NASA

Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011(233)
June 1982

National Aeronautics and Space Administration

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N82-18119 - N82-20138
IAA (A-10000 Series)	A82-22251 - A82-25538

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NASA SP-7011(233)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 233)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1982 in

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

NASA Scientific and Technical Information Branch 1982
National Aeronautics and Space Administration
Washington, DC

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This supplement is available as NTISUB/123/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of $7.00 domestic; $14.00 foreign.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 387 reports, articles and other documents announced during May 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

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

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

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

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1982 Supplements.

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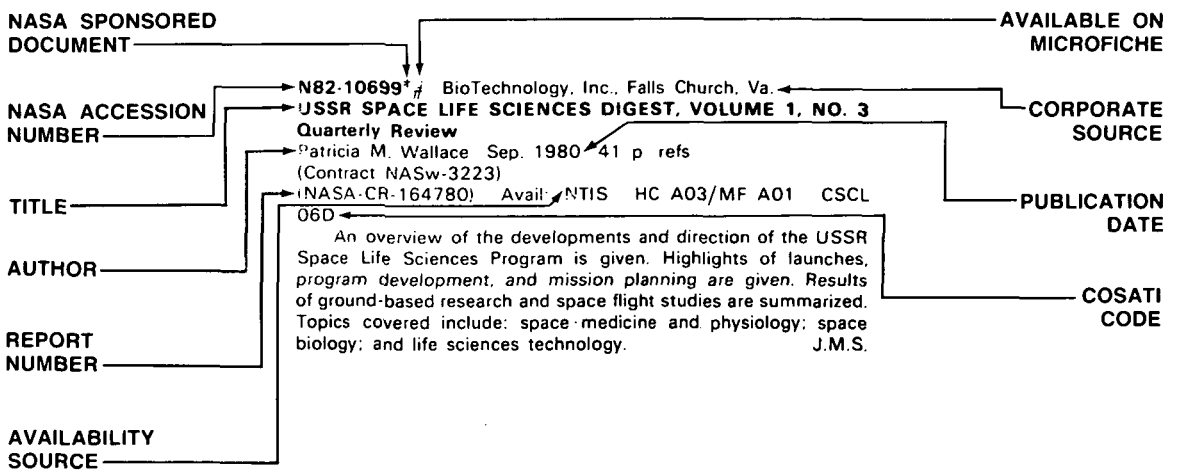

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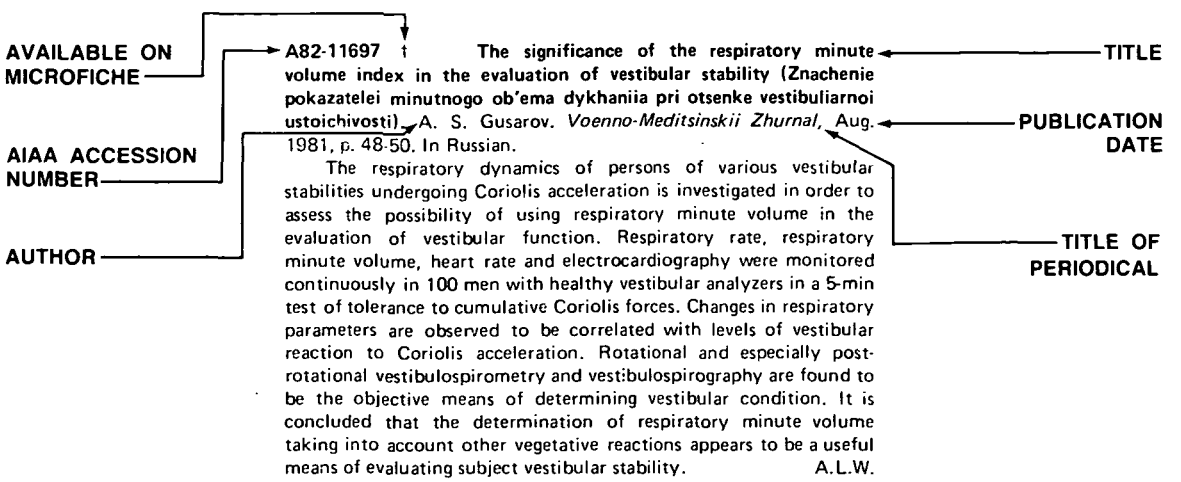


AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 233)

JUNE 1982

IAA ENTRIES

A82-22400 † **Respiratory regulation (Reguliatsiia dykhaniia).** I. S. Breslav and V. D. Glebovskii. Leningrad, Izdatel'stvo Nauka, 1981. 280 p. 1140 refs. In Russian.

The mechanism of respiratory regulation is considered: the central and peripheral organs which play a part in the respiration process are described, including the respiratory muscles and their related efferent tracts and the bulbar respiratory neural centers. The functions of the receptors, responsible for the regulation of breathing are described in detail: the mechanoreceptors of the lungs and the respiratory tracts as well as the arterial and medullary chemoreceptors. Modern theories on the self-regulation of the rate and depth of breathing and/or the regulation of pulmonary ventilation under muscular activity and additional resistance to breathing are presented. Particular attention is given to the human respiratory system, and clinical cases of the mechanisms are cited. J.F.

A82-22435 **Microwave and radio-frequency exposure limits.** F. Harlen (National Radiographical Protection Board, Didcot, Oxon, England). *IEE Proceedings, Part A - Physical Science, Measurement and Instrumentation, Management and Education, Reviews,* vol. 128, pt. A, no. 9, Dec. 1981, p. 589-592. 16 refs.

The paper summarizes the exposure limits that have been promulgated by national organizations of different countries, and the rationales that have been advanced for establishing these limits. The limits differ by orders of magnitude, largely because of different philosophical approaches to standard making. The limits were developed, in the first instance, because of concern about high-power radar equipment, but have gradually been extended to cover very much lower frequencies. New standards are being developed in the USA which are much more restrictive as regards RF exposure. The justification for these is examined. (Author)

A82-22901 **Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.** Edited by G. E. Corrick, E. C. Haseltine, and R. T. Durst, Jr. Santa Monica, CA, Human Factors Society, Inc., 1980. 694 p. Members, $15.; nonmembers, $20.

Progress in human factors engineering, design, and research were covered in topics such as aircraft displays, anthropometry, automation, control design, and situations which demand decision making and problem solving. Attention was also given to human-computer interfaces, designing for the handicapped, for nuclear power plants, for eye safety, and for driver performance and safety. Flight skill maintenance and human-computer communication were discussed, as were space systems involving the Shuttle, effects of living environments, workload studies, and perception and attention studies. Performance evaluation was reviewed, along with the effects of heat stress on human performance, applications of crew station simulation, task taxonomies, the research philosophy of human factors studies, and signal detection. Finally, target acquisition was investigated, and studies of testing and evaluation, training, stress, and visual performance were presented. M.S.K.

A82-22903 **Findings from a study of tactical symbology for fighter aircraft displays.** C. J. Kopala (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 9-12.

Pilot flight performance and symbol recognition performance using a proposed symbology set for a fighter aircraft real-time combat situation display were measured. Significant performance differences attributed to the individual symbol types (aircraft, surface-to-air missiles, and anti-aircraft artillery) and symbol states (hostile, unknown, and friendly) are discussed. (Author)

A82-22904 **A case for early objective evaluation of candidate display formats.** S. Herron (Bunker Ramo Corp., Electronic Systems Div., Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 13-16. Contract No. F33615-78-C-3614.

The development and subsequent evaluation of a candidate head-up display (HUD) symbology set is described as an example of the importance of early evaluation of a candidate display format. HUD allows the pilot to view the outside scene while flying an approach or firing a weapon with little or no reference to other instrumentation. The establishment of standardized HUD symbology for all flight modes is considered essential to enable a pilot to shift orientations to different demanding scenarios such as air-to-air to air-to-ground combat situations rapidly. Eighteen A-7D pilots were employed to test simulations with A-7 HUD displays and the standardized format displays. After two trials with reconfigured HUD symbology, favorable pilot opinions of the proposed HUD symbols were garnered with poor performance results, indicating that further symbology development is required. M.S.K.

A82-22906 * # **What do pilots see in displays.** R. L. Harris, Sr. and D. M. Christhilf (NASA, Langley Research Center, Hampton, VA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 22-26. Abridged.

Based on pilots' scanning data and discussions with pilots, general aviation flight instruments have been classified into three categories. The classification is related to the type of information presented, the way the information is used, and the pilot's role as a monitor and controller. Suggestions are made for modifying the instruments of one category to improve the information displayed such that when monitoring, the pilot can more quickly extract the information needed. (Author)

A82-22907 **A strength and anthropometric comparison of young men and women.** W. W. Hosler (U.S. Army, Electronic Proving Ground, Sierra Vista, AZ) and J. R. Morrow (Houston, University, Houston, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 31-33. 14 refs.

Isokinetic strength and anthropometric differences between men and women were examined for applications in work station design. Randomly selected groups of 85 college students were tested for arm and leg strength in maximal and submaximal trials, and variables such as sitting height, arm length, biacromial diameter, biiliac diameter,

three skinfolds, age, and body fat percentages were recorded. Men were found to have a greater lean body mass and less body fat, while anthropometric variables such as shoulder and hip diameter were less significant. Due to the larger isokinetic body strengths displayed by males, it is recommended that women benefit from the technology of force transducers, such as those required for rapidly removing themselves from emergency situations. Men were also found to be more suited for moving objects and themselves. M.S.K.

A82-22908 Evaluating operator performance on automated tactical systems. C. W. Howard and B. H. Taylor (U.S. Army, Research Institute for the Behavioral and Social Sciences, El Paso, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 41-43.

The U.S. Army's Patriot missile system features many advanced automated capabilities. The sophistication of this system raises the possibility that human intervention will actually degrade its performance. Efforts are underway to develop a performance measure that may be used to gauge these effects. A tentative measure has been derived and is currently being validated and refined. Present and future applications for such a metric are discussed. (Author)

A82-22909 Mini-remotely piloted vehicle precision tracking evaluation. D. C. Fulkerson, M. L. Hershberger, and L. A. Scanlan (Hughes Aircraft Co., El Segundo, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 44-48. Grant No. DAAB07-78-C-2415.

The research reported assessed the ability of a human operator to manually null the residual pointing errors that remain on the output of an automatic target tracker under conditions of data link bandwidth reduction. Three operator performance evaluations were conducted using a hybrid computer simulation of the mini-RPV system. The first study assessed the ability of an operator to null the residual errors using a baseline system design. In the study, 32 combinations of environmental and display factors were examined to determine their impact on pointing accuracy. In no case did the average performance reach the 50 microradian standard deviation criterion. The remaining two studies evaluated candidate modifications to the mini-RPV system which would be expected to improve overall tracking performance. Based on these studies, a modified system was identified which allowed criterion tracking accuracy while yielding a 32-to-1 reduction in the data link bandwidth.
(Author)

A82-22910 Computer assisted displays enabling internalization and reduction of operator workload in higher order systems, or, pushing the barrier of human control beyond second order systems. R. Eberts and W. Schneider (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 59-62. 8 refs.

The design of computer generated displays which allow an operator to respond to higher than second order control system requirements without conscious control reasoning is discussed. Displays are intended to relate appropriate symbology for an intuitive grasp of the situation, with the resultant response coming automatically from thorough training which supplied an unconsciously operating skill. A consistent response to control stimuli is necessary, with time representations changing with the number of dimensions which are to be controlled. The development and implementation of forward-backward display with velocity cues involves the establishment of an internal model within the operator. Factors which have inhibited the development of effective predictor displays are the lack of necessary algorithms, too many unpredictable variables in the flight of a vehicle, and the presence of overly complex and unpredictable environments for some aircraft. M.S.K.

A82-22911 Computer simulations for fault diagnosis training - From simulation to live system performance. W. B. Johnson and W. B. Rouse (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 69-73. 10 refs. Contract No. MDA903-79-C-0421.

Three methods of training for fault diagnosis were studied: traditional instruction, context-specific computer simulations, and context-free simulations. Each of thirty-six powerplant maintenance trainees were trained with one of these methods, and then, transferred to real aircraft powerplants and, later, to simulations of an auto-pilot system. For the aircraft powerplants, it was found that traditional instruction was only superior if explicit demonstrations were provided for the exact failures to be encountered. With respect to overall performance, context-free training did not produce improved performance on the unfamiliar auto-pilot system. Considering correlates of live system performance, it was found that performance in the context-free simulation was a good predictor, while performance in the context-specific simulations was by no means useful. Trainee Grade Point Averages and scores on traditional quizzes were also highly correlated with live system performance.
(Author)

A82-22912 Design criteria for decision aids - The users perspective. R. R. Mackie (Human Factors Research, Inc., Goleta, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p.80-84. 8 refs.

The opinions of over 200 Navy personnel serving aboard ASW aircraft, surface ships and submarines were solicited to identify factors that will influence acceptance and use of a wide variety of computer-generated decision aids designed to assist mission planning, search procedures, target detection, classification, localization, and attack. User concerns about the design and use of decision aids are described and some recommendations for addressing those concerns are made. (Author)

A82-22913 Low-level laser light effects - Long-term effects. H. Zwick, B. E. Stuck, and E. S. Beatrice (U.S. Army, Letterman Army Institute of Research, Presidio of San Francisco, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 152-156. 13 refs.

Attempts to correlate ultrastructural alterations with function changes are described for tests involving the exposure of behaviorally trained Rhesus monkeys to low-level laser light. Two optically undamaged monkeys were secured in a box with their heads positioned to view rear-projected Landolt and gapless rings at various wavelengths to determine log threshold background intensities required for the discrimination of specific acuity criterion at each wavelength. Each animal received a total of 38 hr exposure, and depressed photopic function was observed with prolonged, repetitive viewing of laser light at 514.5 nm. The performance decrement was found to be possibly cumulative, from evidence of lessened acuity between the end of one test and the beginning of another. Caution is advised, along with frequency surveillance of visual function, in any situation requiring exposure to repetitive low-level laser light. M.S.K.

A82-22914 Changes in spectral acuity following laser irradiation. D. O. Robbins, H. Zwick, and M. Haenlein (Ohio Wesleyan University, Delaware, OH; U.S. Army, Letterman Army Institute of Research, Presidio of San Francisco, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 162-166. 5 refs.

Measurements of the immediate recovery of visual acuity and the long-term consequences of repeated exposures to HeNe, Kr, and A laser light at low levels are reported from tests with Rhesus monkeys. Beam diameters between 150-323 microns were shone on the corneas of monkeys whose heads were held in a fixed position, with power levels of 0.3-11 mW at the cornea. The recovery of acuity was measured with both achromatic and chromatic backgrounds for Landolt rings immediately after exposure. Failure to regain acuity resulted in a removal from exposure and continuous monitoring of spectral and white light acuity. Effects were found to be dependent on the wavelength of the laser source, and all subjects showed degradation of acuity in the short wavelength regions two months after the tests. It is suggested that specific spectral lines of coherent light at low levels selectively alter specific foveal cone processes.
M.S.K.

A82-22915 **Flying skill maintenance.** E. E. Eddowes, J. C. DeMaio (USAF, Human Resources Laboratory, Williams AFB, AZ), J. L. Eubanks, D. R. Lyon, T. H. Killion, and R. T. Nullmeyer (Dayton, University, Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 167, 168.

The results of tests with fighter pilots and bomber crews to determine the skills required for combat tasks and the levels of training to maintain those skills are reported. The fighter pilot skills were found to be planning, information processing, discriminating, anticipating, deciding, controlling, concentrating, remembering, and integrating during air-to-surface, air-to-air, and tactical formation tasks. Strategic bombing skills have been focussed on low-level bombing runs, with specific attention to the tasks of the radar navigator and the electronic warfare officer. Additional data have been gathered for Commander and Copilot performance in landing and inflight fueling operations. The results of the subjective and objective tests are being used to prepare training simulator programs for minicomputers and as testing data for separating skilled from less skilled pilots. M.S.K.

A82-22916 **Voice entry for reducing pilot workload.** S. J. Mountford and R. A. North (Honeywell Systems and Research Center, Minneapolis, MN). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 185-189.

An experiment was conducted to assess the potential improvement in operator performance when data entry is performed by voice input over keyboard input. In a workload condition simulating manual/visual time sharing of two tasks (tracking and radio channel changing) performance on both tasks are significantly improved when operators switched to voice input for the data entry task. Results are discussed in light of the potential of voice recognition systems for the future fighter cockpit. (Author)

A82-22918 * **The assembly of large structures in space - An evaluation of hardware configurations and assembly techniques through neutral buoyancy simulation.** T. E. Loughead and E. C. Pruett (Essex Corp., Huntsville, AL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 205-208. Contract No. NAS8-32989.

The implementation of NASA's Space Transportation System (STS) presents the opportunity for the on-orbit assembly of structures which, before the advent of multi-launch missions, were not possible because of their physical size. This report presents the results of an eight-month effort in the investigation of assembly techniques and hardware configurations used in assembly of the basic tetrahedral cell by A7LB pressure-suited subjects in Marshall Space Flight Center's Neutral Buoyancy Simulator. Eleven subjects participated in assembly procedures which investigated two types of structural members and two configurations of attachment hardware. The assembly was accomplished through extra-vehicular activity (EVA) only, EVA with simulated manned maneuvering unit (MMU), and EVA with simulated MMU and simulated remote manipulator system (RMS). Assembly times as low as 10.20 minutes per tetrahedron were achieved. (Author)

A82-22921 **The effects of noise - A review.** V. J. Gawron (Illiana Aviation Sciences, Ltd., Las Cruces, NM). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 233-237. 41 refs. NSF Grant No. DAR-78-12722.

Research on the effects of noise on human performance is reviewed. Instructing subjects of the favorable, unfavorable, or lack of effect by noise has been shown to not affect the level of performance, while high levels of noise have been observed to cause a degradation in the repetition of digits or syllables. The performance of complex tasks involving either mental agility, skill, speed, complex psychomotor activity, or a high level of perceptual capacity was found to degrade in the presence of noise while simple tasks did not. The effects of noise on the complex tasks was found to display a continuous lowering of performance, and no correlations with sound intensity have been found. Results have been contradictory, and the employment of multivariate analyses is recommended as a means to achieve a compromise among contending conclusions. M.S.K.

A82-22922 **The measurement of aircrew task loading during operational flights.** D. Gunning (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 249-252. 6 refs.

In-flight observers collected task loading data during four operational flights of the Air Force's KC-135 tanker aircraft. The data were collected via a Datamyte Data Recorder which the observers used to record the occurrences of 45 different tasks performed by the pilot, copilot, and navigator. Examples of the task loading data are presented including workload profiles for each crewmember, peak workload situations, and usage data for individual aircraft systems. (Author)

A82-22923 **The structure of processing resources - Implications for task configuration and workload.** C. Wickens, W. Derrick, D. Berringer, and J. Micalizzi (Illinois, University, Champaign, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 253-256. 7 refs. Contract No. N00014-79-C-0658.

A series of experiments to validate a three-dimensional model of processing resources are outlined. The model comprises processing stages, which include perceptual and central processing as opposed to response selection and execution, processing modalities, which are visual inputs and manual responses as opposed to auditory inputs and vocal response, and processing codes, which consider verbal as opposed to spatial modes. Subjects were exposed to trials of selected symbols which were or were not included in a previously observed set, and which were manipulated for orthogonal position on the screen, in accordance with principles of Sternberg tasks. The trials were run in tracking, failure detection, and understanding and incorporating verbal and spatial configurations, which were displayed as words and altitude figures. Further performance of the trials to test the applicability to task interferences effects and workload variance is indicated. M.S.K.

A82-22924 * **Instrument scan - Is it an indicator of the pilot's workload.** A. R. Ephrath, J. R. Tole, A. T. Stephens, and L. R. Young (MIT, Cambridge, MA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 257, 258. Grant No. NCC1-23.

Results of an investigation of the relationship between an aircraft pilot's visual scanning of instruments and the level of mental activity during a simulated approach and landing are presented. Noting that periods of activity which demand either close to 100% of human capacity or low levels of capacity are the times when most errors are committed, trials were conducted with three NASA test pilots in a terminal configured vehicle simulator. The pilots flew a normal approach while verbally responding to three digit stimuli to be judged plus or minus according to an order of magnitude scheme, and also while using a control stick to extinguish a light that came on and off to the right and left of the instrument panel. Eyescans of the instrumentation were monitored, and determinations were made of the most common instruments used during approach and flare. Fixation on instruments was found to increase with the arithmetic tasks. M.S.K.

A82-22925 **On the training of the sharing skills - An attention viewpoint.** D. Gopher (Technion - Israel Institute of Technology, Haifa, Israel). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 259-263. 15 refs. USAF-supported research.

Training of time-sharing skills is discussed within an attention framework in which poor time-sharing performance is interpreted to stem from scarcity or inefficient utilization of processing resources. Practice is argued to increase resource availability either by reducing the resource demands of each task, improving coordination, or

enhancing the voluntary control on resource allocation. Based on this analysis notions of skill generalizations and implications for the development of training procedures are examined. (Author)

A82-22926 Flight simulator runway visual textural cues for landing. G. H. Buckland (USAF, Human Resources Laboratory, Williams AFB, AZ). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 286, 287.

The effect of visual textural patterns superimposed upon the runway touch-down zone area was studied as a potential factor in excessive vertical velocity at touchdown during flight simulation. Six simulated daytime runways with varying degrees of textural cues, as well as one night runway scene were used. The average vertical velocities at touchdown were higher in the simulator than comparable test landings in actual aircraft, but the textural cues did produce statistically significant differences in simulated vertical velocities at touchdown. Apparently the texture patterns did help to improve pilot performance, but they were not sufficient by themselves to completely solve the problem of excessive vertical velocities at touchdown. (Author)

A82-22927 The effect of inter-stimulus intervals on the perception of short flashes of red and green light. R. P. Bateman (Texas A & M University, College Station, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 288-291. 11 refs.

The purpose of this investigation was to determine whether or not human perception of two equal flashes of colored light is a function of the interstimulus interval. Thirty subjects with normal color vision were presented with two 5 ms flashes of light, the first at 697 nm (red) and the second at 565 nm (green). The interstimulus interval was varied from 5 to 100 ms. When the interval was less than 30 ms, subjects reported seeing yellow flash. From 30 to 50 ms, subjects reported seeing only a green flash. Above 50 ms, subjects were able to identify two flashes, one red and one green. These results constitute a contradiction of Bloch's Law, which states that for interstimulus intervals less than 70 ms, stimuli are summed to produce perception. The implications of these results on a model for human color vision are discussed. (Author)

A82-22928 * The event-related brain potential as an index of attention allocation in complex displays. C. D. Wickens, E. F. Heffley, A. F. Kramer, and E. Donchin (Illinois, University, Champaign, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 297-301. 10 refs. Contracts No. N00014-76-C-0002; No. F49620-79-C-0233; No. JPL-955610.

The advantages of employing the event-related brain potential (ERP) in the assessment of allocation of attention in dynamic environments are discussed. Three experiments are presented in which the P300 component of the ERP is demonstrated to be a useful index of subjects' locus of attention. The first two experiments were concerned with the allocation of attention during discrete and continuous visual monitoring tasks. The results indicated that a P300 was elicited only by stimuli to which the subject had to attend in order to perform successfully the task. The third experiment was conducted to assess the sensitivity of P300 to the manner in which attention is allocated to different aspects of a display during the performance of a 3-dimensional target acquisition task. The amplitude of the P300 was found to reflect differences between two levels of workload, as well as the task relevance of the stimuli. The results of the experiments are discussed in terms of their utility in the evaluation of the design of man-machine systems as well as in the study of the allocation of attention in operational environments. (Author)

A82-22929 The effects of age and ametropia on the dark focus of visual accommodation. N. M. Simonelli (3M Co., Copying Products Div., St. Paul, MN). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 312-316. 11 refs. Contract No. F49620-77-C-0117.

The effects of age and ametropia on the dark focus of visual accommodation have gone largely unmeasured. Subject populations of young people are generally screened and their vision 'standardized' by testing them while they wear corrective lenses. In this study, 301 participants of both sexes, age 17 to 67, both nearsighted and farsighted were measured for their near points, far points, and dark focuses. It was found that the more nearsighted the eye the larger the dark focus shift. This increase in shifts, however, is relatively small over the commonly found range of ametropia. Age was also found to have a small effect on the dark focus. Older individuals tended to have a smaller dark focus shift, and the dark focus was found to recede with age at roughly the same rate as the far point. (Author)

A82-22930 Selection of Performance Evaluation Tests for Environmental Research. R. C. Carter, R. S. Kennedy, and A. C. Bittner, Jr. (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 320-324. 17 refs. Navy Project MF58-524-002.

A study of various measures of human performance has been carried out in order to select Performance Evaluation Tests for Environmental Research (PETER) suitable for use in repeated measurements. Sources of tests which have been considered for PETER are examined together with plans for the selection of additional tests. Tests in the source batteries, including those that have and those that have not yet been considered for inclusion in PETER, are listed, and their performance contents are discussed. V.L.

A82-22931 The validity of task analytic information to human performance research in unusual environments. R. H. Shannon (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 325-329. 10 refs.

Recurring naval student flight errors were collected using three types of task analytic methodologies: maneuver description questionnaires, critical incident technique of observed student problems and inflight maneuver rating forms. The results from these three efforts were highly correlated, which indicated that the task analytic methodology was valid; and therefore, would have utility in the future development of a performance battery for environmental research. (Author)

A82-22932 Performance Evaluation Tests for Environmental Research /PETER/ - Auditory digit span task. D. B. McCafferty (West Florida, University, Pensacola, FL), A. C. Bittner, Jr., and R. C. Carter (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 330-334. 14 refs. Navy Project MF58-524-002.

The objective of the study was to determine whether baseline performance on the auditory digit span task would stabilize following repeated administration of both forward and backward digit span. The backward digit span scores became more and more correlated with the forward digit span scores as the experiment progressed, which indicated that the mental content of the two tests of memory converged with practice. The forward portion of the auditory digit span task was found to be suitable for use in environmental research employing repeated measures and was recommended for inclusion in a test battery as a measure of inattention or freedom from distraction and as an indicator of short-term memory or neurophysiological impairment. V.L.

A82-22933 Performance evaluation tests for environmental research /PETER/ - Landolt C reading test. J. C. Guignard, A. V. Bittner, Jr., S. W. Einbender, and R. S. Kennedy (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 335-339. 22 refs. Navy Project MF58-524-002.

A Landolt C visual acuity test was evaluated for inclusion in a

battery of Performance Evaluation Test for Environmental Research (PETER) for use in repeated measures experiments. Eight subjects were tested for 12 days to determine stability of means, standard deviations and cross-day correlations. Mixed results for these cross-day correlation analyses made questionable the stability of speed and error measures. Fine-structure analyses indicated that the task was more a measure of response accuracy than acuity. Fine-structure analyses in future performance test evaluation and exploration of 2 alternative visual acuity tests are recommended. It is concluded that the Landolt C test in the form used is not stable and cannot be recommended as a test of visual acuity for inclusion in PETER. (Author)

A82-22934 Item recognition as a Performance Evaluation Test for Environmental Research. R. C. Carter, R. S. Kennedy, A. C. Bittner, Jr., and M. Krause (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 340-343. 16 refs.

Item Recognition (Sternberg, 1966) is a task which reflects the operation of human memory. This task was considered as a candidate for use in a battery of Performance Evaluation Tests for Environmental Research (PETER). Environmental research involves comparison of performances in a baseline environment and in a novel environment. It is desirable that scores be stable at different occasions in the baseline environment, so that changes due to the novel environment will be clear if they occur. It was found that item recognition results were similar to those obtained by other investigations, although the traditional item recognition score (slope) was unreliable across repeated measurements. The response time (RT) was stable for each of the four memory set sizes (1, 2, 3 and 4 items), from the standpoint of reliability, after the fourth session. (Author)

A82-22935 A catalogue of Performance Evaluation Tests for Environmental Research. R. S. Kennedy, R. C. Carter, and A. C. Bittner, Jr. (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 344-348. 30 refs.

The stability and other characteristics of 15 performance tasks investigated as part of the Performance Evaluation Tests for Environmental Research program are examined. Progress is also reported on 45 additional tests which are being studied. All tasks exhibit stable means and variances after adequate practice. However, less than 30% meet minimal stability criteria for intertrial correlations, and substantial practice (typically more than an hour over five days) is required to achieve stability. V.L.

A82-22936 Comparison of memory tests for environmental research. M. M. Harbeson, M. Krause, and R. S. Kennedy (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 349-353. 6 refs.

Four memory tests were considered for inclusion in a human performance test battery. The tests were administered to 23 Navy enlisted men for 15 consecutive days. Group means, standard deviations, and cross-session correlations were examined. Two of the tests, Interference Susceptibility and Free Recall, met the initial statistical criteria for inclusion in the test battery. However, the other tests, Running Recognition and List Differentiation failed to show sufficient task definition and reliability in their present form. These tests are compared with each other and with previous memory research studies. (Author)

A82-22937 Task analytic approach to human performance battery development. R. H. Shannon (U.S. Navy, Naval Biodynamics Laboratory, New Orleans, LA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 354-358. 10 refs.

Task analytic methods were used to isolate critical components of naval student flight performance. This goal was accomplished by utilizing factor and regression analyses to compare student maneuver errors during primary training to the overall phase grades of primary, basic and advanced. The results indicated that flight ability skills appear to be best measured by basic transitions, coordination flying and entries to dirty configurations. These items could be measured within a flight simulator. In a laboratory, these skills could best be measured by a performance battery which contained memory, problem-solving, continuous tracking tasks, and a time-sharing capability between continuous tracking and discrete tasks. In conclusion, the task analytic procedure was determined to be a feasible and useful undertaking in the development of performance measurement systems such as the PETER project. (Author)

A82-22938 Convergence-divergence with extended practice - Three applications. M. B. Jones (Pennsylvania State University, Hershey, PA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 359-362. 18 refs.

It has been recognized that practicing a task might alter its correlation with an external measure. When the correlation increases, the task is said to converge on the external measure; if it decreases, the task diverges from the external measure. The implications of convergence-divergence with extended practice are discussed with reference to differential retention over long periods of no practice, personnel selection and classification, and the identification of latent scores. V.L.

A82-22939 Mental performance impairment in heat stress. P. A. Hancock (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 363-366. 20 refs.

Data in the literature on the relationship between threshold for unimpaired mental performance and heat stress, and in particular the conclusions of Wing (1965), are re-evaluated in the light of more recent research. It is suggested that heat induced mental performance decrement is a function of imminent thermophysiological collapse and occurs at a much higher level of heat stress than Wing has proposed. It is pointed out, however, that although mental performance decrement before impending physiological collapse is slight, most control situations require constituents of motor performance more susceptible to heat. V.L.

A82-22940 Perception and performance in the heat. M. Y. Beshir and J. D. Ramsey (Texas Tech University, Lubbock, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 367-371. 8 refs.

This study reports an evaluation of the effects of heat exposure on human subject's abilities to estimate their physiological responses, perceptual-motor performance and thermal comfort. The differences between male and female subjective estimates of the effects of heat on drowsiness, boredom, and fatigue are also reported. (Author)

A82-22941 Application of a predictive core temperature model to heat stress experimentation. R. E. Schlegel (Oklahoma, University, Norman, OK). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 377-381. 8 refs.

An interactive procedure for evaluating and maintaining an individual's core temperature at a predetermined level was developed and tested. The procedure involved the use of previously developed models for predicting core temperature changes during work and rest. Various levels of metabolic activity were used for rapid core temperature elevation and adjustments in dry-bulb temperature and relative humidity maintained the desired core temperature level. Evaluation of the procedure was made using five female subjects at four different levels of elevation. Results are presented which show the accuracy of the control. (Author)

A82-22942 Core temperature, heart rate and sweatsuits. M. W. Riley, D. J. Cochran, and J. W. Armstrong (Nebraska, University, Lincoln, NE). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.

Santa Monica, CA, Human Factors Society, Inc., 1980, p. 382-385. 6 refs.

Core temperature and heart rate are recorded for three male subjects, while jogging on a treadmill, to determine the influence of sweatsuits. Three trials were run and at each trial the subjects wore gym shorts and T-shirt, cotton sweat clothes, or vinyl sweat clothes. Results indicated the greatest physiological cost was required while exercising in vinyl sweat clothes and there was a significant difference in physiological cost due to the apparel worn. (Author)

A82-22943 An application of manned simulation in crew station conceptual development. J. A. Fitzgerald, J. A. Wise, R. E. Rutkowski, and P. D. Biolchini (McDonnell Douglas Corp., St. Louis, MO). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 386-388.

The McDonnell Aircraft Company's Manned Air Combat Simulator is being used in the early design and evaluation phases of an advanced real-time reconnaissance aircraft. The cockpit arrangement and control logic have been implemented in the engineering development simulator. To date there have been two formal human factors evaluations of the system under simulated operational conditions. This presentation outlines the procedures used, the results, and their impact upon the design. (Author)

A82-22944 Application of preference tree methodology to choice behavior in a AAA supervisory control task. C. Hale (Systems Research Laboratories, Inc., Dayton, OH) and S. Ward (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 400-404. 7 refs.

A study has been carried out to investigate the applicability of the elimination-by-aspects (EBA) model proposed by Tverski (1972) to situations involving active search for sequentially available information of varying value. Subjects were told to select the most appropriate one of three possible operating modes in a task designed to simulate supervisory decision making in an anti-aircraft artillery system. The results obtained in the experiment indicate that subjects search the information set in a compensatory manner, which contradicts the EBA model. Consideration of the various aspects of the experiment suggests that the EBA model is valid only in situations where the subject is faced with many alternatives following receipt of a complete information set. V.L.

A82-22945 Map interpretation and geographic orientation during nap-of-the-earth flight. S. P. Rogers (Anacapa Sciences, Inc., Santa Barbara, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 414, 415.

A series of studies have been conducted to evaluate aviator's precision of geographic orientation during photographically simulated nap-of-the-earth (NOE) flight in unfamiliar areas. The findings of these studies suggest that if a topographic display is to be acceptable and useful to the average aviator, it must include more information than terrain relief alone. However, since many potential battlefields do not include cultural, hydrographic, or vegetation features useful in geographic orientation, additional training in terrain-relief analysis and contour line interpretation would greatly benefit NOE aviators. V.L.

A82-22946 Task taxonomies and modeling for system performance prediction. G. L. Berry (Ohio State University, Columbus, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 425-429. 9 refs.

An approach is suggested for developing a systematic method of analyzing human machine systems and for formulating a task-oriented model from the analysis results. The role of task taxonomies in systematic analysis is examined. Digital simulation of task-oriented networks is shown to be a useful technique for predicting performance characteristics of human machine systems. The process of task analysis is used to abstract a task-oriented description from an actual system. Task analyses are based, either implicitly or explicitly, on a 'view of the world' or task taxonomy. To the extent that the task taxonomy is explicitly defined and used, the task analysis is objective, repeatable, and complete. It is concluded that further research needs to be done to examine available taxonomies and determine which produce the best results or under which conditions certain taxonomies might be used. B.J.

A82-22947 The finite intersection test - A new multivariate statistical technique applicable to the evaluation of complex systems. J. M. Reising (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH) and P. R. Krishnaiah (Pittsburgh, University, Pittsburgh, PA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 453-457. 5 refs. Grant No. AF-AFOSR-77-3239.

In complex human-machine systems, multidimensional behavior is required of the operator. Consequently, there is no commonly-accepted, single measure of operator performance which can be utilized to determine the efficiency of the human-machine interaction. Because the behavior is multidimensional, multivariate statistics must be used to analyze the multiple measures gathered during system evaluation. While multivariate analogues to analysis of variance (ANOVA) exist, there are also a number of candidate multivariate analogues to the post-ANOVA simultaneous comparison tests. This paper describes a newly developed multivariate, simultaneous comparison test - Finite Intersection Test (FIT) - and provides an example of FIT's application to the analysis of multivariate data. (Author)

A82-22948 An integrated approach to pilot performance evaluation. R. L. Hockenberger and J. M. Childs (Seville Research Corp., Pensacola, FL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.
Santa Monica, CA, Human Factors Society, Inc., 1980, p. 462-465.

The issue of norm- versus criterion-referenced evaluation methods is discussed in the context of undergraduate pilot training, and an approach that integrates both methods is described. It is suggested that such an integrated approach would facilitate advanced training management concepts such as proficiency advancement, but would not pose significant user acceptance difficulties. (Author)

A82-22949 Legibility of smoke-obscured emergency exit signs. P. G. Rasmussen, B. P. Chesterfield, and D. L. Lowrey (FAA, Civil Aeromedical Institute, Oklahoma City, OK). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 476-479. 10 refs.

Internally self-illuminated emergency exit signs were investigated to determine the effects of size and background luminance levels on overcoming the visual degradation resulting from the presence of smoke in the visual environment. The results indicate that increased size and background luminance levels can be effective, though inefficient, methods for improving legibility in the presence of dense smoke. (Author)

A82-22950 Finding a needle in a haystack when you've never seen a needle - A human factors analysis of SETI. T. Blake (California State University, Northridge, CA) and J. C. Baird (Dartmouth College, Hanover, NH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 492-496.

An analysis of some key human factors aspects of NASA's SETI (Search for Extraterrestrial Intelligence) program is presented. The results of some preliminary studies in human discrimination and recognition of patterns embedded in gaussian noise fields where the nature of the signal is unknown are discussed. A strategy for employing human pattern recognition capabilities in the SETI context, or in similar applications where signal attributes cannot be determined apriori, is offered. (Author)

A82-22951 Bivariate response distributions in visual detection and discrimination. L. A. Olzak (California, University, Los Angeles, CA). In: Human Factors Society, Annual Meeting, 24th,

Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 502-506. 5 refs.

Two patterns can sometimes be discriminated from one another better than they are detected. A Signal Detection analysis of the information used to perform these psychophysical judgments suggests that properties exist in the visual system which favor the ability to discriminate over the ability to detect. Two candidate properties are inhibition and/or correlated noise between tuned spatial frequency analyzers. The extent to which such processes occur is reflected by the parameters defining sensory response distributions in a Signal Detection model of pattern perception. A method by which these parameters can be estimated is described, and several alternative response spaces are discussed. (Author)

A82-22952 Model of visual detection and discrimination. J. P. Thomas (California, University, Los Angeles, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 507-510. 6 refs. Grant No. NIH-EY-360.

A model of visual detection and discrimination is presented which incorporates recent concepts of multiple, spatially-tuned channels. Predictions about performance on detection and discrimination tasks are derived and supporting data presented. The predictions and data are inconsistent with threshold-type models. (Author)

A82-22953 Required performance levels for autocueing devices. D. C. Fulkerson (Hughes Aircraft Co., El Segundo, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 511-515. Research supported by the Hughes Aircraft Co.

Acquisition of tactical targets embedded in synthetic aperture radar (SAR) imagery was examined in this study. Experienced radar operators saw static scenes with either nine, five, two, or zero possible targets annotated, representing the application of three hypothetical autocueing devices and a no-autocueing baseline condition. In the autocueing conditions, the true target was always annotated, along with a variable number of false alarms, based upon the sophistication of the hypothesized autocuer. With time and probability performance measures taken, a significant improvement in target acquisition behavior was achieved only with the most sophisticated autocuer. This was most evident for the more difficult target types. (Author)

A82-22954 Is image quality important. C. P. Greening (Northrop Corp., Hawthorne, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 516-520. 12 refs. Contract No. N60530-78-C-0188.

The problem addressed by the study was to explore the feasibility of predicting air-to-ground target acquisition performance with electro-optical systems, based on 'real world' data, in terms of specifiable, measureable, sensor image quality characteristics. The approach was to review flight test and simulator test results, rejecting those which did not permit comparison of different image qualities under similar conditions. The surviving data sets did not, in general, use comparable measures of either image quality or performance. Consequently, a review of the relevant measures of those variables was also made. To the limited extent permitted by the data, it can be stated that (1) poor image quality sets performance limits, and (2) further improvement of adequate imagery results in rapidly diminishing benefits. (Author)

A82-22955 Enhancement processes in the visual detection of barely perceptible targets. M. Williams, N. Weisstein, and J. Brown (New York, State University, Buffalo, NY). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 521-525. Abridged.

Experiments are described in which six context patterns yielded significantly different ratings of perceived depth and three context patterns yielded significantly different ratings of perceived connectedness. Observers judged which of two target lines was presented; the line was briefly flashed by itself or was accompanied by one of the nine context patterns. The context pattern appeared simultaneously or followed the target after 30 to 270 msec. Results show that both the variations in perceived depth and the variations in perceived connectedness produced differences in metacontrast functions. Visual response to different spatial frequencies was also tested by blurring the stimuli, thereby diminishing visual response to high spatial frequencies. Results show that blurring the stimuli had striking effects on the temporal functions of accuracy versus delay of the context patterns varying in perceived depth (metacontrast functions): the functions for the patterns rated higher in depth became more like those for the flatter patterns. C.R.

A82-22956 Flight parameters and observer performance in RPV target acquisition. H. Mutschler (Fraunhofer-Institut für Informations- und Datenverarbeitung IITP, Karlsruhe, West Germany). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 526-530. 5 refs. Research supported by the Bundesministerium der Verteidigung.

Observer's performance in a situation simulating real-time air-to-ground reconnaissance by means of a remotely piloted vehicle (RPV) has been investigated as a function of flight altitude, speed, line of sight of the sensor, and frame rate. Variations of flight and optic parameters within the limiting conditions of high speed and low-level flight result in only slight variations of observer target acquisition performance. However, from the military point of view, the resulting detection rates of 10-50% are too low. This can be corrected by reducing target uncertainty (multiple reconnaissance missions) or by combining observers in a team. V.L.

A82-22957 Effects of video bandwidth compression processing on operator performance in the Mini-RPV system. A. K. Agin (Hughes Aircraft Co., Display Systems Dept., El Segundo, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 531-535. Grant No. DAAB07-78-C-2415.

The purpose of this study was to evaluate operator target detection and recognition performance under realistic conditions to provide design information for the Army Mini-RPV (Remotely Piloted Vehicle) system. Bandwidth compression, atmospheric attenuation, target numerosity, target aspect angle, target type, and background complexity were investigated. The tasks included detection and recognition of realistic tactical vehicle targets with a 256 by 262 element video system. There were five bandwidth compression levels with respect to a 3.02 megabit per second uncompressed rate. Detection performance was significantly degraded at a 15:1 compression ratio, and recognition was degraded at a 7.5:1 compression ratio. Both target numerosity and aspect angle were associated with significant differences in performance. Atmospheric attenuation, target type and background complexity effects were not statistically significant. (Author)

A82-22958 Canopy induced displacement evaluation. M. L. Frazier (USAF, Flight Test Center, Edwards AFB, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 552-556.

The optical properties of an aircraft canopy are examined with reference to the target displacement caused by the curved canopy, eye position effect on target displacement, and elevation displacement effects on air-to-air and air-to-ground weapons delivery. It is found that the average absolute target displacement increases with the viewing height and that there is a considerable parallax between the right and left eyes at 1 in. below design eye position. It is concluded that the integrated effects of pilot eye position, head-up display symbology, and canopy optics must be evaluated early in the system acquisition process. V.L.

A82-22959 Operational performance measures for air combat - Development and application. A. P. Ciavarelli, A. M. Williams, and F. Krasovec (Dunlap and Associates, Inc., La Jolla, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings.

Santa Monica, CA, Human Factors Society, Inc., 1980, p. 560-564. 10 refs. Contracts No. N61339-77-C-0167; No. N61339-78-C-0136.

The development, operation, and effectiveness of the Navy Tactical Aircrew Combat Training System (TACTS) are reviewed. TACTS was developed to use operational aircraft mock-ups to simulate realistic dogfights which could be recorded, monitored, and graded. Reference scores were developed to score missile hits as a measure of task accuracy, to measure and set group performance standards, and to set standards for detection of targets and overall engagement outcomes. Best and worst case scenarios have been detailed for kill or be killed results in terms of percentages of success due to radar sighting or not, or first shot or not. Pilots undergoing TACTS training are also provided with data from the Performance Asessment and Appraisal System, which allows comparison between their actions and responses with statistically determined optimum performance parameters. M.S.K.

A82-22960 Operational performance measures for carrier landing - Development and application. C. A. Brictson, S. T. Breidenbach (Dunlap and Associates, Inc., La Jolla, CA), and G. R. Stoffer (U.S. Navy, Naval Training Equipment Center, Orlando, FL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 565-567. 17 refs. Contract No. N61339-75-C-0105.

Fifteen years of carrier landing performance criteria development and applications are described. An offshoot of the research resulted in the emergence of an automated performance measurement and appraisal system designed to enhance the effectiveness of night carrier landing. (Author)

A82-22961 Development and inflight testing of a multimedia course for instructing navigation for night nap-of-the-earth flight. B. A. Smith (Canyon Research Group, Inc., Fort Rucker, AL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 568-571. 7 refs.

This paper describes the development and evaluation of a course of instruction to train Army aviators to navigate during flight operations at nap-of-the-earth (NOE) altitudes at night. The course was developed to provide instruction in map interpretation and terrain analysis using both unaided (naked eye) and aided (Night Vision Goggles) vision, and incorporated lecture, textual, and visual materials. Evaluation of the course was carried out in the UH-1 helicopter flying at NOE altitudes at night. Results of the evaluation indicated that a group of student pilots who received instruction in the course navigated at night along an NOE route with significantly more accuracy than did a control group. Implications of these results for training NOE night navigation are discussed. (Author)

A82-22962 Cognitive styles and the acquisition of a complex aerial maneuver. J. M. Koonce and T. M. McCloy (U.S. Air Force Academy, Colorado Springs, CO). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 578-580. 6 refs.

Approximately equal number of male (45) and female (43) Air Force Academy cadets learned a complex aerial maneuver (chandelle) on a desk-top flight simulator. Prior to the introduction of the complex maneuver all subjects were trained to criterion level on four basic instrument flight maneuvers. Then they learned how to fly the complex maneuver with the number of trials required to reach criterion performance as the dependent variable. Results indicated cognitive factors were very significant in predicting complex maneuver performance. Additionally, individually tailoring the regression equations by sex as opposed to utilizing a general overall regression equation greatly enhanced predictive capability. (Author)

A82-22963 The effects of social facilitation on vigilance performance. K. Unger, C. G. Halcomb, R. P. McGlynn (Texas Tech University, Lubbock, TX), M. G. Copeland (TRW, Inc., Redondo Beach, CA), and J. T. Roth (Applied Science Associates, Valencia, PA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 595-599. 14 refs.

Two experiments were conducted to determine if vigilance performance could be reliably improved by the presence of potentially evaluative or nonevaluative coactors, and to examine differential predictions regarding the necessary conditions for social facilitation. Neither the mere presence of a coactor nor the presence of evaluation potential was found to improve performance. (Author)

A82-22964 Theories of vigilance - A modern perspective. M. Loeb (Louisville, University, Louisville, KY) and E. A. Alluisi. In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 600-604. 45 refs.

Principal theories of vigilance are categorized in terms of learning, neurological, psychophysical, and information processing models. Inhibition and reinforcement theories are reviewed in the light of available experimental evidence, and the difficulties inherent in observing all observing responses are noted. Arousal and habituation neurological models are examined, with mention made of the multidimensional nature of cortical rhythms associated with arousal. Psychophysical models comprise expectancy and probability matching scenarios, with experimental results indicating that expectancy of stimulus causes a decrement in performance due to fewer stimuli than expected or predicted. Finally, information processing models are considered in terms of a filter theory and channel capacity, with the observation that high rates of information loading eventually cause performance decrements which are different from those of habituation criteria. M.S.K.

A82-22965 New approaches to the electrophysiological characterization of vigilance behavior. J. C. Miller (Human Factors Research, Inc., Goleta, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 608-610. 11 refs.

Justifications for two expanded approaches to the assessment of the physiological correlates of vigilance behavior are presented. The approaches include the consideration of heart rate within the context of cardiovascular function and the short-epoch analysis of the spontaneous EEG. (Author)

A82-22966 Recognition of VDU presented colors by color defective observers. H. Bergman and F. Duijnhouwer (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 611-615. 10 refs.

In order to determine the extent to which color defective observers are able to recognize colors presented on a VDU, a choice reaction time experiment was carried out. The experiment determined the effect of advance training, stimulus size and simultaneous color contrast on the performance of subjects, segregated into groups according to the nature of their color vision defect. Analysis of the data shows that type of color vision defect and the simultaneous color contrast influence the number of errors made by the subjects. Suggestions for future experiments and for the possible improvement of performance are given. (Author)

A82-22967 Eyes and glass curtains - Visual accommodation, the Mandelbaum effect, and apparent size. R. A. Benel (Illinois, University, Urbana, IL). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 616-620. 8 refs. Contract No. F49620-77-C-0117.

During vehicle operation visual acquisition of information frequently occurs through an interposed surface, e.g., a windscreen. Then the eye may focus either the windscreen or the distant object. Circumstances have been documented where the interposed surface provides a more or less obligatory stimulus to accommodation. The apparent size of an object has been shown to relate to accommodation distance. These experiments investigated the relationship between the trapping of accommodation at a near distance (Mandelbaum effect) and changes in the apparent size of an object. In experiment I, 24 observers reported smaller size with nearer accommodation and larger apparent size with farther accommodation at a better than chance rate. The 12 observers in experiment II showed a consistent diminution of mean apparent size of an object as a screen was moved nearer to them. These two situations provide

interposed texture analagous to windscreens. The implications for vehicle control are discussed. (Author)

A82-22968 **Scaling of perceived optical distortion.** F. E. Ward and D. F. Quinn (Wright State University, Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 622-625.

Two studies have been carried out to explore scaling of patterns that stimulate optically induced visual distortions. In the first study, subjects rank-ordered computer-generated sine wave patterns in order of distortion severity. The rankings corresponded to the physical parameters of frequency and amplitude. In the second study, all possible pairs of 48 stimuli were rated on a dissimilarity index. The data were analyzed by a nonmetric multidimensional scaling procedure. It is found that a third dimension, that is best described as 'waviness' or 'flat versus depth', is necessary, in addition to frequency and amplitude, to adequately describe the data. V.L.

A82-22969 **Effect of the Circutone seat on hemodynamic, subjective and thermal responses during prolonged sitting.** E. Shvartz, J. G. Gaume, R. T. White, R. C. Reibold (Douglas Aircraft Co., Long Beach, CA), and E. J. Glassford (Mercy Hospital and Medical Center, San Diego, CA). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 639-642. 5 refs.

Seven young men were administered a series of tests during 5 hours of quiet sitting performed two times on two different days. On one day, a massage-type seat cushion was used for 14 min/hour. Hemodynamic responses (measured by an impedance plethysmograph), skin temperature, body weight, urine changes and subjective reactions were noted. Changing from supine to sitting brought on decreases in stroke volume and leg blood flow and blood pooling in the calf and thigh. When the seat cushion was not activated, 5 hours of sitting resulted in a continuous decrease in calf blood flow and in an increase in calf venous pooling; increase in blood pressure and stable cardiac output; very low urine output and a large increase in skin temperature discomfort. The seat cushion caused a substantial exchange of the stagnant blood in the calf and thigh; a tendency to increase calf and thigh blood flow and decrease calf and thigh venous pooling; and less subjective discomfort sensations. The results indicate that the principal adverse hemodynamic effect of prolonged sitting is blood pooling in the lower legs, which, however, is compensated by an increase in blood pressure. C.R.

A82-22970 **The effects of left hand fatigue on right hand performance.** M. E. Benton and R. P. Bateman (Texas A & M University, College Station, TX). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 643-646.

Twenty-five subjects performed tracking tasks with the right arm before and after cranking a bicycle ergometer with the left arm. Three experimental conditions consisted of cranking the ergometer for 60, 90, and 120 seconds. The results indicate there was a significant decrement in tracking performance the first ten seconds after each of the cranking periods. By thirty seconds after cranking, tracking performance returned to pre-cranking level for each of the conditions. The decrement was not attributable to heart rate or breathing rate increases which remained for periods of up to five minutes. The crossover fatigue effect warrants further study. (Author)

A82-22971 **Some current issues in workload assessment.** F. T. Eggemeier (Systems Research Laboratories, Inc.; Wright State University, Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 669-673. 15 refs.

Two current issues related to operator workload assessment include the effects of operator strategy on levels of load experienced by the operator and the nature of operator information processing capacities and resources. Several current positions related to each of these issues are presented, and implications for workload assessment are discussed. It is concluded that workload is a multidimensional construct which requires the development of an assessment battery which should include subjective, performance-based, and physiological measures. (Author)

A82-22972 **Enhancing operator acceptance and noninterference in secondary task measures of workload.** C. A. Shingledecker (Systems Research Laboratories, Inc., Dayton, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 674-677. 7 refs.

A serious disadvantage of many available secondary task measures of operator workload is that they are difficult to employ during later stages of system design and evaluation. Common problems with traditional laboratory tasks include poor operator acceptance and the potential for intrusion on primary tasks. Two methods designed to overcome these limitations are being investigated at the Air Force Aerospace Medical Research Laboratory. In order to improve integration of the measurement task with the operator's duties, realistic aircraft radio communications activities have been developed as secondary tasks. Analytical and subjective methods have been employed to develop communications tasks with scaled workload values. A second project has focused on further development of the interval production task as a workload metric. This task has minimal response requirements and appears to act as an index of load rather than a reserve capacity test. (Author)

A82-22973 **Steady state average evoked potentials as a measure of tracking difficulty.** G. F. Wilson (Systems Research Laboratories, Inc.; Wittenberg University, Springfield, OH). In: Human Factors Society, Annual Meeting, 24th, Los Angeles, CA, October 13-17, 1980, Proceedings. Santa Monica, CA, Human Factors Society, Inc., 1980, p. 678-680.

The utility of steady state average evoked potentials (AEPs) to measure the difficulty of a tracking task will be reported. Medium (14 Hz) and high (50-56 Hz) frequency sine wave modulated light was used to evoke steady state AEPs while subjects performed a tracking task. Three levels of difficulty, based upon each subject's ability, were used in the single axis visual tracking task. The phase lag between stimulus input and the AEP waveform was found to be significantly related to task difficulty. Increasing difficulty levels were associated with greater amounts of phase lag of the AEPs during the high frequency stimulation. Neither the phase lag nor the amplitude of the medium frequency AEPs were significantly affected by the level of tracking difficulty. Each subject was found to have one particular frequency of stimulation in the high range which produced an enhanced AEP amplitude. This suggests that researchers using high frequency stimulation with sine wave modulated light should test each subject to find the frequency which produces the maximal amplitude. (Author)

A82-22976 * **Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979.** Edited by J. Billingham (NASA, Ames Research Center, Extraterrestrial Research Div., Moffett Field, CA). Cambridge, MA, MIT Press, 1981. 478 p. $20.

Papers are presented concerning the nature and distribution of life in the universe, particularly in the areas of the origins of life, life-supporting environments, the evolution of life in the Galaxy, and the detectability of technological civilizations. Specific topics include a preliminary discussion of the role of life in the universe, followed by examination of the role of water in thin films and cold environments in the origin of life, the relation between atmospheric composition and evolution, the possibility of planetary orbits in multiple star systems, and the prospects for detecting extrasolar planetary systems. Attention is also given to the origin of protein synthesis, the evolution of intelligence in multicellular organisms, the manifestations of advanced civilizations, and plans and principles for SETI. A.L.W.

A82-22978 * # **Organic chemical evolution.** S. Chang (NASA, Ames Research Center, Moffett Field, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 21-46. 14 refs.

The course of organic chemical evolution preceding the emer-

gence of life on earth is discussed based on evidence of processes occurring in interstellar space, the solar system and the primitive earth. Following a brief review of the equilibrium condensation model for the origin and evolution of the solar system, consideration is given to the nature and organic chemistry of interstellar clouds, comets, Jupiter, meteorites, Venus and Mars, and the prebiotic earth. Major issues to be resolved in the study of organic chemical evolution on earth are identified regarding condensation and accretion in the solar nebula, early geological evolution, the origin and evolution of the atmosphere, organic production rates, organic-inorganic interactions, environmental fluctuations, phase separation and molecular selectivity. A.L.W.

A82-22979 # **Sulfur - Fountainhead of life in the universe.** B. C. Clark. In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 47-60. 26 refs.

The important role of sulfur and sulfur compounds in biology, planetary evolution and the universe as a whole is discussed, and the possibility of the existence of sulfur-based life in otherwise inhospitable environments is considered. The high abundance of sulfur, which is produced during explosive oxygen burning in supernovas, in the universe is noted, and its roles in the evolution of the earth and other planets, and in biological energetics and enzyme catalysis are examined. The significance of the discovery of small, isolated, ecosystems at the mouths of active hydrothermal vents in the Galapagos rift zone for the existence of chemoautotrophs using sulfur as an energy source is considered, and it is concluded that chemoautotrophy based on sulfur may allow the widening of the zone about each star believed capable of supporting life. A.L.W.

A82-22980 # **Role of interfacial water and water in thin films in the origin of life.** D. M. Anderson (New York, State University, Buffalo, NY). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 61-74. 16 refs.

The properties of clay-water interfaces at low temperatures are examined in view of the probable importance of such regions in abiotic syntheses of the chemical precursors of cellular life. Particular attention is given to the structure and formation of the liquid-like layers at ice-ice, ice-air, silicate-water-air, silicate-water-silicate and silicate-water-ice interfaces at temperatures below 0 C, and the great physical and chemical diversity of these interfaces is pointed out. It is shown that water film environments could have supported a wide variety of organic reactions important in the origin of life due to the stabilizing presence of clay substrates, the catalytic properties of the clay surfaces, the various geometrical characteristics of the clay surfaces and the presence of liquid phase at relatively high water activities below the freezing point of water. A.L.W.

A82-22981 * # **Atmospheres and evolution.** L. Margulis (Boston University, Boston, MA) and J. E. Lovelock (Reading, University, Reading, Berks., England). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 79-100. 24 refs. Research supported by Boston University and Guggenheim Foundation; Grant No. NGR-22-004-025.

Studies concerning the regulation of the earth atmosphere and the relation of atmospheric changes to the evolution of microbial life are reviewed. The improbable nature of the composition of the earth atmosphere in light of the atmospheric compositions of Mars and Venus and equilibrium considerations is pointed out, and evidence for the existence of microbial (procaryotic) life on earth as far back as 3.5 billion years ago is presented. The emergence of eucaryotic life in the Phanerozoic due to evolving symbioses between different procaryotic species is discussed with examples given of present-day symbiotic relationships between bacteria and eucaryotes. The idea that atmospheric gases are kept in balance mainly by the actions of bacterial cells is then considered, and it is argued that species diversity is necessary for the maintenance and origin of life on earth in its present form. A.L.W.

A82-22982 # **Origin and evolution of continents and oceans.** K. K. Turekian (Yale University, New Haven, CT). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 101-110. 21 refs.

The growth histories and origins of the continental and oceanic crust and oceanic basins on earth are discussed. Isotopic constraints on the origin of crustal and midocean ridge materials are examined, and it is noted that heat generated by the radioactive decay of U, Th and K must have been the driving force for the transformation of undepleted mantle into depleted mantle by the formation of continental crust. The question of whether the oceans are increasing in volume is considered, and it is contended that water and other volatiles were released to the surface early in the history of the earth, so that there need be no correlation with continental crust formation and the volumetric growth of the oceans. Finally, the apparent age of the continents (3.8 billion years) is attributed to the destruction of continental crust upon reinjection into the mantle at a time when mantle resorption was more efficient than presently. A.L.W.

A82-22986 # **Constraints on early life by earth's accretional and preaccretional development.** G. Arrhenius (California, University, La Jolla, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 125, 126. Abridged.

Despite the importance of the thermal state of the earth and the properties of the primordial ocean-atmosphere system for the origin of life, the accretionary history and early evolution of the earth remain hypothetical. Recent exploration of the moon, Jupiter and the terrestrial planets including the earth has, however, clarified some earlier limitations on the primordial earth environment and uncovered new information with a direct bearing on the problem. The observational framework supports a variety of accretional hypotheses, leading to drastically different early states but all sharing such common concepts as evolution via planetesimals and with sterilizing and pyrolyzing runaway accretion at some stage. Future space exploration should further narrow the range of possible states for the early earth and other planets. A.L.W.

A82-22991 # **Transfer RNA and the origin of protein synthesis.** A. Rich (MIT, Cambridge, MA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 211-228. 19 refs.

The current state of knowledge regarding the developments which led to the establishment of life on this planet is briefly reviewed. One of the central research goals is the definition of the physical nature of the interactions which occur between messenger RNA (mRNA) and transfer RNA (tRNA). Investigations regarding the structure of tRNA are considered, taking into account studies conducted with yeast phenylalanine tRNA. Attention is given to hydrogen bonding and base stacking, tRNA in solution, initiator and chain-elongation transfer RNAs, and the mechanism whereby nature differentiates between different tRNA species during aminoacylation. It is concluded that there are currently no convincing models for the origin of polynucleotide-directed polypeptide formation. However, it is believed that the molecular mechanics of mRNA reading in the ribosome as well as peptide bond formation may provide a clue to its origin. G.R.

A82-22992 # **Emergence and radiation of multicellular organisms.** J. W. Valentine (California, University, Santa Barbara, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 229-257. 41 refs.

An attempt is made to assess the factors which led to the origin of major (phylum-level) multicellular grades and ground plans. The question is considered whether an evolution of multicellular grades starting a second time under the same conditions would lead to the same results. Attention is also given to the results of an evolution repeated under different environmental conditions as on another planet. The fossil record of metazoan body plans is discussed along with aspects of macroevolution and microevolution, scenarios of quantum events in evolution, and the general case of multicellular evolution. It is concluded that macroevolution is probably a universal feature of life. Macroevolutionary factors should affect multicellular diversification patterns on other worlds, much as they do on earth, although the results would vary with environmental conditions. Microevolution, however, might be an entirely different matter elsewhere. G.R.

A82-22993 # **Speculations on the evolution of intelligence in multicellular organisms.** D. A. Russell (National Museum of Natural Sciences, Ottawa, Canada). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 259-275. 56 refs.

An understanding of the factors which can affect the evaluation of intelligence is important in evaluating the Cosmos as a home for intelligent organisms. The brain is the organ of intelligence. There is evidence of a correlation between brain size and intelligence. On earth, more than 700 million years elapsed between the appearance of multicellular metazoans and Homo sapiens. In order to discover to what extent encephalization rates may have changed during this interval, an investigation is conducted regarding the distribution of the highest levels of encephalization through time. The biology of encephalization is discussed, taking into account temperature, time, biogenic environmental diversity, area, mass extinctions, adaptation, trophic level, metabolism, dimensional complexity, and parental care. It is concluded that for the development of intelligent organisms, the general environmental framework of a planet should resemble that of earth during the past half-billion years. G.R.

A82-22994 # **Evolution of technological species.** B. Campbell (L.S.B. Leakey Foundation, Pasadena, CA). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 277-285.

The term 'technological species' is used to denote any species of animal which employs tools. It is pointed out that the use of tools is not confined to man. Examples include the Galápagos finch Cactospiza, which uses a cactus spike to poke out insects embedded in the branches or trunks of trees. A brief review of terrestrial technology is conducted. The development of facilities and fire was critical in the establishment of a metal technology. Adequate resources derived from agriculture were essential for the development of advanced technology. At all stages, the ratio of cost to reward had to be small and the technological development had to follow an appropriate cultural preadaptation. Attention is given to the factors which made this development possible, taking into account the evolution of social groups. In an extraterrestrial context, a description is given of the characteristics to be expected in the case of organisms with radiotelescopes. G.R.

A82-22996 # **Biochemical keys to the emergence of complex life.** K. M. Towe (Smithsonian Institution, Washington, DC). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 297-306. 40 refs.

If there is intelligent life elsewhere in the universe, it will probably be of the complex multicellular type. The considered investigation is concerned with the fundamental importance of two protein amino acids to the development of complex multicellular life on earth, taking into account hydroxyproline and hydroxylysine. The absence of these acids from the genetic code implies that they are relatively new with respect to biological evolution. It is found that the two amino acids are widely distributed among the higher forms of life but are generally absent from lower organisms. The evolution of the capacity for complex multicellular development on earth required over 2 billion years. This length of time appears to be good evidence that no combination of the 20 coded amino acids could be found that could produce a structural protein comparable to the extensin-collagen family. The development of entirely new amino acids was the real key to opening the way for complex multicellularity. G.R.

A82-22997 * # **Gravity, lignification, and land plant evolution.** S. M. Siegel, B. Z. Siegel, and J. Chen (Hawaii, University, Honolulu, HI). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 307-316. 22 refs. Grant No. NGR-12-001-053; Contracts No. NASw-767; No. NAS2-6624; No. NAS2-8687.

Vascular plants began their occupation of the wetlands interfacing both terrestrial and marine environments at some point in early Paleozoic time. Chemical differences between green algae and vascular land plants are mainly related to an abundance of lignins in the land plants. Answers to questions relating to the phylogeny and adaptive significance of the lignins must depend on experiments and observations using contemporary plant material. A summary is provided of a series of such observations. It is found that the differences between modern Chlorophyta and vascular land plants cannot be explained in full on the basis of lignification alone. Nevertheless, the data point to the emergence of the primitive land populations into an oxygen-rich terrestrial world where the need for mechanical support and water conservation could be met by a single aerobic biochemical process connected to essential aromatic amino acids likely to be found in every cell. G.R.

A82-22998 # **Evolution of man and its implications for general principles of the evolution of intelligent life.** C. O. Lovejoy (Kent State University, Kent, OH). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 317-329. 28 refs.

An investigation regarding the probability of intelligent life on suitable planets must consider one basic question concerning the existence of fundamental evolutionary trends which led to the appearance of man. The question is studied by taking into account three specific aspects. One is concerned with questions regarding the natural evolution of biological systems toward more complex states. It is found that there is no such trend toward complexity. The second problem involves the relation between increased intelligence and aspects of survival and reproduction. It is shown that there is no a priori advantage to intelligence. The evolution of cognition is found to be the consequence of a series of highly specific evolutionary events whose ultimate cause is traceable to selection for unrelated characters such as locomotion and diet. The conclusion is reached that intelligence is not the product of a general trend. Man is, therefore, a highly specific, unique, and unduplicated species. G.R.

A82-23069 *Training for space.* G. L. Borrowman. *Spaceflight,* vol. 24, Mar. 1982, p. 129-132.

Specific aspects of training for space activities are reviewed, with particular attention paid to the experiences of the Soyuz crews, the make-up of the Shuttle crews, and to the presence of female astronauts. The basic Shuttle crew will consist of the commander, a pilot, and a mission specialist, who is usually a scientist, in addition to a payload specialist who will perform activities in a particular field of expertise, while otherwise having training in living, working, and responding to emergency situations in space. The negative effects of competitive personalities have been observed in spaceflight and current psychological profiling in choosing candidates for spaceflight are designed to avoid such traits. The choices of centile ratings for sizing spacesuits, window placements, and control reach distances are outlined, along with equipment necessities peculiar to women. M.S.K.

A82-23136 † **Modeling of the synthesis of peptide-like compounds in the primeval lithosphere of the earth (Modelirovanie sinteza peptidopodobnykh soedinenii v litosfere pervobytnoi zemli).** G. A. Lavrent'ev, L. Iu. Rakitin, T. F. Strigunkova, and I. A. Egorov (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 261, no. 5, 1981, p. 1263-1267. 11 refs. In Russian.

Experiments were performed to study the possibility of the synthesis of peptide-like structure from amino acids in the presence of mineral catalyzers in the case of moisture fluctuations at temperatures below the water-boiling point. The results suggest that the formation of polymer molecules of peptide structure on mineral catalyzer substrates was a widespread phenomenon on the primeval earth at early stages of the existence of the condensed-water phase. This makes it possible to conclude that a great deal of the primeval lithosphere was conducive to the abiogenic synthesis of organic molecules, involving polymerization with the aid of mineral catalyzers. B.J.

A82-23144 † **Changes in the activity of monoaminergic systems of the brain under conditions of adaptation to high altitude (Izmeneniia aktivnosti monoaminergicheskikh sistem mozga v usloviiakh adaptatsii k vysokogor'iu).** E. A. Gromova, V. A. Isabaeva, T. P. Semenova, T. M. Isakunova, and O. N. Li (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii

Vysokogor'ia, Frunze, Kirgiz SSR; Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 262, no. 1, 1982, p. 245-247. 12 refs. In Russian.

A82-23166 † **Phase characteristics of the response of the hypophysal-adrenal system under high-altitude conditions (Faznost' reaktsii gipofiz adrenalovoi sistemy v usloviiakh vysokogor'ia).** D. T. Musabekov, O. K. Kabiev, and Iu. G. Grigor'ev (Kazakhskii Institut Onkologii i Radiologii, Alma-Ata, Kazakh SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 20-24. 10 refs. In Russian.

The phases and rhythms of the adaptive responses of the hypophysis-adrenal cortex system to extended exposure to conditions of chronic altitude hypoxia are investigated in order to gain insight into the temporal organization of hormonal mechanisms of adaptation to high-altitude conditions. Variations in total body weight, hypophysal and adrenal weight, and peripheral blood plasma 11-oxycortocosteroid concentration were determined in rats during a 120-day adaptation period to altitude at Tian'-Shan' (3340 m), and controls kept at Alma-Ata (847 m). Phasic variations in these parameters are found which are characterized by various periods different from those of any natural or latent low-frequency biorhythms. Results may have practical applications in the selection of optimal adaptation schedules under chronic altitude hypoxia and the prediction of individual responses to extremal conditions. A.L.W.

A82-23167 † **Morphological changes in the hematopoietic organs of rats under the influence of adrenalin (Morfologicheskie izmeneniia v krovetvornykh organakh krys pod vliianiem adrenalina).** A. S. Khil'ko (Slavianskii Pedagogicheskii Institut, Slavyansk, Ukrainian SSR) and B. A. Kamenev (Bazovyi Sanatorii Donbass, Slavyansk, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 40-45. 12 refs. In Russian.

Morphological changes in the bone marrow, spleen and lymph nodes resulting from injection of small doses of adrenalin are investigated as a model of the nonspecific stress response in rats. Changes in peripheral blood leucocyte contents were determined 2 h after the injection of adrenalin at a dose of 0.25 mg/kg, and compared with tissue morphologies. The injection of adrenalin is found to induce real changes in peripheral blood leukocyte composition consisting of varying degrees of either leucocytosis or leukopenia and a redistribution of the levels of each type of leucocyte. Changes in leucocyte composition are reflected by changes in the morphology of the blood-forming organs, which are characterized by an activation or suppression of blood formation in the leucocytotic and leukopenic reactions, respectively. Functional and morphological changes in response to adrenalin injection are thus capable of serving as a model of the disturbances brought about by stress states. A.L.W.

A82-23168 † **The condition of certain glycolytic and tricarboxylic acid cycle enzymes in intact and denervated skeletal muscles of the rat during cooling (Sostoianie nekotorykh fermentov glikoliza i trikarbonovogo tsikla v intaktnykh i denervirovannykh skeletnykh myshtsakh krys pri okhlazhdenii).** L. F. Shcherbak (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 46-51. 19 refs. In Russian.

A82-23169 † **Analysis of the effects of isoprenaline on the energy consumption of skeletal muscle (Analiz deistviia izoprenalina na energotraty skeletnoi myshtsy).** N. I. Putilin, A. G. Kozlov, Iu. Iu. Men'shikh, V. I. Zav'ialov, and G. S. Pekach (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 52-55. 14 refs. In Russian.

The kinetics of the action of the beta-adrenomimetic isoprenaline on energy consumption in a working skeletal muscle is analyzed in order to investigate its mechanism of action. Heat production, work capacity and energy efficiency were measured as a function of the dose of isoprenaline as it varied between 5 x 10 to the -6th and 5 x 10 to the -9th g/ml in isolated preparations of the frog sartorius muscle. Nonlinear dose-response curves were obtained with extremum values at doses of 5 x 10 to the -8th and 5 x 10 to the -9th g/ml, which are attributed to desensitization by high doses of the drug. The results are used to derive values for the apparent Michaelis-Menten constant and the constant of substrate inhibition. It is noted that the condition of the muscle with respect to fatigue also determines the kinetics of adrenergic regulation. A.L.W.

A82-23170 † **The effect of small rectilinear sign-varying accelerations on the mucous membrane of the small intestine of dogs (Vliianie malykh priamolineinykh znakoperemennykh uskorenii na sostoianie slizistoi obolochki tonkoi kishki sobak).** T. V. Gladkii (Odesskii Gosudarstvennyi Universitet, Odessa, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 65-71. 20 refs. In Russian.

Experiments carried out on 26 mongrel dogs show that the small intestine undergoes functional changes when subjected to 30 min of rectilinear sign-varying accelerations. The activity of certain enzymes changes, and the lumen of the vascular network in the mucous membrane increases. The number of goblet cells, together with the quantity of secretions, also increases. C.R.

A82-23171 † **The role of the lung in the metabolism of vasoactive substances (Rol' legkogo v metabolizme vazoaktivnykh veshchestv).** O. G. Tishkin and N. A. Temur'iants (Simferopol'skii Gosudarstvennyi Universitet, Simferopol, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 80-85. 42 refs. In Russian.

Among the many well established nonrespiratory functions of the lung, the most important involve the metabolism of vasoactive substances. The present paper reviews the role of the lung in the inactivation of serotonin, noradrenalin, bradykinin and prostaglandins E1, E2 and F2 alpha, the activation of angiotensin I, and the synthesis of angiotensin II, histamine, prostacycline and the SRS-A and ECF-A components of anaphylaxis. The consequent importance of lung metabolism in the anaphylactic reaction and in the development of lung pathologies is pointed out. A.L.W.

A82-23172 † **The effects of cold on catecholamine fluorescence in several structures of the rat brain (Vliianie kholoda na fluorestsentsiiu katekholaminov v nekotorykh strukturakh golovnogo mozga krys).** G. I. Borodaevskaia (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 86-88. 12 refs. In Russian.

A82-23173 † **The response of the microstructure of the cerebral subcommisural organ to a change in light cycle (Reaktsiia mikrostruktur subkomissural'nogo organa mozga na izmenenie svetovogo rezhima).** L. P. Siziakina and E. S. Gul'iants (Rostovskii Meditsinskii Institut, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 88-90. In Russian.

A82-23174 † **Variation in catecholamine excretion in adolescents under mountain conditions (Izmenenie ekskretsii katekholaminov u podrostkov v usloviiakh vysokogor'ia).** N. N. Nagnibeda and I. M. Vorobei (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 91, 92. 14 refs. In Russian.

A82-23175 † **Use of botanical and vitamin preparations in the prevention of gastric ulcers induced in rats by immobilization, noise and vibration (Preduprezhdenie rastitel'nymi i vitaminnymi preparatami iazv zheludka, vyzyvaemykh vozdeistviem immobilizatsii, shuma i vibratsii, u krys).** N. P. Mashchenko, G. N. Lipkan, and G. N. Voitenko (Kievskii Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 28, Jan.-Feb. 1982, p. 103-106. 17 refs. In Russian.

A82-23244 * **The effects of cutting or of stretching skeletal muscle in vitro on the rates of protein synthesis and degradation.** M. J. Seider, R. Kapp, C.-P. Chen, and F. W. Booth (Texas, University, Houston, TX). *Biochemical Journal*, vol. 188, 1980, p. 247-254. 39 refs. Research supported by the Muscular Dystrophy Association of America; Grant No. PHS-AM-19393; Contract No. NAS9-15388.

Skeletal muscle preparations using cut muscle fibers have often been used in studies of protein metabolism. The present paper reports an investigation of the effect of muscle cutting or stretching in vitro on the rates of protein synthesis and/or degradation. Protein synthesis and content, and ATP and phosphocreatine levels were monitored in soleus and extensor digitorum longus muscles from the rat with various extents of muscle fiber cuts and following stretching to about 120% the resting length. Rates of protein synthesis are found to be significantly lower and protein degradation higher in the cut muscles than in uncut controls, while ATP and phosphocreatine

concentrations decreased. Stretched intact muscles, on the other hand, are observed to have higher concentrations of high-energy phosphates than unstretched muscles, while rates of protein degradation were not affected. Results thus demonstrate that the cutting of skeletal muscle fibers alters many aspects of muscle metabolism, and that moderate decreases in ATP concentration do not alter rates of protein concentration in intact muscles in vitro. A.L.W.

A82-23251 † The role of aldosterone in the regulation of the water and salt balance in hot-shop workers of the metallurgical industry (Ob uchastii al'dosterona v reguliatsii vodno-solevogo balansa u rabochikh goriachikh tsekhov metallurgicheskogo proizvodstva). V. I. Dorofeeva and A. K. Merzon (II Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Vrachebnoe Delo,* Oct. 1981, p. 104-106. 9 refs. In Russian.

A82-23252 † The pharmacology of ocular hemodynamics /Review/ (Farmakologiia gemodinamiki glaza /Obzor/). V. S. Iasnetsov, A. S. Bozhefatov, and N. M. Iasnetsova (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Mar.-Apr. 1981, p. 233-238. 89 refs. In Russian.

The effects of various pharmacological substances on ocular hemodynamics are reviewed in light of the importance of vascular disorders in the pathogenesis of distrophic retinal lesions and decreases in visual function. Particular attention is given to vasodilators with myotropic action, cholinomimetics and anticholinesterases, cholinolytic agents, adrenomimetics, adrenal and sympathetic blockers, local anesthetics, osmotic agents, hormonal preparations, oxygen, and individual substances including radioactive iodine, heparin, prostaglandins and fonurite. A.L.W.

A82-23253 † Changes in the temporal parameters of visual perception under the influence of psychostimulants (Izmenenie vremennykh parametrov zritel'nogo vospriiatiia v usloviiakh deistviia psikhostimuliatorov). N. K. Barkov and A. I. Machula (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Institut Obshchei i Sudebnoi Psikhiatrii, Moscow, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Jan.-Feb. 1981, p. 12-14. 5 refs. In Russian.

The effects of small doses of various psychostimulants on the temporal characteristics of visual perception in the cat are investigated. Experiments were performed within the framework of a conditioned response elicited by the presentation of visual stimuli of two types for periods from 500 to 4000 msec. The administration of phenamine (0.2 mg/kg), sydnocarb (1.5 mg/kg) or cocaine (0.5 mg/kg) is observed to increase the percentage of correct stimulus identifications for stimulus durations less than 3 sec, at which all identifications were correct in all circumstances. Catinon, at a dose of 0.5 mg/kg, on the other hand is observed to increase the exposure time required to achieve the same correct response rate. A.L.W.

A82-23254 † Influence of interactions of hearing and vibratory sensations on the masking effect (Vliianie vzaimodeistviia slukha i vibratsionnoi chuvstvitel'nosti na effekt maskirovki). M. L. Shapiro (I Gorodskaia Bol'nitsa, Nizhnii Tagil, USSR). *Vestnik Otorinolaringologii,* May-June 1981, p. 13, 14. In Russian.

The influence of interactions of hearing and vibratory sensation on the masking effect of low-frequency noise on auditory perception are investigated. Experiments were performed in which a sound conductor attached to a tuning fork at one end was held against the mastoid processes of subjects sitting in a quiet room or in a chamber with low-frequency background noise. Measurements of auditory thresholds made with the subject grasping and not grasping the sound conductor reveal that the vibratory sensations encountered upon hand contact with the conductor interact with auditory sensations to reduce the masking effects of low-frequency noise on the perception of tuning fork signals. Results may be useful in the understanding of the pathogenesis of noise and vibration induced damage to the auditory analyzer. A.L.W.

A82-23255 † Vestibulovascular responses in inner ear dysfunction (Vestibulososudistye reaktsii pri disfunktsii vnutrennego ukha). E. I. Petrova, L. Ia. Andriako, O. A. Buianovskaia, and I. Ia. Iakovleva (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* Nov.-Dec. 1981, p. 8-13. 12 refs. In Russian.

Results are presented of comprehensive studies of systemic circulation in patients suffering from attacks of systemic vertigo. Vestibular functions, blood biochemistry and circulatory condition as indicated by arterial pressure dynamics, blood systolic and minute volumes, peripheral resistance and pulse wave propagation rate were evaluated in graded angular acceleration tests on 30 patients with Meniere's disease, and 20 with similar diseases of the labyrinth, induced accompanying cervical osteochondrosis and autonomic vascular dystonia. Three classes of vestibulovascular responses to rotatory stimulation, are found, characterized by (1) increased heart rate and arterial pressure and decreased pulse pressure, analogous to the reactions of normal subjects; (2) reductions in large vessel tonus, pulse wave propagation rate and peripheral resistance and increases in systolic and minute blood volumes, indicative of an inadequate reaction; and (3) hemodynamic disturbances leading to a vestibular crisis. Results demonstrate the efficacy of hemodynamic studies in conjunction with vestibular stimulation in monitoring inner ear dysfunctions. A.L.W.

A82-23256 † Phase phenomena in the vestibular analyzer - Vestibular recruitment (Fazovye iavleniia v vestibuliarnom analizatore - Vestibuliarnyi rekruitment). N. S. Blagoveshchenskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii,* Nov.-Dec. 1981, p. 3-8. 10 refs. In Russian.

It is noted that underlying the concept of vestibular recruitment are vestibular reactions that are inadequate with respect to the strength of the irritation and that can be regarded as phase phenomena. These latter long ago received the attention of the classical school of Soviet physiology (equalizing, paradoxical, inhibitory phases). Since this recruitment is seen with both peripheral and central lesions of the analyzer, it is incorrect to consider its importance local. Vestibular recruitment is especially pronounced in breakdowns of compensating/adaptive mechanisms during the acute and subacute stages of illness. It is noted that electronystagmography makes it possible to accurately determine phase phenomena in the vestibular analyzer. C.R.

A82-23257 † Changes in the posture of healthy rats after the intracranial introduction of brain extracts from animals with experimental vestibulopathy (Izmeneniia pozy u zdorovykh krys posle intrakranial'nogo vvedeniia ekstraktov mozga zhivotnykh s eksperimental'noi vestibulodatiei). G. N. Kryzhanovskii, V. K. Lutsenko, M. Iu. Karganov, and V. I. Torshin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Oct. 1981, p. 404-406. 9 refs. In Russian.

The possibility of reproducing a pathological state in healthy animals with extracts from an injured brain is investigated on a model of experimental vestibulopathy. Unilateral lesions of the vestibular system are limited by the Deiters' nucleus. In certain cases hyperactivity is induced and in others the nucleus is broken down; this manifests itself in clinically different types of vestibulopathy. It is noted that, with the model used here, the vestibular rotation syndrome can be clearly seen. C.R.

A82-23258 † Energy-dependent transport of Ca/2+/ and lipid peroxidation in sarcoplasmatic reticular muscle membranes in hypokinetic rats (Energozavistimyi transport Ca/2+/ i perekisnoe okislenie lipidov v membranakh sarkoplazmaticheskogo retikuluma myshts krys pri gipokinezii). G. V. Chernysheva, V. I. Mel'nik, and G. G. Amarantova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Nov. 1981, p. 548, 549. 16 refs. In Russian.

A82-23259 † The condition of pulmonary surfactant and the ultrastructure of the blood-air barrier in acute hypoxia (Sostoianie legochnogo surfaktanta i ul'trastruktura aerogematicheskogo bar'era pri ostroi gipoksii). K. K. Zaitseva, V. I. Skorik, and S. A. Shliapnikova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Dec. 1981, p. 653-656. 18 refs. In Russian.

Results are presented of an evaluation of the condition of the pulmonary surfactant alveolar complex and the ultrastructure of the blood-air barrier under conditions of acute respiratory hypoxia. Lung samples were taken from dogs following 1.5-2 hours of artificial bradypnea and analyzed by histological, electron microscopic and biochemical techniques. The hypoxic dogs are observed to exhibit

tendencies towards an increased pulmonary coefficient and to be characterized by a decreased air bubble stability coefficient, a five-fold increase in minimum surface tension and a two-fold decrease in the surface tension stability index. Changes in the shape of the surfactant hysteresis loop are also observed, along with a decrease in phosphatidyl choline levels and an increase in lysophosphatidyl choline. Indications of emphysema, interalveolar septal thickening, epithelial cells and erythrocytes in the alveolar cavities, edema in the interalveolar septa and general signs of air-blood barrier deterioration are also found. Results are interpreted in terms of the peroxidation of the surfactant lipids, the impairment of barrier permeability, the filling in of septal space, and disturbances in type II pneumocyte function. A.L.W.

A82-23260 † Effects of gravitational atelectases on the expiratory closure of respiratory tracts (Vliianie gravitatsionnykh atelektazov legkikh na ekspiratornoe zakrytie dykhatel'nykh putei). M. A. Tikhonov and A. V. Kondakov. *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Dec. 1981, p. 663-666. 10 refs. In Russian.

The dynamics of the expiratory closure of respiratory tracts during gravitationally induced atelectasis are investigated in a study of the characteristics of regional pulmonary ventilation. Static and dynamic lung capacities, intrapulmonary gas compositions and expiratory airway closure were monitored in nine subjects undergoing centrifugation at +Gz forces of 2 to 8 g while breathing air or pure oxygen. In contrast to acceleration while breathing air, exposure to pure oxygen is found to lead to coughing and discomfort in most subjects, as well as decreases in total and respiratory lung capacities, and forced inspiratory capacity. Indications of ventilatory impairment of the restrictive type due to the appearance of transitory atelectases simultaneous with the development of peripheral bronchial obstructions is also obtained which may be explained by a biomechanical hypothesis. The ventilation impairments have important implications for the development of hypoxemia during acceleration. A.L.W.

A82-23261 † Preparation of purified erythropoietin from rabbit blood plasma (Poluchenie ochishchennogo eritropoetina iz plazmy krovi krolika). S. N. Osipova, V. V. Mezhevikin, and I. I. Gitel'zon (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Dec. 1981, p. 688, 689. 11 refs. In Russian.

A82-23262 † Characteristics of the lifting reflex in albino rats following prolonged space flight /Effects of weightlessness and artificial gravity/ (Osobennosti liftnoi reaktsii u belykh krys posle dlitel'nogo kosmicheskogo poleta /Vliianie nevesomosti i iskusstvennoi sily tiazhesti/). G. S. Aizikov, A. S. Markin, and A. V. Mokrousova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Dec. 1981, p. 722-725. 7 refs. In Russian.

The effects of prolonged space flight and rotation to simulate normal gravity on the lifting reflex in animals are investigated. The reflex, characterized by limb extension and elevation of the torso upon downward motion in the horizontal position, was evaluated in intact and labyrinthectomized rats before and after flight for 18.5 and 19.0 days on the Cosmos 936 and 1129 biosatellites under conditions of weightlessness or artificial gravity in an onboard centrifuge. Electromyography of the ocular and gastrocnemius muscles and observation of the mechanical component of muscle reaction reveal the lifting reflex to be present in all animals post flight, although the latent time of the reflex as indicated by the mechanical component increased significantly in uncentrifuged animals. A significant weakening of the jump readiness reflex upon downward motion in the head-down position is also observed in rats having experienced artificial gravity or weightlessness. Results suggest that the initial vestibular and conductive stages in the reflex remain unaltered by weightlessness, which instead influences muscular function. A.L.W.

A82-23263 † Reactive changes in autonomic synapses upon frequency electrostimulation (Reaktivnye izmeneniia vegetativnykh sinapsov pri ikh chastotnoi elektrostimuliatsii). O. S. Sotnikov, Iu. P. Pushkarev, and G. A. Zolotareva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Dec. 1981, p. 743-747. 14 refs. In Russian.

Modifications to peripheral autonomic nervous system synapses occurring as a result of high-frequency orthodromal electrical stimulation are investigated in relation to the colloid-chemical transformations of the synaptoplasma produced. Vital phase-contrast microscopy, vital staining and electron microscopy were performed of isolated neurons in the vagosympathetic trunk of the frog and the cervical sympathetic ganglion of the cat during electrical stimulation at a frequency from 20 to 60 pulses/sec for 5-15 min, as well as in electrophysiological controls. Results reveal a rounding of the synaptic buds, an increase in their sizes and a decrease in optical density, decreases in the numbers of dye granules, and a decrease in the numbers of light synaptic vesicles accompanied by the appearance of osmiophilic, myelin-like bodies, dense-core vesicles and glycogen-like granules. The structural changes appearing during the course of electrical stimulation are explained in terms of changes in the colloidal chemistry of the synaptoplasma. A.L.W.

A82-23264 † The blood plasma protein spectrum of dogs under treatment for hypoxia with the membrane oxygenator Sever-OMR (Belkovyi spektr plazmy krovi sobak v usloviiakh lecheniia gipoksii s pomoshch'iu membrannogo oksigenatora 'Sever-OMR'). V. I. Skorik, E. S. Safonova, B. M. Zelikson, T. V. Bykova, and T. M. Malikova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Mar. 1981, p. 277-279. 11 refs. In Russian.

A82-23265 † The effects of immobilization of mice of various radiation sensitivities and the shielding of portions of their bone marrow on survival rate and the formation of splenic colonies following irradiation (O vliianii immobilizatsii myshei raznoi radiochuvstvitel'nosti i ekranirovaniia u nikh chasti kostnogo mozga na vyzhivaemost' i obrazovanie kolonii v selezenke posle oblucheniia). N. F. Gronskaia and G. S. Strelin (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgeno-Radiologicheskii Institut, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Nov. 1981, p. 544, 545. 8 refs. In Russian.

A82-23266 † A method for the study of the pharmacodynamics of antianginal drugs with the use of repeated exercise tests (Metod izucheniia farmakodinamiki antianginal'nykh preparatov s pomoshch'iu povtornykh nagruzochnykh testov). V. A. Nazarenko and S. A. Nikolenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Jan. 1981, p. 64-68. 19 refs. In Russian.

A82-23267 † Criterion for the evaluation of arterial pressure response to bicycle ergometer exercise during treatment for hypertension (Kriterii otsenki reaktsii arterial'nogo davleniia na veloergometricheskuiu nagruzku v protsesse lecheniia gipertonicheskoi bolezni). I. P. Zamotaev, E. P. Dechko, and A. V. Alekseenko (Tsentral'naia Klinicheskaia Bol'nitsa; Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 41-44. 10 refs. In Russian.

A82-23268 † Changes with age in the cholin- and adrenergic innervation of the human heart (Vozrastnye izmeneniia kholin- i adrenergicheskoi innervatsii serdtsa cheloveka). R. I. Abraitis, V. S. Vaichekauskas, R. A. Stropus, and K. A. Tamashauskas (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 106-108. 21 refs. In Russian.

The development of morphological involutions of the autonomic innervation of the human heart and the significance of these changes for the regulation of cardiovascular activity are investigated in histochemical and physiological studies of hearts from accident victims of various ages. It is found that the differentiation of the cholinergic nervous apparatus is complete by the age of 30, with involution of the cholinergic innervation beginning after the age of 50. The adrenergic innervation is observed to be more developed in children, with involution occurring progressively past the age of 30. After the age of 60, the myocardium is completely free of catecholamines. Myocardial sensitivity to adrenalin is found to be practically the same at all ages. It is suggested that involution of the autonomic innervation of the heart might serve as a morphological

basis for the study of the neurohumoral regulation of cardiac function. A.L.W.

A82-23270 † **A *sino-auricular* block with Samoilov-Wenkeback periods - Diagnosis with the aid of an automated analysis of the structure of heart rhythms and clinical assessment (Sinoatrial'naia blokada s periodami Samoilova-Venkebakha: Diagnostika pri pomoshchi avtomaticheskogo analiza struktury serdechnogo ritma i klinicheskaia otsenka).** A. V. Nedostup, A. A. Platonova, and E. A. Bogdanova (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia,* vol. 21, Oct. 1981, p. 38-42. 29 refs. In Russian.

A82-23271 † **Changes in regional and central hemodynamics during the treatment of hypertensive patients with obsidan, apressin and their combination (Izmeneniia regionarnoi i tsentral'noi gemodinamiki pri lechenii bol'nykh gipertonicheskoi bolezn'iu obzidanom, apressinom, i ikh kombinatsiei).** E. V. Erina and G. I. Ozokvo (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 14-19. 20 refs. In Russian.

Changes in the parameters of central and regional hemodynamics brought about by the treatment of hypertensives with the beta-blocker obsidan, the vasodilator apressin and a combination of the drugs are investigated. Tetrapolar chest rheography and bipolar rheoencephalography and leg rheography were performed before and during treatment of 80 patients suffering from stage II hypertension with obsidan alone and then combined with apressin after 15-17 days, apressin alone and then combined with obsidan after 15-20 days, or obsidan and apressin simultaneously for up to 45 days. It is found that obsidan reduces cardiac output and elevates peripheral vascular resistance, while apressin lowers vascular tonus and stimulates cardiac activity. Apressin induces an improvement in brain and peripheral circulation, although with a greater asymmetry in brain and leg rheograms, while obsidan treatment leads to a decrease in rheoencephalogram and leg rheogram asymmetry. Finally, the combination of these drugs is observed to reduce the undesirable effects on hemodynamics and potentiate the hypotensive effect. A.L.W.

A82-23272 † **Microcirculatory pathology under conditions of tissue arterial blood flow insufficiency (Patologiia mikrotsirkuliatsii u usloviiakh nedostatochnogo pritoka arterial'noi krovi v tkani).** N. E. Iarygin, T. N. Nikolaeva, and M. B. Chuprunova (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR). *Kardiologiia,* vol. 21, May 1981, p. 26-30. 12 refs. In Russian.

Results are presented of a morphological study of microcirculation under conditions of insufficient arterial blood flow. Observations were made of the condition of the vascular bed in the omentum of infants having died in the first half year of life from congenital heart defects accompanied by hypovolemia in the systemic circulation, and premature newborns having died as a result of primary cardiovascular insufficiency. Changes in vascular morphology are observed which are attributed to the combination of adaptive processes, related to the maximum utilization of the arterioles, the nonequilibrium perfusion of the capillary net, the reduced deposition of blood in the postcapillary and collecting venules and proper levels of peripheral resistance and adequate postcapillary pressure, and pathological processes, including exsanguination and the aggregation and adhesion of blood cells. It is suggested that the pathology observed in the omentum reflects that present in the terminal vessels of the entire systemic circulation. A.L.W.

A82-23273 † **Cybernetic analysis of cardiac rhythm during a graded exercise test in Salyut-6 crew members (Kiberneticheskii analiz serdechnogo ritma pri probe s dozirovannoi fizicheskoi nagruzkoi u chlenov ekipazhei orbital'noi stantsii 'Saliut-6').** R. M. Baevskii, Zh. V. Barsukova, and I. G. Tazetdinov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Kardiologiia,* vol. 21, Nov. 1981, p. 100-104. 19 refs. In Russian.

The technique of cybernetic analysis of cardiac rhythm is applied to the evaluation and prediction of the functional condition of the cosmonaut cardiovascular system during exercise. The analysis was performed on EKG data obtained for the crews of four prolonged expeditions to Salyut-6 during daily bicycle ergometer tests, and consisted of the determination of the statistical parameters of a series of cardiac intervals along with autocorrelation and spectral analysis. Results indicate that adaptation to the conditions of extended space flights is accompanied by regular changes in the controlling systems, which may be used to determine the course of adaptive processes. In particular, indicators of an unfavorable course of adaptation include a significant increase in the stress index during exercise and a decrease in the difference between the values of slow wave power before and after exercise. The adaptive cost is thus shown to depend on flight duration, and complexity, and individual levels of physical training. A.L.W.

A82-23274 † **Modeling interactions between protein molecules - Investigating complexes of indole and its derivatives through infrared spectroscopy (Modelirovanie mezhmolekuliarnykh vzaimodeistvii v belkakh - Izuchenie kompleksov indola i ego proizvodnykh metodom IK-spektroskopii).** V. N. Umetskaia and L. V. Konovalov (Akademiia Nauk SSSR, Institut Tsitologii, Leningrad, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 773-776. 10 refs. In Russian.

A82-23275 † **Photodamage to the rhodopsin molecule - SH-group oxidation (Fotopovrezhdenie molekuly rodopsina - Okislenie SH-grupp).** I. D. Pogozheva, I. B. Fedorovich, M. A. Ostrovskii, and N. M. Emanuel' (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Biofizika,* vol. 26, May-June 1981, p. 398-403. 22 refs. In Russian.

The role of SH-group oxidation in damage to the rhodopsin molecule resulting from intense or prolonged exposure to visible light is investigated. The illumination of rod outer segments from the frog retina by bright light is found to result in the oxidation of the protein as well as lipid components of the photoreceptor membrane, with the degree of oxidation depending on the intensity and duration of irradiation. Estimations of SH-group contents in the membrane indicate that the oxidation of rhodopsin, the most important membrane protein, takes place by the oxidation of thiol groups to form disulphide bonds, which disturb the native conformation of the molecule and lead to protein aggregation. Inhibitors of free radical processes (antioxidants) are found to prevent completely lipid oxidation and reduce protein oxidation. Results also suggest that retinal acts as a photosensitizer of the photoreceptor membrane components to photooxidation. A.L.W.

A82-23276 † **The central hemodynamics of patients with sepsis and acute renal insufficiency (Sostoianie tsentral'noi gemodinamiki u bol'nykh sepsisom i ostroi pochechnoi nedostatochnost'iu).** M. I. Kuzin, V. A. Svetlov, M. I. Sorokina, and A. I. Kolesnikov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 8, 1981, p. 40-45. 14 refs. In Russian.

A82-23277 † **Biological rhythm aspects of adaptation mechanisms (Mekhanizmy adaptatsii v bioritmologicheskom aspekte).** V. N. Reushkin. *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 12, 1981, p. 50-54. 35 refs. In Russian.

Characteristics of an adaptive time-dependent response to an external stimulus are discussed. The response, termed the expectancy reaction, varies with the type and intensity of a single exposure and prepares the organism for a second encounter with the stimulus after a period of 24 hours. The physiological preparation involves the activation of functional reserves, as well as structural adjustments connected with the synthesis of adaptive enzymes and modifications to cellular structures so that tissues and organs taking part in the adaptation process will be subject to less stress. The characteristics of the expectancy reaction suggest the division of the first state of the stress reaction into three phases, as observed in disease pathogenesis. A.L.W.

A82-23278 † **Genetic and individual differences in cardiovascular disturbances in rats during experimental emotional stress (Geneticheskie i individual'nye razlichiia serdechno-sosudistykh narushenii u krys pri eksperimental'nom emotsional'nom stresse).** K. V. Sudakov, V. A. Dushkin, and E. A. Iumatov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 12, 1981, p. 32-39. 27 refs. In Russian.

The role of genetic and individual differences in the determina-

tion of susceptibility to cardiovascular disorders under conditions of experimentally induced emotional stress is investigated in noninbred, and the Wistar, August and Beg lines of inbred, rats exposed to acute or chronic immobilization. Measurements of changes in heart rate and arterial pressure during 30-hour immobilization reveal the Wistar rats to be most tolerant to emotional stress, while the August rats exhibit the least tolerance. Prognostic criteria allowing the prediction of cardiovascular disturbances and the possibility of sudden death on the basis of early changes in blood pressure and cardiovascular activity are developed. A significant correlation is also found between motor activity and individual and interline differences in stress tolerance, which allows the separation of individuals into groups of tolerant or predisposed animals. It is also noted that animals with varying degrees of tolerance to emotional stress are found within each genetic line. A.L.W.

A82-23279 † **The role of sleep in the adaptation system and in the prognosis of psychological readiness of athletes in competition (Rol' sna v sisteme adaptatsii i v prognozirovanii psikhologicheskoi gotovnosti sportsmenov k sorevnovaniiam).** S. A. Razumov, M. A. Vorob'eva, I. P. Gundorova, G. I. Medvedchuk, I. M. Biruk, E. B. Chemodanova (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR), E. Iu. Morozova, and S. G. Dagaev. *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 21-23. 17 refs. In Russian.

A82-23280 † **The effect of athletic training on the mass distribution of athletes' bodies (Vliianie sportivnoi trenirovki na geometriiu mass tela sportsmenov).** V. N. Seluianov (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 21, 22. 6 refs. In Russian.

A82-23281 † **Indicators of the T system of immunity during physical overstraining (Nekotorye pokazateli T-sistemy immuniteta pri fizicheskom pereutomlenii).** V. M. Shubik, V. Iu. Viaz'menskii, and I. A. Zykova (Leningradskii Nauchno-Issledovatel'skii Institut Radiatsionnoi Gigieny, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Sept. 1981, p. 28, 29. 8 refs. In Russian.

The condition of the T system of immunity is studied in athletes undergoing intense training. Blood T lymphocyte levels and functioning and reactions to the Mantoux test were evaluated in 114 swimmers aged 12-17 undergoing twice daily training six days a week, and 106 adolescent controls. Whereas no significant differences are found between T lymphocyte levels in the athletes and controls, a considerable reduction in thymidine uptake following lymphocyte culture stimulation with phytohemagglutinin is observed in the athletes relative to the controls, indicating a decreased mitogenic response. A lower proportion of positive reactions to the Mantoux test is also obtained in the swimmers, which supports the existence of an impairment in T-lymphocyte function in intense physical exercise. A.L.W.

A82-23282 † **Control of the number of discharges of individual motor units in skeletal muscles as a test of coordination in athletes (Upravlenie chislom razriadov otdel'nykh dvigatel'nykh edinits skeletnykh myshts kak test dlia vyiavleniia koordinatsionnykh sposobnostei sportsmenov).** R. M. Gorodnichev, V. V. Diubin, V. K. Spirin, and Iu. T. Shapkov (Moskovskii Oblastnoi Gosudarstvennyi Institut Fizicheskoi Kul'tury, Velikiye Luki; Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1981, p. 26-28. 10 refs. In Russian.

A82-23283 † **The role of the vestibular analyzer in the spatial analysis of gymnastic exercises (Rol' vestibuliarnogo analizatora v prostranstvennom analize gimnasticheskikh uprazhnenii).** A. I. Popugaev (Udmurtskii Gosudarstvennyi Universitet, Izhevsk, USSR) and O. P. Panfilov (Khabarovskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Khabarovsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 24, 25. 16 refs. In Russian.

The functioning of the vestibular system in the perception of three-dimensional body displacements during the performance of gymnastic exercises involving body rotation and free flight, when the visual analyzer is temporarily inoperative, is discussed based on a review of literature and observational data. Studies of vestibular analyzer excitation thresholds in gymnasts at various levels are presented which demonstrate that the excitability threshold may be used in the evaluation of the functional condition of the vestibular analyzer. At the same time, nystagmography, together with statokinetic stability, appears to be more informative in the study of the motion capabilities of gymnasts. A.L.W.

A82-23284 † **The influence of physical stress on the dynamics of work capacity and electrical activity of skeletal muscles in the course of an entire day (Vliianie fizicheskoi nagruzki na dinamiku rabotosposobnosti i elektricheskoi aktivnosti skeletnykh myshts na protiazhenii dnia).** Iu. V. Shcherbina (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 29, 30. In Russian.

A82-23285 † **The physiological condition of press operators (Sostoianie fiziologicheskikh funktsii u rabochikh-shtampovshchikov).** B. M. Ratsenberg and N. G. Severova. *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 57-59. 7 refs. In Russian.

Results are presented of a study of the physiological functions of workers performing light manual labor characterized by monotony and the necessity of sitting for long periods of time. Press operators were evaluated for heart rate, arterial pressure, visual-motor reaction time, critical flicker fusion and muscular endurance six times during the course of a work shift. The indicators followed are observed to undergo significant variations during the course of work, most notably a slowing of the pulse attributed to monotony, a decrease in critical flicker fusion frequency and increase in reaction time indicating stress on visual-motor functions and a decrease in central nervous system lability, and a decrease in muscle strength indicative of fatigue. Physiological conditions are found to be improved, however, following the institution of improvements in working conditions, including noise reduction, increased illumination, and three additional rest periods, during two of which physical exercises were performed. A.L.W.

A82-23286 † **Possibility of using recorder systems with a low upper frequency boundary in EMG telemetry (Vozmozhnost' ispol'zovaniia sistem registratorov s nizkoi velichinoi verkhnei granitsy chastoty pri telemetricheskoi peredache EMG).** H. Weber, H.-J. Naumann, and M. Quaas (Medizinische Akademie, Dresden, East Germany). *Gigiena Truda i Professional'nye Zabolevaniia,* Dec. 1981, p. 42, 43. 7 refs. In Russian.

The use of a telemetry system combined with an automatic recorder with a limiting upper frequency of 80 Hz in the remote monitoring of electromyograms is investigated in a study of isometric, isotonic and rhythmic exercises in six healthy men. Comparison of electromyograms recorded by the automatic recorder, a standard electromyograph and a photorecorder reveals all three telemetric approaches to provide sufficient time reproducibility, steadily increasing biopotentials dependent on stress, stable relative scatter and significant linear correlations between muscular tension and electric potentials. Nearly identical EMG parameters demonstrate the potential of both the mechanical and the photorecorder instrument in the recording of EMGs, with the upper limit of 80 Hz sufficient for the quantitative evaluation of physical stresses. A.L.W.

A82-23287 † **Reaction of the blood system to single and double exposure to a stress agent (Reaktsiia sistemy krovi na odnokratnoe i dvukratnoe vozdeistvie stressornogo agenta).** M. I. Fedotova and O. I. Belousova. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Nov.-Dec. 1981, p. 24-27. 7 refs. In Russian.

Experiments were performed on male Wistar rats to study the reaction of the blood system to single and double exposure of immobilization stress (the exposure lasted for six hours and was repeated 6 and 14 days after the initial immobilization). It was found that neutrophilic leukocytosis and lymphopenia were maintained in the blood but were less marked after the repeated immobilization. B.J.

A82-23288 † **Prediction of shifts in the radiation resistance of animals under the influence of various factors (K voprosu o prognozirovanii sdvigov radiorezistentnosti zhivotnykh pod vliianiem razlichnykh vozdeistvii).** N. I. Arlashchenko and D. Ia. Oparina (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-

Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1981, p. 891-898. 22 refs. In Russian.

Experiments performed on mice and rats showed that shifts in the radiation resistance of animals can be produced through the influence of various irritants which change the initial functional state of the organism. Besides ionizing radiation, the animals were subjected to the effects of gravitational acceleration stress, noise, reduced temperature, and artifical illumination. The results point to the conclusion that the prediction of the radiation-induced damage of animals in the range from mean lethal dose to sublethal doses of ionizing radiation should be based not on the magnitude of the dose but also on the initial functional state of the organism. B.J.

A82-23289 † **The effectiveness of using various radioprotective agents for protecting the genital cells of male mice from the genetic effects of radiation. I - Investigation of the yield of dominant lethal mutations in postspermatogonial cells (Effektivnost' primeneniia razlichnykh radioprotektorov dlia zashchity polovykh kletok samtsov myshei ot geneticheskogo deistviia radiatsii. I - Izuchenie chastoty dominantnykh letal'nykh mutatsii v postspermatogonial'nykh kletkakh).** M. D. Pomerantseva, L. K. Ramaiia, P. G. Zherebchenko, and G. V. Kalistratov (Akademiia Nauk SSSR, Institut Obshchei Genetiki; Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR). *Radiobiologiia,* vol. 21, Sept.-Oct. 1981, p. 722-729. 22 refs. In Russian.

A82-23290 † **Technique for the self-stimulation of subcortical structures in immobilized rats based on biofeedback (Metodika samorazdrazheniia podkorkovykh struktur u obezdvizhennykh krys po printsipu biologicheskoi obratnoi sviazi).** I. Sabo, G. Cherdash, P. Kolta, L. Kelleni, V. A. Puchkov, and V. A. Markevich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Nov.-Dec. 1981, p. 1311-1313. In Russian.

A82-23291 † **Correlation of behavioral rest-activity phases and the characteristics of the spatial organization of cortical potentials in the case of experimental neurosis (Sootnoshenie povedencheskikh faz 'pokoi-aktivnost' i kharakteristiki prostranstvennoi organizatsii potentsialov kory pri eksperimental'nom nevroze).** I. N. Knipst, A. V. Korinevskii, and S. N. Luk'ianova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Jan.-Feb. 1981, p. 86-95. 15 refs. In Russian.

It was found that the development of experimental neurosis in rabbits led to stable changes in the correlation of behavioral rest-activity phases: some activity phases were prolonged while some rest phases were considerably shortened. An analysis of the spatial-temporal organization of cortical potentials showed that these changes were manifested not only in quantitative characteristics of the rest-activity phases but also in their qualitative characteristics. The 'depth' of the rest states was found to decrease in the case of neurosis, and the spatial-temporal characteristics of cortical potentials during the activity phases were disorganized. B.J.

A82-23294 † **The elimination of metabolic products in expired air in relation to the carbon dioxide content in a sealed chamber (Vydelenie produktov zhiznedeiatel'nosti s vydykhaemym vozdukhom v zavisimosti ot soderzhaniia uglekislogo gaza v germoob'emakh).** A. V. Sedov, G. A. Gaziev, N. A. Surovtsev, G. E. Mazneva, L. I. Kobzeva, O. N. Shevkun, and S. V. Bychkov. *Gigiena i Sanitariia,* Oct. 1981, p. 90, 91. In Russian.

The dependence of the rate of the respiratory elimination of metabolic products on the carbon dioxide content in a sealed chamber is investigated in a study of possible toxicological effects and air purification requirements. Rates for the expiration of carbon oxides, methane, methylketones, amino compounds and ammonia were measured in subjects breathing air containing 0.03, 0.5 and 2% CO2. Analysis of the data is used to derive regression equations expressing increases in the respiratory elimination rates of the various compounds with increasing CO2 content. These increases are attributed to the effects of hyperventilation observed in the subjects. A.L.W.

A82-23295 † **Diurnal and seasonal rhythms in adrenal cortex activity in albino rats undergoing physical training (Sutochnye i sezonnye ritmy aktivnosti kory nadpochechnikov u belykh krys pri fizicheskikh trenirovkakh).** Iu. P. Shorin, E. M. Kazin, and G. V. Efremova (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk; Kemerovskii Gosudarstvennyi Universitet, Kemerovo, USSR). *Problemy Endokrinologii,* vol. 27, Nov.-Dec. 1981, p. 49-52. 17 refs. In Russian.

A82-23296 † **Changes of the catecholamine level in epinephrine-synthesizing oblongatal structures of rats, reacting differently to prolonged single immbolization (Izmeneniia urovnia katekholaminov v adrenalinsinteziruiushchikh strukturakh prodolgovatogo mozga krys, razlichnym obrazom reagiruiushchikh na dlitel'nuiu odnorazovuiu immobilizatsiiu).** R. Kvetnansky, T. I. Belova, Z. Oprshalova, and Iu. Chulman (Slovenska Akademia Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Problemy Endokrinologii,* vol. 27, Nov.-Dec. 1981, p. 58-63. 18 refs. In Russian.

A82-23297 † **Biological methods for predicting the effectiveness of psychopharmacotherapy applied to patients with schizophrenia /Review/ (Biologicheskie metody prognoza effektivnosti psikhofarmakoterapii bol'nykh shizofreniei /Obzor/).** A. V. Nemtsov and V. V. Kalinin. *Zhurnal Nevropatologii i Psikhiatrii im. S.S. Korsakova,* vol. 81, no. 8, 1981, p. 1232-1241. 123 refs. In Russian.

A82-23298 † **Objectives and structure of a radiation safety service in medical institutions (Zadachi i organizatsiia sluzhby radiatsionnoi bezopasnosti v meditsinskikh uchrezhdeniiakh).** G. P. Kochetova, K. P. Kosenkova, M. Ia. Lev, and A. V. Frolova (Ministerstvo Zdravookhraneniia RSFSR, Rentgenoradiologicheskii Institut, Moscow, USSR). *Zdravookhranenie Rossiiskoi Federatsii,* no. 8, 1981, p. 36, 37. In Russian.

A82-23299 † **Vibration sensitivity of workers in the main occupations of shipbuilding (Vibratsionnaia chuvstvitel'nost' u rabochikh osnovnykh professii v sudostroenii).** K. S. Iatsenko, G. A. Trubnikov, Iu. A. Afanas'ev, and V. M. Molokanov (Astrakhanskii Meditsinskii Institut, Astrakhan, USSR). *Sovetskaia Meditsina,* no. 5, 1981, p. 78-80. In Russian.

A82-23300 † **Circadian rhythm of changes of phospholipid content and the activity of nonspecific phosphomonoesterases in the rat liver (Izmenenie soderzhaniia fosfolipidov i aktivnosti nespetsificheskikh fosfomonoesteraz v pecheni krys na protiazhenii sutok).** A. G. Ginovker, L. A. Konovalova, and A. I. Zhikhareva (Tiumenskii Meditsinskii Institut, Tyumen, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* no. 11, 1979, p. 604-607. 14 refs. In Russian.

A82-23301 † **Improving the medical care of navy personnel (Sovershenstvovat' meditsinskoe obespechenie lichnogo sostava Voenno-Morskogo Flota).** N. T. Potemkin. *Voenno-Meditsinskii Zhurnal,* July 1981, p. 8-10. In Russian.

A82-23302 † **The work capacity of seamen under an altered schedule of work and rest (Rabotosposobnost' moriakov v usloviiakh izmenennogo rezhima truda i otdykha).** V. N. Evstaf'ev, L. M. Shafran, and O. Iu. Netudykhatka. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 46, 47. 9 refs. In Russian.

The effect of a 10-hour shift on the work capacity (quantitative and qualitative) of 252 seamen ranging in age from 19 to 45 is investigated. The ships, 10 in all, were at sea for between 15 and 120 days. The longer shift is found to lower the work capacity and to bring about certain physiological changes. However, it is also found that shore leave for a period proportional to that of the voyage removes these deleterious effects. C.R.

A82-23303 † **A system for the rapid operational evaluation of pilot performance (Sistema operativnoi ekspress-otsenki effektivnosti operatorskoi deiatel'nosti letchika).** A. A. Bezbogov, L. I. Mazur, and V. P. Merkulov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 80-84. In Russian.

It is pointed out that simulators and on-board computers offer only limited possibilities for evaluating pilot performance. The

principles underlying the construction of an operational, as opposed to analytical, evaluation system are set forth. The system described is shown to provide real-time evaluation provided the data feed rate does not exceed 60 Hz. Higher rates are possible, however, when the number of parameters being processed is decreased. C.R.

A82-23304 † **A method for automatically evaluating operator performance (Ob odnom metode avtomaticheskoi otsenki effektivnosti operatorskoi deiatel'nosti).** A. A. Bezbogov, L. I. Mazur, and V. P. Merkulov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 76-80. In Russian.

It is pointed out that statistics show human factors to be responsible for a large number of mistakes and that the proportion of these mistakes in showing a tendency to increase. Since the skill of an operator or pilot receiving training in a ground simulator is evaluated by an instructor, subjective elements come into play. The automatic method proposed here is based on statistical standards and involves a comparison, by computer, between actual values and prescribed values. C.R.

A82-23305 † **An investigation of the visual observations made by cosmonauts under experimental and actual conditions (Issledovanie deiatel'nosti kosmonavta po vizual'nomu nabliudeniiu v eksperimental'nykh i real'nykh usloviiakh).** G. I. Vorob'ev, P. R. Popovich, and L. D. Smirichevskii. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 70-76. In Russian.

In analyzing the visual observations made by cosmonauts, it is found that at least three actions are necessary: searching for the object, preparing the instrument, and recording the observation. Time is lost between each step. The case investigated here involves observation of the earth's surface, the time of observation being a function of orbital velocity, spacecraft altitude, and angle of view. Using both flight data and data from tests carried out in an anechoic chamber, it is found that time is lost to an adaptation period and, toward the end of the flight, to fatigue. To minimize these losses, it is recommended that an allowance be made for fatigue and that the conditions under which preflight training is carried out be as close as possible to actual flight conditions. C.R.

A82-23306 † **The modeling of operator activity in referenceless space (Osobennosti modelirovaniia deiatel'nosti operatora v bezopornom prostranstve).** Iu. N. Glazkov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 63-69. 6 refs. In Russian.

The mathematical and physical modeling of the rotational and translational motions of cosmonauts in extravehicular space is discussed. Input data to biomechanical models of the cosmonaut-maneuvering unit system are identified, and the necessity of taking into account displacements of the center of mass in calculations of translational motion due to reaction forces is pointed out. Examples are presented of the mathematical modeling of system rotation about the center of mass during arm motion in a wide arc in the sagittal plane, and a gyroscopic system for the orientation and stabilization of the maneuvering unit by the reduction of the sum of kinetic torques. It is pointed out that such mathematical modeling allows the preliminary evaluation of cosmonaut manuevering units. Physical models of open space are then considered which include neutral buoyancy conditions, parabolic flight and specialized appartus simulating various degrees of freedom. It is noted, however, that no modeling methods can provide a complete representation of the actual conditions in open space. A.L.W.

A82-23307 † **Investigations of the visual identification of abstract spacecraft models (Issledovaniia zritel'nogo opoznaniia abstraktnykh modelei kosmicheskikh ob'ektov).** E. A. Ivanov and A. Ia. Frolov. In: Investigation and simulation of human-operator activity (Issledovanie i modelirovanie deiatel'nosti cheloveka-operatora). Moscow, Izdatel'stvo Nauka, 1981, p. 30-42. 13 refs. In Russian.

The accuracy of the visual identification of spacecraft is an important factor in the success of a manned space mission. The present paper presents an investigation of the characteristics of the visual perception and identification of spacecraft models consisting of combinations of various plane geometrical shapes. Probabilities and times of correct identification were determined for 12 operators shown sequences of nine brightly illuminated spacecraft models against a black referenceless field, and compared with a generalized identification criterion calculated as a function of the relative prevalence of different identifying features. Correct identifications are observed to decrease and identification time to increase with increasing model complexity, while differences in the identifiability of shapes with the same number of components correlate with the identification criterion. Other features observed to facilitate identification include general external appearance, illumination levels and the condition of the visual analyzer as indicated by the acuity of night vision. A.L.W.

A82-23310 **Effects of attitudes on the performance of supervisors.** G. C. Kinney (Mitre Corp., McLean, VA). In: Air Traffic Control Association, Annual Fall Conference, 25th, Arlington, VA, October 19-24, 1980, Proceedings. Arlington, VA, Air Traffic Control Association, 1980, p. 25-30.

The effects of certain mental attitudes of team supervisors on the job are considered. Each attitude discussed is related to motives for the attitude. For helpful attitudes, management actions are considered which would support the attitude. For attitudes which are not helpful, actions are suggested which could help to remedy the attitude, or at least diminish its effects on job performance. An attitude, according to the meaning of this term in the investigation, is a tendency for a person to respond favorably or unfavorably to persons, situations, objects, or events. The responses are essentially automatic once an attitude has developed. Attitudes are formed by a person's social class, social groups, schools, families, experiences, and goals. Relations between attitudes and performance are discussed. G.R.

A82-23370 **A new concept in life support systems - The NGL molecular sieve oxygen generator.** F. Haigh (Normalair-Garrett, Ltd., Yeovil, Somerset, England). *Aircraft Engineering,* vol. 54, Jan. 1982, p. 8-13.

The ion exchange properties that allow zeolite crystals to act as molecular sieves in industrial oxygen-enrichment processes are applied to the construction of an electronically-controlled, on-board oxygen generating system (OBOGS) for military aircraft. Such a system offers unlimited flight time capability, and the elimination of the fire and explosion hazards posed by conventional liquid oxygen life support systems. The molecular sieve oxygen generator (MSOG) supplies oxygen to pilot gas masks at 50-60% concentration, employing microprocessor control valve settings for the triple-molecular sieve beds. System schematics are provided. O.C.

A82-23400 **Comparison of some technical methods for the evaluation of whole-body vibration.** J.-E. Hansson and B.-O. Wikström (National Board of Occupational Safety and Health, Solna, Sweden). *Ergonomics,* vol. 24, Dec. 1981, p. 953-963. 17 refs.

Physical measurements of vibrations transmitted through the driver's seat to operators of off-road forestry machines are compared with the driver's subjective evaluation of discomfort from vibration in different driving situations. A total of 13 different vibration analysis methods were considered. The investigation consisted of seven studies. The machines were driven on five test tracks, each consisting of six to ten shorter intervals representing easy to moderately difficult terrain conditions. Subjective ratings correlated better with technical evaluations based on the two most dominant vibration directions or all three directions than with only the critical direction. Calculations based on vibration energy in the entire frequency range 1-80 Hz gave better correlation than calculations based on energy in the critical frequency band. The weighted sum of vector method gave the best correlation with subjective ratings. The correlation coefficient for this method was 1-3-octave-band in the critical direction and frequency. (Author)

A82-23469 **Twenty years of aviation medicine serving civil aviation of the GDR (20 Jahre Luftfahrtmedizin im Dienste der zivilen Luftfahrt der DDR).** J. Kressin (Ministerium für Verkehrswesen, Berlin, East Germany). *Technisch-ökonomische Information der Zivilen Luftfahrt,* vol. 17, no. 3, 1981, p. 125-129. In German.

A82-23643 † **The statistical structure of EEG rhythm interaction and individual features of brain autoregulation mechanisms (Statisticheskaia struktura vzaimodeistviia ritmov EEG i individual'nye svoistva mekhanizmov samoreguliatsii mozga).** S. I. Soroko and S. S. Bekshaev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1765-1773. 20 refs. In Russian.

An analysis is presented of the statistical characteristics of the time sequence of EEG rhythm variations in different individuals during different mental functions, and their relation to individual characteristics of brain autoregulation mechanisms. Matrices of brain wave transition probabilities were derived from EEGs recorded in 183 healthy subjects at rest with eyes open and closed and during the performance of mental and visual tracking tasks, and compared with the results of tests measuring individual neurodynamic flexibility. The EEG patterns of persons with a high level of neural flexibility are found to be characterized by a functional nucleus, being a dominant rhythm as judged by the number of its connections which acts to stabilize the pattern, in the region of the alpha wave. The functional nucleus is absent in persons with a low degree of nervous system flexibility, and EEG component interactions are equally probable. Changes in brain functions are accompanied by the establishment of new EEG patterns through an intermediary stage also characterized by equally probable interactions. A.L.W.

A82-23644 † **The effect of the beta-adrenergic blocker propranolol and the tranquilizer seduxen on the structure of natural sleep in the cat (Deistvie beta-adrenoblokatora propranolola i trankvilizatora seduksena na strukturu estestvennogo sna koshki).** A. A. Snisarenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1780-1784. 12 refs. In Russian.

A82-23645 † **The relation between the spontaneous activity and the dynamic characteristics of the primary afferents of the frog lateral semicircular canal (Sootnoshenie spontannoi aktivnosti i dinamicheskikh kharakteristik pervichnykh afferentov lateral'nogo polukruzhnogo kanala liagushki).** I. V. Orlov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1798-1806. 13 refs. In Russian.

A82-23646 † **The effects of serotonin on shivering thermogenesis (Vliianie serotonina na sokratitel'nyi termogenez).** N. N. Kudriavtseva (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR) and M. A. Iakimenko (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1862-1865. 9 refs. In Russian.

The role of serotonin in thermoregulatory mechanisms is investigated in a study of shivering thermogenesis in ground squirrels during arousal from hibernation. The intraperitoneal injection of serotonin (10mg/kg) is observed to decrease body temperature in alert squirrels, and prolong the regaining of body heat and muscular electrical activity during arousal from hibernation. The observed inhibition of muscle contractions and thereby heat generation due to serotonin is noted to be twice as great as that induced by the serotonin precursor 5-hydroxytryptophan, indicating that serotonin synthesized during warming was the source of the hypothermic effect. A.L.W.

A82-23647 † **Seasonal differences in the adaptive changes of the thermal effect of muscle contraction (Sezonnye razlichiia adaptatsionnykh sdvigov teplovogo effekta myshechnogo sokrashcheniia).** L. D. Pchelenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad; Syktyvkarskii Gosudarstvennyi Universitet, Syktyvkar, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Dec. 1981, p. 1879-1882. 13 refs. In Russian.

The thermal effects of shivering in cold-adapted animals exposed to cold at different seasons of the year are compared. Electrothermometric measurements were made of heat production in a single contraction of diaphragms at 37 C isolated from rats adapted to cold in the spring and summer. In comparison to spring and summer controls, cold-adapted rat muscle showed a 12% increase in heat produced for the same muscle tension in the summer, and a 54% increase in the spring. Similarly, the calorigenic effect of noradrenalin was 36% in the summer group, and 66% in the spring group. It is concluded that cold adaptation during the first month of the spring is more effective with respect to additional heat production during muscle contraction, than summer adaptation, and thus the degree of lowering of muscular efficiency in cold adaptation may be regulated. A.L.W.

A82-23769 # **Biological effects of space travel /The W. Rupert Turnbull Lecture/.** K. E. Money (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *(Canadian Aeronautics and Space Institute, Annual General Meeting, Montreal, Canada, May 11, 1981.) Canadian Aeronautics and Space Journal,* vol. 27, 3rd Quarter, 1981, p. 195-201. 21 refs.

Prominent human biological problems related to the microgravity environment of space are discussed. The onset of puffy faces and bird legs occurs as a shift in bodily fluids from the lower to upper extremities, and accompanies an up to 12% loss in bodily fluids through urination. The bird legs condition is exacerbated by atrophication due to disuse and can be corrected by exercise. Cardiovascular decompensation is an excessive return of blood volume to the legs after landing, and disappears after several days. Bone demineralization is observed mainly in the feet, at a rate of 100 mg Ca/day, does not display a plateau effect, and, in the case of Skylab crewmembers, will not be totally regenerated after return to earth. Motion sickness is caused by sensory overloads to the vestibular apparatus, a condition which the brain interprets as an ingestion of poison, the remedy to which is vomiting. M.S.K.

A82-22981 * # **Atmospheres and evolution.** L. Margulis (Boston University, Boston, MA) and J. E. Lovelock (Reading, University, Reading, Berks., England). In: Life in the universe; Proceedings of the Conference, Moffett Field, CA, June 19, 20, 1979. Cambridge, MA, MIT Press, 1981, p. 79-100. 24 refs. Research supported by Boston University and Guggenheim Foundation; Grant No. NGR-22-004-025.

Studies concerning the regulation of the earth atmosphere and the relation of atmospheric changes to the evolution of microbial life are reviewed. The improbable nature of the composition of the earth atmosphere in light of the atmospheric compositions of Mars and Venus and equilibrium considerations is pointed out, and evidence for the existence of microbial (procaryotic) life on earth as far back as 3.5 billion years ago is presented. The emergence of eucaryotic life in the Phanerozoic due to evolving symbioses between different procaryotic species is discussed with examples given of present-day symbiotic relationships between bacteria and eucaryotes. The idea that atmospheric gases are kept in balance mainly by the actions of bacterial cells is then considered, and it is argued that species diversity is necessary for the maintenance and origin of life on earth in its present form. A.L.W.

A82-24030 **The effect of prolonged practice of pursuit eye movement.** H. Wallach (Swarthmore College, Swarthmore, PA), P. Schulman (New York, State University, Utica, NY), and A. O'Leary (Pennsylvania, University, Philadelphia, PA). *Perception and Psychophysics,* vol. 30, no. 6, Dec. 1981, p. 533-539. Grant No. PHS-11089.

Prolonged exposure to reciprocating motion that is tracked by the eyes results in diminished extent of perceived motion. Investigation of this effect showed that it becomes manifest only in perceived motion that is caused by ocular pursuit, but that it is not an eye muscle effect. It may consist in a changed evaluation of eye movements. The results throw some light on the relations between the processes that are caused by different stimuli for motion.

(Author)

A82-24031 **The latency of circular vection during different accelerations of the optokinetic stimulus.** G. A. Melcher and V. Henn (Zürich, Universität, Zurich, Switzerland). *Perception and Psychophysics,* vol. 30, no. 6, Dec. 1981, p. 552-556. 12 refs.

Subjects were seated inside a full-field optokinetic cylinder which was accelerated at values between .1 and 100 deg per sec. Subjects indicated when motion was first detected. Latency for onset of self-motion shows a minimum of around 5 deg per sec and increases for lower and faster accelerations of the visual surround. In the low acceleration range, up to 5 deg per sec, all movement is perceived as circular vection, that is, self-rotation. With higher accelerations, motion of the visual surround is perceived initially; over seconds, this gradually transforms to circular vection. Velocity

estimation during low acceleration is better than during comparable vestibular acceleration. During subject rotation in the light, that is, when both the visual and vestibular inputs combine to generate a velocity signal, detection of motion has the shortest latency and represents actual velocity over a wider range than it does with each stimulus alone. (Author)

A82-24032 Individual differences in pulse brightness perception. R. W. Bowen, K. A. Markell (Loyola University, Chicago, IL), R. Sekuler, and C. J. Owsley (Northwestern University, Evanston, IL). *Perception and Psychophysics,* vol. 30, no. 6, Dec. 1981, p. 587-593. 18 refs. NSF Grant No. BNS-78-17779; Grants No. AF-AFOSR-80-0246; No. NIH-AG-01251.

The origins of individual differences in susceptibilities to the Broca-Sulzer effect, upon which a pulse of light of duration 50-150 msec appears brighter than longer or shorter pulses, are investigated. Observers were first classified as Type A (experiencing brightness enhancement for pulses with simultaneous onset and offset with respect to comparison pulses), B (experiencing brightness enhancement for simultaneous offset conditions only) and C (not perceiving brightness enhancement under any conditions), then tested for abilities in brightness estimation, modulation sensitivity to full-field sinusoidal flicker and contrast sensitivity for moving sinusoidal gratings. Differences in observer class are found to be reflected in differences in magnitude estimation, however are not related to flicker and motion sensitivity. It is thus concluded that the three classes of observer differ in the perceptual criteria used in judging the brightness of individual light pulses, rather than in underlying neurophysiological responses. A.L.W.

A82-24477 † Evaluation of the psychological compatibility of drivers in a rally team (Otsenka psikhologicheskoi sovmestimosti sportsmenov v ekipazhe avtogonshchikov-rallistov). V. E. Kagan, V. P. Kolesov, and E. G. Singurindi (Leningradskaia Lesotekhnicheskaia Akademiia, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 11-14. In Russian.

A82-24478 † Criteria and the quantitative evaluation of human disturbance tolerance (O kriteriakh i kolichestvennoi otsenke pomekhoustoichivosti cheloveka). O. N. Mazurov (Krasnodarskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Krasnodar, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 8, 9. 8 refs. In Russian.

Criteria for the quantitative evaluation of the tolerance of a given individual to external disturbing factors during the performance of athletic activities are discussed on the basis of experiments performed on mountain climbers. Evaluations of subject task performance quality were made under natural and laboratory conditions in the presence and absence of distractions represented by the possibility of falling in the first case and electrical stimulation of the skin in the second. The measures of work effectiveness are found to decrease by a factor of two in the presence of disturbances in those subjects preliminarily classified as disturbance intolerant, and remain the same or even increase in those labelled tolerant. Results thus demonstrate changes in work effectiveness to be a reliable indicator of disturbance tolerance in athletes. A.L.W.

A82-24479 † Regulation of blood supply in the extremities during exercise in women (Reguliatsiia krovosnabzheniia konechnostei pri fizicheskoi nagruzke u zhenshchin). P. P. Ozolin', S. O. Plismane, and K. E. Strelis (Latviiski Nauchno-Issledovatel'skii Institut Eksperimental'noi i Klinicheskoi Meditsiny; Gosudarstvennyi Politekhnicheskii Institut, Riga, Latvian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Oct. 1981, p. 27-29. 8 refs. In Russian.

Changes in blood supply to the extremities with the process of adaptation to physical training are investigated in female athletes. Blood flow in the forearm and calf and arterial pressure were monitored in untrained female students and female athletes before, during and after bicycle ergometer exercise. Data reveal a close agreement between cardiac function and volume blood flow rate in the working and nonworking extremities during rest and submaximal exercises, indicative of regulation by the same mechanism, most likely sympathetic activation. Such a mechanism, occurring to a greater extent in women than in men and acting to induce vascular contraction in both working and nonworking muscles, may explain the observed reduction in the work capacities and endurance of women with respect to men. A.L.W.

A82-24480 † Directed training of wrestlers in the biofeedback control of physical work intensity according to heat rate (Napravlennoe obuchenie bortsov. samostoiatel'nomu upravleniiu nagruzkoi v trenirovke po chastote sokrashchenii serdtsa). Iu. P. Zamiatin and V. P. Poimanov (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Dec. 1981, p. 19, 20. 7 refs. In Russian.

A82-24481 † Methodological aspects of studying the immune system in athletes (Metodologicheskie aspekty izucheniia immunnoi sistemy u sportsmenov). R. S. Suzdal'nitskii, S. N. Kuz'min, I. B. Zhogoleva, B. B. Pershin, V. A. Levando, L. A. Kuz'mina, and V. V. Markov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury; Moskovskii Nauchno-Issledovatel'skii Institut Vaktsin i Syvorotok; Vsesoiuznyi Onkologicheskii Nauchnyi Tsentr, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Nov. 1981, p. 17, 18. 11 refs. In Russian.

A comparative analysis is made of indices of humoral and cellular immunity and of certain factors of natural resistance. Here, blood is taken simultaneously from a vein, earlobe, and finger of each athlete in the study. It is established that blood from any one of these sources is satisfactory for purposes of study. A qualitative evaluation of T and B lymphocytes is necessary only for blood taken from a vein. C.R.

A82-24482 † The phase structure in the process by which a system of motions is formed in gymnasts (Fazovaia struktura protsessa formirovaniia sistemy dvizhenii u gimnasta). N. I. Ponomarev (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) and S. V. Dmitriev (Gor'kovskii Pedagogicheskii Institut, Gorki, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Feb. 1981, p. 51-53. In Russian.

A82-24483 † Quantitative criteria for evaluating the candidates granted admission and the effectiveness of athletic training among students in institutes of physical culture (Kolichestvennye kriterii otsenki kachestva nabora abiturientov i effektivnosti sportivnoi padgotovki studentov v institute fizicheskoi kul'tury). Iu. F. Kuramshin and E. A. Losin (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 41-43. In Russian.

A82-24484 † A discussion of the nature of sports medicine (K diskussii o predmete sportivnoi meditsiny). N. D. Graevskaia. *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 47, 48. In Russian.

A82-24485 † The importance of carboanhydrase in regulating the acid-base equilibrium during muscular activity (Znachenie karboangidrazy v reguliatsii kislotno-shchelochnogo ravnovesiia pri myshechnoi deiatel'nosti). V. E. Kal'nitskaia (Krasnodarskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Krasnodar, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 24, 25. In Russian.

A82-24486 † A hand-operated electric bicycle ergometer (Elektricheskii veloergometr s ruchnym privodom). L. A. Dutov, S. A. Bobrov, V. K. Taran, and Iu. A. Golovko (Khar'kovskii Gosudarstvennyi Universitet, Kharkov, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 46-48. In Russian.

It is thought that the manual operation provided for in the design will broaden the range of applications of the ergometer and make it possible to determine the work capacity of an individual in work with the hands or with the hands and feet simultaneously. The test loads range from 0 to 2400 kg-m/min. C.R.

A82-24487 † Training athletes to make quick decisions (Trenirovka operativnogo myshleniia sportsmenov). S. N. Singaevskii and A. A. Krys'kov (Kamenets-Podol'skii Pedagogicheskii Institut, Kamenets-Podolsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Apr. 1981, p. 53, 54. In Russian.

A82-24488 † Energy supply characteristics and blood protein and electrolyte content during submaximal muscular activity

in bicyclists (Pokazateli energoobespecheniia, belkovogo i elektrolitnogo sostava krovi pri myshechnoi rabote submaksimal'noi moshchnosti u velosipedistov). A. M. Efimenko, N. V. Tolkacheva, V. V. Shiriaev, A. G. Taranets, and O. N. Verbitskii (Simferopol'skii Gosudarstvennyi Universitet, Simferopol, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* June 1981, p. 23, 24. In Russian.

A82-24489 † **Natural immunity in athletes of different age groups (Sostoianie ostestvennogo immuniteta u sportsmenov raznykh vozrastnykh grupp).** L. S. Umarova (Aktiubinskii Gosudarstvennyi Meditsinskii Institut, Aktiubinsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 26. In Russian.

A82-24490 † **Vitamins and natural immunity (Vitaminy i estestvennyi immunitet).** K. D. Pletsityi (Akademiia Meditsinskikh Nauk, Moscow, USSR). *Voprosy Pitaniia,* May-June 1981, p. 3-10. 76 refs. In Russian.

The relationship between the supply of vitamins to an organism and the activity of various indices of nonspecific immunity is investigated. Attention is also given to the effect of vitamins on an organism's resistance to various types of infectious agents. The vitamins considered are vitamins C, B1, B2, B6, and B12, folic acid, biotin, pantothenic acid, and vitamins P, E, D, and K. C.R.

A82-24491 † **The condition of several metabolic processes in operators (Sostoianie nekotorykh obmennykh protsessov u operatorov).** V. I. Smoliar, V. Ia. Bereza, E. S. Portnaia, and O. F. Maksimova (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Pitaniia, Kiev, Ukrainian SSR). *Voprosy Pitaniia,* Nov.-Dec. 1981, p. 35-37. 12 refs. In Russian.

The actual diets and energy expenditures of operators are studied along with components of protein, lipid and vitamin metabolism and cardiovascular and nervous system conditions. Time studies and gas exchange measurements indicate a daily energy expenditure of 2724 kcal in power station control panel operators and railroad dispatchers, which is taken to indicate a caloric requirement of 3000 kcal/day. The actual diets of the operators are found to correspond with their net caloric requirements, however contain less than the recommended amounts of animal proteins, vegetable oils, vitamins A and C and calcium. The performance of operator functions is observed to lead, by the end of the work shift, to significant decreases in operative memory and attention, and increases in visual-motor reaction time. Disorders in lipid and vitamin C metabolism are also found. A.L.W.

A82-24492 † **The significance of echocardiography in the detection of left ventricular blood supply disorders during bicycle ergometry (Znachenie ekhokardiografii v vyiavlenii narusheniia krovosnabzheniia levogo zheludochka pri veloergometrii).** L. A. Stadniuk, G. V. Ianovskii, Zh. M. Vysotskaia and N. V. Tkhor (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Sept. 1981, p. 49-51. In Russian.

The use of echocardiography for the detection of disorders of coronary circulation in the left ventricle during graded physical exercise is investigated. Echocardiograms and electrocardiograms were recorded simultaneously in normal subjects and in patients suffering from chronic ischemic heart disease and/or hypertension during and following submaximal, step-wise increasing exercise on a bicycle ergometer. Comparison of the data reveals signs of coronary blood supply disturbances to be apparent at lower exercise levels in the echocardiographic recordings of persons with ischemic heart disease. A tendency towards different types of changes in the functional condition of different parts of the myocardium in the presence of S-T segment depression in hypertensives and patients with ischemia suggests that the depression is caused by transient localized myocardial ischemia rather than systolic overloading of the left ventricle. A.L.W.

A82-24493 † **Neurohumoral regulation of microcirculation in ischemic illness (Neirogumoral'naia reguliatsiia mikrotsirkuliatsii pri vibratsionnoi bolezni).** I. F. Kostiuk and N. N. Mikliaeva (Khar'kovskii Meditsinskii Institut, Khar'kov, Ukrainian SSR). *Vrachebnoe Delo,* June 1981, p. 100-102. In Russian.

A82-24494 † **Investigation of noise sickness (K diagnostike shumovoi bolezni).** A. N. Grusha (Chernigovskaia Oblastnaia Bol'nitsa, Chernigov, Ukrainian SSR). *Vrachebnoe Delo,* June 1981, p. 102, 103. In Russian.

Experimental results are presented on the pathological effects of noise among 134 industrial workers exposed to 107 dB of high-frequency noise. The characteristics of so-called noise sickness are investigated, which involves the impairment of the auditory analyzer and the nervous system in the form of the asthenic and asthenovegetative syndrome. B.J.

A82-24495 † **Additional criteria of cerebral hemodynamic disorders limiting physical loads in patients with hypertension (Dopolnitel'nye kriterii narusheniia tserebral'noi gemodinamiki, limitiruiushchie fizicheskuiu nagruzku u bol'nykh gipertonicheskoi bolezn'iu).** A. P. Vinnitskii and A. A. Krishchuk (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* May 1981, p. 63-67. In Russian.

A82-24496 † **Oxygen supply of the muscle tissue in patients with chronic ischemic heart disease during graded physical loads (Kislorodnoe snabzhenie myshechnoi tkani u bol'nykh khronicheskoi iskhemicheskoi bolezn'iu serdtsa pri dozirovannykh fizicheskikh nagruzkakh).** I. V. Davydova, N. V. Rishko, and V. I. Bogomolets (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii; Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Oct. 1981, p. 15-18. In Russian.

A82-24497 † **Changes in peripheral hemodynamics during transient disturbances in cerebral circulation (Izmeneniia perifericheskoi gemodinamiki pri prekhodiashehikh narusheniiakh mozgovogo krovoobrashcheniia).** M. P. Titarenko and L. A. Shurinok (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* June 1981, p. 22-24. In Russian.

A82-24498 † **The modeling of membranes and membrane engineering (Modelirovanie membran i membrannaia inzheneriia).** L. D. Bergel'son (Akademiia Nauk SSSR, Institut Bioorganicheskoi Khimii, USSR). *Priroda,* no. 11, 1981, p. 15-23. In Russian.

The construction of artificial membrane structures for the study of the complex processes occurring in biological membranes (membrane modeling) is discussed along with the area of endeavor seeking to alter living membranes so as to affect various levels of cellular behavior. Following a brief review of membrane structure as related to the properties of the phospholipids comprising them, attention is given to the formation of membrane structures in phospholipid solutions, particularly liposomes, consisting of a series of concentric lipid bilayers or a single bilayer. Proteolipsomes, derived by the introduction of proteins are then discussed as models of cellular membranes used in studies of membrane permeability to ions and molecules, and membrane absorption, endocytosis, fusion and lipid transfer upon interactions with cells. Liposome-cellular interactions provide a basis for membrane engineering, the changing of cell properties by the incorporation of foreign substances. Problems and potential applications for the use of liposomes to treat various conditions in the whole organism are also considered. A.L.W.

A82-24499 † **Sports morphology on the rise /On the work of the Morphological Section at the International Congress 'Sports in Contemporary Society'/ (Sportivnaia morfologiia na pod'eme /O rabote morfologicheskoi sektsii na Vsemirnom Kongresse 'Sport v Sovremennom Obshchestve'/).** B. A. Nikitiuk and F. V. Sudzilovskii. *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, Mar. 1981, p. 111-113. In Russian.

A82-24500 † **Neuromorphological evidence of individual differences in human vision (Neiromorfologicheskoe svidetel'stvo individual'nykh razlichii v zrenii cheloveka).** V. P. Zvorykin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Oct. 1981, p. 21-24. 11 refs. In Russian.

Individual differences in the volumes of brain structures connected with visual functions are investigated as indicators of human visual characteristics. Volumes of the lateral geniculate body on the subcortical level and field 17 (the area striata) on the cortical level were determined in 45 adult human brain hemispheres. Total volumes of the lateral genicular body and field 17 and grey matter

volumes of the lateral geniculate body are obtained which vary by factors of 2 to 3, significantly more than the total brain mass variation. Results may be interpreted as a neuromorphological basis for the observed variation in visual characteristics between individuals and its genetic predeterminacy. A.L.W.

A82-24501 † **The functional state of the segmental apparatus of the spinal cord in humans during local work after a short period of rest (Funktsional'noe sostoianie segmentarnogo apparata spinnogo mozga cheloveka pri lokal'noi rabote posle sokrashchennogo otdykha).** V. R. Kuchma (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Dec. 1981, p. 35-39. 16 refs. In Russian.

The excitability of spinal motoneurons and the state of the inhibitory systems of the spinal cord during tiresome local work carried out with 50, 30, and 20% of maximum operating force after varying periods of rest are examined. It is found that shortening the rest period does not affect the dynamics of the indices characterizing the functional state of the segmental apparatus during subsequent work. It is also established that, with a shortened rest period, the changes in the functional indices at the moment of 'refusal' become more pronounced; there are higher levels of spinal motoneuron reflector excitability and a greater suppression of the spinal cord's inhibitory systems during repetitive exertions not preceded by a rest. C.R.

A82-24502 † **Cumulative fatigue over long periods caused by localized muscular movements (O kharaktere kumuliatsii utomleniia v dinamike dlitel'nykh periodov lokal'noi myshechnoi raboty).** O. I. Murav'eva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 25-29. 8 refs. In Russian.

The buildup of fatigue in computer keyboard operators over a day, a week, and a month is investigated. Shifts in electromyographic and dynamometric indices attest the growth of fatigue over a week. Monthly cycles are demonstrated by increases in the amplitudes of electromyograms. Longer vacations and programs of physical exercise at work are recommended. C.R.

A82-24503 † **Clinical-physiological characterization of the auditory-analyzer function of workers of various occupations at the Mikhailovskii concentration mill (Kliniko-fiziologicheskaia kharakteristika funktsii slukhovogo analizatora u nekotorykh professional'nykh grupp Mikhailovskogo Gorno-Obogatitel'nogo Kombinata).** V. A. Uriupin, S. Z. Piskunov, Z. A. Zeveleva, M. V. Banchenko, L. P. Proskurina, and V. P. Shcheglov (Kurskii Meditsinskii Institut, Kursk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Nov. 1981, p. 50, 51. In Russian.

A82-24504 † **Certain neurohormonal and blood-coagulation changes in the case of early symptoms of vibration-related pathology in miners (Nekotorye neirogormonal'nye i gemokoaguliatsionnye izmeneniia pri rannikh proiavleniiakh vibratsionnoi patologii u shakhterov).** E. M. Vinarik (Akademiia Meditsinskikh Nauk SSSR, Donetsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 39, 40. In Russian.

A82-24505 † **Progress in the study of occupational diseases at the F. F. Erisman Hygiene Research Institute in Moscow (Razvitie issledovanii po professional'noi patologii v Moskovskom Nauchno-Issledovatel'skom Institute Gigieny im. F. F. Erismana).** A. A. Komarova (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 36-39. In Russian.

A82-24506 † **Certain characteristics of the physiological basis of work-rest regimes for rolling mill operators (Nekotorye osobennosti fiziologicheskogo obosnovaniia rezhimov truda i otdykha operatorov, zaniatykh v nepreryvnykh protsessakh v chernoi metallurgii).** G. T. Chukmasova (Dnepropetrovskii Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR) and T. N. Polianskaia (Dnepropetrovskii Metallurgicheskii Institut, Dnepropetrovsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Apr. 1981, p. 4-7. 6 refs. In Russian.

A82-24507 † **The differential diagnosis of peripheral vasomotor impairments of vibrational and nonvibrational origin (K differentsial'noi diagnostike perifericheskikh vazomotornykh narushenii vibratsionnogo i nevibratsionnogo geneza).** B. E. Petrenko and M. L. Vydrin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 8-11. 7 refs. In Russian.

Criteria for the differential diagnosis of vascular impairments of vibrational and nonvibrational origins are evaluated based on the dynamic characteristics of vascular responses. Together with usual clinical tests and examinations, a series of specially designed tests including a cold test, an arm raising and lowering test, reactive hyperemia, ischemization of the extremities and local vibration were performed on healthy subjects, and patients with autonomic-vascular dysfunctions, Raynaud's disease and syndrome, polyneuropathies and vibration sickness from the effects of whole-body and local vibration. The continuous recording of forearm rheograms during the cold test, in which subjects immersed their hands in 0 C water, is found to allow dynamic vascular responses to be observed and classified as either normal, distonic hyporeactive, primarily vasospastic and secondarily vasospastic. The latter two types of responses, within the context of the clinical picture, appear to be associated preferentially with vibration-induced impairments, and may thus be used as evidence of a vibrational origin. A.L.W.

A82-24508 † **Working conditions and health of female workers in the sawmill sections of the wood-working industry (Usloviia truda v sostoianie zdorov'ia rabotnits lesopil'nykh tsekhov derevoobrabatyvaiushchei promyshlennosti).** V. F. Rotovitskaia, G. I. Shepel'skaia, and I. I. Solov'ev (Krasnoiarskii Meditsinskii Institut, Krasnoyarsk, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 34, 35. In Russian.

A82-24509 † **The use of correlation analysis for the detection of signs of changes in the physiological condition of workers exposed to vibration (Ispol'zovanie korreliatsionnogo analiza dlia vyiavleniia priznakov izmeneniia funktsional'nogo sostoianiia organizma rabochikh vibroopasnykh professii).** N. P. Artamonov (Rostovskii Meditsinskii Institut, Rostov-on-Don, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Oct. 1981, p. 29-31. In Russian.

A82-24510 † **A basis for the optimal duration of work breaks in the presence of noise of various intensities during the course of a work shift (Obosnovanie optimal'nogo vremeni pereryvov pri deistvii shuma razlichnoi intensivnosti v techenie rabochei smeny).** G. S. Zvereva, M. V. Ratner, and T. Ia. Toporets (Akademiia Meditsinskikh Nauk SSSR, Donetsk, Ukrainian SSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 46, 47. 6 refs. In Russian.

A82-24511 † **Evaluation of the information content of the clinical signs and the probability of noise sickness (Otsenka informativnosti klinicheskikh priznakov i veriatnosti shumovoi bolezni).** Iu. P. Syromiatnikov (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Aug. 1981, p. 1-4. 12 refs. In Russian.

The information content of various nonspecific clinical signs and diagnosis probability in the detection of noise sickness are examined. Statistical analysis is applied to data concerning the prevalence of reductions in auditory sensitivity, headaches, dizziness, irritability, insomnia, motion discomfort, general hyperhydrosis, changes in skin temperature topography, arterial pressure asymmetry, reduced vibration sensitivity, vestibular sensibilization and hypothalamic dysfunction in patients with varying degrees of noise pathology. The initial stages of noise sickness are found to be polysyndromic, characterized by signs of neurasthenia and disturbances in autonomic and somatic nervous function. These signs often have a scintillating character, and often disappear after rest. The more severe stages of the sickness are accompanied by progressive deafness, increasing blunting of vibration sensitivity, subjective and nervous signs of a more stable nature and signs of hypothalamic dysfunction. A.L.W.

A82-24512 † **Physiological and hygienic evaluation of the work of female tower crane operators (Fiziologo-gigienicheskaia otsenka truda zhenshchin-mashinistov bashennykh kranov).** G. V. Daletskaia (Vsesoiuznyi Nauchno-Metodicheskii Tsentr po Organizatsii Truda i Upravleniia Proizvodstvom, Moscow, USSR) and G. A. Poliakova (Nauchno-Isledovatel'skii Institut Truda, Moscow, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1981, p. 27-30. In Russian.

A82-24513 † The change in certain parameters of operator activity under the influence of alcohol (Izmenenie nekotorykh parametrov operatorskoi deiatel'nosti pod vliianiem alkogolia). L. Tsaneva and S. Danev. *Gigiena Truda i Professional'nye Zabolevaniia,* May 1981, p. 38. In Russian.

The effect of a small amount of alcohol on the ability of workers to understand spoken information under noisy conditions is investigated. Six men and six women (ranging in age up to 23) are tested to measure their ability to hear and speak both before and after consuming 100 g (men) and 50 g (women) of vodka. It is established that the 0.5 percent figure generally regarded as the lowest concentration of alcohol in the blood at which functions of the central nervous system are affected is too high. It is noted that the subjects were not aware of any impaired perception. C.R.

A82-24514 † An evaluation of the total stress involved in certain types of precision work (Otsenka obshchego rabochego napriazheniia pri nekotorykh kategoriiakh pretsizionnykh rabot). I. D. Gundareva (Institut Gigieny Truda i Profzabolevanii, Leningrad, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* Jan. 1981, p. 39, 40. 12 refs. In Russian.

A82-24515 † Some indices of the functional physiological state of inspectors at a thermal power plant (Nekotorye pokazateli funktsional'nogo sostoianiia organizma mashinistov-obkhodchikov teplovoi elektrostantsii). B. S. Mambetaliev, A. D. Dzhailobaev, A. B. Botombekova, and O. T. Kasymov (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR). *Zdravookhranenie Kirgizii,* May-June 1981, p. 24-29. In Russian.

A82-24516 † Morphofunctional changes in the rabbit myocardium during chronic solar thermal overheating (Morfofunktsional'nye izmeneniia miokarda u krolikov pri khronicheskom solnechno-teplovom peregrevanii). A. A. Abdyldaev and K. S. Mustafin (Dzhalal-Abadskaia Gorodskaia Bol'nitsa, Dzhalal Abad, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Mar.-Apr. 1981, p. 27-30. In Russian.

Functional, histological and morphological changes in the myocardium under conditions of overheating are investigated in relation to the stage of overheating in the rabbit. Experiments were performed on animals undergoing 60 days of solar heating to produce body temperatures of 40-40.5 and 42-42.5 C. Significant changes in electrocardiogram patterns are observed in both groups of animals which correspond to a focal or diffuse myocardial hypoxia following 60 days of exposure. Reductions in the weight percent of the right ventricle, the ventricular index and the weight percent of the left ventricle with respect to controls are found in the experimental animals and attributed to an impairment in electrolyte metabolism. Histological examinations reveal the presence of micronecrosis and cardiosclerosis the extent of which depends on the length and intensity of exposure. A.L.W.

A82-24517 † Evaluation of the effectiveness of the complex treatment of patients with ischemic heart disease by the bicycle ergometer method (Otsenka effektivnosti kompleksnogo lecheniia bol'nykh iskhemicheskoi bolezn'iu serdtsa metodom veloergometrii). Sh. I. Shamenova (Kirgizskii Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Sept.-Oct. 1981, p. 49-51. In Russian.

A82-24518 † Phase analysis of peripheral systemic circulation by a rheographic method (Fazovaia otsenka sistemnogo perifericheskogo krovoobrashcheniia reograficheskim metodom). V. A. Il'in (Kirgizskii Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Mar.-Apr. 1981, p. 35-40. In Russian.

The simultaneous recording of bulk and differential rheograms is used for the phase analysis of peripheral systemic circulation. The bulk rheogram, its first derivative and the lateral pressure curve in the femoral artery were recorded simultaneously with electrocardiograms or instantaneous blood flow rates in the femoral arteries of dogs. It is found that the combined analysis of bulk and differential rheograms allows the initial point of rheogram rise, the completion of the fast filling phase, the phase of maximal filling and the end points of the fast and slow phases of arterial flow and the venous flow phase to be distinguished. A.L.W.

A82-24519 † Cardiac function in surgical tuberculosis patients under conditions of prolonged bed rest (Funktsiia serdtsa u bol'nykh kostno-sustavnym tuberkulezom v usloviiakh dlitel'nogo postel'nogo rezhima). V. P. Zakutaeva and M. I. Poliakova (Kirgizskii Nauchno-Issledovatel'skii Institut Tuberkuleza, Kirgiz SSR). *Zdravookhranenie Kirgizii,* Nov.-Dec. 1981, p. 51-54. In Russian.

A82-24520 † Characteristics of the functional state of health (K kharakteristike funktsional'nogo sostoianiia zdorov'ia). K. I. Zhuravleva and V. L. Iaroslavtsev (Leningradskii Sanitarno-Gigienicheskii Institut, Leningrad, USSR). *Sovetskoe Zdravookhranenie,* no. 6, 1981, p. 14-18. In Russian.

A82-24521 † Criteria for a healthy way of life and prerequisites for establishing it (Kriterii zdorovogo obraza zhizni i predposylki ego formirovaniia). A. D. Stepanov and D. A. Izutkin (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Sovetskoe Zdravookhranenie,* no. 5, 1981, p. 6-10. In Russian.

A82-24522 † Morbidity involving a temporary loss of work capacity among drivers of automotive passenger vehicles (Zabolevaemost' s vremennoi utratoi trudosposobnosti voditelei passazhirskogo avtotransporta). V. D. Zhidkov (Ministerstvo Zdravookhraneniia RSFSR, Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Gorki, USSR). *Sovetskoe Zdravookhranenie,* no. 7, 1981, p. 32-36. 6 refs. In Russian.

A82-24523 † The fatty acid composition of blood serum from intact rats and rats adapted to hypoxia under the conditions of acute hypoxia (Zhirnokislotnyi sostav syvorotki krovi intaktnykh i adaptirovannykh k gipoksii krys na fone deistviia ostroi gipoksii). O. R. Grek, A. V. Dolgov, and A. V. Morozov (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, July-Aug. 1981, p. 469-471. 19 refs. In Russian.

A82-24524 † Effect of regulated muscular load on the morphological and functional characteristics of adrenal glands in dogs with experimental hypocorticalism (Vliianie dozirovannoi myshechnoi nagruzki na morfofunktsional'nuiu kharakteristiku nadpochechnikov sobak s eksperimental'nym gipokortitsizmom). A. G. Kochetkov (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Problemy Endokrinologii,* vol. 27, July-Aug. 1981, p. 53-58. 19 refs. In Russian.

A82-24525 † Circadian and seasonal rhythms in plasma androgen levels in the rhesus macaque monkey (Tsirkadnye i sezonnye ritmy soderzhaniia androgenov v plazme krovi obez'ian makak rezusov). N. P. Goncharov, D. S. Tavadian, and V. I. Vorontsov (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Problemy Endokrinologii,* vol. 27, Nov.-Dec. 1981, p. 53-57. 17 refs. In Russian.

A82-24526 † Intellection and emotions (Myslitel'naia deiatel'nost' i emotsii). V. E. Klochko and S. M. Dzhakupov. *Voprosy Psikhologii,* May-June 1981, p. 169-171. In Russian.

A monograph on this subject by Vasil'ev et al. (1980) is reviewed. It is noted that certain fundamental conceptions in psychology have prevented investigators from considering the relationship between the emotional and intellectual components of thinking as a topic worthy of serious study. The authors of the monograph see the emotions as forming an internal condition, and therefore playing an important role, in intellection. On the basis of Leont'ev's notion of activity as a system having its own structure, internal transitions, and development, the authors seek to lay the foundation for a systems approach. Such an approach, it is noted, would make it possible to investigate the principles governing the inception and operation of emotional phenomena during intellection. C.R.

A82-24527 † A device for laboratory investigations of

technical-diagnostic activity (Ustroistvo dlia laboratornogo issledovaniia tekhniko-diagnosticheskoi deiatel'nosti). A. F. Anufriev. *Voprosy Psikhologii,* Sept.-Oct. 1981, p. 143-145. 5 refs. In Russian.

A device is described for investigating, under laboratory conditions, the way in which workers analyze problems encountered in the production of timepieces. Just as on the shop floor, the device makes it possible to verify an analysis in two ways: either by examining the element suspected of causing the problem or by checking the quality of parts produced after the suspected element is replaced. C.R.

A82-24528 † **Establishing methods of investigating individual characteristics of making decisions in situations of conflict (K obosnovaniiu metodiki issledovaniia individual'nykh osobennostei priniatiia reshenii v konfliktnykh situatsiiakh).** A. N. Kovalev. *Voprosy Psikhologii,* July-Aug. 1981, p. 127-131. 12 refs. In Russian.

It is noted that the technical means at man's disposal for executing decisions far exceed his ability to arrive at decisions in a timely and judicious manner. It is thought that mathematical methods and computers may be useful in studying the way in which decisions are made under various circumstances, including those of conflict. The mathematical theory of games, however, either ignores individual psychological factors altogether or else treats them in a general way. The experiment described here is based on a game played with a computer that can act as either a friend or enemy. The program permits an analysis of individual responses to situations of conflict. C.R.

A82-24529 † **Psychophysiological characteristics of the fatigue state based on activation indicators (Psikhofiziologicheskaia kharakteristika sostoianiia utomleniia na osnove pokazatelei aktivatsii).** G. A. Striukov (Gor'kovskii Gosudarstvennyi Universitet, Gorki, USSR), O. A. Konopkin (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR), and T. N. Dolgolenko. *Voprosy Psikhologii,* May-June 1981, p. 38-48. 22 refs. In Russian.

A82-24530 † **A mediation method for solving problems of 'quick-wittedness' (O sposobe oposredstvovaniia pesheniia zadach na 'soobrazhenie').** B. D. El'konin. *Voprosy Psikhologii,* Jan.-Feb. 1981, p. 110-118. 17 refs. In Russian.

The possibility of transition from immediate to mediated solving of quick-wittedness problems is considered. Mediation here is defined as the mediation of the transition between the conditions and goal of the problem. The object where this transition occurs represents the content of the orienting activity in the solving of quick-wittedness problems. It is shown that this object can be constructed only when the trajectory of operations required by the problem can be represented as an entity to be transformed. In this case, the data appear not as a set of separate cues for required operations but as an object, different transformations of which afford different trajectories of the required operation. B.J.

A82-24531 † **The relationship between the individual properties of a human operator and work efficiency and tolerance to the monotony of work (Sviaz' individual'nykh svoistv cheloveka-operatora s produktivnost'iu deiatel'nosti i ustoichivost'iu k vliianiiu faktora monotonnosti truda).** Iu. V. Bushov and Iu. A. Riabchuk (Tomskii Gosudarstvennyi Universitet, Tomsk, USSR). *Voprosy Psikhologii,* Jan.-Feb. 1982, p. 126-130. 15 refs. In Russian.

A82-24532 † **Human predictive ability in univocally determined situations for normal and pathological states (Prognosticheskaia deiatel'nost' cheloveka v odnoznachno-determinirovannykh sredakh v norme i patologii).** A. Iu. Akopov (Psikhonevrologicheskii Dispanser, Leningrad, USSR) and F. I. Sluchevskii (Leningradskii Gosudarstvennyi Meditsinskii Institut, Leningrad, USSR). *Voprosy Psikhologii,* May-June 1981, p. 119-123. 7 refs. In Russian.

A82-24533 † **The dependence of the strategy by which a solution is sought on the type of intellection (Zavisimost' strategii poiska resheniia ot tipa myshleniia).** V. S. Goncharov. *Voprosy Psikhologii,* July-Aug. 1981, p. 132-136. 11 refs. In Russian.

The investigation is carried out in two stages. First the type of intellection is determined, then the game method is used in studying the features characterizing the search for a solution. The two types of intellection - theoretical and empirical - derive from research done by Davydov (1972). The three components of theoretical intellection are analysis, reflection, and an internal plan of action. It is shown that theoretical and empirical ways of thinking lead to different ways of pursuing solutions. The three components of the theoretical type are shown to have a marked effect on the way a solution is sought. C.R.

A82-24534 † **Determination of oxygen content in air on the basis of meterological parameters /pressure, temperature, and moisture/ in order to predict the hypoxic effect of the atmosphere (Opredelenie soderzhaniia kisloroda v atmosfernom vozdukhe na osnove meteorologicheskikh parametrov /davleniia, temperatury, vlazhnosti/ s tsel'iu prognozirovaniia gipoksicheskogo effekta atmosfery).** V. F. Oucharova (Tsentral'nyi Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii, Moscow, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Mar.-Apr. 1981, p. 29-34. In Russian.

A82-24535 † **Features of biorhythms for patients with chronic nonspecific pulmonary diseases during adaptation to the climato-geographic conditions of the Crimea (Osobennosti biologicheskikh ritmov u bol'nykh s khronicheskimi nespetsificheskimi zabolevaniiami legkikh v protsesse adaptatsii k klimatogeograficheskim usloviiam Kryma).** V. P. Piatkin, G. E. Butenko, V. L. Semenov, N. F. Kostin, and R. V. Fedoriv (Ialtinskii Nauchno-Issledovatel'skii Institut Fizicheskikh Metodov Lecheniia i Meditsinskoi Klimatologii, Yalta, Ukrainian SSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Nov.-Dec. 1981, p. 5-10. 12 refs. In Russian.

A82-24536 † **Chronobiological aspects in the science of health resorts and physiotherapy (Khronobiologicheskie aspekty v kurortologii i fizioterapii).** I. E. Oranskii (Sverdlovskii Institut Kurortologii i Fizioterapii, Sverdlovsk, USSR). *Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kul'tury,* Nov.-Dec. 1981, p. 1-5. In Russian.

Implications of biological rhythms for physiotherapy and treatments at health resorts are discussed. The temporal characteristics of various physiological parameters in healthy and ill persons are outlined and the potential role of physiotherapy in the restoration of biological rhythms disrupted by disease and in the facilitation of adaptation processes is pointed out. Differences in the dynamics of the rhythms of different functions and the indeterminacy of their responses to effecting factors are discussed in light of experiments on nitroglycerin electrophoresis in patients with chronic ischemic heart disease. It is noted that the chronobiological approach is important not only for the study of the mechanisms of the adaptive effects of physical therapy, but has great practical significance, particularly in the development of treatment schedules, the seasonal prevention and treatment of illness and the readjustment of physiological functions following travel between time zones. A.L.W.

A82-24537 † **Individual variability in reaction norms and population adaptation (Individual'naia izmenchivost' normy reaktsii i adaptatsiia populiatsii).** A. S. Severtsov and G. S. Surova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Mar.-Apr. 1981, p. 181-192. 22 refs. In Russian.

The variability of the reaction norms of individuals and populations under various environmental circumstances is investigated based on studies of growth rate in Rana temporaria tadpoles. Individuals were grown from eggs under different conditions of temperature, illumination and population composition, and body size and degree of development were analyzed to determine the heritability of the growth rate characteristic. The individual variations observed are accounted for by individual ranges of the reaction norms and the deviation of the mean individual norm from that of the population. The wide range of reaction norms within the population thus reflects its genotypic heterogeneity. The plasticity of the characteristic is considered to ensure the adaptability of the peak and side groups in the growth rate distribution, while the width of the norm ensures the ecological and evolutionary plasticity of the population as a whole. A.I.W.

A82-24538 † **The effect of the evolution of inherited characteristics on the stability of a predator-prey system - A mathematical model (Vliianie evoliutsii nasledstvennykh priznakov**

na ustoichivost' sistemy khishchnik-zhertva - Matematicheskaia model'). B. G. Kovrov and L. G. Kosolapova (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Zhurnal Obshchei Biologii*, vol. 42, Sept.-Oct. 1981, p. 780-790. 13 refs. In Russian.

A82-24539 † **The stability of a very simple freshwater ecosystem model (Ustoichivost' prosteishei modeli vodnoi ekosistemy).** A. A. Voinov and Iu. M. Svirezhev (Akademiia Nauk SSSR, Vychislitel'nyi Tsentr, Moscow, USSR). *Zhurnal Obshchei Biologii*, vol. 42, Nov.-Dec. 1981, p. 936-940. 7 refs. In Russian.

A82-24540 † **This strange cochlea (Eta strannaia ulitka).** E. Sorokin. *Tekhnika i Nauka*, no. 10, 1981, p. 11-13. In Russian.

A popular account is given of laboratory experiments on the cochlea. A structural diagram of the cochlea is presented, and consideration is given to an electrical analog ('long line') model of its functioning. B.J.

A82-24541 † **Age norms of cardiac chamber volumetric parameters (Vozrastnye normy ob'emnykh pokazatei kamer serdtsa).** N. A. Chigogidze, T. N. Vaulina, and S. V. Kirakosian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhiv Patologii*, vol. 43, no. 9, 1981, p. 69-71. 6 refs. In Russian.

A82-24542 † **Changes in the activity of kidney enzymes during temporary ischemia of the extremities (Izmeneniia aktivnosti fermentov pochek pri vremennoi ishemii konechnostei).** G. A. Chekareva, O. D. Mishnev, T. S. Serdobintseva, and N. P. Istomin (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Arkhiv Patologii*, vol. 43, no. 8, 1981, p. 27-34. 29 refs. In Russian.

A82-24543 † **A comparative study of the effects of constant and intermittent noise on the acoustic analyzer (Sravnitel'noe izuchenie deistviia postoiannogo i nepostoiannogo shuma na slukhovoi analizator).** V. V. Mukhin (Donetskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR). *Gigiena i Sanitariia*, Dec. 1981, p. 60, 61. 10 refs. In Russian.

A82-24544 † **The effects of noise on the physiological condition of blood leucocytes (Vliianie shuma na funktsional'noe sostoianie leikotsitov krovi).** O. P. Lomov and E. V. Tatarinova. *Gigiena i Sanitariia*, Dec. 1981, p. 22-24. 14 refs. In Russian.

The phagocytic activities and glycogen contents of blood leucocytes of persons exposed to various noise levels are studied. Exposure to noise at an equivalent sound level of 95 dBA is found to be accompanied by significant increases in phagocytic number and phagocytic index 4 h after noise exposure, but sharp reductions in leucocyte phagocytic activity and a marked tendency towards reduced neutrophil glycogen saturation on the fifth day of exposure, indicative of a serious reduction in immunobiological potential. In contrast, prolonged exposure to noise at 80 dBA leads to an elevation in immunobiological reactiveness in 30 days after an insignificant initial decline. Correlation analysis of the numbers of segmented neutrophils, the phagocytic index and number, and the mean cytochemical glycogen coefficient suggests that the number of blood leucocytes is determined by their physiological condition. A.L.W.

A82-24545 † **The role of multiple recording devices in the complex equipping of functional-diagnostic facilities (Rol' poligrafov v kompleksnom osnashchenii otdelenii funktsional'noi diagnostiki).** A. G. Tishchenko and L. A. Shuster (Nauchno-Proizvodstvennoe Ob'edinenie Radioelektronnoi Meditsinskoi Apparatury, Lvov, Ukrainian SSR). *Meditsinskaia Tekhnika*, Jan.-Feb. 1981, p. 44-46. 6 refs. In Russian.

A description is given of multiple recording devices: four, six, and eight channel multifunctional diagnostic complexes. The devices provide for the following types of diagnostic recordings: EKG, echo cardiography, sphygmography, EEG, thoracoscopy, and recording of the skin galvanic response. B.J.

A82-24546 † **A complex of instruments for psychophysiological studies (Kompleks priborov dlia psikhofiziologicheskikh issledovanii).** A. I. Vishniakov and E. V. Matveev (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR). *Meditsinskaia Tekhnika*, Jan.-Feb. 1981, p. 14-17. 5 refs. In Russian.

The PFK-01 instrument complex has been developed for the more efficient practical application of psychophysiological examination methods in a network of therapeutic-prophylactic and polyclinical establishments. The complex is based on a programmable keyboard computer and is used to process data obtained by 12 psychophysiological methods. A block diagram of the complex is presented. B.J.

A82-24547 † **Combined rehabilitative and therapeutic measures in space medicine (Kompleksnye vosstanovitel'nolechebnye meropriiatiia v kosmicheskoi meditsine).** T. N. Krupina, A. V. Beregovkin, V. M. Bogoliubov, B. M. Fedorov, A. D. Egorov, A. Ia. Tizul, V. V. Bogomolov, V. V. Kalinichenko, A. P. Ragulin, and V. A. Stepin. *Sovetskaia Meditsina*, no. 12, 1981, p. 3-8. 13 refs. In Russian.

Means and methods developed for the treatment of physiological disorders induced by extended space flights are discussed. The procedures were formulated on the basis of ground-based experiments on antiorthostatic hypokinesia for periods of 49 and 182 days, and experience with the treatment of cosmonauts following space flights of 140- and 175-day durations. Taking into account the etiopathological characteristics of the disorders encountered, the rehabilitative process is founded primarily on functional therapy, including therapeutic physical exercises, massage, dosed walking, physical training and balneological and thermal procedures. These procedures are employed differentially, first in the mild, then in the mild-training and training stages of the rehabilitative process in combination with rational psychotherapy. A.L.W.

A82-24548 † **Application of electrogustometry for the evaluation of adrenal functional conditions (Primenenie elektrogustometrii dlia otsenki funktsional'nogo sostoianiia nadpochechnikov).** E. Sh. Khalfen and A. D. Triapyshko (Saratovskii Meditsinskii Institut, Saratov, USSR). *Kazanskii Meditsinskii Zhurnal*, vol. 62, Sept.-Oct. 1981, p. 34-36. In Russian.

The use of electrogustometry, whereby gustatory sensations are induced by the passage of a constant electric current from the tip of the tongue to the right arm, for the detection of adrenal insufficiency is studied. Measurements of the applied current at which the gustatory sensation disappears were made in 400 healthy persons and 270 patients with an apparatus employing a circuit voltage of 4.5 V and additional resistance of 100 kiloohms. Moderate decreases in critical current were found in 18 and sharp decreases in 25 of the patients in comparison with the healthy subjects and remaining patients. Analysis of blood glucose levels, levels of sodium and potassium in the saliva and blood serum and 17-ketosteroid excretion reveal all patients exhibiting low electrogustometric indicators to have signs of secondary adrenal insufficiency, although not all patients testing normal are without it. Results thus indicate that electrogustometry may be used as a simple preliminary method for the detection of adrenal insufficiency. A.L.W.

A82-24549 † **Morphometric analysis of ultrastructural changes in the skeletal muscles during physical exercise in acute and chronic experiments (Morfometricheskii analiz ul'trastrukturnykh sdvigov v skeletnykh myshtsakh pri fizicheskikh nagruzkakh v ostrom i khronicheskom eksperimente).** M. D. Shmerling, E. E. Filiushina, and I. I. Buzueva (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Akademiia Nauk SSSR, Sibirskoe Otdelenie, Izvestiia, Seriia Biologicheskikh Nauk*, Apr. 1981, p. 124-130. 20 refs. In Russian.

Changes in the morphologies of the subcellular components of skeletal muscle cells as a result of physical exercise of various durations and intensities are investigated in rats undergoing daily treadmill running to exhaustion for three days and physical exercise of increasing intensity over the course of 40 days. Electron microscopic examination of the tibialis anterior muscle following maximal exercise reveals ultrastructural changes in the morphometric characteristics of the sarcoplasmic reticulum and glycogen stores reflecting the sudden mobilization and exhaustion of intracellular reserves. The white, fast-twitch muscle fibers are observed to be more sensitive to these effects than the red, slow-twitch fibers. Prolonged physical exercise, on the other hand, is observed to produce, particularly in the red muscle fibers, ultrastructural changes in sarcoplasmic reticulum, mitochondria and glycogen stores character-

istic of elevated muscular work capacity and fatigue tolerance.
A.L.W.

A82-24550 † Changes in blood sodium and potassium concentrations during emotional stress induced by nociceptive stimuli in rats (Izmenenie kontsentratsii natriia i kaliia v krovi pri emotsional'nom stresse, vyzvannom bolevym razdrazheniem krys). N. A. Gzirishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Izvestiia, Seriia Biologicheskaia,* vol. 6, no. 6, 1980, p. 485-492. 20 refs. In Russian.

A82-24551 † Mechanism of the effects of vacuum on microorganisms (O mekhanizme deistviia vakuuma na mikroorganizmy). A. A. Imshenetskii, S. V. Lysenko, N. F. Pisarenko, and N. L. Velikanov (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). *Mikrobiologiia,* vol. 50, Sept.-Oct. 1981, p. 788-791. In Russian.

The mechanisms for the effects of high vacuum on vacuum-tolerant and vacuum-intolerant microorganisms are investigated in light of the importance of the vacuum environment for the space transport of microbial life forms. Experiments involved the exposure of preliminarily desiccated and moist bacterial (Mycobacterium luteum, Serratia marescens) and yeast (Endomyces magnusii) cells to a vacuum of 0.00005 torr for 15 and 30 min. The survival rates of both the intolerant (E. magnusii, S. marescens) and tolerant (M. luteum) species are found to be greater when vacuum exposure is preceded by desiccation. Microscopic examination confirms the effects of water in cell destruction, revealing the effects of saturated water vapor and ice crystals in cell expansion and eventual rupture. Dehydration is also shown to play a significant role in cell death.
A.L.W.

A82-24552 † Pathogenesis and prevention of the hypoxic contraction of the heart (Patogenez i preduprezhdenie gipoksicheskoi kontraktury serdtsa). F. Z. Meerson and N. A. Abdikaliev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Apr. 1981, p. 60-67. 24 refs. In Russian.

A82-24553 † The prognostic value of the central hemodynamic parameters in patients with acute myocardial infarction (Prognosticheskoe znachenie opredeleniia pokazatelei tsentral'noi gemodinamiki u bol'nykh ostrym infarktom miokarda). Iu. A. Karpov and N. A. Gratsianskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Kardiologiia,* vol. 21, Dec. 1981, p. 27-33. 21 refs. In Russian.

A82-24554 † The isoenzyme spectrum of serum lactate dehydrogenase as a function of age in healthy individuals (Izofermentnyi spektr syvorotochkoi laktatdegidrogenazy v vozrastnom aspekte u prakticheski zdorovykh liudei). M. Ia. Beliaev (I Kazanskii Institut Usovershenstvovaniia Vrachei, Kazan, USSR). *Laboratornoe Delo,* no. 3, 1981, p. 152-154. In Russian.

A82-24555 † Lipid levels in the bone marrow megakaryocytes and thrombocytes of healthy people (Soderzhanie lipidov v megakariotsitakh i trombotsitakh kostnogo mozga zdorovykh liudei). T. V. Tkacheva (Kirovskii Nauchno-Issledovatel'skii Institut Pereliuvaniia, Krovi, USSR) and N. I. Roganova (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Laboratornoe Delo,* no. 9, 1981, p. 520, 521. 6 refs. In Russian.

A82-24556 † Beta-acetylglucosaminidase and alpha-mannosidase activity in the blood serum of healthy people of different blood groups (Aktivnost' Beta-atsetilgliukozaminidazy i alpha-mannozidazy v syvorotke krovi zdorovykh liudei s razlichnymi gruppami krovi). I. Ts. Apostolov and I. I. Kalpazanov (Meditsinska Akademiia, Sofia, Bulgaria). *Laboratornoe Delo,* no. 7, 1981, p. 422-425. 21 refs. In Russian.

A82-24557 † A mechanism for the stimulation of the immune response under the influence of high ambient temperature (Mekhanizm stimuliatsii immunnogo otveta pri deistvii na organizm vysokoi vneshnei temperatury). L. G. Prokopenko and Iu. O. Iakhontov (Kurskii Meditsinskii Institut, Kursk, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Nov.-Dec. 1981, p. 62-66. 15 refs. In Russian.

The mechanism for the observed adjuvant properties of erythrocytes taken from heat-exposed animals is investigated. In a first series of experiments, erythrocytes taken from intact rats were treated with serum taken from rats exposed to daily 40-min intervals at 40 C and injected into syngenic rats together with sheep erythrocytes as antigens. Levels of the immune responses, as indicated by rosetta-cell formation in the spleen and serum antibody-forming cell levels, were increased markedly by the treatment of native erythrocytes with serum from heat-exposed rats. In a second series of experiments, treatment of erythrocytes from heat-exposed rats with serum from intact rats incubated with the polyvalent protease inhibitor trasylol is found to prevent the appearance of the adjuvant properties of the erythrocytes. Results suggest that the modification of erythrocyte surface structures by a serum factor represents a step in the multistage process of immune response stimulation following heat exposure. A.L.W.

A82-24558 † The biological significance of physiological hypoxemia (O biologicheskom znachenii fiziologicheskoi gipoksemii). S. I. Frankshtein, Z. N. Sergeeva, and L. N. Sergeeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Mar. 1981, p. 263-265. 18 refs. In Russian.

Mechanisms of respiratory control related to blood oxygenation are investigated in studies of the effects of oxygen pre-breathing. Experiments involved the measurement of diaphragm muscular activity in rabbits during the complete obstruction of respiratory pathways. Whereas the breathing of air prior to the closing of the tracheotomy tube is observed to lead to increased breathing muscle activity, oxygen pre-breathing for 1 min prior to closing weakens and slows breathing and suppresses the ventilatory response to airway obstruction. Results indicate that a decrease in the excitability of the respiratory center induced by hyperoxia prevents the reaction of the respiratory center, and suggest changes in blood gases during the obstruction of respiratory pathways. Hypoxemia in the norm is thus concluded not only to play a part in the ventilatory reflex to exercise and increased respiratory resistance, but to induce respiratory discomfort leading to the voluntary enhancement of respiration.
A.L.W.

A82-24559 † Correlation of the stress protective and autonomotropic effects of mebicar (Korreliatsiia stress-protektivnogo i vegetotropnogo deistviia mebikara). A. V. Bal'dman, I. V. Zaikonnikova, M. M. Kozlovskaia, I. E. Zimakova, M. F. Bravkov, V. P. Poshivalov, and S. V. Kirshin (Akademiia Meditsinskikh Nauk SSSR, Moscow; Kazanskii Meditsinskii Institut, Kazan; I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Jan.-Feb. 1981, p. 47-49. 8 refs. In Russian.

The relation of the behavioral effects of the tranquilizer mebicar, a tetra-N-alkyl bicyclic bis-urea derivative, with its effects on the somatic and autonomic manifestations of the stress response are investigated. Measurements of hemodynamic baroreflex and respiratory parameters and behavioral changes were made in cats under acute emotional stress induced by encounter with a dog, and in rats under isolation or immobilization stresses. The administration of mebicar at doses from 100 to 300 mg/kg is observed to inhibit the autonomic components of the acute emotional stress response in cats, including hypertension and degradations in central baroreflex control, accompanied by a reduction in emotional and behavioral responsivity. Equivalent tranquilizing doses in rats normalize disturbances in individual and intraspecies behavior induced by prolonged isolation, and reduce the degree of ulcerous damage to the stomach during immobilization stress. A.L.W.

A82-24560 † Effects of vitamin P on the enzyme spectrum of the blood serum of irradiated animals (Vliianie vitamina P na fermentnyi spektr syvorotki krovi obluchennykh zhivotnykh). V. M. Varvashtian, M. A. Orozov, and L. G. Gromova (Akademiia Nauk Kirgizskoi SSR, Institut Organicheskoi Khimii, Frunze, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* no. 1, 1981, p. 62, 63. 13 refs. In Russian.

The effects of the daily injection of vitamin P on the serum enzyme concentrations of animals suffering from radiation sickness are investigated. Activities of serum aldolase, aspartate and alanine aminotransferases, and cholinesterase were determined in rats ex-

posed to a single dose of 250 r of X radiation. The resulting radiation sickness is accompanied by 30-60% increases in enzyme activities, with the exception of cholinesterase by the 14th day following irradiation. The administration of daily doses of rutin or a flavonoid preparation isolated from the caper plant is observed to normalize the enzyme levels of irradiated animals without causing hemorrhaging of the internal organs upon dissection. Both preparations are thus concluded to have similar effects in reducing the permeability of vascular walls. A.L.W.

A82-24561 † Stereotactic biopsy of brain tumors based on computerized tomography (Stereotaksicheskaia biopsiia opukholei golovnogo mozga s ispol'zovaniem komp'iuternoi tomografii). E. I. Kandel', S. B. Vavilov, V. V. Peresedov, and A. S. Saribekian (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Neirokhirurgii,* July-Aug. 1981, p. 3-8. 16 refs. In Russian.

A82-24799 Suprachiąsmatic stimulation phase shifts rodent circadian rhythms. B. Rusak (Dalhousie University, Halifax, Nova Scotia, Canada) and G. Groos (Leiden, Rijksuniversiteit, Leiden, Netherlands). *Science,* vol. 215, Mar. 12, 1982, p. 1407-1409. 15 refs. Research supported by the Nederlandse Organisatie voor Zuiver Wetenschappelijk Onderzoek; Natural Sciences and Engineering Research Council of Canada Grant No. A-0305.

The integrity of the suprachiasmatic nuclei (SCN) of the hypothalamus is essential to the expression of normal circadian rhythms in rodents. Electrical stimulation of the SCN caused phase shifts and period changes in the freerunning feeding rhythms of rats and activity rhythms of hamsters. The phase response curve for SCN stimulation appears to parallel that for light pulses. These findings strengthen the hypothesis derived from lesion studies that the SCN are the dominant light-entrained oscillators in the rodent circadian system. (Author)

A82-24800 Onset and offset of brain events as indices of mental chronometry. B. Renault, R. Ragot, N. Lesevre, and A. Remond (CNRS, Laboratoire d'Electrophysiologie et de Neurophysiologie Appliquée, Paris, France). *Science,* vol. 215, Mar. 12, 1982, p. 1413-1415. 18 refs.

Analysis of single-trial electroencephalogram waveforms in a reaction time task demonstrated that the onset and offset values of event-related potentials can be used as indices of the duration of information processing. Two negative waves have been identified which peak at different times in different regions of the scalp, with the second overlapping the last part of the first. These waves are related in different ways to the duration of perceptual processing. (Author)

A82-24823 Carbon fibre reinforced epoxy prepregs and composites - Health risk aspects. M. Kowalska (Forsvarets Forskningsanstalt, Stockholm, Sweden). *SAMPE Quarterly,* vol. 13, Jan. 1982, p. 13-19. 39 refs.

It is shown that the primary health risk problem of carbon fiber-reinforced epoxy composite production is, in all production steps, allergic contact dermatitis. The toxicity of the reactive and non-reactive diluents, accelerators, and hardeners is comparatively low, and no cancer risk has been established. In addition, the carbon fibers currently in use are of a larger diameter than would be harmful to the respiratory system. Further toxicity, dermatology and carcinogenic tests are recommended for such chemicals as DDS, TGMDA and BF3-MEA. O.C.

A82-24830 † Characteristics of cerebral somato-sensory evoked potentials under various conditions for the formation of simple motor reactions (Osobennosti kharakteristik somato-sensornykh vyzvannykh potentsialov mozga pri raznykh usloviiakh formirovaniia prostoi dvigatel'noi reaktsii). O. P. Tairov, A. G. Smirnov, and R. R. Islamova (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 11-17. 17 refs. In Russian.

A82-24831 † Systems analysis of the EEG during signal discrimination tasks (Sistemnyi analiz EEG pri zadachakh na razhichenie_signalov). J. Michel, B. Kokh, H. Camman, I. Ellerman, Iu. N. Chegurov, and N. B. Suvorov (Berlin, Humboldt-Universität, Berlin, East Germany; Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR; Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Eksperimental'noi i Klinicheskoi Khirurgii, Tiflis, Georgian SSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 18-25. 16 refs. In Russian.

A dynamic systems analysis is presented of EEG patterns during graded mental work represented by a visual signal discrimination task. Experiments were performed on 18 subjects using an automated system for display projection and data recording and processing during a 20-min experimental protocol comprising five phases: rest, reference (task performance without discrimination), rest, mental work (discrimination between two types of bright ring images) and rest. Interval-amplitude analysis of the resulting EEG patterns reveals a significant enhancement in the quantity of theta waves in the vertex and simultaneous decrease in the right occipital region, and an increase in beta activity in both regions during the work phase. A significant reduction in the alpha rhythm is observed during both the reference and the work phases. Finally, in individuals with marked alpha rhythms at rest, a significant correlation is found between the appearance of a stable spindle-shaped alpha rhythm and a reduction in heart rate. A.L.W.

A82-24832 † Analysis of the electrographic correlates of thought activity (Analiz elektrograficheskikh korreliatov myslitel'noi deiatel'nosti). T. A. Petrosova, V. N. Kiroi, and E. V. Mel'nikov (Rostovskii Gosudarstvennyi Universitet Rostov-on-Don, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 26-30. 16 refs. In Russian.

A correlation analysis of cerebrocortical bioelectrical activity is used to investigate the neurophysiological mechanisms of mental activity. EEGs were recorded in 15 subjects before and during the performance of various mental tasks including anagrams, arithmetic problems, logic tests and games, and analyzed by a hierarchical classification algorithm for multi-dimensional EEG time series. The analysis demonstrates changes in the level of bipotential spatial synchronization in the neocortex during mental processes, particularly a decrease in synchronization level following the presentation of instructions and during the resolution of test problems. A relative invariance of spatio-temporal synchronization in biopotentials with respect to selected electrogram parameters is also found. A.L.W.

A82-24833 † The dependence of the productivity of repetitious activity and tolerance to monotonous labor on the individual characteristics of the human operator (Zavisimost' produktivnosti odnoobraznoi deiatel'nosti i ustoichivosti k vozdeistviiu faktora monotonnosti truda ot individual' nykh svoistv cheloveka-operatora). Iu. V. Bushov, Iu. A. Riabchuk, A. P. Pisanko, and A. F. Ershov (Nauchno-Issledovatel'skii Institut Biologii i Biofiziki, Tomsk, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 104-110. 19 refs. In Russian.

A82-24834 † Autonomous biotechnological means for the continuous monitoring and correction of physiological systems (Avtonomnye biotekhnicheskie sredstva nepreryvnogo kontrolia i korrektsii funktsional'nykh sistem organizma). N. N. Vasilevskii, O. V. Bogdanov, A. A. Smetankin, and N. M. Iakovlev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 111-131. 103 refs. In Russian.

The current designs, intended uses, methodological principles and typical operational results of portable autonomous devices for the long-term monitoring and correction of various physiological functions in individuals are reviewed. Devices considered include systems providing continuous telemetry or magnetic or digital recording of EKGs and other indicators of cardiovascular system condition, and the recording of EEGs during normal daily activity, which may be used for purposes of diagnosis confirmation, monitoring drug reactions and establishing the magnitudes of exercise. A variety of devices are also available which are capable of signalling the patient of his condition, either according to the results of continuous monitoring of the system in question, or continuous monitoring combined with signalling of functional variations, the signalling of dangerous conditions, or external feedback for the correction and establishment of new motor skills. A.L.W.

A82-24835 † The typological systematization of adaptive responses - Example of the antiorthostatic effect (O tipologicheskoi

sistematizatsii adaptivnykh reaktsii - Na primere antiortostaticheskogo vozdeistviia). Sh. T. Avetikian, N. N. Vasilevskii, and A. M. Zingerman (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 132-137. 11 refs. In Russian.

An attempt is made to derive a typological classification system expressing individual differences in adaptive responses to physiological stresses as exemplified by the orthostatic effect. Physiological parameters, including heart rate, mean arterial pressure, rheoencephalograms and operator tracking errors, were measured in untrained and experienced subjects while lying in the horizontal and antiorthostatic (-45 deg) positions. Four different classes of response are distinguished on the basis of subject reactivity or areactivity, and the specificity or nonspecificity of the effective reactivity. The different classes are attributed to the interaction of the functional system in question with the nonspecific adaptive response. For the case of the antiorthostatic effect, systemic arterial pressure and heart rate may be used as indicators of nonspecific reactivity, while the dicrotic and diastolic rheoencephalogram indexes may be used to monitor the reactivity of the specific adaptation system. A.L.W.

A82-24836 † The regulation of body temperature during physical work (O reguliatsii temperatury tela pri fizicheskoi rabote). S. V. Rodchenkov. *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 138-142. 12 refs. In Russian.

The relation of initial body temperature to the rise in core temperature observed during exercise is investigated in humans. Rectal, esophageal, external auditory canal and skin temperatures were measured in six healthy subjects along with oxygen demand and respiratory minute volume and rate before and during 30 and 50% maximal bicycle ergometer exercise preceded or not preceded by 1 hour of bed rest. A horizontal position is found to lead to significant reductions in esophageal temperature, oxygen demand, pulmonary ventilation and heart rate. Despite these differences in initial body temperature and physiological condition, exercise is observed to induce identical increases in esophageal temperature in subjects with lowered and normal body temperature, the increase in body temperature depending only on work intensity. Rectal temperature is found to have a longer response time than esophageal temperature, while external auditory canal responses to exercise were intermediate between those of the core and the skin. A.L.W.

A82-24837 † The effects of a flashing light on the spectral composition of brain biopotentials and the biomechanical effectiveness of balancing (Vliianie mel'kaiushchrego sveta na spektral'nyi sostav biopotentsialov mozga i biomekhanicheskuiu effektivnost' ravnovesiia). E. T. Petrenko (Kazakhskii Institut Fizicheskoi Kul'tury, Alma-Ata, Kazakh SSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 143-147. 20 refs. In Russian.

The effects of light flashes of various frequencies on the spectral characteristics and coherence functions of the biopotentials of different regions of the cerebral cortex during the performance of complex equilibrium maneuvers and their biomechanical effectiveness are investigated. Experiments involved the measurement of EEGs along with microdisplacements of the center of gravity and stabillograms in elite gymnasts balancing on the toes of one foot as long as possible in the presence of light flashing at frequencies of from 3 to 25 Hz. Light flashes are observed to reduce the biomechanical effectiveness of the balancing manuever, leading to 50-60% reductions in balancing time and 30-40% increases in stabillogram amplitudes. Changes in EEG patterns corresponding to shifts in the maximum density of the frequency spectrum towards the stimulus frequency, changes in biopotential density and a reduction in their coherence at the flash frequency are also observed. A mechanism involving the disturbance of center of mass correction processes in the peripheral as well as central components of the control system is proposed to account for the effects of low-frequency light interference. A.L.W.

A82-24838 † The role of proprioceptive afferentation in maintaining the equilibrium of unstable mechanical systems (Uchastie proprioteptivnoi afferentatsii v podderzhanii ravnovesiia neustoichivoi mekhanicheskoi sistemy). B. N. Smetanin, M. P. Kudinova, and V. Iu. Shlykov (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 8, Jan.-Feb. 1982, p. 148-154. 11 refs. In Russian.

The role of the various forms of proprioceptive sensibility in the regulation of human posture is investigated in an experimental model of the maintenance of upright posture controlled only by foot motions and subject only to proprioceptive afferentation from the feet, legs and vestibular and visual systems. Experiments were performed with an unstable mechanical system consisting of pedals to which are attached a steel bar with a weight on one side, and the subject's foot on the other, forming a single-mass structure with a center of gravity above the single axis of rotation. The temporary ischemic deafferentation of the foot by compression to stop local blood flow is found to affect the accuracy of the balancing task. Information from muscular receptors, however, is found to be more significant for the complex motions providing for the process of searching for the equilibrium zone of the system. It is proposed that this low-threshold afferentation is processed on the supraspinal level. A.L.W.

A82-24839 # Exploration of cardiovascular function in subjects exposed to plus Gz accelerations in a human centrifuge by new noninvasive techniques (Esplorazione della funzione cardiocircolatoria di soggetti esposti ad accelerazioni plus Gz in centrifuga umana mediante nuove tecniche incruente). G. Rotondo (Aeronautica Militare, Servizio di Sanità, Rome, Italy), C. A. Ramacci (Scuola Militare di Sanità Aeronautica, Rome, Italy), G. Meineri (Centro Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), G. Calcagnini, A. Ottalevi, G. Germano, A. de Zorzi, and M. Ciavarella. *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 212-229. 28 refs. In Italian.

A noninvasive technique has been developed for use in the monitoring of subject cardiovascular responses to head-foot accelerations in a human centrifuge for purposes of the selection and periodic evaluation of aerospace personnel. The technique involves the simultaneous recording of arterial pressure by a miniaturized, electronic dynamic pressurometer system and of electrocardiographic parameters, including heart rate, by the Holter method with two precordial leads. Results obtained from the monitoring of healthy subjects undergoing plus Gz acceleration at 1.5 increasing to 3.0 g are in agreement with previous observations by conventional means of arterial pressure and heart rate during acceleration, confirming the validity of the present technique. A.L.W.

A82-24840 # New ideas on the psychological selection of aircraft pilots (Nuove idee in tema di selezione psicologica del pilota di aereo). A. F. Sparvieri and G. Ruggieri (Aeronautica Militare, Ufficio del Capo del Corpo Sanitario Aeronautico, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 239-249. In Italian.

A discussion is presented concerning the recent revision of psychological selection criteria for aircraft pilots. The current approach is based on probability profiles and measures of intelligence, rather than aptitude, in order to conform to recent international trends towards the discontinuation of judgements of pilot unfitness on the basis of psychological factors. Changes in regulatory procedures implied by the new criteria are also noted. A.L.W.

A82-24841 # Contribution to the history of the theoretical evolution of the psychological selection of aircraft pilots in Italy (Contributo alla storia dell'evoluzione dottrinaria in tema di selezione psicologica del pilota di aereo in Italia). F. Sparvieri (Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 250-280. 32 refs. In Italian.

A82-24842 # Old and new directions in the engineering psychology of artificial horizons and their effects on the mental hygiene of the student pilot (Vecchi e nuovi orientamenti in tema di psicotecnica costruttiva dell'orizzonte artificiale e loro riflessi sull'igiene mentale dell'allievo pilota). F. Sparvieri (Aeronautica Militare, Servizio di Sanità, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 281-289. 10 refs. In Italian.

The development of approaches to the engineering psychology and potential psychological effects of the artificial horizon is outlined. The view of Gemelli (1942) that the use of an artificial horizon would not permit higher mental activity but would

constitute only a stimulus for motor reactions is discussed and contrasted with the contemporary opinion that the use of such equipment always permits higher mental activity. A new view of the engineering psychology of the artificial horizon is then formulated in which the information provided is used for position judgment, and means by which this conception may be used to prevent neurotic reactions in the student pilot are considered. A.L.W.

A82-24843 # **Hematological and chromosomal analysis of a sample population working at radar installations (Analisi ematologica e cromosomica di una popolazione campione operante in centri radar).** A. Piffanelli, A. Ciaccia, P. Malacarne (Ferrara, Università, Ferrara, Italy), and P. Italiano (Organizzazione Militare Territoriale, Direzione di Sanità, Milan, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 290-304. 25 refs. In Italian.

Results are presented of a retrospective hematological and chromosomal study of a sample of workers exposed to radio-frequency radiation at a radar installation of the Italian Air Force. Levels of blood constituents, including reticulocytes, eosinophils, lymphocytes and atypical cells as well as the proportions and types of leucocyte chromosomal aberrations were measured as a function of time exposed to radar in 35 radar controllers and 15 unexposed controls. The results reveal no evidence of a statistically significant change in hematological or karyological characteristics as a result of exposure to radar. A.L.W.

A82-24844 # **High altitude and the oxygen dissociation curve of hemoglobin - Modifications in inter-heme cooperativity (L'alta quota e la curva di dissociazione dell'ossigeno dalla emoglobina - Modificazioni nella cooperatività tra gli emi).** P. Ascenzi (Aeronautica Militare, Servizio Sanitario, Rome, Italy) and A. M. Innocenzi (Aeronautica Militare, Servizio Sanitario, Capodichino, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 305-318. 33 refs. In Italian.

Mechanisms of adaptation to acute hypoxia are reviewed as regards experimental observations and theoretical bases of changes in oxygen transport properties. Shifts in the hemoglobin oxygen dissociation curve induced by ambient conditions within the erythrocyte are discussed with particular attention given to the allosteric effects of CO2 and 2,3-phosphoglycerate on the oxygen affinity of hemoglobin. The possible adaptive significance of a lowered oxygen affinity as indicated by a shift in dissociation curve position under conditions of acidosis, as observed most markedly in high-altitude natives, is disputed. Modifications in inter-heme cooperativity, as indicated by the shape rather than the position of the oxygenation curve, are then proposed as the physiological basis of changes in oxygen transport properties upon exposure to high altitudes. A.L.W.

A82-24845 # **Measurements of tinnitus in transmission and perceptive deafness (Rilievi acufenometrici nelle sordità di trasmissione e di percezione).** S. Bucci, A. di Carlo, M. Saponara, L. Zangrilli, and V. Camarda (Roma, Università; Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 319-331. 11 refs. In Italian.

The possible relation between the characteristics of tinnitus and the type of auricular lesion inducing it is investigated. Automatic tinnitometry was used to measure the tone, intensity and harmonic composition of tinnitus accompanying cochlear perceptive deafness, post-cochlear perceptive deafness and transmission deafness. Although no correlation is found between tinnitus characteristics and the site of conductive deafness, spectral properties of the tinnitus in perceptive deafness are found to be closely related to the frequency of the auditory lesion, and distinct from those found in other forms of deafness. A.L.W.

A82-24846 # **Man in weightlessness - Physiological problems, clinical aspects, prevention and protection.** H. S. Fuchs. *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 332-346.

Disturbances in human physiology induced by the weightless state in space are discussed, and research on the prevention of the detrimental effects of weightlessness is reviewed. Attention is given to anthropometric changes including loss of body mass, increase in height, and fluid volume shifts, cardiovascular responses, bone demineralization, changes in renal, electrolyte and endocrine functions, decreases in red cell mass, and central nervous system responses affecting sleep patterns, space motion sickness, and the perception of high energy heavy cosmic ray particles. Current research has thus centered on the areas of space motion sickness, cardiovascular deconditioning, bone mineral and muscle losses, red blood cell production and fluid and electrolyte changes. Opportunities for the further study of the physiological effects of weightlessness that will be provided by future Spacelab missions are also noted. A.L.W.

A82-24847 # **Factor calculation of the test variables in use by the legal medicine institutes of the Italian Air Force (Calculo fattoriale sulle variabili testologiche in uso presso gli istituti medico legali A.M.).** F. Sparvieri and B. de Rosa (Aeronautica Militare, Istituto Medico Legale, Rome, Italy). *Rivista di Medicina Aeronautica e Spaziale,* vol. 44, July-Dec. 1980, p. 386-391. In Italian.

A factor analysis of variables measured by the Italian Air Force is presented in order to demonstrate the degree of saturation of the Spearman G factor in Air Force testing. The variables considered are the D48, PM38, reaction time and its variability, tachistoscope data, tremometry, and numbers and duration of errors in a muscular coordination test. The low G levels obtained for all variables including D48 and PM38 suggest that G values be determined not from the reasoning tests only, but from the results of all the tests according to a multiple regression model in the prediction of future professional performance. A.L.W.

A82-24901 **Psychophysical studies of perception and memory (Psikhofizicheskie issledovaniia vospriiatiia i pamiati).** Edited by Iu. M. Zabrodin. Moscow, Izdatel'stvo Nauka, 1981. 216 p. In Russian.

Topics discussed include mathematical models of detection and discrimination in psychophysics, scales of subjective intensity and judgement processes, and a dynamic approach to the analysis of the signal detection process in psychophysics. Also considered are selective visual adaptation, the application of the evoked potential method to psychophysical studies, an experimental study of auditory perception, the stability of a nonthreshold index of sensitivity, and the use of neurophysiological methods to determine operator speed. B.J.

A82-24902 † **Problems of the psychic reflection of the properties of the objective world on the sensory-perception level (Problemy psikhicheskogo otrazheniia svoistv ob'ektivnogo mira na sensorno-pertseptivnom urovne).** K. V. Bardin and Iu. M. Zabrodin. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 9-42. 57 refs. In Russian.

A review of the historical development and foundations of psychophysics is presented. Consideration is then given to two basic problems of psychophysics: the discreteness-continuity problem of sensory series, and the problem of the fundamental law of psychophysics (i.e., the Weber-Fechner law). B.J.

A82-24903 † **Mathematical models of detection and discrimination (Matematicheskie modeli obnoruzheniia i razlicheniia).** P. Kvaas. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 43-60. 20 refs. In Russian.

A review of mathematical models of detection and discrimination in psychophysics is presented. The detection models considered include the classic threshold model, the Tanner-Swets decision-making model of detection, and Luce's low-threshold detection model. Among the discrimination models considered are Thurstone's model based on the law of comparative judgment, and the theory of the neural quantum. Results of the models are compared with experimental data, and an assessment of the various models is presented. B.J.

A82-24904 † **Scales of subjective intensities and judgment processes (Shkaly sub'ektivnykh intensivnostei i protsessy suzhdeniia).** P. Pettsol'd. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 61-69. 7 refs. In Russian.

The paper examines a fundamental problem of psychophysics: the determination of the relationship between the intensity of the

stimulus and its subjective impression. Attention is given to such aspects of the problem as the modality-dependence of the exponent in Steven's law, the intramodal dependence of the exponent on the stimulus range, the effect of an aggregate of stimuli, and information integration. As an example, the judgment process as a whole is considered, and sensory transformation is examined as a constituent part of this process. It is found that, within the limits of numerical evaluations, the power law describes well the dependence of subjective intensity on physical intensity. It is noted that various methods lead to various information-processing results, which can be determined by specific laws; and the most important thing is to determine the invariant quantities and the specifying components. B.J.

A82-24905 † **Dynamic approach to the analysis of the signal detection process (Dinamicheskii podkhod k analizu struktury protsessa obnaryzheniia signala).** E. Z. Frishman. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 69-76. 27 refs. In Russian.

The paper examines a dynamic approach in psychophysics, wherein the threshold is taken as the index of subjective activity in the signal detection process. It is found that a lowering of the threshold is determined by an increase in sensory capability and a decrease in the rigor of the detection criterion, whereas a raising of the threshold is associated with the opposite effect: a decrease in sensory capability and an increase in the rigor of the criterion. Particular attention is given to problems of threshold variance. B.J.

A82-24906 † **Selective visual adaptation and the feature model (Selektivnaia zritel'naia adaptatsiia i model' priznaka).** E. N. Dzhafarov and Iu. K. Allik. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 77-92. 36 refs. In Russian.

Problems of visual adaptation are discussed, using as an illustration Blakemore and Campbell's (1969) study on the existence of neurons in the human visual system selectively sensitive to the orientation and size of retinal images. Three types of models for the analysis of adaptation experiments are considered: the realization of reference stimulus-scale value pairs, the adaptation model, and the feature model. Particular consideration is given to figural aftereffects. B.J.

A82-24907 † **Objective sensometrics on the basis of the alpha-rhythm block reaction (Ob'ektivnaia sensometriia po reaktsii blokady al'fa-ritma).** M. B. Mikhalevskaia. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 92-117. 65 refs. In Russian.

The possibility of developing an objective sensometrics on the basis of the alpha-rhythm block (ARB) reaction is examined theoretically and experimentally. The general characteristics of the ARB as an index of sensitivity are considered, with attention given to the functional significance of the ARB and the parameters of an ARB reaction induced by an optical stimulus. An experiment dealing with the minimization of the ARB in background EEG is discussed. Attention is also given to the application of the ARB reaction in psychophysical studies; objective sensometrics of the auditory function is considered as an example. B.J.

A82-24908 † **Experience with the application of the method of evoked potentials in psychophysical studies (Opyt primeneniia metoda vyzvonnykh potentsialov v psikhofizicheskom issledovanii).** L. V. Matveeva. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 118-139. 41 refs. In Russian.

A psychophysical experiment is described in which the amplitude characteristics of evoked potentials were correlated with psychophysical indices of detection. An attempt is made to verify the hypothesis that early evoked-potential waves reflect the magnitude of the physical stimulus. It is found that the early waves do indeed reflect the magnitude of the stimulus, but that this reflection is not direct (as was originally thought) but indirect: i.e., it is manifested in the sensory effect. Therefore it is more correct to say that the state of the analyzer input (and not the magnitude of the stimulus) is reflected in the early components. B.J.

A82-24909 † **Analysis of operator speed by means of neurophysiological methods (Analiz skorosti deistvii operatora s pomoshch'iv neirofiziologicheskikh metodov).** B. G. Bovin. In: Psychophysical studies of perception and memory. Moscow, Izdatel'stvo Nauka, 1981, p. 206-214. 9 refs. In Russian.

A formula for determining the reaction time of human operators is developed and confirmed experimentally. A direct comparison of the value of the dominant alpha-rhythm and the reaction time for various signal alphabet lengths yields a negative correlation coefficient: i.e., the greater the alpha-rhythm frequency, the shorter the reaction time. The results agree with Lebedev and Lutskii's reaction model and indicate that neurophysiological (i.e., EEG) methods can be used to study operator reaction time. B.J.

A82-24910 **Tissue hypoxia and its correction (Tkanevaia gipoksiia i ee korrektsiia).** Edited by L. L. Vannikov. Novosibirsk, Izdatel'stvo Nauka, 1981. 80 p. In Russian.

The book treats the mechanisms giving rise to tissue hypoxia and possible means of chemical intervention for the treatment of tissue hypoxia arising in a variety of pathological conditions. The antioxidant effects of sodium persulfate in the treatment of radiation-induced tissue hypoxia are demonstrated, and mechanisms of early post-ischemic disturbances giving rise to hypoxia are examined together with the effects of sodium persulfate and cytochrome c on their development. Tissue oxygen balance in diabetes mellitus is discussed, and the treatment of diabetes with rheopolyglucine, heparin and sodium persulfate is investigated. Effects of vibration sickness on blood oxygen balance and acid-base equilibrium and of radiation on intracellular membranes and tissue hypoxia are also considered, and the oxidative properties of persulfates are discussed. A.L.W.

A82-24912 **Regulation of Pa/CO2/ and ventilation in humans inspiring low levels of CO2.** H. V. Forster, J. P. Klein, L. H. Hamilton, and J. P. Kampine (Wisconsin, Medical College, Milwaukee; U.S. Veterans Administration Medical Center, Wood, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 287-294. 35 refs. Research supported by the U.S. Veterans Administration.

A82-24913 **Free and conjugated catecholamines and metabolites in cat urine after hypoxia.** J. Claustre and L. Peyrin (Lyon I, Université, Lyons, France). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 304-308. 32 refs. Research supported by the Université Lyon I; Centre National de la Recherche Scientifique Contract No. ER-196.

A82-24914 **Renin, aldosterone, and converting enzyme during exercise and acute hypoxia in humans.** J. S. Milledge and D. M. Catley (Northwick Park Hospital, Harrow, Middx., England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 320-323. 14 refs.

The possibility that hypoxia might inhibit the secretion of angiotensin-converting enzyme (ACE) would explain the low concentrations of aldosterone reported in humans at high altitude. To observe the effect of such a reduction in ACE concentration on the plasma aldosterone concentration (PAC), four subjects performed mild exercise throughout a 2-h study so as to elevate their plasma renin activity (PRA). After the first 60 min breathing air they were switched to breathing 12.8% O2 (4,000 m altitude equivalent). Venous samples were taken at intervals for hormone analysis. Results showed the expected rise of PRA and PAC both tending toward a plateau after about 45 min. There was no significant change in ACE activity. Hypoxia produced a further 50% rise in PRA but a fall in PAC and a 30% reduction in ACE activity. Angiotensin I concentrations closely followed PRA throughout. These results indicate that during exercise acute hypoxia changes the usual close relationship between PAC and PRA by reducing ACE activity. (Author)

A82-24915 **Mechanical cardiopulmonary interdependence.** T. C. Lloyd, Jr. (Indiana University Medical Center, Indianapolis, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Feb. 1982, p. 333-339. 15 refs. Grant No. PHS-R01-HL-15694.

Cardiopulmonary interdependence in ten pentobarbital sodium-

anesthetized dogs is investigated in three ways. In the first, the increase in left atrial pressure required to hold cardiac output constant on application of a positive end-expiratory pressure is measured. In the second, the reduction in left atrial pressure required to mimic the cardiac output fall observed when a positive end-expiratory pressure is applied while the left atrial pressure is held constant is determined. In the third, left ventricular pressure-volume curves measured in freshly dead dogs during ventilation are compared with and without a positive end-expiratory pressure. It is found that the atrial pressure changes can be divided into terms for pleural pressure change, lung deformation, and an undefined residual component and that they can be used to obtain a compliance opposing ventricular filling. Another compliance is derived from the pressure-volume curves. C.R.

A82-24916 Heart contractility at pressure loads induced by ischemia of exercised muscle in humans. F. Bonde-Petersen and Y. Suzuki (Copenhagen, University, Copenhagen, Denmark). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 340-345. 19 refs. Research supported by the Danish Space Research Council.

A82-24917 Pulmonary carbonic anhydrase in the human, monkey, and rat. G. Lönnerholm (Uppsala, Universitet, Uppsala, Sweden). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 352-356. 30 refs. Research supported by the Swedish Medical Research Council Grants No. 5413; No. 2874.

A82-24918 Bradykinin-induced increase in pulmonary vascular permeability in hypoxic sheep. L. M. Pang, H. M. O'Brodovich, R. B. Mellins, and S. A. Stalcup (Columbia University, New York, NY). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 370-375. 30 refs. Research supported by the New York Heart Association; Grants No. NIH-HL-14214; No. NIH-HL-07421.

A82-24919 Ventilatory responses at rest and during exercise in marathon runners. D. A. Mahler, E. D. Moritz, and J. Loke (Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 388-392. 30 refs.

To evaluate ventilatory control and its possible role in athletic performance, measurements are made of ventilatory responses to hypercapnia and hypoxia at rest and of ventilatory equivalents for carbon dioxide and oxygen during exercise in 20 marathon runners and 20 control subjects. No significant differences exist in the ventilatory responses at rest to hypercapnia and hypoxia. In similar fashion, no significant differences are found in the ventilatory equivalents for carbon dioxide and oxygen between the two groups. Good correlation is observed between hypercapnic response at rest and exercise ventilation in the runners. However, both hypercapnic and hypoxic ventilatory responses correlate poorly with marathon running time. The results demonstrate no differences in ventilatory responses at rest and during exercise between marathon runners and control subjects. C.R.

A82-24920 Strain difference in thermoregulation of rats surviving extreme heat. F. Furuyama (Nagoya City University, Nagoya, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 410-415. 30 refs.

A82-24921 Effect of muscle glycogen content on glucose uptake following exercise. R. D. Fell, S. E. Terblanche, J. L. Ivy, J. C. Young, and J. O. Holloszy (Washington University, St. Louis, MO). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 434-437. 24 refs. Grants No. NIH-AM-18986; No. NIH-AG-00425.

This study examined the effects of raising muscle glycogen by carbohydrate feeding and of keeping muscle glycogen low by carbohydrate restriction following exhausting exercise on the ability of perfused skeletal muscle to take up glucose and to synthesize glycogen. Muscle glycogen concentration was more than twice as high in the rats fed carbohydrate as in those not given carbohydrate. Muscle glycogen synthesis during a 30-min perfusion with glucose and insulin was significantly greater in the animals with low muscle glycogen. Furthermore the muscles with low glycogen content converted a greater proportion of the glucose taken up to glycogen and less to lactate than did the muscles with high glycogen content. In rats subjected to exhausting exercise on the preceding day, the rate of glucose uptake by perfused skeletal muscle was significantly higher (60-80%) at the same insulin concentration in animals in which muscle glycogen was kept low than in those in which glycogen was raised by carbohydrate feeding. (Author)

A82-24922 Guinea pig soleus and gastrocnemius electromyograms at varying speeds, grades, and loads. K. R. Gardiner, P. F. Gardiner, and V. R. Edgerton (California, University, Los Angeles, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 451-457. 21 refs.

A82-24923 Isotopic analysis of leucine and urea metabolism in exercising humans. R. R. Wolfe, R. D. Goodenough, M. H. Wolfe, G. T. Royle, and E. R. Nadel (John B. Pierce Foundation, New Haven, CT; Harvard University; Massachusetts General Hospital; Shriners Burns Institute, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Feb. 1982, p. 458-466. 20 refs. Grants No. NIH-GM-00455-03; No. NIH-GM-21700-07; No. NIH-GM-007-035.

A82-25134 Relation between high density lipoprotein cholesterol and coronary artery disease in asymptomatic men. G. S. Uhl, R. G. Troxler, J. R. Hickman, Jr., and D. Clark (USAF, School of Aerospace Medicine, Brooks AFB, TX). *American Journal of Cardiology,* vol. 48, Nov. 1981, p. 903-910. 25 refs.

Recent epidemiologic investigations have shown high density lipoprotein (HDL) cholesterol levels to have an inverse relation to the risk of developing coronary heart disease. The present paper reports a study of the relation of HDL cholesterol levels to latent coronary heart disease in asymptomatic subjects. Determinations of total serum cholesterol, HDL cholesterol, and triglycerides were made concurrently with electrocardiographic studies including symptom-limited exercise tolerance testing in 572 consecutive aircrew members. In addition, cardiac catheterization was performed on the 132 patients showing abnormal exercise electrocardiograms. The remaining 440 men, believed to have a 1% chance of having coronary artery disease, exhibited a mean cholesterol level of 213 mg/100 ml, mean HDL cholesterol of 51 mg/100 ml and mean cholesterol/HDL ratio of 4.4. Mean values did not differ significantly in men with normal angiographic findings or subcritical coronary disease, however 14 of 16 men with coronary artery disease had a cholesterol/HDL ratio of 6.0 or more compared with only four with normal coronary arteries. Results suggest that HDL cholesterol levels may be used to identify asymptomatic persons with greater risks of coronary heart disease. A.L.W.

A82-25135 Limitations of echocardiographic techniques in evaluation of left atrial masses. P. C. Come, M. F. Riley, J. F. Markis, and M. Malagold (Beth Israel Hospital; Harvard University, Boston, MA). *American Journal of Cardiology,* vol. 48, Nov. 1981, p. 947-953. 36 refs.

Limitations in the use of M mode and two-dimensional echocardiography in the evaluation of left atrial masses are demonstrated in case histories of patients in whom echocardiography failed to detect or greatly underestimated the extent of the lesion. M mode echocardiography in four patients and two-dimensional echocardiography in three of the four revealed the left atrium to be clear of echoes in two patients subsequently found in pathologic examination to have left atrial thrombi weighing 35 and 100 g. Definitely abnormal echoes were visualized only in the inferior aspect of the left atrium beneath the posterior root of the aorta in the third patient for whom angiography revealed a 70 g myxoma filling almost the entire left atrium. In the fourth patient, two-dimensional four-chamber apical scanning was superior to two-dimensional and M-mode long-axis scanning in defining the extent of a large left atrial myxoma. The results may be explained by the relatively homogeneous nature of certain intracavity masses. A.L.W.

A82-25136 Two dimensional echocardiographic detection of intraatrial masses. N. L. DePace, R. L. Soulen, M. N. Kotler, and G. S. Mintz (Hahnemann Medical College and Hospital; Temple University Hospital, Philadelphia, PA). *American Journal of Cardiology,* vol. 48, Nov. 1981, p. 954-960. 46 refs.

The relative merits of two-dimensional and M mode echocardiography in the evaluation of intraatrial masses are investigated in a study of 19 patients. In ten patients with rheumatic mitral stenosis, two-dimensional echocardiography revealed left atrial thrombus as indicated by a mass of irregular nonmobile laminated echoes within an enlarged atrial cavity, usually with a broad base of attachment to the posterior left atrial wall. In seven patients with a left atrial myxoma, the myxoma appeared as a mottled ovoid, sharply demarcated mobile mass attached to the interatrial septum. Two-dimensional echocardiography also detected the presence of a right atrial angiosarcoma and a left atrial leiomyosarcoma in the remaining patients. M mode echocardiography, on the other hand, was able to detect only six of the myxomas, one thrombus, and neither of the other tumors. Two dimensional echocardiography thus appears to be the technique of choice in the detection, localization and differentiation of intraatrial masses. A.L.W.

A82-25162 **Detection and recognition - Concurrent processes in perception.** R. Parasuraman, F. Richer, and J. Beatty (California, University, Los Angeles, CA). *Perception and Psychophysics,* vol. 31, no. 1, Jan. 1982, p. 1-12. 45 refs. Contract No. N00014-76-C-0616.

The relationships between and dynamic brain characteristics of detection and recognition are investigated by the examination of the event-related potentials (ERPs) of the brain during a simultaneous detection and recognition task. EEGs were recorded in 10 subjects listening to pure tones in noise who were asked to report whether one of a set of a target tones had occurred, and to which of two or four tones the target corresponded. A correctly detected and identified target stimulus is found to be associated with changes in the N100 negative potential and in the P300 positive brain potential that disclose temporal features of stimulus processing. In addition, a slow positive potential is observed to contribute to changes in the P300 amplitude. The amplitude of the N100 ERP component varies only with processing related to stimulus detection, while the P300 component varies with both detection and recognition and the slow potential varies only with recognition. Results support the view that detection and recognition are partially independent, concurrent processes, with the process of detection beginning before the process of identification. A.L.W.

A82-25188 † **Current questions in the problem of flight crew fatigue (Ob aktual'nykh voprosakh problemy utomleniia letnogo sostava).** V. I. Kopanev. *Voenno-Meditsinskii Zhurnal,* Jan. 1982, p. 49-51. In Russian.

Various aspects of the problem of flight fatigue requiring further study are discussed. A definition for flight fatigue is proposed as the physiological state arising in air crews during flight as the result of flight activity and characterized by a reduction in work capacity and changes in homeostasis parameters. The evaluation of crew member work capacity based on criteria of professional activity and physiological condition is considered, and the differentiation between states of flight fatigue and overstrain is discussed. The signs of flight fatigue are examined, with attention given to the reduction in work capacity, behavioral reactions, slowing of mental processes, illusions and loss of spatial orientation, the appearance of the stress state, subjective feelings of fatigue, and changes in hemodynamics, and possible means for preventing fatigue and overstrain are considered. A.L.W.

A82-25189 † **Characteristics of skin function in sailors in the tropics (Nekotorye osobennosti funktsii kozhi u moriakov v tropikakh).** G. F. Grigorenko and V. V. Berdyshev. *Voenno-Meditsinskii Zhurnal,* Jan. 1982, p. 52-54. In Russian.

Results are presented of an investigation of the functional characteristics of the skin and their relation to skin pathology in sailors in the tropics. Parameters characterizing skin thermoregulatory, protective, excretory and reabsorptive function were measured before and after sailing in sailors completing cruises of various durations in subtropical and tropical waters. Measurements of skin temperatures, sweat production rates and sensitivity to parasympathetic mediators reveal an enhancement in thermoregulatory functioning, while analyses of sweat composition at various stages indicate enhancements in excretory and reabsorptive functions. Changes in responses to the Kavetskii and Rotter tests, vascular resistance, ultraviolet biodose times, acid-base balance and bactericidal properties also reveal significant changes in the protective functions of the skin. In sailors with various skin diseases (dermatitis, eczema, pyodermitis), significant differences in protective, reabsorptive, excretory functions were found with respect to healthy sailors. Results suggest a connection between characteristics of skin function in hot and humid climates and the increased dermal morbidity of sailors in the tropics, and allow a set of recommendations to be formulated for the prevention of skin diseases. A.L.W.

A82-25220 **Biochemical evolution.** Edited by H. Gutfreund (Bristol, University, Bristol, England). Cambridge and New York, Cambridge University Press, 1981. 374 p. $25.

Selected topics in the evolution of biochemical pathways and the use of biochemical techniques to derive phylogenetic relationships are discussed. Prebiotic chemical evolution is considered, particularly as regards self-replication, translation and compartmentalization, and data handling methods for deriving phylogenetic trees from amino acid or nucleotide sequences are examined. Attention is also given to the evolution of bacterial enzymes, the photosynthetic apparatus in procaryotes and in eucaryotes as a result of endosymbiosis, the major histo-compatibility antigens, immunoglobulins, the control mechanisms of muscle contraction, and the vertebrate visual pigments. A.L.W.

A82-25230 † **The controlled cultivation of plants in an artificial medium - Biotechnological foundations (Upravliaemoe kul'tivirovanie rastenii v iskusstvennoi srede - Biotekhnicheskie osnovy).** V. I. Rozhdestvenskii and A. F. Kleshnin. Moscow, Izdatel'stvo Nauka, 1980. 200 p. 210 refs. In Russian.

Technological aspects of the cultivation of plants under automatically controlled artificial conditions are discussed in light of the importance of such techniques for the optimization of biomass and agricultural production. A survey is presented of the various types and organization of phytotrons and other systems for the controlled cultivation of plants in artificial media. Particular attention is then given to the components of such systems, including high-intensity irradiators, air conditioning systems, systems for the automatic regulation of the gas medium and the measurement of photosynthesis intensity, and the automatic control of plant mineral requirements. Potentials for the inclusion of electronic computer control are also considered. A.L.W.

A82-25231 † **Systemic mechanisms of emotional stress (Sistemnye mekhanizmy emotsional'nogo stressa).** K. V. Sudakov. Moscow, Izdatel'stvo Meditsina, 1981. 232 p. 145 refs. In Russian.

The book examines the systemic manifestations of emotional stress occurring in humans and animals in conflict situations. Emotional stress is discussed as the leading factor in the development of cerebrovisceral disorders, and systemic mechanisms of arterial pressure regulation and their impairment under conditions of emotional stress are considered. Attention is given to genetic, nervous and humoral mechanisms of resistance and predisposition of the cardiovascular system to emotional stress, and to the cerebral mechanisms of the development of the stress syndrome. Recommendations are also presented concerning means of increasing human cardiovascular resistance to acute and chronic emotional stresses. A.L.W.

A82-25244 † **Innervation of skin glands of the hedgehog /Erinaceus europaeus/ and its histochemical changes induced by hibernation (Innervatsiia kozhnykh zhelez ezha /Erinaceus europaeus/ i ee gistokhimicheskie izmeneniia, vyzyvaemye zimnei spiachkoi).** V. E. Sokolov, S. A. Shabadash, and T. I. Zelikina (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 252, no. 4, 1982, p. 978-981. 15 refs. In Russian.

A82-25321 † **Investigation of the effects of space flight factors on rat bone marrow cell chromosomes (Issledovanie vliianiia faktorov kosmicheskogo poleta na khromosomy kletok kostnogo mozga krys).** N. N. Bobkova. *Kosmicheskie Issledovaniia,* vol. 20, Jan.-Feb. 1982, p. 154, 155. 11 refs. In Russian.

Metaphase analyses of the structure of bone marrow cell chromosomes were performed in rats on the second and 27th days following 22-day exposure on board the Cosmos-605 satellite.

Frequencies of chromosome aberrations (individual fragments) are observed to range between 1 and 4% in experimental animals, and between 1 and 3% in ground controls. Statistical analysis reveals the experimental aberration frequencies not to differ significantly from the control, and to fall within the limits of the oscillations of the spontaneous rate. A.L.W.

A82-25372 * **Carbon isotopic fractionation in the biosynthesis of bacterial fatty acids - Ozonolysis of unsaturated fatty acids as a means of determining the intramolecular distribution of carbon isotopes.** K. D. Monson and J. M. Hayes (Indiana University, Bloomington, IN). *Geochimica et Cosmochimica Acta*, vol. 46, Feb. 1982, p. 139-149. 45 refs. Grant No. NGR-15-003-118.

A82-25494 **Method for the analysis of pilot postural behavior based on head-up - head-down simulations (Méthode d'analyse du comportement postural du pilote à partir de simulations tête haute - tête basse).** A. Coblentz, R. Mollard, G. Ignazi, R. Steck (Paris V, Université, Paris, France), G. Santucci, J.-P. Menu, and D. Batejat (Centre d'Etude et de Recherche de Médecine Aérospatiale, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 184-190. 7 refs. In French.

A simulation method has been developed for use in the analysis of pilot posture during a mission, allowing the definition of zones of preferential pilot activity for purposes of cockpit design. The method is based on experiments undertaken with an adjustable cockpit model, using a task simulation software package reproducing tasks performed in the head-up and head-down positions. Postural variations are studied by means of numerical image processing, allowing the three-dimensional analysis of segmental displacements. The method is to be applied in experiments with a sample of pilots selected to exhibit the biometric characteristics of the predicted pilot population 10-15 years in the future, and the resulting experimental data will be used in the modeling of the cockpit-pilot system. A.L.W.

A82-25495 **Modifications in systolic time intervals induced by the transition to weightlessness (Modifications des temps systoliques provoquées par le passage en absence de pesanteur).** J. Colin (Service de Santé des Armées, Centre de Recherches, Clamart, Hauts-de-Seine, France) and J. Timbal. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 191-194. 11 refs. In French.

Cardiovascular effects of the transition from normal gravity to weightlessness are investigated in a noninvasive study of systolic time intervals in subjects undergoing a body tilt from the passive vertical position to the quasi-horizontal. Systolic intervals were measured by cardiac electrical impedance plethysmography during rest in the vertical position and tilting to a head-down position at an angle of -5 deg from the horizontal. While no variation is observed in the presystole and the time separating the Q wave and mitral closure, tilting is found to induce significant decreases in heart rate, pre-ejection period, isovolumetric contraction time and pre-ejection period/left ventricular ejection time ratio, and increases in left ventricular ejection time. Results are symmetric with respect to experiments on tilting from the horizontal to the vertical positions, and may be explained as the result of hemodynamic reactions to fluid shifts. A.L.W.

A82-25496 **Coronary risk in flight personnel: Epidemiologic approach - Incidence upon screening and prevention (Le risque coronarien dans le personnel navigant: Approche épidémiologique - Incidence sur le dépistage et la prévention).** G. Leguay, J. F. Poulignier, A. Seigneuric, G. Jacob, and J. Traversat (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 195-200. 9 refs. In French.

An epidemiologic study is presented of the risk factors for the development of coronary artery disease in flight personnel and their implications for screening and prevention. The longitudinal study was performed using the medical records of 100 military flight personnel, 25 of whom had a history of myocardial infarction, 25 of whom had experienced primary repolarization difficulties classified as benign, and the remainder of whom had no evident coronary problems. Analysis of the risk factors previously uncovered in the Framingham study (cholesterol, arterial pressure, smoking, diabetes, obesity, a family history of cardiovascular problems, psychological profile and age) reveals them not to be influenced by aeronautical activity. It is, however, observed that transport pilots have a greater risk of developing myocardial infarction than fighter pilots. The importance of reducing the known risk factors for the prevention of coronary disease is emphasized, and the greater predictive value of stress electrocardiograms in the identification of disease in individuals at high epidemiologic risk is noted. A.L.W.

A82-25497 **Mechanisms of motion sickness (Mécanismes du mal des transports).** A. Léger (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 201-204. 8 refs. In French.

Recent hypotheses proposed to explain the essential nature of motion sickness are discussed. Following a survey of the nervous and sensory structures implicated in the etiology of motion sickness, including most importantly components of the vestibular system, attention is given to the sensory mismatch model developed by Reason (1975, 1978). The model mechanism is based upon the comparison of sets of sensory inputs with an internal model, resulting in an error signal inducing the motion sickness when inputs do not agree with past experience. Conflicts are classified as visual-vestibular or intralabyrinthine, and may arise upon the simultaneous presentation of stimuli, or the absence of one set of stimuli. The significance of motion sickness is also considered, and it is noted that it may be useful to treat the syndrome as a stress response. A.L.W.

A82-25498 **The psychological selection of French astronauts for a Franco-Soviet scientific space mission (La sélection psychologique des spationautes Français en vue d'une mission scientifique spatiale Franco-Soviétique).** J. Bremond and G. Veron (Service de Santé des l'Armées, Saint-Cyr-l'Ecole, Yvelines, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 205-210. In French.

The procedures used in the psychological selection of French candidates in a joint Franco-Soviet mission to the Soyuz space station are discussed. The psychological selection process, performed within the context of a full educational, professional medical, psychological and training selection program, includes a series of performance tests to measure numerical, spatial, verbal and social abilities, memory and intelligence, personality tests to detect psychopathological tendencies, group interaction tests to study decision making, intellectual rigor and honesty and social participation, and conversations with psychiatrists. Out of the 193 candidates undergoing the entire evaluation process, two were finally selected to undergo training in the USSR, both being military pilots and engineers pursuing careers as test pilots. A.L.W.

A82-25500 **Cosmic ray measurements on board the Concorde /results after four years/ (Mesures des radiations cosmiques à bord de Concorde /résultats après 4 ans d'exploitation/).** J. Pasquet, J. Lavernhe, and E. Lafontaine (Compagnie Nationale Air France, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 20, no. 79, 1981, p. 222-227. 15 refs. In French.

The advent of commercial supersonic flight has introduced the flying population to a new potential risk - increased cosmic radiation at stratospheric heights. The present paper presents the results of four years of measurement of the radiation doses received on board the Concorde. Dose rates are observed to be greater over the North American routes than the other routes served, in agreement with expectations, and average 1.40 and 0.80 mrem hour, respectively. The alert level of 10 mrem/h was never encountered, nor were solar proton events observed. The values obtained are well below international radiation standards for occupational and public exposures to ionizing radiation, and appear low with respect to doses required for significant carcinogenic effects. It is noted that, although reassuring, the results do not justify the discontinuation of radiation monitoring or the modification of radiation alert or protection procedures. A.L.W.

STAR ENTRIES

N82-18255*# Mainz Univ. (West Germany).
EFFECTS OF RECTILINEAR ACCELERATION, OPTOKINETIC AND CALORIC STIMULI IN SPACE
R. vonBaumgarten *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 5 p

Avail: NTIS HC A08/MF A01 CSCL 06P

The set of experiments comprising the Spacelab 1ES201 package designed to investigate the human vestibular system and equilibratory function in weightlessness are described. The specific objectives of the experiments include: (1) the determination of the threshold of perception of linear oscillatory motion; (2) measurement of physiological and subjective responses to supra threshold, linear and angular motion stimuli; (3) study of the postural adjustments, eye movements, and illusions of attitude and motion evoked by optokinetic stimuli, (i.e., moving visual patterns) in order to assess visual/vestibular interactions; (4) examination of the effect of thermal stimulations of the vestibular apparatus to determine if the eye movements elicited by the 'caloric test' are used by a density gradient in the semicircular canal; and (5) investigation of the pathogenesis of space motion sickness by recording signs and symptoms during the course of vestibular stimulation and, specifically, when the test subject is exposed to sustained, linear ocillatory motion. M.G.

N82-18256*# Massachusetts Inst. of Tech., Cambridge.
VESTIBULAR EXPERIMENTS
L. R. Young *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 5 p

Avail: NTIS HC A08/MF A01 CSCL 06P

Spacelab experiments designed to investigate space motion sickness, any associated changes in otolith-mediated responses occurring during weightlessness, and the carryover of any such changes to postflight conditions are described. The experiments aimed at assessing otolithic responses in space are intended to clarify presumed alterations in vestibular function during weightlessness. Vestibular function will be investigated at several levels: vestibulo-ocular reflexes, vestibulo-spinal pathways, cortical functions involving perception of motion and spatial orientation, visual vestibular interaction, and motion sickness susceptibility. A second major objective relates to space motion sickness and man's well-being and productivity in space. M.G.

N82-18257*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VESTIBULO-SPINAL REFLEX MECHANISMS
M. F. Reschke *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 2 p

Avail: NTIS HC A08/MF A01 CSCL 06P

The specific objectives of experiments designed to investigate postural reflex behavior during sustained weightlessness are discussed. The first is to investigate, during prolonged weightlessness with Hoffmann response (H-reflex) measurement procedures, vestibulo-spinal reflexes associated with vestibular (otolith) responses evoked during an applied linear acceleration. This objective includes not only an evaluation of otolith-induced changes in a major postural muscle but also an investigation with this technique of the adaptive process of the vestibular system and spinal reflex mechanisms to this unique environment. The second objective is to relate space motion sickness to the results of this investigation. Finally, a return to the vestibulo-spinal and postural reflexes to normal values following the flight will be examined. The flight experiment involves activation of nerve tissue (tibial N) with electrical shock and the recording of resulting muscle activity (soleus) with surface electrodes. Soleus/spinal H-reflex testing procedures will be used in conjuction with linear acceleration through the subject's X-axis. M.G.

N82-18258*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE INFLUENCE OF SPACE FLIGHT ON ERYTHROKINETICS IN MAN
Carolyn S. Leach *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06S

An experiment is described the purpose of which is to measure specific factors relative to the control of erythrokinetics in man which might be altered during the first seven days of exposure to the weightless environment of space flight. It is anticipated that these data will provide information relative to the mechanism by which the red cell mass is reduced during space flight. Specifically, the experiment is designed to establish: (1) if there is a significant change in red cell mass and plasma volume during the initial period of exposure to weightlessness; (2) if the plasma concentration of erythropoietin is reduced; (3) if there is an increase in the plasma concentration of erythropoietin inhibitors; (4) if there is a change in the effectiveness of erythropoiesis; and (5) if the number and age distribution of reticulocytes are altered. M.G.

N82-18259*# Freie Univ., Berlin (West Germany). Physiologisches Inst.
MEASUREMENT OF CENTRAL VENOUS PRESSURE AND DETERMINATION OF HORMONES IN BLOOD SERUM DURING WEIGHTLESSNESS
K. Kirsch *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 2 p

Avail: NTIS HC A08/MF A01 CSCL 06P

A Spacelab experiment is described which proposes to obtain data on the degree of engorgement of the cephalad circulation during weightlessness by recording central venous pressure. Of practical importance is the question of how close the astronauts are to pulmonary edema and whether the pressure falls toward normal during the time of the mission. Another experiment to investigate deviations from normal fluid and mineral metabolism, possibly initiated by the central engorgement of the low pressure system, is discussed. Hormones responsible for the control of water and mineral balance (vasopressin, catecholamines, renin, aldosterone, corticosteroids, and prostaglandin E1) will be analyzed from blood samples. M.G.

N82-18260*# Illinois Univ., Urbana.
EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE OF HUMANS
E. W. Voss, Jr. *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 2 p

Avail: NTIS HC A08/MF A01 CSCL 06S

An experiment to examine the possible interrelationship of various classes of immunoglobulins by utilizing the effect of weightlessness as a stress factor and subsequently measuring inhibitory, compensatory, or enhancing interrelationships. A second objective of the experiment is to investigate the state of immune competency under conditions of sustained weightlessness. M.G.

N82-18261*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
EFFECT OF WEIGHTLESSNESS ON LYMPHOCYTE PROLIFERATION
Autusto Cogoli *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 4 p

Avail: NTIS HC A08/MF A01 CSCL 06P

An experiment to study the effect of weightlessness on lymphocyte proliferation to detect possible alteration of the cells responsible for the immune response during long-duration space flights is described. Human lymphocytes in culture medium will be delivered shortly before launch in an incubator which will be kept at 37C. Mitogen will be added to the culture. A control without mitogen will be run in parallel. After 70 hours of incubation, radioactive thymidine will be added. After two hours, cellular activity will be stopped by fixation and incubator power switched off. Later, the amount of incorporated thymidine will be determined and the cell morphology and the distribution of cell organelles will be investigated. R.J.F.

N82-18262*# Rome Univ. (Italy).
THREE-DIMENSIONAL BALLISTOCARDIOGRAPHY IN WEIGHTLESSNESS
A. Scano *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 4 p

Avail: NTIS HC A08/MF A01 CSCL 06E
An experiment is described the aim of which is to record a three dimensional ballistocardiogram under the condition of weightlessness and to compare it with tracings recorded on the same subject on the ground as a means of clarifying the meaning of ballistocardiogram waves in different physiological and perphaps pathological conditions. Another purpose is to investigate cardiovascular and possibly fluid adaptations to weightlessness from data collected almost simultaneously on the same subjects during the other cardiovascular during the other cardiovascular and metabolic experiments. R.J.F.

N82-18264*# Stirling Univ. (Scotland).
MASS DISCRIMINATION DURING WEIGHTLESSNESS

Helen Ross *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06S
An experiment concerned with the ability of astronauts to discriminate between the mass of objects when both the objects and the astronauts are in weightless states is described. The main object of the experiment is to compare the threshold for weight-discrimination on Earth with that for mass-discrimination in orbit. Tests will be conducted premission and postmission and early and late during the mission while the crew is experiencing weightlessness. A comparison of early and late tests inflight and postflight will reveal the rate of adaptation, to zero-gravity and 1-g. The mass discrimination box holds 24 balls which the astronaut will compare to one another in a random routine. R.J.F.

N82-18265*# Pennsylvania Univ., Philadelphia.
NUTATION OF HELIANTHUS ANNUUS IN A MICROGRAVITY ENVIRONMENT
Allan H. Brown *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06C
An experiment to gather evidence to decide between the Darwinian concept of endogenously motivated nutation and the more mechanistic concept of gravity dependent nutation is described. If nutation persists in weightlessness, parameters describing the motion will be measured by recording in time lapse mode the video images of a population of seedlings that were grown at 1-g, but which will be observed at virtual zero gravity. Later, the plant images will be displayed on a video monitor in a laboratory, photographed on 16 millimeter film, and analyzed frame by frame to determine the kinetics of nutation for each specimen tested. R.J.F.

N82-18266*# State Univ. of New York at Binghamton.
PRELIMINARY CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS DURING SPACE FLIGHT: NEUROSPORA AS A MODEL SYSTEM
Frank W. Sulzman *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06P
The effects of the Spacelab environment on the circadian rhythms in microorganisms are investigated. Neurospora is chosen because of its well characterized circadian rhythm of growth. Growth rate, banding patterns, and circadian period and phase information are studied. B.W.

N82-18267*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Aachen (West Germany). Abteilung Biophysik.
MICROORGANISMS AND BIOMOLECULES IN SPACE HARD ENVIRONMENT
G. Horneck *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06C
Microorganisms and biomolecules exposed to space vacuum and to different intensities of selected wavelengths of solar ultraviolet radiation is studied. The influence of these factors, applied singly or simultaneously, on the integrity of microbial systems and biomolecules is measured. Specifically, this experiment will study in Bacillus subtilis spores (1) disturbances in subsequent germination, outgrowth, and colony formation; (2) photochemical reactions of the DNA and protein in vivo and in vitro and their role in biological injury; and (3) the efficiency of repair processes in these events. B.W.

N82-18268*# San Francisco Univ., Calif.
RADIATION ENVIRONMENT MAPPING
E. Y. Benton *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06R
An experimental set up to map the cosmic radiation fieldinside the Spacelab vehicle to determine the potential biological hazards present is described. In addition to the integral linear energy transfer (LET) spectrum for protons and HZE particles, the parameters to be determined include the total radiation dose; fluence of neutrons, protons, and high charge and energy (HZE) particles. These results are to be derived from measurements made in passive dosimeters. B.W.

N82-18269*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Aachen (West Germany). Abtelung Biophysik.
ADVANCED BIOSTACK EXPERIMENT
H. Buecker *In* NASA. Marshall Space Flight Center Spacelab Mission 1 Expt. Descriptions Nov. 1981 3 p

Avail: NTIS HC A08/MF A01 CSCL 06R
The Advanced Biostack Experiment is described. The objectives are: (1) to confirm, complement, and enlarge the information obtained from the previous experiments by applying improved and advanced methods of localization and physical and biological evaluation, performing advanced experiments based on these data, and including additional biological specimens and additional radiation detectors; (2) to determine the biological importance of nuclear disintegration stars; (3) to determine the interference of HZE particle induced effects with those of other space flight factors (e.g., weightlessness); and (4) to determine the distribution of HZE particles and of disintegration stars at different locations inside the module and on the pallet. B.W.

N82-18854*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PHYSIOLOGICAL RESPONSES TO PROLONGED BED REST AND FLUID IMMERSION IN MAN: A COMPENDIUM OF RESEARCH (1974 - 1980)
John E. Greenleaf, Lori Silverstein (San Jose State Univ.), Judy Bliss, Vicki Langenheim, Heidi Rosson (California Univ., Davis), and Clinton Chao (California Univ., Berkeley) Jan. 1982 112 p
(NASA-TM-81324; A-8709) Avail: NTIS HC A06/MF A01 CSCL 06S
Water immersion and prolonged bed rest reproduce nearly all the physiological responses observed in astronauts in the weightless state. Related to actual weightlessness, given responses tend to occur sooner in immersion and later in bed rest. Much research was conducted on humans using these two techniques, especially by Russian scientists. Abstracts and annotations of reports that appeared in the literature from January 1974 through December 1980 are compiled and discussed. Author

N82-18855# Ohio State Univ., Columbus. Dept. of Veterinary Pathobiology.
MOLECULAR INTERACTIONS OF HIGH ENERGY FUELS AND JET FUELS WITH ONCOGENIC VIRUSES AND ENDOGENOUS VIRUSES Annual Report, 31 Jul. 1980 - 15 Sep. 1981
James R. Blakeslee, Jr. Oct. 1981 110 p refs
(Contract F49620-80-C-0087; AF Proj. 2312)
(AD-A108377; AFOSR-81-0765TR) Avail: NTIS HC A06/MF A01 CSCL 06/2
The objectives of this research are to develop rapid in-vitro assays to evaluate the carcinogenic potential of chemicals used by the U.S. Air Force. Snyder-Theilen Feline Sarcoma Virus (ST FeSV), quantitatively transforms human skin fibroblasts following second order kinetics. These studies were performed

in order to determine whether chemicals altered ST FeSV transformation in a predictable manner and to correlate the alteration with the carcinogenic or non-carcinogenic activity of the text chemical. The results, to date, show diverse carcinogens classed as: aromatic amines, polycyclic hydrocarbons, Aminofluorenes, hydrazines, asbestos and mycotoxins inhibited virus transformation when virus infected cells (2 hours post-infection) were exposed to test chemical, while non-carcinogenic chemicals had no significant effect on transformation. Triton X-100, acetone, petroleum and shale oil derived JP5; RJ5 and diesel fuel, marine, demonstrated non-carcinogenic activity while formaline demonstrated carcinogenic activity. Experiments designed to show the specificity of the antagonistic effect of known carcinogens are reported. Disulfuram inhibits biotransformation of 1,2 symmetrical dimethyl hydrazine (SDMH) metabolites, azomethane to azoxymethane (ultimate carcinogen) thereby preventing carcinogenic effect of the proximate carcinogen SDMH. Detailed methodology required to ascertain effect of chemicals on ST FeSV pro-virus integration and synthesis are presented. GRA

N82-18857 Royal Aircraft Establishment, Farnborough (England) Engineering Physics Dept.

SCATTER DIAGRAMS BASED ON THE ANTHROPOMETRIC SURVEY OF 2000 ROYAL AIRFORCE AIRCREW (1970/1971)

R. E. Simpson and E. Violet Hartley 10 Feb. 1981 154 p refs

(RAE-TR-81017; RAE-EP-763; BR79375) Copyright. Avail: Issuing Activity

An anthropometric survey was conducted in order to provide information for aircrew clothing, personal equipment and aircraft workspace design purposes. Scatter diagrams of pairs of measurements of value to engineers, ergonomists or clothing designers who require information on the interrelationship between specific measurements are presented. Each subject is represented by a pair of coordinates, x and y, which represent the two measurements considered. Information on the number of subjects to which the diagram relates, means of x and y variate values, correlation coefficient, and regression equations for the x and y variates are given. Functional clothing sizing is based on two control measurements, e.g., stature and chest circumference for one piece coveralls. Author (ESA)

N82-18858*# National Aeronautics and Space Administration, Washington, D. C.

MISSION OPERATION REPORT: SPACE SHUTTLE PROGRAM. STS-2 POSTFLIGHT MEDICAL OPERATIONS

29 Jan. 1982 23 p

(NASA-TM-84135; E-989-81-02) Avail: NTIS HC A02/MF A01 CSCL 06S

The STS-2 mission presented the NASA medical team with a series of operational problems associated with the potential contamination of the onboard potable water and altered work/rest cycles. The first problem was traced to the inflight malfunctioning fuel cell, while the second was attributed to the modification of in-flight crew timelines in order to maximize the scientific data acquisition. Shortened sleep period, heavy work laods, inadequate time allocation for food preparation and consumption and estimated low water intake, though tolerable for a 54 hour mission, would have been unacceptable for a longer misson. A contingency plan was developed to restructure in-flight time-lines and institute corrective health maintenance procedures in the event that the mission was extended beyond 54 hours. Minor losses of medical data occurred as a result of the shortened mission duration. All phases of the mission required real-time re-evaluation, identification of potential impact on preexisting medical constraints, and development of appropriate recommendations and solutions. The activities required significant coordination among the different teams involved in medical operations. N.W.

N82-18859*# Houston Univ., Tex. Dept. of Chemistry.

ANALYSIS OF VOLATILE METABOLITES IN BIOLOGICAL FLUIDS AS INDICATORS OF PRODROMAL DISEASE CONDITION Final Report

A. Zlatkis Jan. 1982 25 p refs

(Contract NAS9-15882)

(NASA-CR-167513) Avail: NTIS HC A02/MF A01 CSCL 06E

The volatile profile cannot be defined as a single class of substances, rather it is a broad spectrum of materials of different polarities characterized by having a boiling-point in the low to medium range (up to approximately 300 C) and the fact that the compounds are suitable for gas chromatography without derivatization. The organic volatile profiles are very complex mixtures of metabolic byproducts, intermediates, and terminal products of enzymatic degradations composed mainly of alcohols, ketones, aldehydes, pyrazines, sulfides, isothiocyanates, pyrroles, and furans. The concentration of organic volatiles in biological fluids covers a wide range with many important components present at trace levels. The complexity of the organic volatile fraction requires the use of capillary columns for their separation. T.M.

N82-18860# Texas Univ. at Arlington. Dept. of Mathematics.

STATISTICAL TOOLS FOR DETERMINING FITNESS TO FLY Final Report, Sep. 1978 - Mar. 1980

Patrick L. Brockett and Gerald A. Shea Brooks AFB, Tex. School of Aerospace Medicine Sep. 1981 44 p refs

(Contract F33615-78-C-0623; AF Proj. 7755)

(AD-A108599; SAM-TR-81-20) Avail: NTIS HC A03/MF A01 CSCL 12/1

The goal of this project is to use data from regularly scheduled physical examinations to estimate the probability of an event such as a heart attack. This is done via the construction of a mathematical model. A high probability of an event as computed by the model would be evidence of a high risk case. The model developed here, termed the periodic checkup predictive model, is a survival distribution model similar to the proportional hazards model when there is little or no loss to followup and to logistic regression when the object is to predict the occurrence of an event during a fixed interval of time. Author (GRA)

N82-18861# European Space Agency, Paris (France).

EVALUATION OF THE VISUAL ACQUISITION RANGE OF ENROUTE AIR TRAFFIC FROM COCKPIT OBSERVATIONS

Otto Weber Oct. 1981 56 p refs Transl. into ENGLISH from 'Bestimmung der visuellen Auffassreichweite von Verkehrsflugzeugen im Streckenglug aus Beobachtungen im Cockpit', Rept. DFVLR-Mitt-80A-14 DFVLR, Brunswick, West Germany, Sep. 1980 53 p

(ESA-TT-691; DFVLR-Mitt-80-14) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 11,90

Onboard observations and approach lead time measurements are employed. The results of 29 measurement campaigns conducted by airline pilots are analyzed. Evaluation methods are described and problems due to converging courses and large cross track distances in the head-on case are treated. The results for the acquisition range and the apparent size of the intruder derived from this range are discussed. The advantages of anticollision and position lights, vapor trials and air traffic control signals for the acquisition process are demonstrated. Data acquisition improvements are suggested. Author (ESA)

N82-18862# Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 5.

RESEARCH PREDICTIONS FOR UNDERWATER ACTIVITIES IN THE 1980'S [FORSKNINGSBEHOV INOM 1980-TALETS UNDERVATTENSVERKSAMHET]

Bo Cassel Oct. 1981 29 p In SWEDISH

(FOA-C-58010-H1) Avail: NTIS HC A03/MF A01

Present developments show that technical equipment compliments the diver's work and makes it easier, but cannot take the place of the diver. In bell diving a depth of 700 m was reached in 1981. Data from North Sea diving under harsh weather conditions were studied and make up, to a certain extent, the background of research and development in the next decade. Oil and gas resources at depths between 300 and 600 m will be exploited at that time. Diving at such depths involves special problems. Safety requirements for divers are addressed.

Author (ESA)

N82-18863# Ohio State Univ., Columbus. Coll. of Medicine.

STUDY OF CHLORINE DIOXIDE AND ITS METABOLITES IN MAN

Joseph R. Bianchine, Judith R. Lubbers, Sudha Chauhan, and Judy Miller Sep. 1981 100 p refs

(Grant EPA-R-805643)

(PB82-109356; EPA-600/1-81-068) Avail: NTIS HC A05/MF A01 CSCL 06T

An assessment of the relative safety of chronically adminis-

tered chlorine water disinfectants in man was undertaken. A rising dose tolerance investigation examined the effects of single dose increasing concentration administration of chlorine disinfectants to normal healthy adult male volunteers. The impact on normal subjects of twelve week daily ingestion of the disinfectants was addressed. Physiological impact was assessed by evaluation of a large battery of qualitative and quantitative tests. In general, the study affirmed the relative safety and tolerance of normal healthy adult males and normal healthy adult male glucose-6-phosphate dehydrogenase deficient individuals to daily twelve week ingestion of 500 mL of chlorine disinfectants at a concentration of 5 mg/L. GRA

N82-18864# Midwest Research Inst., Kansas City, Mo.
HYDROGEN CYANIDE HEALTH EFFECTS Final Report
Bonnie L. Carson, Larry H. Baker, Betty L. Herndon, Harry V. Ellis, III, and Eileen M. Horn Sep. 1981 71 p refs
(Contract EPA-68-03-2928)
(PB82-116039; EPA-460/3-81-026) Avail: NTIS HC A04/MF A01 CSCL 06T

Health effects literature primarily related to inhalation exposures to hydrogen cyanide was collected, evaluated, tabulated and summarized. Approximately 170 documents were collected from computerized and manual literature searches covering the period 1899-1981. Pharmacologists and an M.D. epidemiologist rated the documents according to their applicability to the study and their methodology. The approximately 20 documents considered useful for deriving a range of concern for human exposure to hydrogen cyanide from automotive emissions were tabulated. The 25 pages of tables detail the results of acute and repeated dose testing of mice, rats, guinea pigs, rabbits, cats, monkeys, dogs, goats, donkeys and humans as well as human occupational studies. Most of the documents evaluated are described in an annotated bibliography. GRA

N82-18865# Midwest Research Inst., Kansas City, Mo.
AMMONIA HEALTH EFFECTS Final Report
Bonnie L. Carson, Harry V. Ellis, III, Cecily M. Beall, and Larry H. Baker Sep. 1981 108 p refs
(Contract EPA-68-03-2928)
(PB82-116047; EPA-460/3-81-027) Avail: NTIS HC A06/MF A01 CSCL 06T

Health effects literature primarily related to inhalation exposures to ammonia was collected, evaluated, tabulated, and summarized. Appoximately 200 documents were collected from computerized and manual literature searches covering the period 1886-1981. Pharmacologists and an M.D. epidemiologist rated the documents according to their applicability to the study and their methodology. The approximately 50 documents considered useful for deriving a range of concern for human exposure to ammonia from automotive emissions were tabulated. The 50 pages of tables detail the results of acute, repeated dose, and chronic testing of bats, mice, rats, guinea pigs, chickens, rabbits, cats, monkeys, dogs, turkeys, swine, and humans as well as human occupational and accidental studies. Most of the documents evaluated are described in an annotated bibliography. GRA

N82-18866*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF TACTILE VIBRATION ON ANNOYANCE TO SYNTHESIZED PROPFAN NOISE
Sherman A. Clevenson Dec. 1981 16 p refs Presented at the 102nd Meeting of the Acoust. Soc. of Am., Miami Beach, Fla., 1-4 Dec. 1981
(NASA-TM-83258) Avail: NTIS HC A02/MF A01 CSCL 05H

Design information that maximizes passenger comfort for propfan aircraft is presented. Predicted noise and vibration environments and the resultant passenger acceptability were studied. The effect of high frequency tactile vibration (i.e., greater than 30 Hz) on passenger reactions was analyzed. Passenger reactions to a wide range of noise with and without tactile vibration was studied. The passenger ride quality simulator was employed using subjects who evaluated either synthesized propeller noises only, or these noises combined with seat/arm vibration. The noises ranging from 80-100 dB consisted of a turbulent boundary layer noise with a factorial combination of five blade passage frequencies (50-200 Hz), two harmonic rolloffs, and three tone/noise ratios. It is indicated that passenger reaction (annoyance) to noise is not significantly changed in the presence of tactile vibration. E.A.K.

N82-18867# Illinois Univ., Urbana-Champaign. Engineering-Psychology Research Lab.
TIME-SHARING MANUAL CONTROL AND MEMORY SEARCH: THE JOINT EFFECTS OF INPUT AND OUTPUT MODALITY COMPETITION, PRIORITIES AND CONTROL ORDER
Michael Vidulich and Christopher D. Wickens Dec. 1981 61 p refs
(Contract N00014-79-C-0658; NR Proj. 196-158)
(AD-A108721; EPL-81-4/ONR-81-4) Avail: NTIS HC A04/MF A01 CSCL 05/1

This report addresses some of the issues that must be considered as voice recognition and synthesis (VRAS) technology is integrated into complex man-machine system environments. These issues include the input and output channels demanded by competing activities, task difficulty or workload, the allocation of attention and the nature of the task that - spatial or verbal - will be interfaced with VRAS. The present experiment addresses primarily the first three issues within the framework of multiple resource theory. Ten subjects performed first and second order tracking tasks either alone or concurrently with a Sternberg Memory Search Task with a set size of three letters. In different conditions the memory search task was presented either auditorily (A) or visually (V), and responses were executed with either a speech response (S), or manually (M). These generated four input/output combinations: AS, VS, AM, VM, that could be defined in terms of an increasing degree of resource overlap with the VM tracking task. GRA

N82-18868# Colorado Univ. at Boulder. Inst. of Cognitive Science.
HOW AN UNFAMILIAR THING SHOULD BE CALLED
Patricia Baggett and Andrzej Ehrenfeuch Nov. 1981 33 p refs
(Contract N00014-78-C-0433; NR Proj. 157-422)
(AD-A109179; TR-111-ONR) Avail: NTIS HC A03/MF A01 CSCL 05/10

An empirical method is described to derive good names for unfamiliar objects. Three principles were used in deriving the names: (1) The vocabulary and structure of the names should be within the user's linguistic capacities; (2) the names should be informationally efficient, namely, short, but at the same time unique; and (3) the names should form a classification system. For example, most names have a generic term and one or more modifiers. These principles lead to the following design for creating good names: Step 1: Names are generated by a group of subjects. Step 2: From the names generated by subjects, the experimenter chooses a subset of the names according to the following criteria: (a) the modal name is chosen, namely, if a particular name is generated more often than others, it is chosen; (b) shorter names are preferred; (c) names chosen stay within the classification system provided by the subjects. Step 3: How good the names are is tested by measuring (1) how well people can match the names with the objects they describe; and (2) how well they can recall the names, given the physical objects. Steps 2 and 3 can be iterated; namely, if a given name is poorly matched or recalled, it can be replaced by another generated name and tested again. The method results in names that form a classification system and that are natural, short, well matched with their physical referents and well recalled. GRA

N82-18869# Technische Hogeschool, Delft (Netherlands). Lab. for Measurement and Control.
IDENTIFICATION OF THE ADAPTIVE FEEDBACK OF THE HUMAN MOTOR SYSTEM USING THE RESPONSE DIFFERENCE METHOD (RDM)
Ton Eland Jul. 1981 131 p refs
(WTHD-134) Avail: NTIS HC A06/MF A01

The role of proprioceptive and visual feedback in generating slow, goal directed movements was investigated using a cybernetic model. The physiological structure of the movement control system is reflected by a feedforward path and a parallel feedback loop. Psychological schemata identified in the feedforward path are the internal model of the task, and the internal model of the motor system load. The RDM uses the differences between a routine and a disturbed response to identify the feedback system. The method was tested by computer simulation and a control

stick positioning task. Correlation between model and measured results is >0.95. Visual feedback is only used for a continuous readjustment of the proprioceptive position sense. Proprioceptive feedback tuning is dependent of the velocity of the planned movement. The proprioceptive velocity feedback adapts within 130 msec to an increase in the mass which is moved. Proprioceptive feedback does not adapt to a decreasing mass and/or a changing damping of the load. Author (ESA)

N82-18870*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STS-2 INDUCED ENVIRONMENT CONTAMINATION MONITOR (IECM): QUICK-LOOK REPORT
E. R. Miller, ed. Jan. 1982 76 p refs
(NASA-TM-82457) Avail: NTIS HC A05/MF A01 CSCL 06K

The STS-2/induced environment contamination monitor (IECM) mission is described. The IECM system performance is discussed, and IECM mission time events are briefly described. Quick look analyses are presented for each of the 10 instruments comprising the IECM on the flight of STS-2. A short summary is presented. S.L.

N82-18871*# George Washington Univ., Washington, D.C. Science Communication Div.
BIBLIOGRAPHY ON CARBOHYDRATE SYNTHESIS. SELECTED WORKS, 1861 - 1981
Patricia A. Dufour Jul. 1981 25 p Presented at Workshop on Carbohydrate Synthesis in a Controlled Ecological Life Support System (CELSS), Elkridge, Md., 23-27 Jun. 1981
(Contract NASw-3165)
(NASA-CR-168553) Avail: NTIS HC A02/MF A01 CSCL 07C

International in scope, this bibliography cites 220 articles books, patents, and conference proceedings related to carbohydrate synthesis. The works are listed alphabetically by author in the following categories: (1) experimental and industrial chemistry; (2) space travel and feeding studies; (3) hardware; and (4) general reviews and progress. A.R.H.

N82-18872# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Flugzeuge.
FLIGHT ERGONOMICS IN THE AIRCRAFT INDUSTRY PERSONNEL-ERGONOMIC DEVELOPMENT [FLUGERGONOMIE IN DER LUFTFAHRTINDUSTRIE MIT BESONDERER BERUECKSICHTIGUNG PERSONAL-ERGONOMISCHER ENTWICKLUNGEN]
Ruediger Seifert 4 Jun. 1981 23 p refs In GERMAN
(MBB-FE-301/S/PUB/44) Avail: NTIS HC A02/MF A01

Management systems applied to evaluate qualitative and quantitative personnel requirements for maintaining the man machine system (MMS) were determined. Qualitative personnel requirements are plant operation, attendance, maintenance/placement of the MMS needed, professional specialty, and job qualification. In quantitative personnel requirement the number of needed manpower is determined for every professional specialty and area. Personnel selection is recommended for activities, special abilities, performance, and skills. Personnel selection should be made according to these criteria. It is concluded that ergonomic measures are necessary in the development process of the MMS. Transl. by E.A.K.

N82-18873# Boeing Aerospace Co., Seattle, Wash. Engineering Technology Div.
HUMAN ENGINEERING PROCEDURES GUIDE Final Report, 2 Apr. - 2 Dec. 1979
Charles W. Geer Sep. 1981 245 p refs
(Contract F33615-79-C-0520)
(AD-A108643; D180-25471-1) Avail: NTIS HC A11/MF A01 CSCL 05/5

Human engineering (HE) procedures during the system acquisition process are presented for the assistance of various Air Force and industry personnel. The guide is divided into three parts. The first part of the guide is introductory material which scopes the effort and defines HE and human factors engineering (HFE). The second part provides guidance to Air Force and industry management. The third, and last part is the largest section and it provides assistance to both Air Force and industry persons assigned direct responsibility for HE. The management portion shows current management aspects of the HE process utilizing directives, specifications, regulations and pamphlets. HE activities are described in general terms of both what should be done and when it should be accomplished. GRA

N82-18874# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.
ACTIVITIES OF THE COMMITTEE ON HUMAN FACTORS: OCTOBER 1, 1980 - SEPTEMBER 30, 1981 Annual Summary Report
Robert T. Hennessy 30 Nov. 1981 22 p
(Contract N00014-81-C-0017; NR Proj. 196-167)
(AD-A108606) Avail: NTIS HC A02/MF A01 CSCL 05/1

The Committee on Human Factors was established and held its first meeting in December 1980. The three principal accomplishments of the committee during the reporting period were: (a) identifying critical problems in human factors and formulating preliminary statements defining the nature of these problems and the basic research needed to alleviate these problems; (b) establishing membership and guidelines for a special working group on simulation; and (c) planning the conduct of a workshop on applied methodologies that will identify some methodologies suitable for presentation at a tutorial symposium and other methodologies deserving research support. GRA

N82-18875*# Purdue Univ., Lafayette, Ind. School of Industrial Engineering.
MODELING HUMAN ATTENTION ALLOCATION STRATEGIES WITH COMPETING CRITERIA Final Report, Mar. - Aug. 1981
Thiruvenkatasamy Govindaraj Oct. 1981 22 p refs
(Grant AF-AFOSR-0144-81; AF Proj. 2313)
(AD-A108509; AFOSR-81-0785TR) Avail: NTIS HC A02/MF A01 CSCL 05/8

In supervisory control situations involving multiple human operators, proper cooperation and coordination is essential. In addition to their individual tasks, the operators are jointly responsible for certain tasks. It is usually not clear when and who should take responsibility for the joint tasks. Proper scheduling of tasks and appropriate allocation of resources are necessary for optimal performance, and in some instances, for overall safety. Understanding how multiple operators interact requires the understanding of single operator performance. A model based on Pareto optimality and Fuzzy Set theory was developed for the human operation. An experimental paradigm had been developed earlier to study the human monitor. The scenario used was similar to monitoring the spread of forest fires, and timely identification of threatening conditions. Experiments were conducted based on the paradigm. Results showed that the operators used updates to reduce the uncertainty to a sufficiently low level before starting threat classification. Sites where the probability of damage was close to 0.5 were more difficult to classify. Author

N82-19147*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ENVIRONMENTAL CONTROL SYSTEMS
Frank Hrach *In* NASA. Langley Research Center Elec. Flight Systems Feb. 1982 p 247-252

Avail: NTIS HC A12/MF A01 CSCL 06K

Materials illustrating a presentation on environmental control systems for electric flight systems are presented. The major technology issues, major development and application steps, the role of NASA, and required flight testing are outlined. J.D.H.

N82-19808 Texas A&M Univ., College Station.
BIOCHEMICAL, PHYSIOLOGICAL AND ECOLOGICAL ASPECTS OF AMMONIUM REGENERATION BY MARINE CRUSTACEANS Ph.D. Thesis
Robert Richard Bidigare 1981 122 p
Avail: Univ. Microfilms Order No. 8128874

Laboratory investigations were carried out with the marine mysid, Praunus flexuosus, to assess the degree of coupling between glutamate dehydrogenase (GDH) activity and the rate of whole animal ammonium excretion. A strong correlation between GDH activity and rate of ammonium excretion by this mysid confirmed that ammonium excretion rates could be accurately predicted by employing the enzyme assay presented here. GDH activity surveyed in different taxa of marine crustaceans was higher in muscle tissue extracts than in gill tissue extracts

or in a whole animal homogenate. Zooplankton excretion experiments conducted during austral spring and summer in the Scotia Sea, Antarctica, showed that weight-specific ammonium excretion increased both with increasing ambient temperature and with decreasing body size. The GDH assay appears useful as an alternative method to the traditional time-course, animal-in-a-jar experiments for quantifying zooplankton excretion impacts in the world oceans. Used in conjunction with the ETS assay, the GDH assay is a sensitive tool for surveying depths of maximal grazing and/or predation. Dissert. Abstr.

N82-19809*# General Electric Co., Fairfield, Conn. Space Div.

LIFE SCIENCES PASSIVE GN2 FREEZER THERMAL PERFORMANCE TEST Summary Report

G. W. Belshaw 13 Nov. 1981 79 p

(Contract NAS9-15629)

(NASA-CR-167546) Avail: NTIS HC A05/MF A01 CSCL 06C

Thermal performance tests that were conducted on the life sciences passive GN2 freezer project are summarized as well as the improvements to the freezers to improve the thermal performance of the containers. Procedures were developed, based upon these tests, to initially charge the freezers with LN2 and verify that the freezer performance is adequate for the mission duration. Improvements were made to the corvac sample tube to limit the amount of breakage due to thermal expansion of the liquid during freezing. A method of verifying the freezer vacuum insulative integrity was defined as well as a procedure for refurbishment of the internal vacuum level. Freezer modifications were made to ease the reevacuation of the containers. The orientation of the freezer in a 1-G environment, after being charged, had to remain in a vertical position. The LN2 boiloff rate increased significantly in a horizontal position. This resulted in a stowage definition in the spacecraft prior to launch. Functional testing, using the SL-1 mission timeline showed that the freezer will maintain samples in the frozen state for the duration of the mission. S.L.

N82-19810# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).

STUDY OF THE KINETICS OF OXYGEN SATURATION OF FLUOROCARBON EMULSIONS

Yu. D. Aprosin, V. K. Alekseeva, and N. I. Afonin 1982 20 p refs Transl. into ENGLISH from Vop. Med. Khim. (Russia), v. 26, no. 6, 1980 p 793-799

(ISSN-0077-5606; NRC/CNR-TT-2007) Avail: NTIS HC A02/MF A01

The use of fluorocarbon emulsions as blood substitutes is addressed. Specifically, the mechanism of oxygen absorption by perfluorotributyl amine (PFTBA) emulsions is examined. The functional dependence of the absorption constant on various parameters (viscosity, temperature, and concentration of PFTBA in the emulsion) was established, and a comparative analysis of the efficiency of gas transport by the emulsion and by blood was carried out. M.G.

N82-19811# Ball State Univ., Muncie, Ind. Dept. of Biology.

DETERMINATION OF THE EFFECTS OF MATERIAL FROM ALTERNATE ENERGY SOURCES ON THE UPPER RESPIRATORY TRACT CLEARANCE MECHANISM. PART 1: IN VITRO EXPOSURE TO PARTICULATE POLLUTANTS. PART 2: IN VIVO EXPOSURE TO OZONE Final Report

Dorothy Adalis Sep. 1981 75 p refs

(Contract EPA-68-02-2295)

(PB82-117037; EPA-600/1-81-067) Avail: NTIS HC A04/MF A01 CSCL 06T

Studies were conducted to measure the toxic effects of a variety of substances from the environment on the clearance mechanism of the upper respiratory tract using an in vitro hamster model system. Studies using hamsters for in vivo exposures to ozone were also conducted to determine the effects of ozone on the cilia beat frequency and cytopathology of the tracheal epithelium. Organ cultures of hamster tracheal tissue were exposed to graded concentrations of pollutants to determine effects on the respiratory cilia. Parameters studied were beat frequency, ciliostasis, cytopathology, and ATP concentration. GRA

N82-19812 Utah Univ., Salt Lake City.

NUMERICAL AND EXPERIMENTAL STUDIES OF ELECTROMAGNETIC NEAR-FIELD ENERGY ABSORPTION IN MODELS OF MAN Ph.D. Thesis

Indira Chatterjee 1981 156 p

Avail: Univ. Microfilms Order No. 8125898

The Plane Wave Spectrum approach was used to numerically evaluate the electromagnetic fields and energy absorption in models of man subjected to near-zone leakage fields. Three models were considered: a homogeneous semi-infinite slab model, a layered slab model, and an inhomogeneous 180 cell block model. The numerical results show the strong dependence of energy absorption on the characteristics of the prescribed leakage fields. Results are presented, both for plane waves at various angles of incidence and for near-zone leakage fields. The importance of phase and amplitude variations in the prescribed leakage field is evaluated. A highlight of this work is the considerably reduced energy absorption for near-field partial-body exposures as compared to that obtained for far-field exposure conditions. Experimental results supporting the validity of the empirical relationships are presented. Dissert. Abstr.

N82-19813 Texas A&M Univ., College Station.

CATECHOLAMINE LEVELS IN FIT AND NONFIT MALES WHEN EXPOSED TO AN EMOTIONAL STRESS Ph.D. Thesis

Camille Jeanette Bunting 1981 123 p

Avail: Univ. Microfilms Order No. 8128877

The difference in catecholamine (CA) excretion levels and perceived anxiety levels between physically fit and nonfit human subjects when exposed to an emotional stress was studied. The differences in heart rate responses between physically fit and nonfit subjects, as well as the difference in CA excretion levels and perceived anxiety levels between individuals classified as introverts and extraverts were also studied. Rock climbing was selected as the experimental stress factor. The results of the analysis for the fit and nonfit classifications indicated significant differences in epinephrine (E) excretion levels and responses on the Spielberger State Anxiety Inventory (SSAI) between treatments, as well as significant groups x treatments interaction for norepinephrine (NE) excretion levels. Significant groups x treatments x times and treatments x times x activities interactions were found for heart rate. Analysis for the introvert and extravert classifications revealed significant differences in NE excretion levels and SSAI responses between treatments, as well as a significant groups x treatments interaction for E excretion levels. Dissert. Abstr.

N82-19814*# General Electric Co., Houston, Tex. Systems Dept.

ANALYSIS OF EVAPORATIVE WATER LOSS IN THE SKYLAB ASTRONAUTS

J. I. Leonard 19 Dec. 1977 77 p refs

(Contract NAS9-14523)

(NASA-CR-167462) Avail: NTIS HC A05/MF A01 CSCL 06P

Daily evaporative water losses (EWL) during the three Skylab missions were measured using the indirect mass and water balance techniques. A mean inflight EWL of 860 ml/day-m 2 was obtained for nine men who averaged one hour of daily exercise. Although it was expected the EWL would increase in the hypobaric environment of Skylab (1/3 atmosphere), an average decrease from preflight sea level conditions of 11 percent was measured. The results suggest that weightlessness may have been a factor in modifying EWL primarily by decreasing sweat losses during exercise and possibly by reducing insensible skin losses as well. The weightless environment apparently promotes the formation of a sweat film on the skin surface both directly, by reducing heat and mass convective flow and sweat drippage, and perhaps indirectly by inducing measurable biochemical changes resulting in high initial sweating rates. It is proposed that these high levels of skin wettedness favor sweat suppression by a previously described mechanism. Author

N82-19815*# Baylor Univ., Houston, Tex. Dept. of Dermatology.

EVALUATION OF MATERIALS PROPOSED FOR USE IN SPACE FLIGHT Final Report

W. Christopher Duncan Aug. 1981 4 p

(Contract NAS9-16358)

(NASA-CR-167537) Avail: NTIS HC A02/MF A01 CSCL 06Q

The cutaneous primary irritancy and allergenicity potential of cotton shirts/fabrics treated with flame retardants were evaluated in order to establish their suitability for spacecraft crew use. Twenty-five volunteer human subjects were patch tested on the back utilizing standard methodology, with both treated and untreated cotton fabric. The fabric was treated with tetrakis (hydroxymethyl) phosphonium hydroxide and subsequently cured with gaseous ammonia. The final treatment comprised adding on dicyandiamine phosphoric acid. None of the individuals experienced primary irritant or allergic reactions attributable to the fabric during induction or challenge patch testing. Likewise, there were no reactions to treated or untreated fabric patches placed on ten subjects of the usage panel at the conclusion of the study. R.J.F.

N82-19816# Communications Research Centre, Ottawa (Ontario). Informatics Applications Management Branch.
REVIEW OF HEALTH AND SAFETY ASPECTS OF VIDEO DISPLAY TERMINALS
W. C. Treurniet Feb. 1982 39 p refs
(CRC-TN-712-E) Avail: NTIS HC A03/MF A01

The factors that contribute to worker complaints when video display terminals (VDT) are introduced into the workplace are investigated. Survey data from field experiments indicate that a number of ergonomic factors and job characteristics can contribute to reports of discomfort from VDT users. Specifically, reports of visual discomfort are related to improper ambient lighting (which can cause bothersome reflections and contrast glare), poor display quality, and ophthalmological deficiencies. Reports of muscle pain and fatigue are related to poor workstation design such as improper heights of chair, keyboard, and display screen, and absence of source document holder, and no support for the forearms and wrists. It is noted that the frequency of such complaints is influenced by the worker's attitude regarding the job. A negative attitude arising from performing a meaningless, routine task, or from having no opportunities for career advancement, will result in more complaints due to ergonomic shortcomings. The issue of electromagnetic emissions from television displays is also considered. B.W.

N82-19817# European Space Agency, Paris (France).
HUMAN CARDIOVASCULAR ADAPTATION TO ZERO GRAVITY
F. Bonde-Petersen, ed., B. Battrick, comp., and J. Mort, comp. Jan. 1981 64 p refs Proceedings of Symp., Copenhagen, 20-21 Apr. 1981. Sponsored in cooperation with Copenhagen Univ.
(ESA-SP-1033; ISSN-0379-6566) Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Methods for investigating the effects of weightlessness on the human body are presented, and the physiological problems caused by zero gravity are discussed. Cardiovascular and hormonal responses, incuding hemodynamic effects and posture influence, are considered. Vestibular, brain and masticatory functions are investigated. Rebreathing techniques are assessed.

N82-19818# Technische Univ., Berlin (West Germany).
CURRENT VIEWS AND FUTURE PROGRAMS IN CARDIOVASCULAR PHYSIOLOGY IN SPACE
K. Kirsch *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 3-5 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A microplethysmographic method which charts fluid shifts such as those caused by sudden exposure to zero gravity is described. An ultrasonic probe, calibrated in human tissue layer thickness, measures areas where the underlying bone provides good echos. Tissue volume is calculated from the depth of the tissue cylinder between the skin surface and the bone. Measurements on subjects undergoing tilting confirm that edema occurs preferentially in the lower third of the tibia close to the ankle. Tilting the subject from a slight head down position into the upright position is followed by a decrease of tissue layer thickness above heart level, whereas below heart level the opposite occurs. The effects are reversible. Author (ESA)

N82-19819# Texas Univ. Health Science Center, Dallas.
ADAPTATION TO ZERO GRAVITY AS SIMULATED BY HEAD-DOWN TILT
C. G. Blomqvist, J. V. Nixon, R. L. Johnson, and J. H. Mitchell *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 6-7 refs
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The accuracy of the head down tilt model of adaptation to zero gravity is assessed by comparing test results of subjects undergoing a 24 hr 5 deg tilt with measurements of heart rate, plasma volume, urine production, etc., obtained during and after space flight. The magnitude of the changes in body fluid distribution and the degree of post-tilt cardiovascular dysfunction closely resemble space results. Results indicate that the cardiovascular system adapts rapidly and efficiently to the central fluid shift that occurs early during exposure to zero gravity. Hemodynamic changes are transient with a nearly complete return to the control state within 6 hrs. The adaptation is achieved primarily by a diuresis and a decrease in blood volume, mediated by ADH, renin, and aldosterone inhibition. Author (ESA)

N82-19820# *Kobenhavns Amts Sygehus i Glostrup (Denmark).*
CLINICAL PHYSIOLOGY OF THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM
J. Giese *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 8-9

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Methods for studying the renin-angiotensin-aldosterone system are reviewed. Plasma renin concentration measurements, referred to the international standard, are advocated as a way of standardizing measures obtained by different methods. Plasma concentration of angiotensin 2 is the most suitable measurement. Saralasin and converting enzyme inhibitors are good angiotensin 2 blockers. Tetrahydroaldosterone excretion measurement is a satisfactory method for studying aldosterone secretion.
Author (ESA)

N82-19821# Kommune Hospital, Copenhagen (Denmark).
CARDIOVASCULAR REFLEXES DURING UPRIGHT POSITION
O. Henriksen *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 10-12 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Control systems involved in compensatory changes in vascular conductance in response to postural changes are described. Studies of blood flow regulation in subcutaneous limb tissue during changes of vascular transmural pressure are cited. Evidence suggests that constriction of the vessels in the skin contributes to the decrease in total vascular conductance in upright position. Both remote sympathetic reflex mechanisms elicited by a decrease in baroreceptor activity, and local sympathetic (axon) reflex mechanisms elicited by venous distension participate in pressure regulation during upright position. Author (ESA)

N82-19822# Technische Univ., Berlin (West Germany).
VOLUME REGULATING HORMONES AND THEIR ROLE IN THE CARDIOVASCULAR ADAPTATION TO ZERO GRAVITY
L. Roecker *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 18-20 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Neurohormonal control of plasma volume is postulated. A change in blood volume is sensed by cardiovascular receptors which transmit this information up to the central nervous system. From there two main routes are involved, the antidiuretic hormone (ADH) mechanism for the water, and the sympathetic renin-angiotensin-aldosterone-system for sodium control. Diuresis measurements during water immersion, negative pressure breathing, and prolonged bed rest support this concept. Evidence suggests that ADH is the key to volume control of the circulation system, but the low physiological concentrations of ADH, especially under weightless conditions, make detection difficult. Thermal dehydration tests indicate that factors other than osmolality control ADH secretion under long term negative water balance. Author (ESA)

N82-19823# Nara Women's Univ. (Japan).
CARDIOVASCULAR RESPONSES TO ISOMETRIC EXERCISE IN SITTING AND LYING POSITION
T. Sadamoto, F. Bonde-Petersen, and Y. Suzuki *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 21-24 refs
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Cardiovascular responses to static exercises in the sitting and lying positions, which simulated 1 g and 0 g, were studied. Subjects were investigated during and after 2 min of sustained isometric exercise performed as knee extension, plantar flexion or handgrip at a tension of 40% of maximum voluntary contraction. Heart rate, arterial pressure, and blood flow were recorded. In the two positions, where the force of gravity was varied but where the conditions in the exercising muscles were identical, there was a significant difference in mean arterial pressure (MAP). The effect of isometric exercise on MAP is reduced in the lying position due to the decreased sympathetic nervous activity (SNA). Increments in forearm blood flow and forearm vascular resistance indicate that the baroreceptors are active in both cases. Lower heart rate, MAP and forearm vascular resistance as well as increased forearm blood flow during rest in the lying as compared to the sitting position are attributed to differences in SNA.
Author (ESA)

N82-19824# Texas Univ. Health Science Center, Dallas.
HEMODYNAMIC EFFECTS OF LOWER BODY POSITIVE PRESSURE
F. A. Gaffney, E. R. Thal, W. F. Taylor, B. C. Bastian, J. A. Weigelt, J. M. Atkins, and C. G. Blomqvist *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 25-26 ref
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The way in which medical antishock trousers increase arterial pressure is examined. Supine and 60 deg head up tilt blood pressure, heart rate, forearm muscle flow, cardiac output and stroke volume measurements on healthy adults in garments with 10 and 100 mm Hg pressures are presented. Results show that the garment acts as a local, effective, nonpharmacologic, vasoconstrictor. In supine normovolemic subjects it raises pressure by increased afterload. During head up tilt, venous pooling in the legs decreases stroke volume and cardiac output.
Author (ESA)

N82-19825# Copenhagen Univ. (Denmark).
CARDIOVASCULAR REACTIONS TO TILT AND LOWER BODY POSITIVE PRESSURE (LBPP)
F. Bonde-Petersen, Y. Suzuki, T. Sadamoto, and T. Staehr-Johansen *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 27-29 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The difference in the reaction of the heart towards increasing total peripheral resistance passively, as during lower body positive pressure (LBPP), and actively, as during head up tilt, is examined. Standard measures were taken of subjects tilted at 25 deg (head up, head down) and in anti-g suits inflated to 60 or 120 mm Hg. For passive increase, a substantial increase in afterload does not affect cardiac output (CO). For active increase, CO is decreased without any significant increase in afterload, due to the decreased venous return. For LBPP applied in the sitting position (where venous return also is reduced) there is no increase in venous return and CO, although mean arterial pressure rises, probably due to the mechanical compression of the vascular beds in the legs.
Author (ESA)

N82-19826# University Hospital, Copenhagen (Denmark).
MEASUREMENTS OF VESTIBULAR FUNCTION
S. Vesterhauge and K. Zilstorff *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 33-34

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Vestibular reflexes used for measuring vestibular function are discussed, including vestibular sensations, vestibular vegetative vestibulo-spinal, and vestibulo-ocular reflexes. Most human displacements consist of linear accelerations/decelerations, which stimulate otolith organs, but angular accelerations provoked by rotatory movements which stimulate the semicircular canals, give rise to more compensations, so it is on these that clinical interest centers. Understanding of the interactions between the semicircular canal otolith functions and the rest of the system is hampered by the difficulty of isolating the effect of the peripheral sense organs, since the system adapts well to defects in sensory input. Zero gravity experiments are a step towards developing more sensitive measurement techniques for vestibular functions.
Author (ESA)

N82-19827# Kobenhavns Amts Sygehus i Gentofte, Hellerup (Denmark).
CEREBRAL HEMODYNAMICS AT ZERO GRAVITY
J. Olesen *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 35-36 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

Investigations on the effects of weightlessness and increased gravity on cerebral pressure autoregulation in man and animals are reviewed. Mean arterial blood pressure (MABP) was altered by vasoactive drugs, by a pneumatic cuff, and by posture changes. Test pilots' medical histories and the reactions of patients subjected to extirpation of external and internal jugular veins during bilateral radical dissection for neck carcinoma are considered. Artificial spinal fluid was infused into animals in order to increase intracranial pressure. Results show that cerebral blood flow is unchanged between perfusion pressures of 60 to 150 mm Hg MABP, and that substantial increases in cerebral venous pressure do not impair intellectual capacity. Therefore high g forces during ascent and weightlessness do not overload the autoregulation mechanism.
Author (ESA)

N82-19828# Royal Dental Coll., Copenhagen (Denmark).
THE ETIOLOGY OF FACIAL PAIN AS RELATED TO MASTICATORY MUSCLES
E. Moeller *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 37-41 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The link between chewing and facial pain in subjects with functional disorders of the masticatory system was tested. Blood flow in mandibular elevators was assessed by local isotope clearance using Xenon 133. Intercuspal biting at 25% or more of full effort for 90 sec causes obstruction or impairment of blood flow in the muscles. Deliberate unilateral mastication for 90 sec in a normal subject produces post exercise hyperemia in the most vigorously acting muscles. Since the degree of activity exerted by the elevators during mastication typically exceeds 50% of full effort, only pauses between the bursts of activity in the opening movement are available for blood flow. During part of these periods stretching of the elevators limits the capacity for circulation. This suggests that impaired blood flow due to contraction is the source of the pain.
Author (ESA)

N82-19829# Copenhagen Univ. (Denmark).
MEASUREMENTS OF INTRA AND EXTRACELLULAR WATER SPACES AND ELECTROLYTE CONCENTRATIONS IN HUMAN SKELETAL MUSCLE
G. Sjoegaard *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 43-44 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A method for measuring the extracellular space in small muscle biopsies was developed. For each 70 kg body weight, 2 mCi of sup 3H inulin is injected. Extracellar water content (H2Oe) is calculated from: H2Oe ml/100 g d.w. muscle tissue = (sup 3H activity/100 g d.w. muscle tissue)/(sup 3H activity/ml plasma H2O). The magnitude of H2Oe in the soleus (high % slow twitch fibers) triceps brachii (high % fast twitch) and vastus lateralis (equal number slow and fast twitch) was calculated. The total water content was 318 (298-342) ml/100 g d.w. for the three muscles. This indicates that factors other than fiber composition, e.g., the hydrostatic effect, are responsible for H2Oe magnitude differences. The method can measure reductions in muscle water spacing in the lower body caused by adaptation to zero gravity, and whether this is accompanied by electrolyte concentration changes.
Author (ESA)

N82-19830# Texas Univ. Health Science Center, Dallas.
USE OF ACETYLENE REBREATHING METHOD FOR MEASURING CARDIAC OUTPUT DURING PHYSIOLOGICAL AND CLINICAL STUDIES
C. G. Blomqvist *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 45-46 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A modification of the acetylene rebreathing method, suitable for complex or prolonged experiments which require multiple sessions, is presented. A mixture containing 0.5% C2H2, 10% He, 30% O2 with a balance of N2 for a total bag volume of 1.5 to 2.5 l is used. Six ml of C18O is added for pulmonary diffusion capacity determination. Instantaneous C2H2 concentrations are normalized with respect to He, which is not absorbed. Comparison with the standard indocyanine green indicator dilution technique reveals no systematic error. Experimentally induced stroke volume and cardiac output differences of + or - 10% to 15% can be established by standard statistical methods in groups of 5 to 10 subjects. Author (ESA)

N82-19831# Copenhagen Univ. (Denmark).
A COMPARISON BETWEEN ACETYLENE AND FREON REBREATHING FOR MEASURING CARDIAC OUTPUT DURING EXERCISE
P. Norsk, F. Bonde-Petersen, and Y. Suzuki *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 47-49 refs
Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

The suitability of freon rebreathing as a noninvasive measurement method in spaceborne microgravity cardiac output tests was examined. Cardiac output, oxygen uptake, blood pressure, and heart rate were measured for subjects with spontaneous, and subjects with forced respiratory rates during rebreathing. Comparison of their results shows that freon can replace acetylene if a spontaneous breathing rate is used, and if the end tidal gas fractions are corrected for changes in rebreathing volume. Inadequate mixing can be avoided by using an inert, insoluble gas. Author (ESA)

N82-19832# Odense Univ. (Denmark).
ON-LINE, REAL-TIME DETERMINATIONS OF BREATH-TO-BREATH GAS EXCHANGE
J. S. Lundsgaard and J. Groenlund *In* ESA Human Cardiovascular Adaptation to Zero Gravity Jan. 1981 p 50-53 refs

Avail: NTIS HC A04/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO (+20% others)

A real-time on-line system which measures respiratory gas uptake and release in noninvasive investigations of cardiac output is described. For respiration, a hot-wire anemometer connected to the computer measures true mass gas flow. The nonlinear relation between flow rate and flow signal, which differs between gases, is accounted for by a calibration table in the computer program. Another flowmeter, which measures inspiration, is connected to the first by an alternating switch. A mass spectrometer samples 20 cu cm/min flow in order to measure partial pressures. Author (ESA)

N82-19833# Ohio State Univ., Columbus. College of Pharmacy.
CHEMICAL AND MOLECULAR BIOLOGICAL ASPECTS ALKYLHYDRAZINE-INDUCED CARCINOGENESIS IN HUMAN CELLS IN VITRO Interim Report, 1 Sep. 1980 - 31 Aug. 1981
Donald T. Witiak Sep. 1981 20 p refs
(Contract F49620-80-C-0086; AF Proj. 2312)
(AD-A109088; AFOSR-81-0864TR) Avail: NTIS HC A02/MF A01 CSCL 06/20

Carbon-14 labeled 1,1-DMH and 1,2-DMH of high specific activity were prepared and utilized, along with 14C-labeled MMH, to study alkylation of DNA and proteins in low passage human neonatal foreskin derived fibroblasts. When human fibroblasts were treated under conditions which would be expected to lead to a negligible number of transformation events, i.e. cells labeled were in a non-growing environment and the dose of methylhydrazine (1.6 microgram/ml) was well below the ED50 value (62-100 microgram/ml), significant differences in DNA and protein methylation were observed. For both protein and DNA, 1,2-DMH produced a higher degree of methylation than 1,1-DMH, with MMH demonstrating the lowest level. The data suggests that in these cells there are significant differences in the metabolic and/or chemical transformation of the methylhydrazines in the proposed active metabolite, methyl diazonium ion. GRA

N82-19834# Naval Health Research Center, San Diego, Calif.
NONAUDITORY EFFECTS OF HIGH INTENSITY NOISE ON GROUND CREWS AT A NAVAL AIR STATION Interim Report
David J. Hord and M. A. Coultas 1981 19 p refs
(MF58524002)
(AD-A108996; NAVHLTHRSCHC-81-27) Avail: NTIS HC A02/MF A01 CSCL 06/19

Physiological, behavioral and subjective data were obtained from 14 ground crew considered possibly to be at risk for nonauditory effects of intense noise while working around jet aircraft. Fourteen matched control subjects working in normal noise environments were given the same test protocol. Brain stem evoked potentials, eye tracking behavior, balance, and nystagmus were compared between the groups and found to be nondiscriminating. In addition, subjective mood and perceived illness were compared and found to be the same in the two groups. It was concluded that ground crew wearing the required ear protection devices do not show nonauditory effects of intense noise encountered on their jobs, and that within the confines of the variables studied, no evidence exists that current safety measures and standards are inadequate. Author (GRA)

N82-19835# Tracor Jitco, Inc., Rockville, Md.
ENVIRONMENTAL AND HEALTH ASPECTS OF ACRYLAMIDE: A COMPREHENSIVE BIBLIOGRAPHY OF PUBLISHED LITERATURE Final Report, 1950 - 1981
Washington EPA Jun. 1981 83 p
(Contract EPA-68-01-5836)
(PB82-110123; EPA-560/7-81-006) Avail: NTIS HC A05/MF A01 CSCL 06I

The citations were selected from a thorough literature search, and broadly classified as having primarily environmental or biological emphasis. The sources used in the search are identified, and for the portion performed on line, the search strategies are also included. GRA

N82-19836# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
THE EFFECT OF VISUAL INFORMATION ON THE MANUAL APPROACH AND LANDING
P. H. Wewerinke 16 May 1980 72 p refs
(Contract NIVR-1857)
(NLR-TR-80055-U) Avail: NTIS HC A04/MF A01

The effect of visual information combined with a basic display information on manual approach performance on the manual approach and landing task was studied. A pre-experimental, theoretical analysis in terms of the optimal control model for pilot/aircraft was performed, yielding approach performance predictions which could be compared with the experimental results of a moving base simulator program. The model provides a description of the visual perception process involved in the complex manual approach task, with predictive capability. The complex interaction of a variety of task variables is examined. Author (ESA)

N82-19837*# CAE Electronics Ltd., Montreal (Quebec).
SIX DEGREE OF FREEDOM MANUAL CONTROLS STUDY REPORT Final Report
G. M. McKinnon, A. Lippay, and M. L. King [1982] 65 p
(Contract NAS9-15939)
(NASA-CR-167532) Avail: NTIS HC A04/MF A01 CSCL 05H

The feasibility of using degree of freedom manual controls in space in an on orbit environment was determined. Several six degree of freedom controls were tested in a laboratory environment, and replica controls were used to control robot arms. The selection of six degrees of freedom as a design goal was based on the fact that six degrees are sufficient to define the location and orientation of a rigid body in space. S.L.

N82-19838*# SRI International Corp., Menlo Park, Calif.
THE FEASIBILITY OF MINIATURIZING THE VERSATILE PORTABLE SPEECH PROSTHESIS: A MARKET SURVEY OF COMMERCIAL PRODUCTS

Tracy Walklet Nov. 1981 207 p
(Contract NAS2-10143; SRI Proj. 8134)
(NASA-CR-168611) Avail: NTIS HC A10/MF A01 CSCL 05H

The feasibility of a miniature versatile portable speech prosthesis (VPSP) was analyzed and information on its potential users and on other similar devices was collected. The VPSP is a device that incorporates speech synthesis technology. The objective is to provide sufficient information to decide whether there is valuable technology to contribute to the miniaturization of the VPSP. The needs of potential users are identified, the development status of technologies similar or related to those used in the VPSP are evaluated. The VPSP, a computer based speech synthesis system fits on a wheelchair. The purpose was to produce a device that provides communication assistance in educational, vocational, and social situations to speech impaired individuals. It is expected that the VPSP can be a valuable aid for persons who are also motor impaired, which explains the placement of the system on a wheelchair. E.A.K.

N82-19839# Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 5.
HUMAN FACTORS IN SYSTEM DEVELOPMENT: EXPERIENCES AND TRENDS
Bengt Bergstroem, ed., Hans Furustig, ed., and Jeanette Palm, ed. Jun. 1981 156 p refs Proceedings of Symp., Karlstad, Sweden, 24-25 Sep. 1980
(FOA-A-56003-H9) Avail: NTIS HC A08/MF A01

The role of human factors engineering and research in present and future systems development is evaluated. Limitations on the man machine systems design process are pointed out. Status and effectiveness of human factors engineering are assessed. Ergonomic considerations in product design and evaluation are highlighted. Human factors and safety in nuclear power plant operation are discussed.

N82-19840# Research Inst. of National Defence, Karlstad (Sweden).
HUMAN FACTORS AND THE REAL WORLD
Bengt Bergstroem *In its* Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 7-13 refs

Avail: NTIS HC A08/MF A01

The integration of human factors in systems design and development is considered. The role of the ergonomist as an integral member of the design team is depicted. Real world limitations which sometimes prevent optimal systems from being realized are pointed out. These can be technical and economical, or political and legal constraints on design engineers. Limitations may also arise from the planning process or from scientific uncertainty as to the solvability of a problem. Common systems language and systems design criteria improve communication between specialists on the human side and on the hardware side. The identification of systems related tasks and functions has a direct influence on human performance in systems operation and determines their efficiency. Author (ESA)

N82-19841# Navy Personnel Research and Development Center, San Diego, Calif.
HUMAN FACTORS IN SYSTEM DEVELOPMENT: STATUS AND EVALUATION
David Meister *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 15-76 refs
Avail: NTIS HC A08/MF A01

Human factors in system development as it is presently performed in the U.S. is described. What is achieved and remaining problems are discussed, indicating research requirements and how human factors research does or does not satisfy these requirements. The way in which the developmental human factors engineer performs and the kinds of information needed are determined by circumstances under which the work is done. These circumstances make demands for supporting human factors research which to a large extent are not now being satisfied. As a consequence, the developmental human factors engineer's ability to perform system development tasks is severely impaired. Author (ESA)

N82-19842# Aktiebolaget Ergonomilaboratoriet, Stockholm (Sweden).
ERGONOMIC CONSIDERATIONS IN PRODUCT DESIGN AND EVALUATION
Toni Ivergaard *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 77-95
Avail: NTIS HC A08/MF A01

The influence of free market competition, particularly advertising and marketing constraints, on product development is assessed. The need for an ecological approach is stressed while an ergonomic design procedure is outlined. The marketing of products which are offered to consumers, including industrial users, is in some respects good and fulfills useful functions for the consumers. Still, there are many products which are potentially dangerous, unhealthy, uncomfortable, wearing or difficult to use. Ergonomics in product evaluation can help identify these problems. In many countries, the authorities feel obliged to control development in different ways. The extent and direction of these controls depends on the companies themselves investing in ergonomics as part of product development. Author (ESA)

N82-19843# Ergonomaad A.B., Karlstad (Sweden).
HUMAN FACTORS AND SAFETY IN NUCLEAR POWER PLANT OPERATION
Jan Wirstad *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 97-122 refs
Avail: NTIS HC A08/MF A01

Taking the Three Mile Island accident as an example, the extent to which human factors engineering is accepted and implemented in nuclear power plant design and operation is discussed. Characteristics of process plant operator jobs are pointed out. The safety philosophy of a nuclear power plant is called into question. Human factors R and D in the U.S. and Europe are reviewed. The need to integrate human factors with plant planning, procurement and evaluation is evident.
Author (ESA)

N82-19844# Research Inst. of National Defence, Karlstad (Sweden).
WORK PARADIGMS IN HUMAN FACTORS RESEARCH
Hans Furustig *In its* Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 123-135 refs

Avail: NTIS HC A08/MF A01

Reasons for studying the systems development process from a behavioral standpoint are put forward. The complexity of factors influencing systems development is examined. Indications of irrational systems development are listed. The work paradigm is defined in terms of hardware factors, personnel factors, and procedures. Means of studying systems development are outlined, i.e., participation in systems development, historical documentation, and simulation. The results of such studies can be of significant assistance in optimizing the efficiency of the development process. Author (ESA)

N82-19845# Navy Personnel Research and Development Center, San Diego, Calif.
HUMAN FACTORS FOR THE FUTURE: TRENDS AND SPECULATIONS
David Meister *In* Research Inst. of National Defence Human Factors in System Develop.: Experiences and Trends Jun. 1981 p 137-155 refs
Avail: NTIS HC A08/MF A01

Two possible scenarios for human factors (HF) utilization in the next 20 years are projected. The worst case scenario is one of status quo; it suggests that no fundamental changes in HF research and practice will occur because of the continuing inability of the HF practitioner (the developmental human factors engineer) to apply research to systems development. The best case scenario assumes that the current gap between HF research and practice will be bridged and that consequently the developmental engineer's ability to analyze, evaluate and predict will be significantly increased. Author (ESA)

N82-19846# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Computer Science.
SAM: A CONFIGURABLE EXPERIMENTAL TEXT EDITOR FOR INVESTIGATING HUMAN FACTORS ISSUES IN TEXT PROCESSING AND UNDERSTANDING
Roger W. Ehrich Sep. 1981 38 p
(Contract N00014-81-K-0143)

(AD-A109331; CSIE-81-3) Avail: NTIS HC A03/MF A01 CSCL 09/2

There are numerous behavioral issues involving human-machine communications that are exemplified by text editing applications. Examples include scanning mechanisms and information location techniques, command language design, effect of language syntax on productivity and accuracy, and the relationship of syntax to the user task model. In general, there exist little data to support design goals, and in order to formulate studies of these issues, a flexible text editing system is required. This report describes SAM, a reasonably sophisticated text editor that has table driven command language and syntax that allows reasonably easy reconfiguration for special experiments. In particular, it is straightforward to insert the metering procedures required to measure specific aspects of human performance.

Author (GRA)

N82-19847# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

TRANSMISSION OF SINUSOIDALLY CHANGING VERTICAL SPECIFIC FORCE TO THE HEADS OF SEATED MEN MEASURED IN A FLIGHT SIMULATOR

R. A. A. Reutlinger and J. C. vanderVaart May 1981 34 p refs

(VTH-LR-319) Avail: NTIS HC A03/MF A01

Modulus and phase lag of the transmission of vertical specific force between a flight simulator moving base and the heads of 10 male seated subjects were measured over a frequency range of 0.1 to 9 Hz. Subjects were seated unrestrained in a normal relaxed position in a pilot seat with or without seat cushions. Although there is scatter among subjects, prominent peaks at around 1.5, 6, and 10 Hz are found for the case without seat cushions. The presence of seat cushions tends to cause a single larger peak in the modulus at around 4 to 5 Hz, and a larger phase lag at higher frequencies. A modulus close to unity and no phase lag are found both with and without seat cushions at frequencies below 1 Hz. It is difficult to read cockpit instruments in the frequency range 4 to 8 Hz.

Author (ESA)

N82-19848# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Instrumentierung und Anthropotechnik.

INTERACTIONS BETWEEN HELMET MOUNTED SIGHT DISPLAY AND SENSOR PLATFORM UNDER THE INFLUENCE OF A HUMAN PILOT

Erhard Danneberg, Ernst Kohnen, Helmut Stein, and Ulrich Stolzke Jun. 1981 182 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-746)

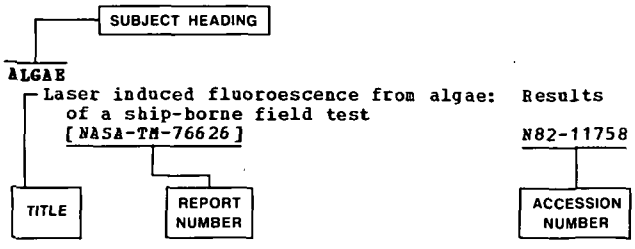
(DFVLR-FB-81-30) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 37.90

For low altitude flight of helicopters at night and with poor visibility, the interaction of a helmet mounted sight display (HMS/D), a moving sensor platform and a human pilot as system user was investigated by means of laboratory, moving simulator, and flight tests. The technical potential of the HMS/D in the laboratory, the tracking accuracy achieved by the pilot on the moving simulator, and the practical application under real flight conditions are considered. Considerable improvements are possible compared to head down displays if the layout of the instrument readings and their combination with an environmental picture are favorable.

Author (ESA)

SUBJECT INDEX

Typical Subject Index Listing



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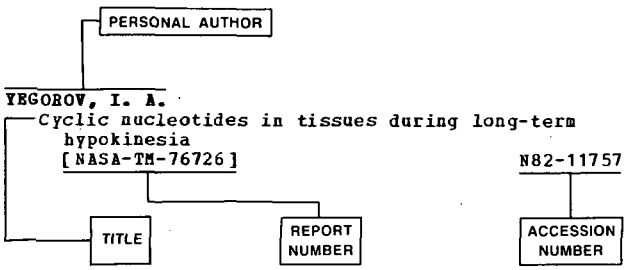

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1. Report No. NASA SP-7011(233)	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography (Supplement 233)		5. Report Date June 1982 6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, D.C. 20546		10. Work Unit No. 11. Contract or Grant No.
12. Sponsoring Agency Name and Address		13. Type of Report and Period Covered 14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This bibliography lists 387 reports, articles, and other documents introduced into the NASA scientific and technical information system in May 1982.

17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects	18. Distribution Statement Unclassified - Unlimited		
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 120	22. Price* $7.00 HC

*For sale by the National Technical Information Service, Springfield, Virginia 22161

NASA-Langley, 1982

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