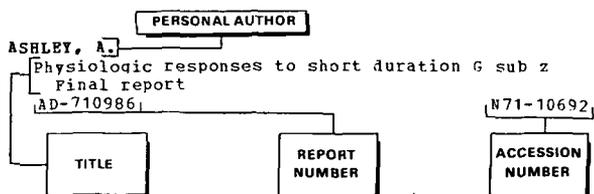
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