NASA

Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011(247)
July 1983

25
25th Anniversary
1958-1983

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Pages 205-245

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NASA SP-7011(247)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 247)

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 June 1983 in

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

NASA Scientific and Technical Information Branch 1983
National Aeronautics and Space Administration
Washington, DC

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

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 269 reports, articles and other documents announced during June 1983 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 by *STAR* categories 51 through 55, the Life Sciences division. 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. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1983 Supplements.

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GENERAL AVAILABILITY

All publications abstracted in this bibliography are available to the public through the sources as indicated in the *STAR Entries* and *IAA Entries* sections. It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

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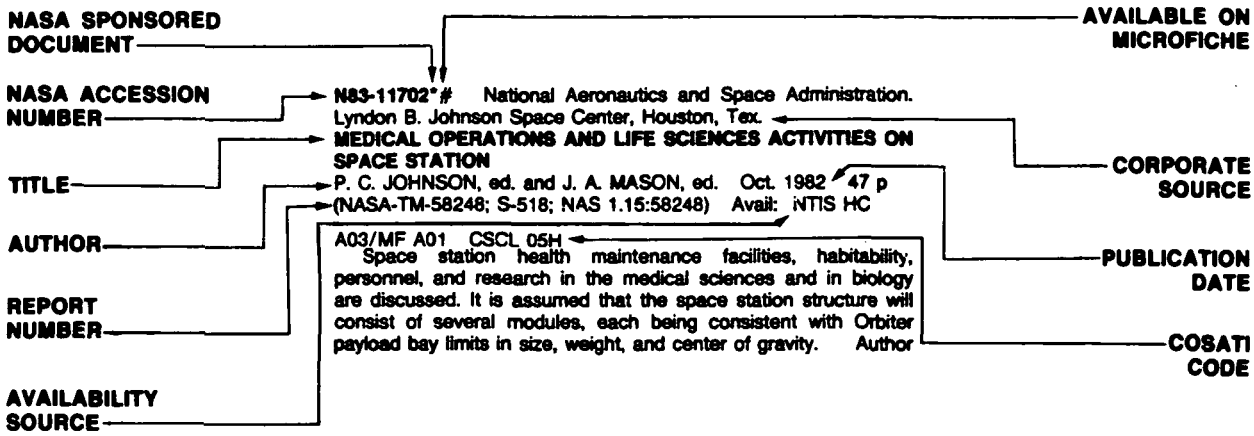

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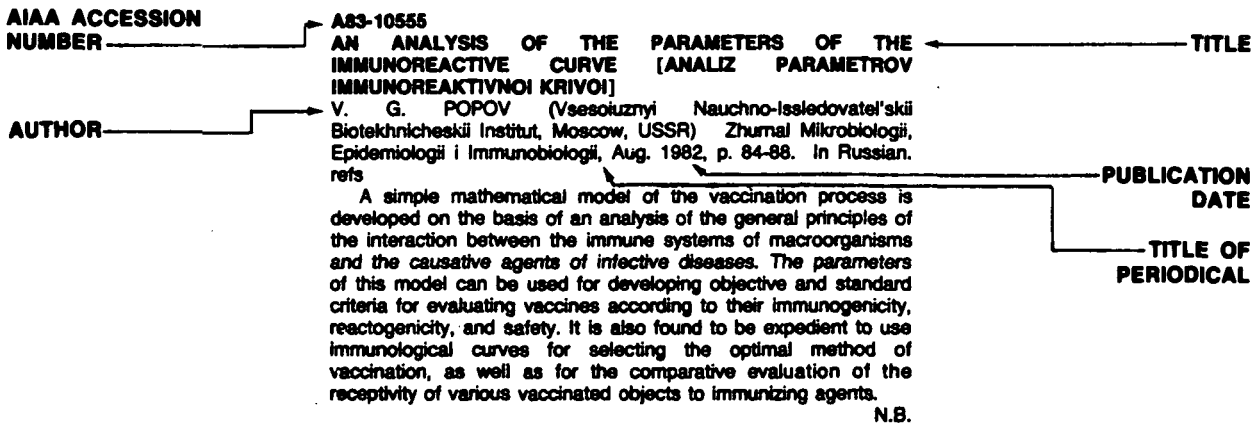

AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 247)

JULY 1983

51

LIFE SCIENCES (GENERAL)

Includes genetics.

A83-27520
THERMODYNAMIC PROPERTIES OF TISSUE IMPACTED BY CO2 LASER
C. S. LEE, R. DECK, R. MORRISS, and Y. J. SETO (Tulane University, New Orleans, LA) In: Lasers '81; Proceedings of the International Conference, New Orleans, LA, December 14-18, 1981. McLean, VA, STS Press, 1982, p. 166-171.

Theoretical and experimental investigations into the thermal aspects of CO2 laser interactions with tissue have been carried out. Sprague-Dawley rats are the animal model. Tissues excised from the inner abdominal walls of male rats are employed as the irradiation samples. Thermocouple probes inserted in the tissue are used to measure temperatures versus time during irradiation. Dimensions of the crater produced by an irradiation are measured. A theoretical model has been devised to calculate the dimensions of a developing crater and temperatures as functions of time in the sample. In these calculations a water model has been used for tissue. The agreement between experiment and calculations is considered to be good. (Author)

A83-27776
INTERNATIONAL UNION OF PHYSIOLOGICAL SCIENCES, ANNUAL MEETING, 4TH, SAN DIEGO, CA, OCTOBER 10-15, 1982, PROCEEDINGS
Physiologist, Supplement, vol. 25, Dec. 1982. 176 p.

The results of research are presented concerning various aspects of gravitational physiology, including the effects of reduced gravitational stimuli on circulation and fluid balance; the physiological effects of hypergravity; plant gravity receptors, structures, and biochemical transducers; the perception of gravitational stimuli in animals; the gravitational effects on plant development, morphogenesis, and growth; and the metabolic effects of hypogravity, hypokinesis, and exercise. Specific topics discussed include the effect of gravity on plant cells, circadian variations in tolerance to +Gz acceleration, changes in weightlessness in calcium metabolism and in the musculoskeletal system, hormonal changes in antiorthostatic rats, the enhancement of chronic acceleration tolerance by selection, and the role of auxin and protons in plant shoot gravitropism. Also examined are the reversal of early pattern formation in inverted amphibian eggs, the gravitropic basis of leaf blade nastic curvatures, the changes in osteoblastic activity due to simulated weightless conditions, the significance of motor unit studies for weightlessness hypokinesia, and the effects of age and sex on hormonal responses to weightlessness simulation. N.B.

A83-27777#
THE EFFECT OF GRAVITY ON PLANT CELLS
T.-H. IVERSEN (Trondheim, Universitetet, Trondheim, Norway) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-1 to S-4. refs

A discussion is presented of the effect of gravity on plant cells. The statolith theory is examined in which the primary action of gravity is explained by the sedimentation of movable cell organelles (statoliths) that enable the cell to perceive gravity. Other topics discussed include the site of gravitropic perception, the gravity-perceiving cells, and the mechanism of graviperception. Possible future research concerning the effects of gravity on plant cells using experiments in space is discussed. N.B.

A83-27778*# Pennsylvania Univ., Philadelphia.
THE FIRST PLANTS TO FLY ON SHUTTLE
A. H. BROWN and D. K. CHAPMAN (Pennsylvania, University, Philadelphia, PA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-5 to S-8. refs
(Contract NAS9-15340; NAS9-15531; NGR-39-030-010; 39-010-149)

The methods and results are presented concerning experiments using the first plants to make a journey for scientific purposes in earth orbit on board Space Shuttles 2 and 3. These experiments were conducted in order to validate the culture system planned for use in a Spacelab-1 experiment involving the growth and kinetics of sunflower seedlings. The experimental flight package is described and the preparation steps taken prior to the flights are discussed. The conditions to which the plants were exposed during the flights are examined in detail, focusing on the temperature profile and the gravitational forces during reentry to landing. N.B.

A83-27779#
THE EFFECT OF WEIGHTLESSNESS ON THE REPRODUCTIVE FUNCTION OF MAMMALS
L. V. SEROVA and L. A. DENISOVA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-9 to S-12. refs

A review is presented of research concerning the effect of weightlessness on the reproductive function of mammals. Attention is focused on the results of experiments with rats flown on board the Cosmos 1129 and 605 satellites. One experiment assessed the fertilization capacity of rats in weightlessness conditions. The results suggest that the stress effects of the early flight stage act to prevent gestation, possibly by inducing a disorder in the oestral cycles and fertilization. The findings of other experiments indicate that the level of dominant lethal mutations in mature spermatozoids as well as in stem cells of spermatogenesis in male rats exposed to zero-g for 1/50 of their life time was close to these parameters in the controls. However, the state of the offspring produced by the nonflown females fertilized by the flight males soon after recovery differed from that of the controls. The flight offspring showed transient manifestations of physiological immaturity, such

as delayed growth in the postnatal period, and delayed eye opening and hearing initiation. N.B.

A83-27780*# Virginia Univ., Charlottesville.
EFFECTS OF CHRONIC ACCELERATION ON BODY COMPOSITION
G. C. PITTS (Virginia, University, Charlottesville, VA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-13 to S-16. refs
(Contract NAS2-1554; NAS2-10195; NGR-47-005-213; NSG-225)

Studies of the centrifugation of adult rats showed an unexpected decrease in the mass of fat-free muscle and bone, in spite of the added load induced by centrifugation. It is suggested that the lower but constant fat-free body mass was probably regulated during centrifugation. Rats placed in weightless conditions for 18.5 days gave indirect but strong evidence that the muscle had increased in mass. Other changes in the rats placed in weightless conditions included a smaller fraction of skeletal mineral, a smaller fraction of water in the total fat-free body, and a net shift of fluid from skin to viscera. Adult rats centrifuged throughout the post-weaning growth period exhibited smaller masses of bone and central nervous system (probably attributable to slower growth of the total body), and a larger mass of skin than controls at 1 G. Efforts at simulating the effects of weightlessness or centrifugation on the body composition of rats by regimens at terrestrial gravity were inconclusive. N.B.

A83-27781#
ADH RESPONSES TO VOLUME SHIFTS IN THE LOW PRESSURE SYSTEM
J. P. MEEHAN and J. P. HENRY (Southern California, University, Los Angeles, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-17 to S-20. refs

A review is presented of research concerning the responses of the antidiuretic hormone (ADH) to volume shifts in the low pressure system. It is shown that ADH responses to blood volume shifts in the low pressure system depend on the state of hydration of the subject and the interaction between the osmoreceptors and the vascular receptors of the low and the high pressure systems. Vascular fluid becomes hyposmotic in the hydrated subject as a result of water immersion. The release of ADH is inhibited by the osmoreceptors. In hydropenia, immersion does not produce a hyposmotic plasma, while ADH is inhibited through the action of the low pressure system receptors. In addition, a further interaction takes place between the high and low pressure system receptors, in which the high pressure receptors exert a greater influence on ADH release in hypotension. Vascular receptors adapt, as in the case of atrial receptors, and buffer acute changes rather than functioning as absolute regulators. N.B.

A83-27785#
STATIC AND DYNAMIC MECHANISMS OF SPACE VESTIBULAR MALAISE
R. J. VON BAUMGARTEN, J. WETZIG, H. VOGEL, and J. R. KASS (Mainz, Universitaet, Mainz, West Germany) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-33 to S-36. refs

Experiments are conducted in order to determine the static and dynamic mechanisms of space sickness. The experiences of humans during spaceflight have shown that space sickness can be provoked or increased by dynamic stimuli, such as head movements or locomotion. However, susceptible persons also experienced spacesickness in the weightless state without such provocative stimuli. Experiments using unilaterally destated goldfish show that these fish, although well-compensated on the ground, exhibit signs of vestibular asymmetry when flown in parabolic flight. The results demonstrate that compensated otolith weight differences alone cannot explain vestibular asymmetries in space. It is found that in weightlessness the general gain of the otolith system is raised by the same factor on both sides. When the otolith system is partially deficient on one side, then any proportional augmentation of the gain would lead only to increased asymmetry. These results indicate that crew members who were susceptible to static spacesickness might have a latent well-compensated asymmetry of their otolith system. N.B.

A83-27786#
THE ASSOCIATION BETWEEN CANCELLOUS ARCHITECTURE AND LOADING IN BONE - AN OPTICAL DATA ANALYTIC VIEW
C. E. OXNARD (Southern California, University, Los Angeles, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-37 to S-40. Research supported by the University of Southern California refs
(Contract NSF DEB-24366; NIH-AM-16805)

A review is presented of research concerning the relationship between the cancellous architecture of bone and the stresses that bones bear during function which utilize optical data analysis of the architectural patterns in sections, tomograms, and radiographs of bones. It is shown that details of the cancellous network in sections and radiographs of vertebrae can be analyzed so as to reveal further information about the many bony elements, both their size and direction, in a manner not readily obtained using conventional techniques. These results suggest that there is not a one-to-one relationship between the orthogonal network of principal stresses in a bone under load, as well as between the orthogonal network of bony trabeculae. The implications of these findings for the biomechanics of various animals are discussed. N.B.

A83-27787#
CHANGES IN WEIGHTLESSNESS IN CALCIUM METABOLISM AND IN THE MUSCULOSKELETAL SYSTEM
G. D. WHEDON (National Institutes of Health, Bethesda, MD; Kroc Foundation, Santa Ynez, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-41 to S-44. refs

A review is presented of research concerning the disorders of calcium metabolism which occur in humans and animals during conditions of weightlessness. Topics examined include the Skylab studies of calcium metabolism, the Skylab observations of muscle metabolism, the Soviet Cosmos studies, and the significance of calcium and nitrogen losses. These studies and observations of the effects of weightlessness on man and animals have indicated an impairment of musculoskeletal function and derangement in calcium and nitrogen metabolism which might be hazardous on flights of approximately 9-12 months or more. In addition, studies on humans using bed rest as an analog to simulate the effects of weightlessness have not been able to develop a fully or even a largely protective countermeasure. N.B.

A83-27788#
CALCIUM-PHOSPHOROUS METABOLISM AND PREVENTION OF ITS DISORDERS IN HYPOKINETIC RATS
A. S. USHAKOV, V. B. SPIRICHEV, M. S. BELAKOVSKII, I. N. SERGEEV, and IU. I. KONDRATEV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-45 to S-48. refs

Results of experiments are presented concerning the effect of weightlessness on the calcium and phosphorous metabolism of rats flown onboard Cosmos biosatellites. Results show that the rats exhibited delayed growth of skeletal bones and their mineralization, as well as decreased strength and increased sensitivity to loads, caused by variations in calcium balance after 18.5-22.5 days in space. An increase in calcium excretion was also found. The role of vitamin D in controlling calcium and

phosphorous metabolism during conditions of weightlessness was also studied. Results of these studies show that metabolites of 25-hydroxycholecalciferol are required to maintain calcium homeostasis and to regulate bone status in hypokinetic rats. Other results indicate a strong inhibition of bone formation during hypokinesia. The results of drug testing using two precursors of vitamin D indicate that these compounds in physiological doses may prevent changes in the calcium and phosphorous metabolism during hypokinesia, indicating their involvement in the regulation of vitamin D metabolism. It is concluded that these findings indicate the usefulness of employing several active metabolites of vitamin D3 in order to prevent changes in calcium and phosphorous metabolism during weightlessness and hypokinetic states. N.B.

A83-27790*# National Aeronautics and Space Administration, Washington, D. C.
THE NASA SPACE BIOLOGY PROGRAM
T. W. HALSTEAD (NASA, Office of Space Science and Applications, Washington, DC) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-53 to S-56.

A discussion is presented of the research conducted under the auspices of the NASA Space Biology Program. The objectives of this Program include the determination of how gravity affects and how it has shaped life on earth, the use of gravity as a tool to investigate relevant biological questions, and obtaining an understanding of how near-weightlessness affects both plants and animals in order to enhance the capability to use and explore space. Several areas of current developmental research are discussed and the future focus of the Program is considered. N.B.

A83-27791*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STATUS OF JOINT US/USSR EXPERIMENTS PLANNED FOR THE COSMOS '83 BIOSATELLITE MISSION
K. A. SOUZA (NASA, Ames Research Center, Biomedical Research Div., Mountain View, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-57 to S-60.

The plans and status of the fourth joint US/USSR biosatellite experiment, scheduled to be conducted in the last half of 1983, are discussed. These experiments will be conducted on board an unmanned Soviet spacecraft and will involve two restrained Rhesus monkeys and 10 pregnant rats, as well as a variety of small plant and radiation biology experiments. Three of the joint studies will use the monkeys for studies of biorhythms, calcium homeostasis, and the cardiovascular system. The fourth experiment will study rodent embryogenesis and neonatal behavior and development following in utero exposure to spaceflight. Specialized sensors and battery powered hardware have been designed, fabricated, and qualified for flight. N.B.

A83-27795#
ALTERATIONS IN GLOMERULAR AND TUBULAR DYNAMICS DURING SIMULATED WEIGHTLESSNESS
B. J. TUCKER, A. R. HARGENS, O. W. PETERSON, and R. C. BLANTZ (California, University; U.S. Veterans Administration, Medical Center, San Diego, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-67, S-68. refs

There are few studies pertaining to the functional adaptation of the kidney to fluid and electrolyte shifts induced by prolonged weightlessness. The present study examines the effects of 7 day 20-25 deg head-down tilt to simulate weightlessness on the dynamics of glomerular ultrafiltration and reabsorption. The head-down tilt method was utilized in 6 Munich-Wistar rats and the 25 deg head-down tilt was maintained during measurements of glomerular dynamics and proximal tubule reabsorption. The results demonstrate a significant reduction in nephron filtration rate during head-down tilt. The reduction in nephron filtration was due to an increase in efferent arteriolar resistance which decreased nephron plasma flow. Despite the reduction in nephron filtration, absolute proximal fluid reabsorption remained constant, resulting in a significant reduction in the delivery of sodium and water to distal portions of the nephron. (Author)

A83-27799#
HORMONAL AND RENAL RESPONSES TO PLASMA VOLUME EXPANSION AFTER HORIZONTAL RESTRAINT IN THE RHESUS MONKEY
D. T. DICKEY, G. E. BILLMAN, M. J. KEYL, D. A. KEM, L. C. KEIL, H. SANDLER, and H. L. STONE (Oklahoma, University, Oklahoma City, OK) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-75, S-76. refs

It has been determined that horizontal restraint in rhesus monkeys results in a decrease in plasma volume, while arterial pressure is unchanged, as well as in orthostatic intolerance and a reduced resistance to +Gz stress (Dickey et al., 1982). A study was conducted in which rhesus monkeys were subjected to a 25% blood volume expansion (BVE) after 7 and 14 days of horizontal restraint in order to discover any changes in the renal and hormonal responses that may have contributed to the changes found with horizontal restraint. Results show that changes in the response of the renal system to BVE alone could not account for the conditions associated with horizontal restraint. However, it was found that the increase in control plasma antidiuretic hormone and aldosterone can increase in response to a decrease in arterial pressure or a decreased blood volume. N.B.

A83-27800*# Emory Univ., Atlanta, Ga.
HORMONAL CHANGES IN ANTIORTHOSTATIC RATS
V. POPOVIC, P. POPOVIC, and C. HONEYCUTT (Emory University, Atlanta, GA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-77, S-78. refs
(Contract NAG2-87)

Hypokinesia, especially hypokinesia with negative tilt ('antiorthostatic hypokinesia'), mimics some of the effects of weightlessness. It is shown that cardiac output is increased during early exposure of rats to antiorthostatic hypokinesia. The increase of the stroke volume and of the cardiac output observed in the antiorthostatic hypokinetic rats is probably the consequence of a blood volume shift toward the chest brought forth by head-down positioning of the animals. It is also possible that struggling of the animals to escape from the harness and an increased metabolism contribute to the elevation of cardiac output. In order to study this hypothesis 'stress hormones' were measured in the antiorthostatic rats. Plasma levels of ACTH, corticosterone and prolactin were measured in the arterial blood (0.3 ml) sampled before, during and after hypokinesia from chronic aortic cannulas of the rats. (Author)

A83-27801*# Northrop Services, Inc., Houston, Tex.
FLUID SHIFTS AND ERYTHROPOIESIS - RELEVANCE TO THE 'ANEMIA' OF SPACE FLIGHT
C. D. R. DUNN (Northrop Services, Inc.; Baylor University, Houston, TX), P. C. JOHNSON, and C. S: LEACH (NASA, Johnson Space Center, Houston, TX) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-79, S-80. refs
(Contract NAS9-16180; NAS9-16154; NAS9-15425; NAGW-308)

To model the fluid shifts thought to occur in man during space flight, cephalic fluid shifts have been induced in man subjected to horizontal or headdown bedrest, in squirrel monkeys exposed to lower body positive pressure, and in rats subjected to antiorthostatic hypokinesia. The influence on erythropoiesis of such fluid redistribution has been studied. Only in man did a cephalic fluid shift consistently and significantly lead to a plasma volume reduction and an increased hematocrit. Although there was evidence for erythrosuppression and the subjects were 'anemic' at the end of the study, serum erythropoietin titers remained normal throughout bedrest. The erythrosuppression probably did not arise

due to the increased hematocrit but may have been related to P50 shifts or the loss of body weight. Each model appeared to reproduce different parts of man's physiological response to weightlessness and promises to be useful in unraveling the etiology of the 'anemia' of space flight. (Author)

A83-27803*# California Univ., Berkeley.
ESTIMATION OF SKELETAL MUSCLE MASS FROM BODY CREATINE CONTENT
N. PACE and D. F. RAHLMANN (California, University, Berkeley, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-83, S-84. refs
(Contract NSG-7336)

Procedures have been developed for studying the effect of changes in gravitational loading on skeletal muscle mass through measurements of the body creatine content. These procedures were developed for studies of gravitational scale effects in a four-species model, comprising the hamster, rat, guinea pig, and rabbit, which provides a sufficient range of body size for assessment of allometric parameters. Since intracellular muscle creatine concentration varies among species, and with age within a given species, the concentration values for metabolically mature individuals of these four species were established. The creatine content of the carcass, skin, viscera, smooth muscle, and skeletal muscle was determined for each species. In addition, the skeletal muscle mass of the major body components was determined, as well as the total and fat-free masses of the body and carcass, and the percent skeletal muscle in each. It is concluded that these procedures are particularly useful for studying the effect of gravitational loading on the skeletal muscle content of the animal carcass, which is the principal weight-bearing organ of the body. N.B.

A83-27804*# California Univ., Davis.
ENHANCEMENT OF CHRONIC ACCELERATION TOLERANCE BY SELECTION
A. H. SMITH (California, University, Davis, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-85, S-86. Navy and NASA-supported research. refs

A review is presented of experiments concerning the physiological consequences of chronic acceleration and of studies of selection for acceleration tolerance over many generations. It is shown that acceleration selection is effective in improving chronic acceleration tolerance. However, it is determined that the variable selection procedure employed in developing this acceleration-tolerant line limits the confidence in the quantitative evaluation of the procedure. N.B.

A83-27805*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INCREASED GLUCONEOGENESIS IN HYPER-G STRESSED RATS
B. C. DALIGCON and J. OYAMA (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-87, S-88. refs

The role of gluconeogenesis in the altered carbohydrate metabolism in rats exposed to hyper-G stress is investigated. The blood levels of the substrates and hormones involved in gluconeogenesis were determined in rats exposed to 3.1 G for various time periods (0.25 to 24 hr). It is found that hyper-G stressed rats showed an immediate increase in plasma glucose at the onset of centrifugation which persisted throughout all the exposure periods. A substantial part of the initial rise in blood glucose is attributed to an increased rate of gluconeogenesis. An increase in liver glycogen deposition was observed in centrifuged rats as early as 0.50 hr exposure time, with progressively larger amounts accumulated as the exposure time was extended to 24 hr. It is concluded that the increase in gluconeogenic activity of hyper-G stressed rats is due to an increase in the mobilization of gluconeogenic substrates from perpheral tissues to the liver as a result of increases in circulating catecholamines and glucagon. N.B.

A83-27806*# California Univ., Davis.
RESTRAINT HYPOTHERMIA IN COLD-EXPOSED RATS AT 3 G AND 1 G
C. B. MONSON, J. M. HOROWITZ, and B. A. HORWITZ (California, University, Davis, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-89, S-90. refs
(Contract NSG-2234)

The relationship between heat loss, heat production, and hypothermia was investigated in experiments with rats which determined if hypergravity affects heat production by altering oxygen consumption and if restraint modifies the ability of the rats to activate thermogenic mechanisms after cold exposure in a hypergravic field. Restrained and unrestrained rats were exposed for 1 hr periods to 1 G and 3 G at ambient temperatures of 24 C or 10 C, and the rate of oxygen consumption, the core temperatures, and the tail temperatures were measured. Results show that thermoregulatory mechanisms are impaired when rats are exposed to 3 G fields, and at 24 C as well as at 10 C this impairment leads to an inappropriate increase in heat loss. N.B.

A83-27807*# California Univ., Riverside.
SHORT HYPERDYNAMIC PROFILES INFLUENCE PRIMATE TEMPERATURE REGULATION
C. A. FULLER (California, University, Riverside, CA) and B. A. WILLIAMS (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-91, S-92. refs
(Contract NAS2-2-10536; NSF BNS-79-2441; NAGW-309; PHS-BRD-RR-09070 ; PHS-BRS-RR-05816)

Primates have been shown to be sensitive to hyperdynamic fields. That is, when exposed to + 2Gz, body temperature falls. The purpose of this study was to examine the relative sensitivity of these animals to short centrifugation profiles which mimic the gravitational envelope seen on the Space Shuttle during launch (8 minutes, 2.9 Gz max) and re-entry (19 min, 1.7 Gz max). Four loosely restrained squirrel monkeys, isolated from additional external stimuli, were exposed to these profiles. During launch simulation, the temperatures never fell markedly below control levels. However, subsequent to return to 1G, the recovery phase showed decreases in body temperature in all four animals averaging 0.4 C over the next 10 to 15 minutes. The two animals exposed to the reentry profile showed decreases in body temperature within five minutes of the onset of centrifugation. Maximum fall in body temperature was reached by the end of the centrifugation phase and averaged 0.7 C. Thus, the temperature regulation system of this primate is sensitive to short hyperdynamic field exposures. (Author)

A83-27808*# Nebraska Univ., Lincoln.
ALTERED AUDITORY FUNCTION IN RATS EXPOSED TO HYPERGRAVIC FIELDS
T. A. JONES, L. HOFFMAN, and J. M. HOROWITZ (Nebraska, University, Medical Center, Lincoln, NE; California, University, Davis, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-93, S-94. refs
(Contract NSG-2234; NAGW-70)

The effect of an orthodynamic hypergravic field of 6 G on the brainstem auditory projections was studied in rats. The brain temperature and EEG activity were recorded in the rats during 6 G orthodynamic acceleration and auditory brainstem responses were used to monitor auditory function. Results show that all animals exhibited auditory brainstem responses which indicated impaired conduction and transmission of brainstem auditory signals during the exposure to the 6 G acceleration field. Significant increases in central conduction time were observed for peaks 3N, 4P, 4N, and 5P (N = negative, P = positive), while the absolute

latency values for these same peaks were also significantly increased. It is concluded that these results, along with those for fields below 4 G (Jones and Horowitz, 1981), indicate that impaired function proceeds in a rostro-caudal progression as field strength is increased. N.B.

A83-27809#
INFLUENCE OF ABDOMINAL RESTRICTION ON GAS EXCHANGE DURING +GZ STRESS IN DOGS
H. I. MODELL (Virginia Mason Research Center, Seattle, WA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-95, S-96.
(Contract F49620-78-C-0058; F49620-81-C-0055)

The time course of gas exchange detriment resulting from +Gz stress and the influence of G-suit abdominal bladder inflation on that detriment were experimentally investigated. Arterial and mixed venous blood was sampled from dogs exposed to +3.4 and 5 GHz with an onset rate of 0.1 G/sec. Exposures were made with and without G-suit abdominal bladder inflation. Arterial oxygen and carbon dioxide pressure as a function of time were determined. The blood gas data are consistent with progressive atelectasis during +Gz exposure with G-suit inflation, but it is concluded that airway collapse is a more likely explanation since the observed gas exchange detriment was easily removed by rapid reinflation of the lungs. C.D.

A83-27810*# Cornell Univ., Ithaca, N. Y.
CHARACTERISTICS OF STATOLITHS FROM ROOTCAPS AND COLEOPTILES
F. D. SACK and A. C. LEOPOLD (Cornell University, Ithaca, NY) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-97, S-98. refs
(Contract NAGW-3)

Amyloplasts with intact envelopes were isolated from corn coleoptiles, incubated with either cationized ferritin (CF) or fluorescein isothiocyanate (FITC)-CF, and examined with epifluorescence optics. Before incubation, the mean zeta potential was found to be -19.4 mv. The net negative surface charge was confirmed ultrastructurally by the binding of CF to both amyloplasts and starch grains. Binding to the latter was reduced compared to the former. FITC-CF showed binding to some but not all amyloplasts, and was absent from individual starch granules. Membrane-bound calcium, indicated by chlorotetracycline, fluorescence, was detected throughout the cytoplasm of root cap cells. These results may reflect an affinity of CF for membrane-based charge, and suggest that a calcium shell exists on the amyloplast envelope. C.D.

A83-27811#
THE MODE OF GRAVITY SENSING IN PLANT CELLS
G. PERBAL (Paris VI, Universite, Paris, France) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-99, S-100. refs

The role and the mode of action of gravity sensing cells were investigated in the Asparagus officinalis epicotyl and in the Lens culinaris root. In epicotyls, it has been shown that the ability of perceiving gravity is not only linked to the presence of statoliths, but also depends on the state of differentiation of the statocytes. In roots, the pressure of statoliths on the more viscous parietal cytoplasm could be responsible for the transmission of the geotropic stimulus (Author)

A83-27812*# Michigan Univ., Ann Arbor.
LINKAGE BETWEEN GRAVITY PERCEPTION AND RESPONSE IN THE GRASS LEAF-SHEATH PULVINUS
P. DAYANANDAN, C. I. FRANKLIN, and P. B. KAUFMAN (Michigan, University, Ann Arbor, MI) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-101, S-102.
(Contract NAGW-34)

Cellulose synthesis inhibitors 2,6-dichlorobenzonitrile and coumarin inhibit the normal gravitropic response of the leaf-sheath pulvini in several grasses. These inhibitors induce thickenings that are mostly distributed in the radial walls. Their distribution patterns follow a previously published equation that describes the geometry of asymmetric growth in the leaf-sheath pulvinus. It is proposed that radial transport of growth promotors may account for the observed asymmetric growth rather than the classical concept of lateral downward transport in an horizontally placed shoot. Electron microscopic observation of an interaction between the tonoplast membrane and statoliths suggests that such an interaction might be a basis for gravity perception in grass leaf-sheath pulvini. (Author)

A83-27813*# San Diego State Univ., Calif.
ROLE OF AUXIN AND PROTONS IN PLANT SHOOT GRAVITROPISM
D. L. RAYLE, F. MIGLIACCIO, and E. WATSON (San Diego State University, San Diego, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-103, S-104. refs
(Contract NAGW-230)

Experiments designed to probe the relationship between asymmetric acid efflux and auxin redistribution during gravitropism are reported. Gravistimulation of sunflower hypocotyls results in the retardation of growth on the upper surface and the acceleration of growth on the lower surface relative to a vertically oriented control. Auxin and H(+) both elicit growth over a similarly broad region of the hypocotyl. The correspondence between auxin, H(+), and gravisensitive tissues is consistent with the notion that auxin redistribution may initiate asymmetric acid efflux during gravistimulation. Data are presented showing a redistribution of C-14-IAA and H-3-IAA occurs within 20-30 minutes of gravistimulation. Data on the effects of selected inhibitors of shoot gravitropism are also presented. Taken together, the data suggest that lateral transport of auxin initiates asymmetric acid efflux in gravitropically stimulated shoots. C.D.

A83-27814*# California Univ., Berkeley.
PROTEIN SYNTHESIS IN GEOSTIMULATED ROOT CAPS
L. J. FELDMAN (California, University, Berkeley, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-105, S-106. refs
(Contract NAGW-234)

A study is presented of the processes occurring in the root cap of corn which are requisite for the formation of root cap inhibitor and which can be triggered or modulated by both light and gravity. The results of this study indicate the importance of protein synthesis for light-induced gravitropic bending in roots. Root caps in which protein synthesis is prevented are unable to induce downward bending. This suggests that light acts by stimulating proteins which are necessary for the translation of the gravitropic stimulus into a growth response (downward bending). The turnover of protein with time was also examined in order to determine whether light acts by stimulating the synthesis of unique proteins required for downward growth. It is found that auxin in combination with light allows for the translation of the gravitropic stimulus into a growth response at least in part through the modification of protein synthesis. It is concluded that unique proteins are stimulated by light and are involved in promoting the downward growth in roots which are responding to gravity. N.B.

A83-27815*# Texas Univ., Austin.
QUANTITATION OF CHLORPROMAZINE-BOUND CALMODULIN DURING CHLORPROMAZINE INHIBITION OF GRAVITROPISM
S. J. ROUX and R. L. BIRO (Texas, University, Austin, TX) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-107, S-108. refs
(Contract NSG-7480)

The regulatory protein, calmodulin (CaM), controls the activity of a plasma membrane localized ATPase in plants which serves to pump calcium out of cells. Recent data are consistent with the hypothesis that activation of this pump is one of the early steps necessary for gravitropism. Chlorpromazine (CPZ), a CaM antagonist, reversibly inhibits gravitropism in oat coleoptiles at concentrations which permit normal growth rates. C-14-labeled CPZ was used to photo-affinity label endogenous CaM in vivo to learn whether the drug is actually binding to some portion of endogenous CaM when it inhibits gravitropism. Under conditions in which CPZ inhibits gravitropism for over an hour, at least 11% of the CaM in gravitropically stimulated coleoptiles is bound to CPZ. In a given CPZ experiment the degree of inhibition of gravitropism correlates well with the amount of CaM bound to CPZ. (Author)

A83-27816#
A REEVALUATION OF THE ROLE OF ABSCISIC ACID IN ROOT GRAVITROPISM
M. L. EVANS and T. J. MULKEY (Ohio State University, Columbus, OH) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-109, S-110.

According to the root cap inhibitor theory of gravitropism, the downward curvature of roots in response to gravity is due to accumulation of a growth inhibitor on the lower side of horizontally placed roots. The inhibitor is thought to be produced in the root cap which is also the site of gravity detection. Since abscisic acid (AbA) has been suggested to be the root cap inhibitor, or at least a major component of the inhibitor, the effects of AbA on root growth were examined. Although it was found that high concentrations of AbA do inhibit root growth in long term experiments, it was noted that the initial effect of AbA over a wide concentration range is to promote root growth. This transient promotion lasts up to ten hours which is well beyond the time required for roots to complete gravitropism. In experiments involving asymmetric application of AbA to horizontally placed roots, it was found that AbA applied to the top of the root accelerates gravitropism while AbA applied to the bottom retards gravitropism. The results are inconsistent with the theory that AbA acts as a growth inhibitor in establishing the asymmetric growth causing root gravitropism. (Author)

A83-27817*# Utah State Univ., Logan.
THE MECHANICS OF GRAVITROPIC BENDING IN LEAFY DICOT STEMS
F. B. SALISBURY, W. J. MUELLER, P. T. BLOTTER, C. S. HARRIS, R. G. WHITE, L. S. GILLESPIE, and J. E. SLIWINSKI (Utah State University of Agriculture and Applied Science, Logan, UT) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-111, S-112.
(Contract NSG-7567)

The mechanism of the gravitropic bending in stems of the cocklebur and castor bean are investigated. The results of these experiments demonstrate the quick stopping of growth and the increased tensions on the upper layer of a horizontal stem. It is suggested that bending apparently occurs as the resistance of the upper surface layers is extended to the inner cells below. A model of stem bending is developed which can explain the asymmetry of the stem-cell response. N.B.

A83-27818#
STRIATED ORGANELLES IN HAIR CELLS OF RAT INNER EAR MACULAS - DESCRIPTION AND IMPLICATION FOR TRANSDUCTION
M. D. ROSS (Michigan, University, Ann Arbor, MI) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-113, S-114. refs

Use of unusual fixation procedures resulted in display of the several striated organelles that are present in hair cells of the inner ear. In the vestibular system these include the striated rootlets of the kinocilia, the striated cuticular plate and its attachments to the cell membrane at the zonula adherens, and a striated neck organelle (SNAP) that is present only in Type I hair cells. The possible roles of these organelles in vestibular hair cell transduction are considered here. It is suggested that the kinociliary apparatus serves as a pacemaker for hair cell activity, and that the cuticular plate functions in part to coordinate kinociliary and stereociliary interactions. The plate also could transmit signals from the apical to the lateral cell membrane and, if contractile, could amplify small signals and produce graded hair cell responses. SNAP is situated at the plasma membrane under the upper end of the calyx nerve ending where it could modulate hair cell electric conductance. (Author)

A83-27819*# Case Western Reserve Univ., Cleveland, Ohio.
TIMING OF NEURON DEVELOPMENT IN THE RODENT VESTIBULAR SYSTEM
J. R. KEEFE (Case Western Reserve University, Cleveland, OH) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-115, S-116. refs
(Contract NAGW-83)

The timing of cell generation (onset and duration) in the developing rat vestibular and proprioceptive systems is investigated. The results clearly indicate a defined time-span for generation of all neurons in the central nervous system nuclei studied. This cytogenetic period in both vestibular and proprioceptive sensory nuclei is determined to occur during and immediately after placentation, a potentially critical period for spaceflight exposure due to alterations in maternal physiology. N.B.

A83-27821#
REVERSAL OF EARLY PATTERN FORMATION IN INVERTED AMPHIBIAN EGGS
A. W. NEFF and G. M. MALACINSKI (Indiana University, Bloomington, IN) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist Supplement, vol. 25, Dec. 1982, p. S-119, S-120.

The effect of immobilizing Xenopus laevis eggs shortly after fertilization under conditions which prevented the rotation response of the eggs was investigated. The rotation response is the rotation of the egg so that the animal hemisphere opposes gravity and the vegetal hemisphere faces gravity. Results show that early pattern formation in Xenopus laevis does not require the egg rotation response for normal development. In addition, these experiments produced inverted amphibian eggs that were able to establish bilateral symmetry and develop through organogenesis. It is also found that some cell components and developmental events responded to gravity in several ways. These responses include the shifting of the vegetal yolk mass with gravity and the shifting of the clevage furrow formation against gravity, while the egg cortex and cortical pigment did not respond to gravity orientation. N.B.

A83-27822*# Temple Univ., Philadelphia, Pa.
GRAVITO-INERTIAL SENSITIVITY OF THE SPIDER - ARANEUS SERICATUS
A. FINCK (Temple University, Philadelphia, PA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-121, S-122. refs
(Contract NAGW-242)

The gravito-inertial transfer function of the orb-weaving spider was evaluated by changes in the cardiac reflex. A non-intrusive method, using a laser system recorded the cardiac pulse. Between 1.001 and 1.5 Gz the data are 'best-fit' by a log function (r-squared 0.92). The response of the neurogenic heart is seen to be a good dependent variable for invetebrate research. The arachnid lyriform organ has those qualities which complement the obtained gravity function. It is hypothesized that the cardiac pump maintains the spiders equilibrium in the gravito-inertial field. (Author)

A83-27823*# Pennsylvania Univ., Philadelphia.
GRAVITY RECEPTORS IN A MICROCRUSTACEAN WATER FLEA - SENSITIVITY OF ANTENNAL-SOCKET SETAE IN DAPHNIA MAGNA
D. G. MEYERS (Pennsylvania, University; University City Science Center, Philadelphia, PA) and J. M. FARMER (North Carolina, University, Chapel Hill, NC) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-123, S-124. refs
(Contract NAGW-70)

Gravity receptors of Dephnia magna were discovered on the basal segment of the swimming antennae and were shown to respond to upward water currents that pass the animal as it sinks between swimming strokes. Sensitivity of the gravity perceiving mechanism was tested by subjecting daphnids to a series of five decreasingly dense aqueous solutions (neutral density to water) in darkness (to avoid visual cues). Three-dimensional, video analysis of body position (pitch, yaw and roll) and swimming path (hop and sink, vertical and horizontal patterns) revealed a gradual threshold that occurred near a density difference between the animal and its environment of less than 0.25%. Because daphnids do not sink but continue to slide after stroking in the increased density solutions, gravity perception appears to occur during a vertical swing of the longitudinal body axis to the vertical plane, about their center of gravity, and, thereby, implies a multidirectional sensitivity for the antennal-socket setae. (Author)

A83-27824*# State Univ. of New York, Stony Brook.
SOME KARYOLOGICAL OBSERVATIONS ON PLANTS GROWN IN SPACE
A. D. KRIKORIAN and S. A. OCONNOR (New York, State University, Stony Brook, NY) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-125, S-126. refs
(Contract NSG-7270)

Experiments were conducted to assess whether cell division in a plant root would be affected by prolonged exposure to microgravity. Root materials from sunflower, oat, and mung bean plants grown on STS-2 and STS-3 were utilized for the experiments. It is found that all oat, sunflower, and mung seedlings showed a reduced number of cells in division as they went through their first cell division cycle on earth when compared to their ground controls. A significant number of oat, mung, and sunflower plantlets exhibited random root orientation and the lack of strictly orthotropic growth of their shoot systems in the flight samples. In addition, it is found that the mung roots were apparently least affected in terms of their cytology despite the fact that their roots were often randomly oriented. N.B.

A83-27825*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EFFECT OF CULTURAL CONDITIONS ON THE SEED-TO-SEED GROWTH OF ARABIDOPSIS AND CARDAMINE - A STUDY OF GROWTH RATES AND REPRODUCTIVE DEVELOPMENT AS AFFECTED BY TEST TUBE SEALS
T. HOSHIZAKI (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-127, S-128. refs
(Contract NAS7-918)

The effects of test tube seals on the growth, flowering, and seed pod formation of Arabidopsis thaliana (L.) Heynh., mouse ear cress, and Cardamine oligosperma Nutt, bitter cress, are studied in order to assess the conditions used in weightlessness experiments. Among other results, it is found that the growth (height) and flowering (date of bud appearance) were suppressed in mouse ear cress in tubes sealed with Saran. Seed pod formation which occurred by day 45 in open-to-air controls, was still lacking in the sealed plants even up to day 124. The growth and flowering of bitter cress were also suppressed by the Saran seal, although up to day 55 the Saran-sealed plants were taller. It is suggested that atmospheric composition was the cause of the suppression of growth, flowering, and seed pod development in these plants, since the mouse ear cress renewed their growth and then set seed pods after the Saran seal was ruptured. N.B.

A83-27826#
LIGNIFICATION IN YOUNG PLANTS EXPOSED TO THE NEAR-ZERO GRAVITY OF SPACE FLIGHT
J. R. COWLES, H. W. SCHELD, C. PETERSON, and R. LEMAY (Houston, University, Houston, TX) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-129, S-130.

Pre-germinated pine seedlings and oat and mung bean seeds were prepared for flight on STS-3. The experimental chambers were placed in two (flight and ground control) plant growth units (PGU) equipped with lights and capable of day/night cycling, data recording and some temperature regulation. Observations after the 8-day flight revealed that pine seedlings grew and developed similarly to ground controls. Oat and mung bean seeds germinated and also grew well in space. The most noticeable difference between flight and ground control seedlings was the number of oat and mung bean roots which grew upward out of the root support medium in the flight seedlings and certain orientation difficulties experienced by the mung bean. The lignin content in the whole stems of pine and mung beans was slightly lower in the flight vs control tissues. Protein content and PAL and peroxidase activity in the upper hypocotyl sections of pine stems showed an increased amount of protein and a corresponding decrease in PAL and peroxidase activity. (Author)

A83-27827*# Yale Univ., New Haven, Conn.
A COMPARATIVE STUDY OF MONOCOT AND DICOT ROOT DEVELOPMENT IN NORMAL /EARTH/ AND HYPOGRAVITY /SPACE/ ENVIRONMENTS
R. D. SLOCUM and A. W. GALSTON (Yale University, New Haven, CT) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-131, S-132.
(Contract NSG-7290; NAGW-70)

The anatomy and fine structure of roots from oat and mung bean seedlings grown under hypogravity conditions aboard NASA's Space Shuttle were examined and compared to those of roots from ground control plants grown under similar conditions. Oat roots from both sets of plants exhibited normal tissue organization and ultrastructural features, with the exception of cortex cell mitochondria, which characteristically showed a 'swollen' morphology. Flight-grown mung bean roots differed significantly from the controls in that root cap cells were somewhat disorganized and degraded in appearance, especially at the cap periphery. At

the EM level, these cells exhibited a loss organelle integrity and a condensed cytoplasm. The potential significance of this finding for the putative gravity-sensing cap cells were noted. (Author)

A83-27828*# Loyola Univ., Chicago, Ill.
GRAVITROPIC BASIS OF LEAF BLADE NASTIC CURVATURES
A. B. HAYES (Loyola University, Chicago, IL) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-133, S-134. refs
(Contract NAGW-131)

The curvatures produced in leaf blades by auxin treatment have been described as nastic curvatures because the initial differential growth is always enhanced on the lower side, regardless of the side of application. It is now known, however, that blades can show differential growth of either the upper or the lower side depending on the conditions of treatment. The dorsiventrality of the blade therefore influences but does not limit the direction of curvature. The dorsiventral directionality of response to growth regulators and the response to changes in the orientation to gravity are seen as indicating that blade curvatures are analogous to negative or positive gravitropism. It is noted that neither blade hyponasty or epinasty can be accounted for by ethylene alone. Petiole responses, however, are not directional, and the leaf angle changes induced by rotation or auxin treatment can be accounted for by ethylene production. C.R.

A83-27829#
MECHANICAL STRESS REGULATION OF GROWTH AND PHOTOSYNTHETIC PRODUCTIVITY OF GLYCINE MAX /L./ MERR. CV WELLS II UNDER DIFFERENT ENVIRONMENTAL REGIMES
T. PAPPAS and C. A. MITCHELL (Purdue University, West Lafayette, IN) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-135, S-136. refs

Brief seismo- or thigmo-treatments applied twice or three times daily to vegetative soybean plants as gyratory shaking or manual stem rubbing significantly retarded plant growth and photosynthetic productivity. Plants grown in a greenhouse in the summer under 1/3 to 1/2 of full sun showed a greater degree of sensitivity to mechanical stress than did plants grown under full sun. Growth dynamics analysis of plants grown in a controlled environment favoring mechanical responsivity indicated a decrease in relative growth rate (RGR) of shaken plants, indicating stress-induced inhibition of photosynthetic productivity. Changes in net assimilation rate and leaf area ratio are being assessed to determine with RGR components contributed to the observed changes in RGR. Short-term measurements of leaf gas exchange are being conducted to complement growth dynamic analysis. (Author)

A83-27830*# Yale Univ., New Haven, Conn.
POLYAMINE FORMATION BY ARGININE DECARBOXYLASE AS A TRANSDUCER OF HORMONAL, ENVIRONMENTAL AND STRESS STIMULI IN HIGHER PLANTS
A. W. GALSTON, H. E. FLORES, and R. KAUR-SAWHNEY (Yale University, New Haven, CT) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-137, S-138.
(Contract NSG-7290)

Recent evidence implicates polyamines including putrescine in the regulation of such diverse plant processes as cell division, embryogenesis and senescence. We find that the enzyme arginine decarboxylase, which controls the rate of putrescine formation in some plant systems, is activated by light acting through P(r) phytochrome as a receptor, by the plant hormone gibberellic acid, by osmotic shock and by other stress stimuli. We therefore propose arginine decarboxylase as a possible transducer of the various initially received tropistic stimuli in plants. The putrescine formed could act by affecting cytoskeletal components. (Author)

A83-27831*# Columbia Univ., New York.
CHANGES IN OSTEOBLASTIC ACTIVITY DUE TO SIMULATED WEIGHTLESS CONDITIONS
S. B. DOTY (Columbia University, New York, NY) and E. R. MOREY-HOLTON (NASA, Ames Research Center, Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-141, S-142. refs
(Contract NAGW-238; NCA2-OR-172-101)

Using histochemistry and electron microscopy, the reduced bone formation which occurs in the hypokinetic, orthostatically treated adult rat has been studied. The two major changes noted occurred in the osteoblast population, indicated by a reduced alkaline phosphatase activity and reduced numbers of gap junctions between cells. These results were most noticeable in the periosteum and endosteum of the long bones. Changes in osteoblasts lining the surface of trabecular bone were not as evident. These results indicate that the cells lining the surfaces of weight bearing bones are most affected by hypokinesia and this reduction in cellular activity may be a mechanically induced effect. (Author)

A83-27832*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CALCIUM TRANSPORT FROM THE INTESTINE AND INTO BONE IN A RAT MODEL SIMULATING WEIGHTLESSNESS
D. D. BIKLE, R. K. GLOBUS (U.S. Veterans Administration, Medical Center, San Francisco, CA), and E. R. MOREY (NASA, Ames Research Center, Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-143, S-144.

The objective of this study was to determine whether a defect in transport of calcium in the duodenum was related to decreased bone formation in the suspended rat. Rats were suspended by the tail at a 40 deg angle for up to 15 days. Ca-45 was injected into the ligated duodenum in situ 15 minutes prior to sacrific. Blood, tibia, vertebra and humerus were obtained for total calcium and Ca-45 analyses. Intestinal calcium transport did not appear to be sigificantly altered by suspension. However, by 5 days of suspension a significant decrease in accumulation of Ca-45 into tibia and vertebra was observed. A trend of decreasing bone mineral and mass was established in tibia and vertebra by the fifth day of suspension. The humerus failed to demonstrate a significant weight decrease or change in Ca-45 accumulation after 15 days of suspension. Results from this simulated weightlessness model suggest that transport of calcium from intestine into bone is decreased within 5 days of suspension. This deficiency appears to be associated with a progressive decrease in total mass of non-weightbearing bones. (Author)

A83-27833*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IS SUPPRESSION OF BONE FORMATION DURING SIMULATED WEIGHTLESSNESS RELATED TO GLUCOCORTICOID LEVELS
E. R. MOREY-HOLTON, M. D. BOMALASKI, E. ENAYATI-GORDON, M. R. GONSALVES, and T. J. WRONSKI (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-145, S-146. refs

To investigate the hypothesis that suppression of bone formation in the suspended rat model was the result of increased levels of corticosterone, experiments were performed on young, growing, male rats exposed either to 4 C or suspended for two weeks. Rats suspended on the model system, designed to simulate certain aspects of spaceflight, gained weight at a rate at least equal to control animals but still showed a significant suppression of bone formation within 7 days. Cold-exposed rats gained less weight than their corresponding control group and did not demonstrate any suppression of bone formation. These findings suggest: (1) tail suspension is less stressful than previously used harness systems; (2) suspension in young, rapidly growing rats

causes a significant suppression of cortical bone formation; (3) cold exposure does not alter bone formation rate in rats of a similar age and strain to those suspended in this study; and (4) suppression of bone formation provoked by unloading the rear limbs is not due solely to sustained stimulation of the pituitary-adrenal system. (Author)

A83-27834#
BONE MINERAL ANALYSIS OF RAT VERTEBRA FOLLOWING SPACE FLIGHT - COSMOS 1129
E. P. FRANCE, C. M. OLOFF, and L. E. KAZARIAN (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-147, S-148.

The methods and results are presented of a comparative vertebral centrum bone mineral content analysis from rats flown on Cosmos 1129 and ground based control rats. Among other results, it is found that the wt. % of PO4(-) remained constant in both flight and ground rats while the Ca levels in the flight rats were decreased, which may be an indicator of incomplete osteoid mineralization. The curves for wt. % Ca level for flight and ground rats are similarly oriented with the flight set of curves at decreased wt. % values which indicates that space flight exposure caused an arrest in bone formation with no change in resorption rate. These results indicate that similar mineral dynamics are functioning with all gravity resisting skeletal structures in the rat. N.B.

A83-27835*# Texas Univ., Galveston.
ALTERATIONS IN MITOCHONDRIA AND SARCOPLASMIC RETICULUM FROM HEART AND SKELETAL MUSCLE OF HORIZONTALLY CASTED PRIMATES
L. A. SORDAHL (Texas, University, Galveston, TX) and H. L. STONE (Oklahoma, University, Oklahoma City, OK) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-149, S-150. refs
(Contract NSG-2282)

Horizontally body-casted rhesus monkeys are used as an animal model in order to study the physiological changes known as cardiovascular deconditioning which occur during weightless conditions. No difference was found between the experimental and control animals in heart mitochondrial oxidative phosphorylation which indicates that no apparent changes occurred in the primary energy-producing system of the heart. A marked increase in cytochrome oxidase activity was observed in the casted primate heart mitochondria compared to controls, while a 25% decrease in respiratory substrate-supported calcium uptake was found in casted primate heart mitochondria compared to controls. Sacroplasmic reticulum isolated from the primate hearts revealed marked changes in calcium transport activities. It is concluded that the marked depression in cardiac sarcoplasmic reticulum functions indicates altered calcium homeostasis in the casted-primate heart which could be a factor in cardiovascular deconditioning. N.B.

A83-27836*# Louisville Univ., Ky.
EFFECT OF SUSPENSION HYPOKINESIA/HYPODYNAMIA ON GLUCOCORTICOID RECEPTOR LEVELS IN RAT HINDLIMB MUSCLES
J. M. STEFFEN and X. J. MUSACCHIA (Louisville, University, Louisville, KY) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-151, S-152. refs
(Contract NSG-2325; NAGW-70)

Ilyina-Kakueva et. al. (1976) conducted an investigation in which rats were exposed to weightlessness during the Cosmos program. An examination of the rats revealed a marked atrophy of hindlimb muscles. A suspension model has been developed to simulate these weightlessness-induced alterations. In agreement with the Cosmos studies, suspension hypokinesia/hypodynamia (H/H) results in differential atrophy of hindlimb muscles in rats. Recent studies have demonstrated elevated glucocorticoid receptor numbers in the gastrocnemius muscle following immobilization and denervation. One of the objectives of the present investigation was to evaluate the effect of suspension H/H on glucocorticoid receptor levels in rat hindlimb muscles. Another objective was to ascertain whether altered receptor levels reflect the differential nature of hindlimb muscle atrophy during suspension H/H. The obtained findings suggest that differential muscle atrophy resulting from H/H may result from differential alterations of glucocorticoid receptor levels. G.R.

A83-27837*# Texas Univ., Dallas.
EVALUATION OF THE RESPONSE OF RAT SKELETAL MUSCLE TO A MODEL OF WEIGHTLESSNESS
G. H. TEMPLETON, M. PADALINO, M. GLASBERG, J. MANTON, P. SILVER, and J. SUTKO (Texas, University, Dallas, TX) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-153, S-154.
(Contract NAGW-140)

Suspension of rats in a head-down tilt position such that their hind limbs are non-load bearing has been proposed as a model for weightlessness. Changes observed in metabolism, bone formation (Morey et al., 1979), and muscle catabolism (Mussachia et al., 1980) support the validity of the model. To further document this model, the effects of suspension on the mechanical, biochemical and histochemical characteristics of two hind limb skeletal muscles, the gastrocnemius and the soleus, are investigated. (Author)

A83-27838*# Arizona Univ., Tucson.
SYNTHESIS OF AMINO ACIDS IN WEIGHT BEARING AND NON-WEIGHT BEARING LEG MUSCLES OF SUSPENDED RATS
M. E. TISCHLER and S. R. JASPERS (Arizona, University, Tucson, AZ) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-155, S-156. refs
(Contract NAGW-227)

The effect of hypokinesia (HYP) for 6 days on the de novo synthesis of glutamine (GLN) and glutamate (GLU), and of alanine was tested in isolated leg muscles of intact, adrenalectomized (ADX) and ADX cortisol-treated rats. The net synthesis of GLN and GLU was lower in soleus muscles of HYP animals of these three groups of rats. The synthesis of alanine was lowered by HYP in ADX animals and apparently raised by HYP in ADX cortisol-treated rats. No HYP effect was seen in the extensor digitorum longus (EDL) muscles of these animals. Although ADX lowered the synthesis of GLN and GLU in soleus muscles of control rats, while cortisol treatment restored this process to near normal, neither ADX nor cortisol treatment produced any effect in the HYP animals. However, effects of ADX and cortisol treatment on synthesis of GLN and GLU in EDL muscles and of alanine in both muscles seemed normal in HYP animals. (Author)

A83-27839#
WEIGHTLESSNESS HYPOKINESIA - SIGNIFICANCE OF MOTOR UNIT STUDIES
D. G. STUART and R. M. ENOKA (Arizona, University, Tucson, AZ) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-157, S-158. refs

The whole-muscle fatigue in the medial gastrocnemius motor units of cage-reared rats was investigated. The fatigability characteristics of the medial gastrocnemius motor units were estimated using a theoretical noncaged-reared rat model, which assumed that the theoretical muscle would have unit properties like those found in hindlimb muscles of noncage-reared rats. The results of this analysis showed that an impairment of the electrochemical process of neuronal excitation-contraction coupling occurred at one or several sites between motor axons and the contractile machinery. N.B.

A83-27842*# Louisville Univ., Ky.
SHORT TERM /1 AND 3 DAY/ CARDIOVASCULAR ADJUSTMENTS TO SUSPENSION ANTIORTHOSTASIS IN RATS
X. J. MUSACCHIA and J. M. STEFFEN (Louisville, University, Louisville, KY) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-163, S-164. refs
(Contract NSG-2325)

Antiorthostasis (AO) results in responses reflective of thoracic vessel loading. Initial findings included fluid and electrolyte shifts (diuresis and natriuresis) in AO but not in orthostatic (O) rats. This study aims at obtaining supportive evidence for cardiovascular responses, E.g., blood pressure and related parameters, in light of the original hypothesis. Tilting rats rapidly head-up from either horizontal (O) or head-down (AO) positions was used to assess cardiovascular sensitivities. O and AO rats were used after 1 or 3 days of suspension. Rats were controls (C), pre-tilted O and AO, tilted O and AO (rapid head-up 70-80 deg); post-tilted (to original postures). MAP in C rats was 108 +2 mmHg, in O, (117 + or - 1.02) and AO, (120 + or - 0.58). MAP, diastolic pressure (DP) and pulse pressure were consistently elevated in AO rats on day 3. With rapid head-up tilt, only MAP and DP showed significant increases. These changes were seen as cardiovascular responses to AO and support further use of this rat model for AO studies. (Author)

A83-27843*# State Univ. of New York, Binghamton.
DAILY RHYTHMS OF ACTIVITY AND TEMPERATURE OF MACACA NEMESTRINA
F. M. SULZMAN and S. A. SICKLES (New York, State University, Binghamton, NY) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-165, S-166.
(Contract NAS2-10621)

The activity and temperature rhythms of pig-tailed macaques (Macaca nemestrina) maintained in LD 16:8 at 25 C in specially designed restraint chairs have been examined. Activity was monitored via a sensor that was attached to the restraint chair. Temperature was monitored at the axilla, ankle and ear. All variables showed prominent day-night variations, and except for ankle temperature, had highest values during the daytime. These results show that the regulation of the daily rhythm of body temperature involves anatomical sites that are utilized in a temporally distinct fashion. (Author)

A83-28525
THE LEVEL OF ENDOGENOUS ETHANOL AND ITS CONNECTION WITH THE VOLUNTARY CONSUMPTION OF ALCOHOL BY RATS [UROVEN' ENDOGENNOGO ETANOLA I EGO SVIAZ' S DOBROVOL'NYM POTREBLENIEM ALKOGOLIA KRYSAMI]
IU. M. OSTROVSKII, M. N. SADOVNIK, A. A. BANKOVSKII, and V. P. OBIDIN (Akademiia Nauk Belorusskoi SSR, Otdel Reguliatsii Obmena Veshchestv, Minsk, Belorussian SSR) Akademiia Nauk BSSR, Doklady, vol. 27, no. 3, 1983, p. 272-275. In Russian. refs

A study is conducted in order to determine the role of endogenous ethanol in the blood and tissues of rats which prefer ethanol solutions or water. The level of endogenous ethanol in the blood of the rats is determined before testing their preference for alcohol or water, and these animals are used in experiments employing substances for which the effect on the demand for alcohol is already established. Results show a negative correlation between the amount of ethanol consumed and the endogenous ethanol level in the blood. It is found that substances which increase the voluntary consumption of ethanol cause a decrease of the endogenous ethanol levels in the tissues, while those substances which decrease the voluntary consumption of ethanol cause an increase in the endogenous ethanol levels. N.B.

A83-28756* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROSTACYCLIN-INDUCED HYPERTHERMIA - IMPLICATION OF A PROTEIN MEDIATOR
S. B. KANDASAMY and B. A. WILLIAMS (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA) Neuropharmacology, vol. 21, 1982, p. 1065-1072. refs

The mechanism of the prostacyclin-linked hyperthermia is studied in rabbits. Results show that intracerebroventricular administration of prostacyclin (PGI2) induces dose-related hyperthermia at room temperature (21 C), as well as at low (4 C) and high (30 C) ambient temperatures. It is found that this PGI2-induced hyperthermia is not mediated by its stable metabolite 6-keto prostaglandin F-1(alpha). Only one of the three anion transport systems, the liver transport system, appears to be important to the central inactivation of pyrogen, prostaglandin E2, and PGI2. Phenoxybenzamine and pimozide have no thermolytic effect on PGI2-induced hyperthermia, while PGI2 still induces hyperthermia after norepinephrine (NE) and dopamine levels are depleted by 6-hydroxydopamine. Indomethacin and SC-19220 (a PG antagonist) do not antagonize PGI2 induced hyperthermia, while theophylline does not accentuate the PGI2-induced hyperthermia. However, the hyperthermic response to PGI2 is attenuated by central administration of the protein synthesis inhibitor, anisomycin. It is concluded that PGI2-induced hyperthermia is not induced by NE, dopamine, or cyclic AMP, but rather that a protein mediator is implicated in the induction of fever by PG12. N.B.

A83-28763
THE CONTENT OF ENDOGENOUS SEROTONIN IN THE LYMPH ORGANS OF RATS DURING THE ADAPTATION TO HIGH-ALTITUDES AND THE PATTERN OF RADIATION SICKNESS [SODERZHANIE ENDOGENNOGO SEROTONINA V LIMFOIDNYKH ORGANAKH KRYS PRI ADAPTATSII K VYSOKOGOR'IU I DINAMIKE LUCHEVOI BOLEZNI]
B. MOLDOTASHEV, S. B. DANIIAROV, K. M. MAKSUTOV, and I. CH. CHOCHUNBAEV (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR) Zdravookhranenie Kirgizii, Sept.-Oct. 1982, p. 36-40. In Russian.

The patterns of endogenous serotonin in the lymph tissues of rats were studied during the adaptation to high-altitude (3200 m) conditions and after exposure to radiation. Results show that the rats in high-altitude conditions exhibited higher concentrations of serotonin than did control rats at lower altitudes. Rats irradiated at high-altitude conditions had levels of endogenous serotonin in the lymph tissues that were higher than for rats irradiated at lower altitudes. It is concluded that serotonin may act by means of cAMP to increase the proliferating activity of lymph tissue cells and thus exert a radioprotective effect via the immune system. N.B.

A83-28764
THE PATHOLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF THE DEFICIENCIES OF THE MITRAL VALVE IN ANIMALS AS A CONSEQUENCE OF HIGH-ALTITUDE HYPOXIA [PATOFIZIOLOGICHESKAIA KHARAKTERISTIKA NEDOSTATOCHNOSTI MITRAL'NOGO KLAPANA U ZHIVOTNYKH V USLOVIIAKH POSLEDEISTVIIA VYSOKOGORNOI GIPOKSII]
A. IU. TILIS and A. K. KADYRALIEV (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR) Zdravookhranenie Kirgizii, Sept.-Oct. 1982, p. 40-46. In Russian.

The functioning of the cardiovascular and respiratory systems was investigated in dogs with deficiencies of the mitral valve under the conditions of natural hypoxia, and the pattern of the functional changes after these animals were returned to their normal environments were examined. Results show that the period following high-altitude hypoxia is accompanied by significant disorders of these functional systems which indicates the loss of the adaptations acquired in high-altitude conditions. In addition, in high-altitude conditions, the animals with deficiencies of the mitral valve experienced a new level of demand for oxygen which was met by increasing the stress on the blood circulation and respiratory

systems. The readaptation of these animals to their normal environments often produced additional stresses which led to their deaths. N.B.

A83-28766
THE MORPHOLOGICAL AND ANATOMICAL STRUCTURE OF ARABIDOPSIS THALIANA /BRASSICACEAE/ IN ONTOGENESIS [MORFOLOGICHESKOE I ANATOMICHESKOE STROENIE ARABIDOPSIS THALIANA /BRASSICACEAE/ V ONTOGENEZE]
E. A. KONDRATEVA-MELVIL and L. E. VODOLAZSKII (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) Botanicheskii Zhurnal, vol. 67, Aug. 1982, p. 1060-1069. In Russian. refs

The duration of the age periods of ontogenesis is established in experiments concerning the morphogenesis of Arabidopsis thaliana from the time of germination up to necrosis. The interdependence in the development of the plant organs and the correlation between the morphological and anatomical processes are examined. It is shown that the structural and biological characteristics of A. thaliana are the early transition to reproductive development, an extended phase of fruit-bearing, and a weak, although continuous, secondary growth. The relatively continuous life of this plant is determined by the repeated formation of foci of the primary meristem during the development of adventitious roots, as well as the large number of auxiliary shoots and fruits at the beginning of their formation. N.B.

A83-28818
THE REACTION OF NEURONS TO PROLONGED STIMULATION MORPHOLOGICAL INVESTIGATIONS [REAKTSIA NEIRONOV NA DLITEL'NUIU STIMULIATSIIU MORFOFIZIOLOGICHESKOE ISSLEDOVANIE]
O. S. MERKULOVA and IU. A. DARINSKII Leningrad, Izdatel'stvo Nauka, 1982, 196 p. In Russian. refs

The interconnections of the functional and structural transformations in the neurons of the central nervous system during various types of activation are analyzed. The dominating effect of synaptic processes in the initiation of morphological and metabolic shifts in the neurons is examined. The intensive and prolonged synaptic effects during the activation of afferents may be the causes of the pathological changes in cells (pyknomorphous compression, vacuolization), and the reversibility of these pathological changes is examined. Various theoretical questions about the mechanisms of the regulation of the structural and metabolic changes in the neurons during their prolonged functioning are discussed. N.B.

A83-28823
THE REGULATION OF THE CENTRAL MECHANISMS OF VISION [REGULIATSIIA TSENTRAL'NYKH MEKHANIZMOV ZRENIIA]
V. L. SILAKOV Leningrad, Izdatel'stvo Nauka, 1982, 188 p. In Russian. refs

A discussion is presented of the neural mechanisms of cortical-subcortical relations, based partly on experimental data obtained in studies of the cortical and subcortical regions of the visual analyzer. The principles of the conditioned and unconditioned reflex regulation of the behavior of the afferent flow of impulses in the visual structures of the brain are examined. A conception of the microsystemic organization of the central mechanisms of visual function forms the main conceptual basis for theoretical generalizations. A description of the inner-analyzer temporal connections is given. The activity of the visual structures of the brain in normal conditions and during organic injuries of the brain is considered. N.B.

A83-28825
RADIATION HYGIENE [RADIATSIONNAIA GIGIENA]
V. F. KIRILLOV and E. F. CHERKASOV Moscow, Izdatel'stvo Meditsina, 1982, 248 p. In Russian.

This textbok presents an outline of the field of radiation hygiene. Topics examined include the action of ionizing radiation on humans and animals, the natural sources of ionizing radiation, and the permissible dose limits of radiation as principles of radiation safety. Also considered are the safety principles in working with radioactive substances and sources of ionizing radiation, work hygiene during the use of radioactive substances, and work hygiene during radiation defectoscopy.Attention is also given to topics concerning environmental radiation pollution. N.B.

A83-28934
HEMORRHAGIC TOLERANCE OF RATS AT SEA LEVEL AFTER ACUTE EXPOSURE TO HIGH ALTITUDE
P. CHERDRUNGSI and V. VERAWATNAPAKUL (Mahidol University, Bangkok, Thailand) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 347-350. Research supported by the Rockefeller Foundation and National Research Council of Thailand. refs ISSN 0095-0562 .

It was found that the exposure of rats to a simulated altitude of 5000 m for 1 and 3 days caused increases in hematocrit (Hct) and in hemoglobin concentration and a decrease in total plasma volume incomparison with sea level control animals. The total blood volume (TBV) was found to be decreased after 1 day of exposure to altitude but returned to normal in 3 days of altitude exposure. The bleeding volume which resulted in death following cannulation under anesthesia was used to measure the sea level hemorrhagic tolerance. These values were recorded as a bleeding volume index (BVI), the total volume of blood lost per 100 g of body weight. The mean BVI was found to decrese in 1-day altitude rats, but not in 3-day altitude rats. Changes in mean arterial blood pressure and Hct during bleeding were determined. It is suggested that the decresed hemorrhagic tolerance is due in part to a decreased TBV and to a loss in arterial blood pressure regulatory capability after severe hemorrhage. N.B.

A83-29249
MICROBODIES IN THE LIVING CELL
C. DE DUVE (International Institute of Cellular and Molecular Pathology, Brussels; Louvain, Catholic University, Louvain, Belgium; Rockefeller University, New York, NY) Scientific American (ISSN 0036-8733), vol. 248, May 1983, p. 74-84. ISSN 0036-8733

The discovery of various microbodies in cells is described, and the functions carried out by those microbodies are discussed. The findings that led to the acceptance of the existence of peroxisomes are recounted, and the detection of the glyoxylate cycle and its location in the new particles called glyoxysomes are described. The similarities between glyoxysomes and pyroxisomes, the functions of both, and the light that the study of either has thrown on the functions of the other, are discussed in some detail. The problem of their origin is addressed in detail, showing how the study of that origin led to the discovery of new microbodies and treatment for venereal disease. C.D.

A83-29250
SUDDEN CARDIAC DEATH - A PROBLEM IN TOPOLOGY
A. T. WINFREE Scientific American (ISSN 0036-8733), vol. 248, May 1983, p. 144-149, 152-157, 160, 161. ISSN 0036-8733

A topological model is applied to the heart's pacemaking function in order to show how fibrillation can result from the application of an external electrical stimulus to the heart. The latencies that can occur between the application of the stimulus and the next heartbeat are plotted against the period from the initial beat to the application of the stimulus, or coupling interval. The resulting patterns of latencies are called weak and strong rescheduling. The latencies are assigned colors by means of a cylinder with a full cycle of colors around its circumference, which equals one natural period. The cylinder is conceptually moved to construct a rectangle partially filled with colors standing for latencies. The topological nonretraction theorem is used to show that within the rectangle there is a point with no color, representing a stimulus that does not result in a fundamental latency. The functional existence of this singularity in a squid axon is documented, and its ability to cause fibrillation in the human heart is assessed. C.D.

A83-29272
THE MOLECULAR MECHANISMS OF THE ACTION OF ENDOGENOUS AND EXOGENOUS ETHANOL [MOLEKULIARNYE MEKHANIZMY DEISTVIIA ENDOGENNOGO I EKZOGENNOGO ETANOLA]
I. A. KOMISSAROVA, A. IU. MAGALIF, IU. S. ROTENBERG, and IU. V. GUDKOVA (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR) Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia (ISSN 0002-3329), Mar.-Apr. 1983, p. 260-267. In Russian. refs ISSN 0002-3329

A concept is presented which explains the molecular mechanisms of the action of endogenous and exogenous ethanol as the effect of various concentrations of acetaldehyde (AA) on the bioenergetic processes in mitochondria. The concept is based on studies of the participation of AA in the transport of electrons in the respiratory cycle of mitochondria and the properties of AA in high concentrations to evoke an inhibition of the disruption of the oxidation of NAD-dependent substrates. Endogeneous ethanol is considered to be a shuttle-transport center containing an adequate level of AA in normal reactions, while in acute treatments with exogeneous ethanol it is a factor leading to adaptive change in the energy metabolism. It is suggested that an acute treatment with exogeneous ethanol leads to an inhibition of the acetaldehyde-dependent NADH dehydrogenase in the mitochondrial respiratory chain and an activation of succinate dehydrogenase. Chronic alcohol treatment results in the predominance of this reaction. Under these conditions, a sharp cessation of ethanol results in the development of withdrawal symptoms. N.B.

A83-29274
THE SPECIFIC CHARACTERISTICS OF HEAT STRESS DURING THE MICROWAVE IRRADIATION OF MAMMALS (THEORETICAL ANALYSIS) [VIDOVYE OSOBENNOSTI TEPLOVOGO STRESSA PRI MIKROVOL'NOM OBLUCHENII MLEKOPITAIUSHCHIKH (TEORETICHESKII ANALIZ)]
V. A. SHESTIPEROV and V. S. TIKHONCHUK Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia (ISSN 0002-3329), Mar.-Apr. 1983, p. 282-286. In Russian. refs ISSN 0002-3329

Results are presented for a theoretical analysis of the experimental dependencies of the effect of microwave on mice, rats, and dogs. Relations are obtained which elucidate the specific characteristics of microwave heat stress. The development of the effect of injury over time is linked to the change in the temperature of the animal. A biological model is developed on the basis of this data which allows not only the integral heating of the animals to be calculated, but also the safe level of irradiation to be predicted. N.B.

A83-29332
THE STRUCTURAL PRINCIPLES OF INTERNEURAL INTEGRATION [STRUKTURNYE OSNOVY MEZHNEIRONNOI INTEGRATSII]
V. P. BABMINDRA and T. A. BRAGINA Leningrad, Izdatel'stvo Nauka, 1982, 164 p. In Russian. refs

The structural preconditions necessary for carrying out the integrating activity of an individual neuron, a complex of neurons, and a nerve center at various levels of the nerve system (vegetative ganglia, spinal cord, and the cerebrum) are analyzed. A comparison of these objects which are quite distant from one another is presented in order to provide an elucidation of the unique structure of the nerve cells and the high specificity of their connections. The growth of convergent axons into a neuron in the hierarchical order of the nerve system and the increase in the number of sources of its afferentation are examined. N.B.

A83-29421* California Univ., Richmond.
TRANSITIONS AND TRANSVERSIONS IN EVOLUTIONARY DESCENT - AN APPROACH TO UNDERSTANDING
R. HOLMQUIST (California, University, Richmond, CA) Journal of Molecular Evolution (ISSN 0022-2844), vol. 19, March 1983, p. 134-144. refs ISSN 0022-2844
(Contract NGR-05-003-460)

A quantitative theoretical groundwork is presented for determining the proportions of the possible types of base substitutions observed between 12 genes sharing a common ancestor and isolated from extant species. Three methods (direct count, regression, and informational entropy maximization) are described by which conditional base substitution probabilities that determine evolutionary descent can be estimated from experimental data. These methods are utilized to study the ratio of transversions to transitions during gene divergence. The limiting ratio is directly calculated from a knowledge of the 12 conditional probabilities for each type of base substitution and from a knowledge of the equilibrium base composition of the DNAs compared. An expression is developed for this calculation. It is concluded that multiple substitutions per se do not lead to a decrease in transition differences with increasing evolutionary divergence. N.B.

A83-29530* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OPPOSING ACTIONS OF DIBUTYRYL CYCLIC AMP AND GMP ON TEMPERATURE IN CONSCIOUS GUINEA-PIGS
S. B. KANDASAMY and B. A. WILLIAES (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA) Neuropharmacology (ISSN 0028-3908), vol. 22, Å, p. 45-70. refs ISSN 0028-3908

It is shown that the intracerebroventricular administration of dibutyryl cyclic AMP (Db-cAMP) induced hyperthermia in guinea pigs which was not mediated through prostaglandins or norepinephrine since a prostaglandin synthesis inhibitor and an alpha-adrenergic receptor blocking agent did not antagonize the hyperthermia. However, the hyperthermic response to Db-cAMP was attenuated by the central administration of a beta-adrenergic receptor antagonist, which indicates that cAMP may be involved, through beta-adrenergic receptors, in the central regulation of heat production and conservation. The central administration of Db-cGMP produced hypothermia which was not mediated via histamine H1 or H2 receptors and serotonin. The antagonism of hypothermia induced by Db-cGMP and acetylcholife + physostigmine by central administration of a cholinergic muscarine receptor antagonist and not by a cholinergic nicotinic receptor antagonist suggests that cholinoceptive neurons and endogenous cGMP may regulate heat loss through cholinergic muscarine receptors. It is concluded that these results indicate a regulatory role in thermoregulation provided by a balance between opposing actions of cAMP and cGMP in guinea pigs. N.B.

A83-29533* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CENTRAL EFFECTS OF SOME PEPTIDE AND NON-PEPTIDE OPIOIDS AND NALOXONE ON THERMOREGULATION IN THE RABBIT
S. B. KANDASAMY and B. A. WILLIAMS (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA) IN: Environment, drugs and thermoregulation. Basel, S. Karger, 1983, p. 98-100. refs

The effects of several peptide and non-peptide opiods and naloxone on induced hyperthermia is studied in rabbits. The effect of tyical mu, kappa, and sigma receptor antagonists (morphine, ketocyclazcine and SKF 10,0 10, 047) and some opioid peptides (Beta-endorphin /BE/, methionine-enkaphalin /ME/, and D-Ala2-methionine-enkaphalin-amide /DAME/ are determined. The role of prostaglandins (PG), cAMP, and norepinephrine (NE) in morphine, BE, and DAME induced hyperthermia is investigated. In addition, the effect of naloxone on pyrogen, arachidonic acid, PGE2, prostacyclin, dibutyryl cAMP, and NE induced hyperthermia is determined. Among other results, it is found that the three receptor antagonists induced hyperthermia in rabbits. BE, ME, and DAME were also found to cause hyperthermia, and it is suggested that

they act on the same type of receptor. It is also determined that neither NE nor cAMP is involved in the hyperthermia due to morphine, BE, and DAME. It is suggested that an action of endogenous peptides on naloxone sensitive receptors plays little role in normal thermoregulation or in hyperthermia. N.B.

A83-29546* *Childrens Hospital Medical Center of Northern Calif., Oakland.*
BIOCHEMICAL CHANGES IN RAT LIVER AFTER 18.5 DAYS OF SPACEFLIGHT (41566)
S. ABRAHAM, C.Y. LIN (Children's Hospital Medical Center, Oakland, CA), C. M. VOLKMANN, and H. P. KLEIN (NASA, Ames Research Center, Moffett Field, CA) Society for Experimental Biology and Medicine, Proceedings (ISSN 0037-9727), vol. 172, 1983, p. 334-339. refs ISSN 0037-9727
(Contract NAS2-9523)

The effect of weightlessness on liver metabolism was investigated using tissue from rats flown in earth orbit for 18.5 days on the Soviet Cosmos 936 biosatellite and the changes in the activities of 28 carbohydrate and lipid enzymes were determined. The activities of two enzymes, palmitoyl-CoA desaturase and lactate dehydrogenase, increased, while the activities of five, glycogen phosphorylase, 6-phosphogluconate dehydrogenase, both acyltransferases which act on alpha-glycerolphosphate and diglycerides, and and aconitate hydratase decreased. The other enzyme activities were found to be unchanged. In addition, increased levels of liver glycogen and palmitoleate were detected which probably resulted from the lowered glycogen phosphorylase and increased palmitoyl-CoA desaturase activities, respectively, in those animals that experienced weightlessness. All of the changes observed in the rats after 18.5 days of spaceflight disappear by 25 days after the flight. N.B.

A83-29547* Madras Univ. (India).
INFORMATION CONTAINED IN PROTEIN SHAPES
K. SUNDARAM, V. N. VISWANADHAN (Madras, University, Madras, India), and R. D. MACELROY (NASA, Ames Research Center, Moffett Field, CA) International Journal of Peptide and Protein Research (ISSN 0300-9769), vol. 21, 1983, p. 107-117. Research supported by the Ministry of Science and Technology of India. refs ISSN 0300-9769

The sequence of local conformations at C-alpha atoms of a protein has been considered as an informational message string. The total self-information contents and self-information per letter have been evaluated for 83 globular proteins whose structures are known from X-ray crystallography. The derived information contents provide a method of quantitating structural specificity of proteins. This method of analysis enables repeating, intricate structural features to be recognized. Among the globular proteins whose structures have been solved, high potential iron protein stands out with the largest three-letter dependence. Author

A83-29551* Maryland Univ., Baltimore.
EFFECT OF DENERVATION AND REINNERVATION ON OXIDATION OF 6-(C-14) GLUCOSE BY RAT SKELETAL MUSCLE HOMOGENATES
D. C. DUBOIS and S. R. MAX (Maryland, University, Baltimore, MD) Journal of Neurochemistry (ISSN 0022-3042), vol. 40, no. 3, 1983, p. 727-733. refs ISSN 0022-3042
(Contract NIH-NS-15760; NAG2-100)

The effects of denervation and reinnervation of the rat extensor digitorum longus muscle on the oxidation of 6-(C-14) glucose to (C-14)O2 is investigated. Results show that the rate of (C-14)O2 production decreased dramatically following denervation and the decrease became significant 20 days after nerve section. The changes which occurred prior to day 20 apparently reflected the decline of muscle mass. The decreased (C-14)O2 production was found to be due to reduced capacity of the enzymatic system, while there was no change in the apparent affinity for glucose. Results of mixing experiments showed that the loss of oxidative capacity following denervation is not caused by the production of soluble inhibitors by degenerating muscle. Measurements of the (C-14)O2 revealed that oxidative metabolism recovered during reinnervation. The specific activity in reinnervated muscles displayed an 'overshoot' of approximately 50 percent, which returned to control levels by day 60. The time-course of the denervation-mediated change indicates that altered oxidative capacity is secondary to events that initiate dennervation changes in muscle, although diminished oxidative capacity may be of considerable metabolic significance in denervated muscle. N.B.

A83-29711
EFFECT OF AGE ON BENZODIAZEPINE-INDUCED BEHAVIOURAL CONVULSIONS IN RATS
G. A. BARR (Albert Einstein College of Medicine, Bronx; Hunter College, New York, NY) and T. LITHGOW (Hunter College, New York, NY) Nature (ISSN 0028-0836), vol. 302, March 31, 1983, p. 431, 432. Research supported by Hunter College. refs ISSN 0028-0836

The anticonvulsants flurazepam and chlordiazepoxide, which both belong to the benzodiazepine family caused convulsions in newborn rats of 3, 10, 18, and 25 days of age when injected. The percentage of pups that convulsed decreased with increasing age of the pup, and younger pups convulsed even at very low chlordiazepoxide doses. One interpretation of the results is the selective activation of one of two receptors relative to another. The ontogenesis of these two binding sites in the rat differs, with type two being predominant at birth and type one increasing in number after the second week after birth. It is suggested that the type two receptor facilitates seizures and the type one inhibits them, and that the convulsions are due to the activation of the former in the absence of the latter in immature rats. C.D.

N83-21752 Defence Research Information Centre, Orpington (England).
AN APPROACH TO ESTIMATING THE POTENTIAL PRODUCTIVITY OF PHYTOPLANKTON BY ANALYSIS OF THE KINETICS OF FLUORESCENCE INDUCTION
J. NEVEUX and H. JUPIN Oct. 1982 20 p refs Transl. into ENGLISH from Marine Bio., (France), v. 63, 1981 p 13-21
(DRIC-T-6730; BR85874) Avail: Issuing Activity

The importance of the kinetics of fluorescence induction for characterization of phytoplankton activity is discussed. In vivo chlorophyll fluorescence is particularly interesting to ecologists because of various concepts associated with it. The kinetics of fluorescence in unialgal cultures and in the natural population of marine phytoplankton were studied by spectrophotofluorometry. The apparatus did not achieve satisfactory results with cell suspensions having a chlorophyll concentration less than 10 micro to the minus 1 power. A method for estimating kinetics of diluted cultures and marine phytoplankton was tested using cells collected on glass fiber filters. The method proved satisfactory for unialgal cultures in the exponential growth phase. For aged cultures, however, and natural marine phytoplankton the method proved unsuitable. The kinetics of fluorescence induction vary according to taxonomic position of the cells, light intensity of the measuring excitation beam and productiveness of the culture medium. E.A.K.

N83-21753*# Monsanto Research Corp., Dayton, Ohio.
MUTAGENIC SCREENING OF DIAMINE MONOMERS Contractor Report, 19 Feb. - 19 Dec. 1982
W. D. ROSS, J. E. NOBLE, J. A. GRIDLEY, J. M. FULLENKAMP, M. T. WININGER, and J. A. GRAHAM Feb. 1983 87 p refs
(Contract NAS1-16246)
(NASA-CR-166085; NAS 1.26:166085; MRC-DA-1124) Avail: NTIS HC A05/MF A01 CSCL 06C

The effects of phenyl ring coupling moieties, of isomeric amine positions relative to the coupling groups, and of insertion of other coupling groups on the mutagenic response of a series of dianilines were investigated using the Ames Salmonella assay. Generally, S-9 metabolic activation from Aroclor-induced rat liver was required for mutagenic expression. The range of mutagenicity of steric isomers of several dianiline series was also investigated. No mutagenicity was found for purified samples of o,o' and m,p'

isomers of methylene dianiline (MDA) and diaminobenzophenone, while varying degrees of mutagenicity were found for other isomers. The mutagenicity of 'benzylogs' of MDA decreased as the degree of linear separation of the m,m' anilino groups by aromatic rings increased. Methylation and two-year storage increased mutagenic response in certain isomers of MDA. However, high performance liquid chromatography indicated there was no discernible change in m,p'-MDA samples aged under varied conditions over four months. Likewise, no change in mutagenicity was found. Author

N83-21754# National Research Council of Canada, Ottawa (Ontario).
INVESTIGATION OF PROMISING ALGAE (GRACILARIA VERRUCOSA (HUDS.) PAPENF.) FOR CULTIVATION IN THE FAR EAST
V. F. MAKIENKO 1979 16 p refs Transl. into ENGLISH from Tr. Vses. Nauchno-Issled. Inst. Morsk. Ryb. Khoz. Okeanogr. (Moscow), no. 138, 1979 p 51-60
(NRC/CNR-TT-2051) Avail: NTIS HC A02/MF A01

The use of Gracilaria for the production of agar, Gracilaria found along the far eastern coast of the USSR, the distribution and biology of Gracilaria verrucosa (Huds.) Papenf., and problems involved in the experimental cultivation of Gracilaria verrucosa in the Far East are discussed. Author

N83-21755*# Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.
RESEARCH OPPORTUNITIES IN CARDIOVASCULAR DECONDITIONING, PHASE 1 Final Report
M. N. LEVY, ed. and J. M. TALBOT, ed. Feb. 1983 78 p refs (Contract NASW-3616)
(NASA-CR-170164; NAS 1.26:170164) Avail: NTIS HC A05/MF A01 CSCL 06C

Cardiovascular deconditioning research is discussed. Author

N83-21756*# Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.
RESEARCH OPPORTUNITIES IN SPACE MOTION SICKNESS, PHASE 2 Final Report
J. M. TALBOT, ed. Feb. 1983 63 p refs 2 Vol. (Contract NASW-3616)
(NASA-CR-170165; NAS 1.26:170165) Avail: NTIS HC A04/MF A01 CSCL 06C

Space motion sickness research is reported. Author

N83-21757# California Univ., Livermore. Lawrence Livermore Lab. Dept. of Biophysics.
BIOLOGICAL EFFECTIVENESS OF NEUTRON IRRADIATION ON ANIMALS AND MAN Ph.D. Thesis
T. STRAUME Nov. 1982 222 p refs
(Contract W-7405-ENG-48)
(DE83-003071; UCRL-53329) Avail: NTIS HC A11/MF A01

Neutron experiments on a highly radiosensitive in vivo system, oocytes in mice, which provide new insight into the nature of the radiosensitive targets of these important cells were discussed. Neutron data from animals and humans are integrated, and radiation protection standards for neutrons are addressed. Oocyte killing in juvenile mice by 0.43-MeV, (252)Cf fission, and 15 MeV neutrons, compared with that by (6) 0Co gamma rays, yields unusually low neutron RBEs (relative biological effectiveness). At 0.1 rad of 0.43 MeV neutrons the RBE is only 1.8, which is in contrast with values of 100 or more reported at low doses for other endpoints. In mice just prior to birth, however, when oocytes are less radiosensitive, the neutron RBE is much higher, similar to values fo most other mammalian endpoints. The dramatic change in neutron RBE with mouse age is explained as the result of a shift from a less radiosensitive target to a much more radiosensitive one. A value for the neutron Quality Factor is estimated as 17 much lower than 100 which was suggested. It is found that 17 is not markedly different from the value of 10 which is presently in general use. DOE

N83-21758# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
MODEL SYSTEMS FOR CHLOROPHYLL PHOTOCHEMISTRY: RETENTION OF FLUORESCENCE AT HIGH CHLOROPHYLL DENSITY AT A HYDROPHOBIC-HYDROPHILIC INTERFACE
G. R. SEELY and V. SENTHILATHIPAN 1982 11 p refs (Contract DE-AC02-82ER-12039)
(DE83-000350; DOE/ER-12039/T4) Avail: NTIS HC A02/MF A01

Many model systems containing chlorophyll show concentration quenching of fluorescence at quite moderate occupancies of the available phase space. A new kind of model system has been introduced, involving adsorption of chlorophyll and certain other amphiphilic substances to particles of polyethylene swollen with hydrocarbons, in which fluorescence is retained at coverages approaching a monolayer. In the example illustrated, the fluorescence lifetime is undiminished in spite of evidence for the presence of associated chlorophyll species along with the monomer. The preservation of fluorescence is probably owing to a combination of high viscosity in the swollen polyethylene phase and the presence of a surfactant to keep the chlorophyll in monomeric and well defined associated forms. DOE

N83-21759# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 17, NO. 1, JANUARY - FEBRUARY 1983
O. G. GAZENBO, ed. 4 Mar. 1983 150 p refs Transl. into ENGLISH of Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 96 p
(JPRS-83007) Avail: NTIS HC A07/MF A01

Twenty-eight articles were published with emphasis placed on aerospace physiology. Subject matter covered includes: nutrition, cardiac function, effects of weightlessness, and physical response to spaceflight.

N83-21769# Joint Publications Research Service, Arlington, Va.
RAT REACTIONS TO IMMOBILIZATION STRESS FOLLOWING SPACEFLIGHT
L. V. SEROVA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 72-78 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 52-57
Avail: NTIS HC A07/MF A01

The study of male Wistar rats flown on the biosatellite Cosmos 1129 showed that 7 to 10 hours after recovery they developed a distinct stress reaction of blood cell elements (increased neutrophil and decreased lymphocyte counts) and the thymus (decreased thymocyte count). Despite this, the level of their reaction (as a percentage of the preflight values) to additional immobilization stresses was similar to that of controls. As a result, by the end of immobilization tests deviations from the physiological norm in the flown animals were greater and their reserve capabilities were lower than in the controls. Author

N83-21770# Joint Publications Research Service, Arlington, Va.
ACTIVITY OF GLYCOGENOLYTIC ENZYMES IN RAT BONES AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE
I. A. POPOVA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 79-82 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, 1983 p 57-60
Avail: NTIS HC A07/MF A01

In order to study the effect of weightlessness on metabolic processes in the bone organic matrix, alpha-amylase and aldolase activities in the ulnar bone of rats flown on Cosmos 1129 were measured. The activity of alpha-amylase and especially of aldolase was increased 6 to 10 hours after flight. The enzymic changes were the greatest in the animals exposed to weightlessness. The postflight exposure of the rats of the three experimental groups to immobilization produced different changes in the activity of the glycogen splitting enzymes: it was either stimulated or inhibited. The findings suggest that the enzymes involved in glycogen splitting

in the bone organic matrix of rats flown for 18.5 days probably aim at eliminating the adverse effects of weightlessness. Author

N83-21771# Joint Publications Research Service, Arlington, Va.
ORGANIC ACID PRODUCTION AND CARBONATE CONTENT OF RAT BONES AFTER SPACEFLIGHT
A. A. PROKHONCHUKOV, K. S. DESYATNICHENKO, and L. S. KUZNETSOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 83-87 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 60-62
Avail: NTIS HC A07/MF A01

The content of citric, pyruvic and lactic acids in bones of 30 rats flown on Cosmos 1129 was measured. Postflight the content of citric and pyruvic acids decreased and that of lactic acid increased. During readaptation the content of the acids tended to return to normal but never reached the vivarium level. The mechanism of these changes is discussed. Author

N83-21773# Joint Publications Research Service, Arlington, Va.
COMPLEMENT AND HETEROPHIL ANTIBODY LEVELS IN MONKEYS DURING ANTIORTHOSTATIC HYPOKINESIA
A. A. IVANOV, V. N. SHVETS, and M. I. BOYKO *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 93-95 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v 17, no. 1, Jan. - Feb. 1983 p 66-67
Avail: NTIS HC A07/MF A01

Sexually immature primates Macaca mulatta exposed to head down tilt and clinostating hypokinesia showed an increase in the complementary activity of serum and a decrease of heterophil antibodies. An increase in the complement content reflects an adaptive reaction to head down tilt and a decrease in heterophil antibodies indicates an inhibition of antibody forming cells (B-lymphocytes). E.A.K.

N83-21774# Joint Publications Research Service, Arlington, Va.
TRICARBOXYLIC ACID CYCLE OXIDATIVE ENZYME ACTIVITY IN LIVER OF HYPOKINETIC RATS
Y. A. GANIN *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 96-101 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 67-71
Avail: NTIS HC A07/MF A01

The activity of oxidative enzymes of the Krebs cycle was examined in white rats during hypokinesia. On hypokinesia day 7 the cytosol activity of NAD dependent isocitrate dehydrogenase (ICDH) increased and that of malic enzyme decreased. On hypokinesia days 30 and 45 the activity of succinate dehydrogenase (SDH) and alfa-ketoglutarate dehydrogenase (alfa-KGDH) decreased, that of cytoplasmatic malate dehydrogenases (MDH) slightly increased, and that of NADP ICDH declined. On hypokinesia day 60 the total activity of mitochondrial dehydrogenases reduced due to a low protein content of the mitochondrial fraction, whereas the specific activity either remained unchanged (ICDH, NAD, MDH, alfa-KGDH) or increased (SDH, NADP MDH). On recovery day 25 only the activity of mitochondrial NAD dependent malate and isocitrate dehydrogenases returned to normal. E.A.K.

N83-21777# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODELS OF SOME EXOBIOLOGICAL SITUATIONS
V. V. VERIGO and T. F. PONOMAREVA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 114-118 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 79-81
Avail: NTIS HC A07/MF A01

Quarantine and sterilization requirements of spaceflights and the possibility of coexistence of terrestrial and aboriginal forms of life was explored. It is found that if the trophic chain with the terrestrial form acting as a consumer evolves both forms may coexist. Spatial distribution and diffusion suggests wave like processes similar to the distribution of autocatalytic reactions in chemical kinetics. E.A.K.

N83-21781# Joint Publications Research Service, Arlington, Va.
CATECHOLAMINE CONTENT OF ISOLATED RAT HYPOTHALAMUS NUCLEI AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE
R. KVETNANSKY, Y. CHULMAN, and R. A. TIGRANYAN *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 132-135 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 89-90
Avail: NTIS HC A07/MF A01

Long term spaceflight effects on neuroendocrine reactions and changes in catecholamine (CA) metabolism in the hypothalamus were investigated. The CA levels in different hypothalamic nuclei, aboard a biosatellite were studied. The hypothalamus, which is the main mediator between the central nervous (CNS) and endocrine systems, is richly innervated with catecholaminergic fibers, and contains relatively large amounts of noradrenalinergic, dopaminergic and adrenalinergic fibers. The presence of CA in the rat hypothalamus, as well as their exact location in its nuclei, was demonstrated by biochemical techniques. One of the important functions of CA in the hypothalamus is its participation in regulating liberin or hormone secretion and, in regulating the function of virtually the entire endocrine system. E.A.K.

N83-22950# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
LIGNIN OF THE LOWER PLANTS. 4: ISOLATION AND INVESTIGATION OF THE LIGNIN OF ALGAE
V. M. REZNIKOV and M. F. MIKHASEVA 1983 8 p refs Transl. into ENGLISH from Khim. Drevesniy (USSR), v. 4, 1976 p 76-79
(NRC/CNR-TT-2054; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

G.L. Stadnikov has obtained nonhydrolyzable substances from the algae Laminaria digitata, L. japonica and Fucus vesiculosus in the amounts 7, 10 and 19% with carbon contents of 53, 62 and 61% respectively and very low methoxyl content. By analysis of these results and of a series of other works, it is concluded that lignin enters into the plant substance at all stages in the evolutionary tree up to unicellular algae, during which its contents increased so far as to serve in the organization of the plant. L.F.M.

N83-22951# Argonne National Lab., Ill. Div. of Biological and Medical Research.
BIOLOGICAL AND MEDICAL RESEARCH: LOW LEVEL RADIATION, CARCINOGENESIS, TOXICOLOGY, HUMAN PROTEIN INDEX, BIOPHYSICS Annual Technical Report
M. W. ROSENTHAL, ed. Jun. 1982 160 p refs
(DE83-000920; ANL-82-35) Avail: NTIS HC A08/MF A01

Biological and medical research performed during 1981 is summarized. The studies included work in: low level radiation; carcinogensis; toxicology; human protein index; and biophysics. Reports on support facilities, educational activities, seminars, staff talks, and funding agencies are included.

N83-22953# Argonne National Lab., Ill.
RADIATION TOXICITY IN DOGS
T. E. FRITZ, L. S. LOMBARD, C. M. POOLE, T. M. SEED, D. V. TOLLE, J. M. ANGERMAN, S. M. CULLEN, D. DOYLE, L. V. KASPAR, W. G. KEENAN et al. *In* ANL Biol. and Med. Res. p 11-13 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

Late effects of low doses of ionizing radiation, in large, long living animals were investigated. The influence of daily exposure rate and accumulated total exposure are determined. Radiation specific excess mortality in the dog is compared with rodents to develop a unifying concept of damage. Base line data and

specimens which characterize the pathogenesis and mechanisms of induction of leukemia, aplastic anemia, and late occurring soft tissue tumors are provided. E.A.K.

N83-22955# Argonne National Lab., Ill.
RADIATION BIOLOGY OF CULTURED MAMMALIAN CELLS
A. HAN, M. M. ELKIND (Colorado State Univ.), E. BEN-HUR (Nuclear Research Center-Negev), F. BUONAGURO, C. K. HILL, H. UTSUMI (Kyoto Univ.), F. SUZUKI, E. M. BUESS, J. L. DAINKO, P. J. DALE et al. *In* ANL Biol. and Med. Res. p 19-22 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The mechanisms of radiation induced changes in mammalian cells which lead to cell lethality, mutation, and neoplastic transformation were examined. The influence of repair processes are investigated. Different qualities of ionizing radiations and nonionizing radiations of different wavelengths are used. E.A.K.

N83-22956# Argonne National Lab., Ill.
MAMMALIAN GENETICS
D. GRAHN, N. L. GARRIOTT, B. H. FARRINGTON, C. H. LEE, J. J. RUSSELL, and D. J. CROWE *In* ANL Biol. and Med. Res. p 23-25 Jun. 1982
Avail: NTIS HC A08/MF A01

The genetic hazards from testicular borders of 239Pu and the retention and microdistribution of this element in the testis were determined. The effects of 239Pu with single, weekly and continuous 60 Co gamma irradiation and single and weekly fission neutron irradiation are compared to develop a basis for estimating relative biological effectiveness (RBE) for genetic end points. Dose response data for genetic end points, at low doses of neutron and gamma rays are developed. E.A.K.

N83-22964# Argonne National Lab., Ill.
PROPERTIES OF BIOLOGICAL MOLECULES IN SOLUTION
M. MACCOSS, H. M. SCHWARTZ, C. F. AINSWORTH, S. H. GRAY (Illinois Univ.), M. MCCROSKEY (Maryville College), and R. J. ROSS (Northern Illinois Univ.) *In* ANL Biol. and Med. Res. p 87-89 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

Biological molecules and their properties in solution were investigated. The purpose is to study: (1) the synthesis end chemical characterization of naturally occurring biomolecules and specifically modified analogues; (2) determination of quantitative structural/conformational parameters for those molecules; and (3) correlation of structural and conformational properties with biological functions. E.A.K.

N83-22966# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
ASSOCIATION OF CHLOROPHYLL WITH AMIDES ON PLASTICIZED POLYETHYLENE PARTICLES. 1: N, N-DIMETHYLMYRISTAMIDE
G. R. SEELY, A. M. RUTKOSKI, Y. KUSUMOTO, V. SENTHILATHIPAN, and E. R. SHAW 1982 32 p refs 3 Vol.
(Contract DE-AC02-82ER-12039)
(DE83-000349; DOE/ER-12039/T2-PT-1) Avail: NTIS HC A03/MF A01

Model systems have been prepared in which chlorophyll a and N,N-dimenthylmyristamide (DMMA) are adsorbed together in various ratios to particles of polyethylene swollen with undecane. The adsorption is performed by equilibrating the particles with methanol-water solutions of increasing water content. Absorption spectra of the coated particles in viscous suspensions show sharp well-marked bands over much of the composition range examined. With the aid of second derivative spectra, the red absorption band has been resolved into three components, at 661.5, 674 and 689 nm. Fluorescence spectra have also been resolved into their principal components with some assistance from comparison with spectra of chlorophyll in undecane solution containing DMMA. At room temperature (295 K) the resolvable components are of monomeric chlorophyll at 670 nm, and of associated species at 681 and 725 nm. Fluorescence at 77 K is of similar intensity but is distributed differently in favor of longer-wave components. Corresponding to the 295 K components are emission bands at 675, 683-5 and 735 nm. Other components appear under certain conditions: at 695 to 700 nm when the chlorophyll and DMMA concentrations are both high, and at 705 nm when the ratio of DMMA to chlorophyll is low. DOE

N83-22967# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
ASSOCIATION OF CHLOROPHYLL WITH AMIDES ON PLASTICIZED POLYETHYLENE PARTICLES. 2. THE ISOMERIC N-(PYRIDYL)MYRISTAMIDES
Y. KUSUMOTO, G. R. SEELY, and V. SENTHILATHIPAN 1982 36 p refs 3 Vol.
(Contract DE-AC02-82ER-12039)
(DE83-000348; DOE/ER-12039/T2-PT-2) Avail: NTIS HC A03/MF A01

When chlorophyll, together with certain other amphiphilic substances, is adsorbed to particles of polyethylene plasticized by incorporation of tetradecane, it is maintained: in monomeric or oligomeric forms with characteristic absorption and fluorescence spectra. The properties of chlorophyll a on such particles in the presence of the three isomeric N-(pyridyl)myristamides is described, and of the similarly shaped but not basic compound myristanilide, in an effort to ascertain the structural factors governing associations of these species. Absorption and fluorescence spectra at room temperature are resolved into minimal sets of Gaussian components, and relations between the component sets are proposed. The positions of the component bands and their relative abundance are characteristic of the amide used. The 3 and 4 pyridyl isomers bind more strongly to chlorophyll, probably by ligation of the pyridine nitrogen to Mg of the pigment. The 2 pyridyl isomer and myristanilide bind more weakly, probably through the amide carbonyl group. DOE

N83-22968# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
ASSOCIATION OF CHLOROPHYLL WITH AMIDES ON PLASTICIZED POLYETHYLENE PARTICLES. 3: UNUSUAL SPECTRA OF CHLOROPHYLL A WITH N-METHYLMYRISTAMIDE
Y. KUSUMOTO, V. SENTHILATHIPAN, and G. R. SEELY 1982 20 p refs 3 Vol.
(Contract DE-AC02-82ER-12039)
(DE83-000533; DOE/ER-12039/T2-PT-3) Avail: NTIS HC A02/MF A01

The absorption spectrum of chlorophyll a, adsorbed with the amphiphilic amide, N-methylmyristamide, to particles of polyethylene swollen with tetradecane, is unusual in that the red band apparently consists of three main components, which by Gaussian deconvolution are located at 664.5, 678 and 687 nm. The last is very narrow, with a bandwidth of only 5 to 6 nm at half maximum. At low amide concentration, the 744 nm band of chlorophyll hydrate is also observed. Room temperature fluorescence is weak, and indistinctly resolved into bands. However, on gradual cooling to 80 K, the fluorescence intensifies greatly; the spectrum can be resolved into at least eight bands, some of which can be related to room temperature absorption bands with some reliability. The circular dichroism spectrum of the red band region shows optical rotatory strength in two narrow bands at 677 and 686 nm which is enormous, compared to that of monomeric chlorophyll or even the 744 nm hydrate. It is suggested that cyclic oligomer structures, in which adjacent chlorophylls are linked through the amide group of NMMA, might be responsible for the spectral phenomena. DOE

N83-22969# Boston Univ., Mass. Dept. of Chemistry.
INVESTIGATION OF THE TRIPLET STATE OF CHLOROPHYLLS Progress Report, 1 May 1981 - 30 Apr. 1983
R. H. CLARKE 25 Nov. 1982 12 p
(Contract DE-AC02-76ER-02570)
(DE83-003747; DOE/ER-02570/9; COO-2570-9) Avail: NTIS HC A02/MF A01

The triplet state of chlorophyll was utilized as a (nondestructive) probe into the structural and dynamical nature of the photosynthetic unit. Using primarily zero field optically detected magnetic resonance spectroscopy, supplemented by resonance raman spectroscopy, we have examined the chlorophyll molecule in a range of environments in both in vivo systems and in model chlorophyll units in vitro. Our research effort has focused on chlorophyll in the presence of simple organic ligands, in lipid bilayer vesicles, in synthetically reconstituted protein, and on the surface of metal and nonmetal substrates. The overall aim of the research has been to detail the physical features and interactions of the photosynthetic pigment systems through examination of pigment subunits of the photosynthetic apparatus and model system which represent them. DOE

N83-22970# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 28
21 Jan. 1983 111 p refs Transl. into ENGLISH from various Russian articles
(JPRS-82696) Avail: NTIS HC A06

Articles and abstracts are presented covering the fields of biochemistry, biotechnology, environment pollution, epidemiology, genetics, public health, radiation biology, laser applications, and human factors engineering.

N83-22971# Joint Publications Research Service, Arlington, Va.
UPDATE ON INDUSTRIAL MICROBIOLOGY
P. SOLOZHENKIN *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) p 9-12 21 Jan. 1983 Transl. into ENGLISH from Kommunist Tadzhikistana (USSR), 1 Sep. 1982 p 2
Avail: NTIS HC A06/MF A01

The use of microbiological products and preparations in nonferrous metallurgy, chemical and textile industries, and agriculture is discussed. The conversion of agricultural wastes to edible protein and toxic waste conversion by bacterial agents are also addressed. M.G.

N83-22974# Joint Publications Research Service, Arlington, Va.
COMPARATIVE MUTAGENIC EFFECTIVENESS OF GAMMA AND LASER RADIATION
V. G. VOLODIN, V. A. MOSTOVNIKOV, B. I. AVRAMENKO, Z. I. LISOVSKAYA, and I. V. KHOKHLOV *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) p 29-32 21 Jan. 1983 Transl. into ENGLISH from Dokl. Akad. Nauk BSSR (Minsk), v. 26, no. 8, Aug. 1982 p 753-756
Avail: NTIS HC A06/MF A01

The mutagenic effectiveness of gamma and laser radiation was investigated using cultivars and mutants of spring wheat and barley. M.G.

N83-22976# Joint Publications Research Service, Arlington, Va.
EVALUATION OF SIGNIFICANCE OF PARAMETERS OF FUNCTIONAL ACTIVITY OF ADRENAL CORTEX TO FORECASTING INDIVIDUAL RADIOSENSITIVITY. REPORT 1: METHODOLOGICAL APPROACHES TO FORECASTING INDIVIDUAL RADIOSENSITIVITY ACCORDING TO INDIRECT PARAMETER OF ADRENOCORTICAL ACTIVITY
In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) p 50-54 21 Jan. 1983 refs Transl. into ENGLISH from Radiobiologiya (Moscow), v. 21, no. 1, Jan. - Feb. 1981 p 86-89
Avail: NTIS HC A06/MF A01

Male Wistar rats weighing 227 + or - 6.4 g were used to investigate the possibility of predicting the outcome of radiation sickness on the basis of derivative parameters of K/Na ratio in whole blood before and after irradiation by the method of parabolic distribution and Gaussian type distribution. It was shown that use of Gaussian type distribution permitted forecasting the outcome of radiation sickness according to K/Na parameters in blood, with maximum accuracy of 89%. M.G.

N83-22979 Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 29
3 Mar. 1983 96 p refs Transl. into ENGLISH from various Russian articles
(JPRS-82998) Avail: NTIS HC A05/MF A01

Several areas of biomedical and behavioral sciences were addressed including human factors, radiation biology, public health, microbiology, and genetic engineering.

N83-22980# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CHANGES IN CELL MEMBRANES OF CHINESE HAMSTER FIBROBLASTS USING FLUORESCENT PROBE AFTER EXPOSURE TO LASER AND X-RADIATION
A. K. ABDVAKHITOVA, I. M. PARKHOMENKO, and T. N. SOKOLOVA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 37-42 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 155-159 Original language document was announced as A82-35660
Avail: NTIS HC A05

A study was made of interaction between a fluorescent probe 1-anilinonaphthalene-8-sulfonate and Chinese hamster cells exposed to a helium neon laser in stimulating doses. A decrease in fluorescence was demonstrated in the probe bound with irradiated cells; the binding constant (K sub b) decreased 1.7 to 1.8 fold while quantum yield decreased to 1/2 to 1/3. The quantum yield decreased to 1/2 to 1/3 and K sub b increased 1.5 to 1.7 fold after x-irradiation in a dosage of 8 Gy. Author

N83-22981# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF RADIOPROTECTIVE EFFECT OF CYSTEAMINE ON MODEL OF HEAT-INDUCED PROPHAGE LAMBDA
S. Y. BRESLER, V. L. KALININ, and I. N. SUSLOVA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 43-50 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 176-182
Avail: NTIS HC A05

Studies were made of lethal and mutagenic effects of Co(60) gamma quanta on prophage lambda c1857 in lysogenic cells of Eschrichia coli AB1886 uvrA6 and AB2463 recA13 irradiated in the absence or presence of cysteamine (0.05 M). With heat induction immediately after gamma radiation, cysteamine sensitizes prophage to the lethal effect of gamma quanta (DMF (dose modification factor) nearly equal to 1.5). In the presence of cysteamine, the frequency of gamma induced c mutations is much higher in prophage than in the absence of cysteamine, in lysogen AB1886, but not lysogen AB2463. With induction of prophage after postradiation incubation in broth, neither survival nor incidence of gamma induced mutations depend on presence of cysteamine at the time of irradiation or on the product of the recA(+) gene. Author

N83-22982# Joint Publications Research Service, Arlington, Va.
COMPARATIVE EVALUATION OF EFFICACY OF RADIOPROTECTIVE AGENTS ACCORDING TO CRITERIA OF BONE MARROW AND GASTROINTESTINAL TRACT PROTECTION
N. N. PYATOVSKAYA and I. Y. BRUMBERG *In its* USSR: Rept.: Life Sci. Biomed. and Behavioral 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 183-186
Avail: NTIS HC A05

In experiments on mice, it was demonstrated that the radioprotective agent, 4-aminobenzo-2,1,3-thiadiazol, unlike cystamine, protects hemopoietic tissue against ionizing radiation and has no radioprotective effect on the gastrointestinal tract. The effect of this agent is manifested in bone marrow on the level of stem cells and does not affect cells in the proliferative and maturing pool. Author

N83-22985# Joint Publications Research Service, Arlington, Va.
ROLE OF ENDOGENOUS SUBSTANCES IN ENHANCING RADIORESISTANCE BACKGROUND. INVESTIGATION OF EFFECTS OF SOME AET DERIVATIVES ON ENDOGENOUS RADIORESISTANCE BACKGROUND
Y. N. GONCHARENKO, S. V. STOYEV, S. V. ANTONOVA, and Y. E. GRAYEVSKAYA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 65-68 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 252-255
(REPT-16) Avail: NTIS HC A05

Data were published in 1974 concerning the radioprotective effect of adeturon S-2-aminoethyl isothiuronium adenosine triphosphate, a product synthesized with use of two compounds, ATP and AET aminoethylisothiuronium. Two more products were developed in the same laboratory, based on AET: 2-amino-4-iminothiazoline (DAT) and bromoethylisothiourea (BET). Adeturon and DAT demonstrated good radio-protective properties in mammals, and this served as grounds for intensive investigation of the mechanism of their action. Radioprotective agents were described from the standpoint of endogenous radioresistance background. Author

N83-22986# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF GENERAL ADAPTABILITY OF OFFSPRING OF IRRADIATED ANIMALS. MOUSE RESISTANCE TO RADIATION, HYPOXIA, ENDOTOXIN AND PHYSICAL EXERCISE
I. Y. VOROBTSOVA and K. L. GOLZBERG *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 69-72 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 261-264
(REPT-3) Avail: NTIS HC A05

Analysis of the literature dealing with distinctive features of offspring of biological objects indicates that the information on this score is contradictory and insufficient. At the same time, the importance of such studies is obvious, since evaluation of genetic sequelae of ionizing radiation is considered full enough only if it is based not only on data concerning the speed of the mutation process, as determined by appearance of major genetic abnormalities in generations of an irradiated population, but the results of studying the offspring of irradiated organisms with reference to the most diverse quantitative criteria characterizing general fitness of these specimens (life expectance, resistance to deleterious agents, etc.). Author

N83-22988 Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 20
11 Mar. 1983 148 p refs Transl. into ENGLISH from various Russian articles
(JPRS-83057) Avail: NTIS HC A07

Several areas of life sciences and technology are addressed including radiation biology, public health, psychiatry, laser effects, and medicine.

N83-22993 Joint Publications Research Service, Arlington, Va.
EFFECT OF PULSED LASER RADIATION ON EHRLICH'S ASCITES TUMOR CELL LYSOSOMES
K. G. MOSKALIK, Y. M. RYAZANOV, V. V. LAZO, and K. MERKLE *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 25-27 11 Mar. 1983 refs Transl. into ENGLISH from Vopr. Onkol. (Leningrad), v. 28, no. 4, Apr. 1982 p 42-44
Avail: NTIS HC A07

A study was made of the effect of neodymium laser radiation (wavelength = 1.06 microns) on lysosomes of Ehrilich's ascites tumor cells. It was demonstrated that, with laser radiation energy density of 10 to 100 J/sq. cm. 1 to 4 h after in vitro exposure of tumor cells there was synchronous increase in free and total activity of acid phosphatase in the fraction of isolated lysosomes, which is the result of labilization of cytoplasmic membranes of tumor cells. It was also determined that laser radiation in the tested doses does not affect activity of acid phosphatase in an enzyme preparation. Author

N83-22994 Joint Publications Research Service, Arlington, Va.
STUDY OF CYTOGENIC ACTION OF ELECTROSTATIC FIELD
V. F. SHAKARNIS and Y. V. KOVALCHUK *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 44-48 11 Mar. 1983 refs Transl. into ENGLISH from Izv. Akad. Nauk Latviyskoy SSR (Riga), no. 3, Mar. 1982 p 115-117
Avail: NTIS HC A07

Researchers have been interested in studying electrostatic fields (ESFs) as a factor capable of disturbing a cell's genetic apparatus. This interest is associated primarily with the fact that were it discovered that such a field has a mutagenic effect, the problem of protecting man from ESFs, which are widely encountered in industry and in the home, would be raised in a new way. Author

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

A83-27344
HYDROELECTROLYTIC AND HORMONAL MODIFICATIONS RELATED TO PROLONGED BEDREST IN ANTIORTHOSTATIC POSITION
A. GUELL, P. DUPUI, G. FANJAUD, A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France), J. P. MOATTI (Centre Hospitalier Universitaire La Grave, Toulouse, France), and C. GHARRIB (Lyon I, Universite, Lyon, France) Acta Astronautica, vol. 9, Sept. 1982, p. 589-592. refs

The effects of prolonged bedrest in antiorthostatic position on electrolyte balance were studied in four young volunteers. An increase was noted in sodium excretion during the first four days. Plasma renin activity and plasma aldosterone varied in parallel manner during the same period. Potassium balance and creatinine clearance were not significantly modified. In light of these data it is suggested that prolonged bedrest in antiorthostatic position constitutes an effective way to simulate on earth metabolic and hormonal modifications occurring in man under weightlessness conditions. (Author)

A83-27349
CHANGES IN THE LOCO-REGIONAL CEREBRAL BLOOD FLOW /R.C.B.F./ DURING A SIMULATION OF WEIGHTLESSNESS
A. GUELL, P. DUPUI, M. BARRERE, G. FANJAUD, A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France), and A. KOTOWSKAIA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Acta Astronautica, vol. 9, Nov. 1982, p. 689, 690. refs

Possible cephalic circulatory changes in a microgravity environment were examined in simulated zero-g conditions consisting of 7 days of bed rest in an antiorthostatic position. A total of seven subjects were tested, with three receiving 0.45 mg of Clonidine per day in three doses. The subjects breathed a gas mixture containing Xe-133 for one minute for hemispheric studies using 16 scintillation detectors. Increased blood flow in the grey matter was observed in all subjects who did not receive Clonidine. The same subjects reported venous congestion, a common symptom among astronauts. The Clonidine masked the symptoms by depressing cardiac output and stimulating local Alpha2 adrenergic receptors. Longer term studies are recommended for assessing the effectiveness of space pharmocopeia in realistic space flights of several weeks. M.S.K.

A83-27782#
EFFECTS OF WEIGHTLESSNESS ON PULMONARY FUNCTION
J. B. WEST, H. B. GUY, and D. B. MICHELS (California, University, La Jolla, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-21 to S-24. refs

A review is presented of research concerning the effects of gravity and increased acceleration on the lung, and the available data on the effects of short periods of weightlessness on the lungs is summarized. Measurements of the uneven distribution of bloodflow in the upright human lung have shown that bloodflow decreases significantly from base to apex reaching very low levels at the apex. The regional differences of structure and function of the lung are found to be exaggerated by increased acceleration. Studies during short periods of weightlessness indicate that the topographical inequality of bloodflow is very nearly abolished under these conditions. In addition, the future directions of research concerning the effects of weightlessness on the structure and function of the lung which are planned for Spacelab are discussed. N.B.

A83-27783#
CIRCADIAN VARIATIONS IN TOLERANCE TO +GZ ACCELERATION
D. H. GLAISTER and G. M. HALL (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-25 to S-28. refs

The possibility of a diurnal variation in the human tolerance to sustained +Gz acceleration is investigated in experiments with 8 normal subjects. Grayout thresholds were determined using a standard technique at two rates of acceleration onset (0.1 and 1.0/Gs), at 6 times of the day spread over a period of 4 weeks. The heart rate of the subjects was also monitored during a 15 sec centrifuge run at +3 Gz with a 1.0/Gs onset rate. Other factors studied included blood pressure, intraocular tension, body temperature, serum cortisol, and serum glucose. Results show the presence of a significant circadian rhythmicity in the slow onset grayout threshold and in the +3 Gz heart rate response. Although diurnal changes were also found in the other measures, they were either too small in magnitude or of the wrong phase to account for the rhythm in G-tolerance, with the exception of the diurnal responses of changes of cortisol. However, this change was small, with an amplitude of 0.115 G and an acrophase time of 0407 hr, and was not considered to be of operational significance. N.B.

A83-27784#
HUMAN TOLERANCE TO ROTATION AT DIFFERENT G'S
A. M. GENIN, A. R. KOTOVSKAIA, R. R. GALLE, and A. A. SHIPOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-29 to S-32. refs

The effects of a rotating environment which creates an artificial gravity of 1.1, 1.6, and 2 G are studied in experiments with humans and rats. In the human experiments, results showed that at 1.1 G the subjects developed vestibulo-autonomic symptoms 10-15 min after the onset of the rotation, including increased salivation, perspiration, fever, nausea, and sometimes vomiting. During the second 30 min of rotation, the subjects displayed sleepiness, inactivity, headache, and other central symptoms of motion sickness. When artificial gravity was increased to 2.0 G, the symptoms of motion sickness declined, although all subjects reported a marked sensation of increased weight of the head and limbs, which lead to increased fatigue. The effects of a 21-day rotation at 1.1 and 2.0 G was also studied in rats. This study demonstrated that after the 21-day rotation, the rats did not show any significant differences in their static and dynamic endurance as compared with the controls. However, changes were detected in the nystagmic reaction of the rats during readaptation, which reflected alterations in the state of the nystagmogenic center caused by prolonged stimulation of the semicircular canals due to cross-coupled acceleration together with additional stimulation of the otolith apparatus by increased gravity. N.B.

A83-27789#
EXPERIMENTAL ANALYSIS OF MOTOR EFFECTS OF WEIGHTLESSNESS
I. V. KOZLOVSKAIA, I. F. ASLANOVA, L. S. GRIGOREVA, and IU. V. KREIDICH (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-49 to S-52. refs

The motor effects of weightlessness and immersion were studied in humans in order to determine the role of support unloading in weightlessness-induced motor disorders. Results show that a 7-day exposure to zero-G or immersion brings about changes in different parts of the motor system that are similar to those seen in longer-duration flights, although the level of changes is different. Following immersion the level of motor disorders was slightly greater than after space flights of equal duration. It is suggested that these findings are due to the summation (and probably potentiation) during immersion of the support unloading effects with the effects of hypokinesia, which is substantial in simulated and negligible in actual space flights. The high correlation between the tone and strength decrease in the antigravitational muscles after 7-day space flight and immersion, as well as the distinct relationship between postural changes and body harness rigidity, indicates that the tonic shift due to the lower support inputs is the main factor responsible for motor disorders during short-term space flights. N.B.

A83-27792#
COMPARISON OF CARDIOVASCULAR EFFECTS OF SPACE FLIGHT AND ITS ANALOGS USING COMPUTER SIMULATIONS
R. SRINIVASAN and J. I. LEONARD (GE Management and Technical Services Co., Houston, TX) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-61, S-62. refs

The results of a long-term and a short-term cardiovascular mathematical model simulation of weightless conditions are presented and compared with available experimental data. It is found that the cardiovascular response to orthostatic stress following exposure to weightlessness or any of its analogs cannot be fully explained on the basis of blood volume loss alone.

Peripheral resistance changes appear to play a significant role in producing the observed cardiovascular responses. The lowering of mean pressures and volumes in the legs seems to be more dominant than any fundamental change in leg venous compliance. C.D.

A83-27793*# California Univ., San Diego.
FLUID SHIFTS IN VASCULAR AND EXTRAVASCULAR COMPARTMENTS OF HUMANS DURING AND AFTER SIMULATED WEIGHTLESSNESS
A. R. HARGENS, B. J. TUCKER, and C. M. TIPTON (U.S. Veterans Administration Medical Center; California, University, Medical Center, San Diego, CA; Iowa, University, Iowa City, IA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-63, S-64. Research supported by the U.S. Veterans Administration refs
(Contract NAS9-16039; NIH-AM-25501; NIH-AM-26344; NIH-AM-00602)

A study is presented of the transcapillary pressures and the possible fluid shifts in muscles and subcutaneous tissue of the lower leg before, during, and after head-down tilt. Results showed that the subjects experienced facial edema, headache, nasal congestion, diuresis, and decreased lower-leg volume in response to 8 hours of 5 degree head-down tilt. Also found were significant decreases in systolic and diastolic pressures 2 hours after initiation of tilt, although blood pressure normalized thereafter. The lower-leg volume, urine output and interstitial fluid pressures of the tibialis anterior muscle and overlying subcutaneous tissue also changed significantly. No significant change was found in the colloid osmotic pressures of blood or interstitial fluid. It is concluded that these results indicate the need for countermeasures to maintain precapillary-muscle tone during long space flights in order to prevent swelling of lower-leg tissues upon readjustment to earth's gravity. N.B.

A83-27794*#
COMPUTER SIMULATION ANALYSIS OF THE BEHAVIOR OF RENAL-REGULATING HORMONES DURING HYPOGRAVIC STRESS
J. I. LEONARD (GE Management and Technical Services Co., Houston, TX) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-65, S-66. refs
(Contract NAS9-16328)

A computer simulation of a mathematical circulation model is used to study the alterations of body fluids and their electrolyte composition that occur in weightlessness. The behavior of the renal-regulating hormones which control these alterations is compared in simulations of several one-g analogs of weightlessness and space flight. It is shown that the renal-regulating hormones represent a tightly coupled system that responds acutely to volume disturbances and chronically to electrolyte disturbances. During hypogravic conditions these responses lead to an initial suppression of hormone levels and a long-term effect which varies depending on metabolic factors that can alter the plasma electrolytes. In addition, it is found that if pressure effects normalize rapidly, a transition phase may exist which leads to a dynamic multiphasic endocrine response. N.B.

A83-27796#
CLONIDINE AS A COUNTER MEASURE FOR METABOLIC STUDIES DURING WEIGHTLESSNESS SIMULATION
A. GUELL, C. GHARRIB, G. GAUQUELIN, P. MONTASTRUC, and A. BES (Centre Hospitalier Universitaire, Toulouse, France) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-69, S-70. Research supported by the Centre National d'Etudes Spatiales.

The effect of clonidine is investigated in humans during a simulation of weightlessness. The subjects were placed in bedrest in the orthostatic position at -4 degrees during 7 days and clonidine was administered during the bedrest. Results showed that the control subjects who did not receive clonidine exhibited increased diuresis, sodium depletion and aldosterone outflow, while plasma renin and aldosterone rose after the first day. In subjects who received clonidine, the diuresis was inhibited and the sodium depletion was stopped after the second day, while the plasma renin and plasma aldosterone did not increase significantly and the antidiuretic hormone concentration in the urine was reduced. It is concluded that clonidine can be used as an effective countermeasure during weightlessness simulation experiments N.B.

A83-27797#
EFFECTS OF ANTIORTHOSTATIC POSITION AT -4 DEG ON HYDROMINERAL BALANCE
A. GUELL, C. GHARRIB, G. FANJAUD, P. DUPUI, and A. BES (Centre Hospitalier Universitaire, Toulouse, France) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-71, S-72. Research supported by the Centre National d'Etudes Spatiales. refs

Experiments involving bedrest in a -4 deg antiorthostatic position were conducted to simulate cardiocirculatory, metabolic, and hormonal modifications observed during space flight. Four young healthy volunteers were used in the seven-day experiment. Blood and urine samples were taken daily to determine the plasma concentrations of Na(+), K(+), creatinine, urea, renin and aldosterone. The hematocrit rose from 43.5 + or - 1.5 to 46.8 + or - 0.9. Plasma sodium fell from 138.1 + or - 0.5 to 136.3 + or - 0.7 mmol. Plasma renin activity rose significantly after the 24th hour. Increased diuresis, sodium depletion, and aldosterone outflow were noted along with the classic clinical picture of cephalic congestion. Blood pressure was not significantly modified, but heart rate decreased by 22 percent until the fourth day. These reactions were most striking during the first three or four days, and result from a redistribution of the body fluids toward the cardiac cavities and the head. C.D.

A83-27798#
CARDIOVASCULAR AND ENDOCRINE EFFECTS OF GRAVITATIONAL STRESSES /LBNP/ - THE INFLUENCE OF ANGIOTENSIN-CONVERTING ENZYME INHIBITION WITH CAPTOPRIL
F. BONDE-PETERSEN, B. HESSE, S. RASMUSSEN, N. J. CHRISTENSEN, J. GIESE, M. D. NIELSEN, and J. WARBERG (Copenhagen, Universitet, Copenhagen; University Hospital, Glostrup; University Hospital, Herlev; University Hospital, Hvidovre, Denmark) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-73, S-74. Research supported by the Danish Space Board. refs

The hemodynamic and hormonal responses of humans to lower body negative pressure (LBNP) were studied before and after captopril, a converting enzyme blocking agent, in order to determine the significance of the renin angiotensin system in relation to sympathetic nervous activity and plasma vasopressin concentration. Results show that the mean arterial pressure remained stable before captopril during -20 mm Hg LBNP, but fell after captopril. The plasma concentrations of renin and angiotensins I and II remained unchanged at -20 mm Hg LBNP before captopril, while the concentrations of epinephrine and vasopressin increased after captopril at -20 mm Hg LBNP. It is concluded that although there was an activation of vasoconstrictor hormones and the sympathetic nervous system after captopril, the fall in blood pressure was not compensated by an enhanced increase in the total peripheral resistance, which indicates a central role of the angiotensin system in normal blood pressure homeostasis. N.B.

A83-27802#
THE RELATIVE CONTRIBUTIONS OF GRAVITY, BUOYANCY, AND COLD TO THE CHANGES OF HUMAN PLASMA VOLUME DURING SIMULATED WEIGHTLESSNESS
D. R. KNIGHT and S. M. HORVATH (California, University, Santa Barbara, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-81, S-82.

Cardiac volume receptors may reduce plasma volume (Vp) during immersion by initiating diuresis. Other authors suggested that cold temperature and hydrostatic pressure (buoyancy) translocate sufficient blood into the central blood volume to distend the heart and stimulate volume receptors. Accordingly, body fluid responses in 6 men were attributed to either the forces of buoyancy (immersion, 35 C water), cold (14.8 C air), or cold buoyancy (29.8 C water) when the responses differed significantly from control (27.6 C air). Reduction of vital capacity (p less than 0.05) indicated expansion of central blood volume by the forces of buoyancy and cold buoyancy. Buoyancy and cold buoyancy caused diuresis (p less than 0.05), but only cold reduced the Vp (p less than 0.05). Shifts of plasma into the tissues probably resulted from cold-induced vasoconstriction because decrement of Vp was independent of urine volume. It is concluded that Vp is maintained during continuous expansion of central blood volume (6 hours) in spite of a diuretic response to stimulated volume receptors.
(Author)

A83-27820#
OCULOMOTORIC RESPONSE TO VOLUNTARY HEAD ROTATIONS DURING PARABOLIC FLIGHTS
S. VESTERHAUGE, A. MANSSON, T. S. JOHANSEN, and K. ZILSTORFF (Rigshospitalet; Royal Danish Air Force, Vedbaek, Denmark) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-117, S-118. Research supported by the Danish Space Board.

Eight voluntary subjects were exposed to zero-G environment during parabolic flight and to two-G conditions during the same flight. The oculomotoric response to voluntary horizontal head rotations at 0.4 Hz was measured and computed as the transfer function between the head rotations and the eye movements. The gain of the response varied proportionally to the G-load. This might be of importance for the development of space motion sickness because the variation results in unprecise eye movements in unusual G-environments. (Author)

A83-27840*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VO2 KINETICS DURING SUBMAXIMAL EXERCISE FOLLOWING SIMULATED WEIGHTLESSNESS
V. A. CONVERTINO and H. SANDLER (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-159, S-160. refs

A study is presented of the effects of deconditioning following 7 days of continuous head-down (-6 degrees) bedrest on changes in steady-state VO2, O2, and recovery VO2 during the performance of constant-load exercises. The deconditioning effects of bedrest on the physical working capacity were manifested in the subjects by significant changes in VO2 kinetics following the 7 days of head-down bedrest. While the subjects demonstrated the ability to attain similar steady-state VO2, simulated weightlessness using head-down bedrest resulted in a reduction of total VO2 capacity and an increase in the O2 deficit and VO2 halftime during submaximal constant-load exercise. It is concluded that this change in VO2 kinetics was induced by reexposure of the cardiovascular system to the +1 Gz (upright) environment. N.B.

A83-27841*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTS OF AGE AND SEX ON HORMONAL RESPONSES TO WEIGHTLESSNESS SIMULATION
F. LAROCHELLE, C. LEACH, and J. VERNIKOS-DANELLIS (NASA, Johnson Space Center, Houston, TX; NASA, Ames Research Center, Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-161, S-162. refs

The effects of horizontal bedrest on the excretion of catecholamines, aldosterone, and cortisol by human subjects grouped by age and sex are examined. The responses are assessed by assays of 24-hr urine samples collected throughout the studies. In 36-45-yr-olds, the excretion of epinephrine increases, whereas it decreases in the 46-55- and 56-65-yr-old groups. Norepinephrine excretion decreases (5-27%) in all groups during bedrest. Aldosterone excretion increases in the younger two groups of both males (19 and 6%) and females (47 and 9%). A slight decrease is observed in 56-65-yr-old males (6%), whereas excretion in females is unchanged. Cortisol excretion increases in the youngest groups of both men (12%) and women (13%) but decreases in the 56-65-yr-old groups (6 and 5%). For the two groups of intermediate age (46-55 yr), excretion in females decreases (15%), whereas in males it increases (19%). It is believed that hormone measurements may be of value in explaining variation in stress tolerance due to age and/or sex during space flight. C.R.

A83-27844*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INCREASED HEMATURIA FOLLOWING HYPERGRAVIC EXPOSURE IN MIDDLE-AGED WOMEN
D. J. GOLDWATER, D. B. OHARA, and H. SANDLER (NASA, Ames Research Center, Moffett Field, CA) (International Union of Physiological Sciences, Annual Meeting, 4th, San Diego, CA, Oct. 10-15, 1982.) Physiologist, Supplement, vol. 25, Dec. 1982, p. S-167, S-170. refs

The effects of simulated weightlessness on orthostatic tolerance were studied in 9 women (55 to 65 years old) who underwent acceleration and lower body negative pressure before and after 10 days of horizontal bed rest. The results of this study show the first known association of microscopic hematuria with hypergravic and orthostatic stress which suggests similarities to the 'stress hematuria syndrome' previously seen with heavy exercise (Boileau et al., 1980). In addition, the sporadic occurrence of this phenomenon indicates a multifactorial etiology in predisposed individuals. Bedrest or weightlessness simulation per se does not seem to significantly alter renal function, but may decrease microscopic hematuria with an orthostatic component. N.B.

A83-28757* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REDUCTION IN PEAK OXYGEN UPTAKE AFTER PROLONGED BED REST
J. E. GREENLEAF (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field, CA) and S. KOZLOWSKI (Polska Akademia Nauk, Warsaw, Poland) Medicine and Science in Sports and Exercise, vol. 14, no. 6, 1982, p. 477-480. refs

The hypothesis that the magnitude of the reduction in peak oxygen uptake (VO2) after bed rest is directly proportional to the level of pre-bed rest peak VO2 is tested. Complete pre and post-bed rest working capacity and body weight data were obtained from studies involving 24 men (19-24 years old) and 8 women (23-34 years old) who underwent bed rest for 14-20 days with no remedial treatments. Results of regression analyses of the present change in post-bed rest peak VO2 on pre-bed rest peak VO2 with 32 subjects show correlation coefficients of -0.03 (NS) for data expressed in 1/min and -0.17 for data expressed in ml/min-kg. In addition, significant correlations are found that support the hypothesis only when peak VO2 data are analyzed separately from studies that utilized the cycle ergometer, particularly with

subjects in the supine position, as opposed to data obtained from treadmill peak VO2 tests. It is concluded that orthostatic factors, associated with the upright body position and relatively high levels of physical fitness from endurance training, appear to increase the variability of pre and particularly post-bed rest peak VO2 data, which would lead to rejection of the hypothesis. N.B.

A83-28760* Bologna Univ. (Italy).
THE IDENTIFICATION OF THE VARIATION OF ATHEROSCLEROSIS PLAQUES BY INVASIVE AND NON-INVASIVE METHODS
R. H. SELZER and D. H. BLANKENHORN (Bologna, Universita, Bologna, Italy) In: Atherosclerosis: Clinical evaluation and therapy; Proceedings of the Fourth International Meeting on Atherosclerosis, Bologna, Italy, November 23-25, 1981. Lancaster, England, MTP Press, Ltd., 1982, p. 453-465. NASA-supported research refs (Contract NIH-HL-23619; NIH-HL-23807)

Computer-enhanced visualization of coronary arteries and lesions within them is discussed, comparing invasive and noninvasive methods. Trial design factors in computer lesions assessment are briefly discussed, and the use of the computer edge-tracking technique in that assessment is described. The results of a small pilot study conducted on serial cineangiograms of men with premature atherosclerosis are presented. A canine study to determine the feasibility of quantifying atherosclerosis from intravenous carotid angiograms is discussed. Comparative error for arterial and venous injection in the canines is determined, and the mode of processing the films to achieve better visualization is described. The application of the computer edge-tracking technique to an ultrasound image of the human carotid artery is also shown and briefly discussed. C.D.

A83-28765
A PHYSIOLOGICAL AND HYGIENIC EVALUATION OF THE WORK REGIME OF OPERATORS WHO ARE WORKING IN CURRENT ENERGY PRODUCTION IN KIRGHIZIA [FIZIOLOGO-GIGIENICHESKAIA OTSENKA REZHIMA TRUDA OPERATOROV, OBSLUZHIVAIUSHCHIKH SOVREMENNYE ENERGETICHESKIE PROIZVODSTVA KIRGIZII]
B. S. MAMBETALIEV, A. D. DZHAILOBAEV, A. B. BOTOMBEKOVA, O. T. KASYMOV, and A. M. KYDYRALIEVA (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR) Zdravookhranenie Kirgizii, Sept.-Oct. 1982, p. 7-12. In Russian.

A83-28801
THE VALUE OF ECHOCARDIOGRAPHY IN DIAGNOSING DISEASES OF THE CARDIOVASCULAR SYSTEM [ZNACHENIE EKHOKARDIOGRAFII V DIAGNOSTIKE ZABOLEVANII SERDECHNO-SOSUDISTOI SISTEMY]
K. I. KORYTNIKOV Voenno-Meditsinskii Zhurnal, Feb. 1983, p. 35-38. In Russian. refs

A review is presented of research concerning the use of one and two-dimensional echocardiography in diagnosing diseases of the cardiovascular system. Topics discussed include the use of echocardiography in evaluating the size of the left atrioventricular opening in patients with mitral stenosis, determining the presence of pericardial exudations in patients with myocardial infarctions, determining the presence of primary and metastasizing heart tumors, evaluating the extent of hypertrophy of the myocardium of the left ventricle, and determining the general and intracardial hemodynamics in patients with hypertonic diseases and arterial hypertension. It is concluded that the use of these two types of echocardiography permit a significant improvement in the diagnosis of a wide variety of cardiovascular diseases, as well as an increase in the effectiveness of monitoring the recovery of these patients. N.B.

A83-28802
THE CONDITION OF THE CONTRACTILE FUNCTION OF THE MYOCARDIUM AND THE HEMODYNAMICS IN PATIENTS WITH HEART DISEASES ACCORDING TO ECHOCARDIOGRAPHY [SOSTOIANIE SOKRATITEL'NOI FUNKTSII MIOKARDA I GEMODINAMIKI U BOL'NYKH S POROKAMI SERDTSA PO DANNYM EKHOKARDIOGRAFII]
S. P. SOVLUKOV, S. N. MIROCHITSKII, V. V. ZABRODSKII, L. V. PETRUSEVA, and O. P. VIUSHINA Voenno-Meditsinskii Zhurnal, Feb. 1983, p. 38-40. In Russian.

A83-28803
THE HEMATOLOGICAL CHANGES DURING THE ADAPTATION TO POLAR CONDITIONS [GEMATOLOGICHESKIE IZMENENIIA PRI ADAPTATSII V USLOVIIAKH ZAPOLIAR'IA]
I. A. SAPOV and V. S. NOVIKOV Voenno-Meditsinskii Zhurnal, Feb. 1983, p. 45, 46. In Russian.

The changes in the hematological parameters were investigated in individuals during the process of their adaptation to polar conditions. Studies were conducted on 348 individuals who had lived in these conditions from 1 month to 15 years. Three periods of hematological changes are found which occur during the adaptation to polar conditions. During the first year the number of leukocytes increases as a result of an increased tendency for lymphocytosis, monocytosis, neutropenia, etc. caused by the adaptation process. During the next 6-8 years these processes are stabilized. The third period, beginning 9-12 years after the adaptation process is initiated, increased leukopenia, neutropenia, and lymphopenia are observed, which lead to a lowering of the protective action of the blood. N.B.

A83-28804
THE EVALUATION OF THE FUNCTIONAL CONDITION OF THE CARDIAC MUSCLE DURING BICYCLE ERGOMETER TESTS IN PILOTS [OTSENKA FUNKTSIONAL'NOGO SOSTOIANIIA SERDECHNOI MYSHTSY PRI VELOERGOMETRII U LITS LETNOGO SOSTAVA]
E. G. MUKHAMEDOV, A. G. BRIUKHOVETSKII, and L. P. PUKACH Voenno-Meditsinskii Zhurnal, Feb. 1983, p. 47, 48. In Russian. refs

The functional condition of the cardiac muscle was evaluated in pilots by determining the level of the maximum arterial pressure and the length of the electrical systole. Bicycle ergometer tests were conducted on 46 patients with various types of heart diseases and on 50 healthy pilots ranging in age from 25-52 years. Results showed that the size of the 'systolic production' among the patients differed significantly from that exhibited by the healthy pilots. It is concluded that the combination of bicycle ergometer tests and determinations of the 'systolic production' can effectively be used to evaluate the functional condition of the cardiovascular system in pilots. N.B.

A83-28805
THE EFFECT OF SMOKING ON THE NONSPECIFIC RESISTANCE OF SAILORS DURING SEA VOYAGES [VLIIANIE KURENIIA NA NESPETSIFICHESKUIU REZISTENTNOST' ORGANIZMA MORIAKOV, NAKHODIASHCHIKHSIA V PLAVANII]
V. N. BORTNOVSKII Voenno-Meditsinskii Zhurnal, Feb. 1983, p. 49, 50. In Russian. refs

The effect of smoking on the nonspecific resistance of sailors during extended sea voyages was studied in 74 individuals between the ages of 25-32 years, 38 of whom had smoked for at least 5 years. Factors investigated include the number of leukocytes, their absorption function, the intensity of absorption, the physical work capacity, and the subjective condition of the individual. It is concluded that smoking during extended sea voyages has a negative effect on the nonspecific mechanisms of the anti-infection defences of sailors, which leads to a decrease in their physical work capacity and an increase in infectious pathologies. N.B.

A83-28925
PSYCHOLOGICAL STRESS INDUCES SODIUM AND FLUID RETENTION IN MEN AT HIGH RISK FOR HYPERTENSION
K. C. LIGHT, J. P. KOEPKE, P. A. OBRIST, and P. W. WILLIS, IV (North Carolina, University, Chapel Hill, NC) Science (ISSN 0036-8075), vol. 220, April 22, 1983, p. 429-431. refs ISSN 0036-8075
(Contract PHS-HL-23718; PHS-HL-18976; PHS-HL-01096; PHS-RR-46)

Exposure to competitive mental tasks significantly reduced the urinary sodium and fluid excreted by young men with one or two hypertensive parents or with borderline hypertension. In this high-risk group, the degree of retention was directly related to the magnitude of heart rate increase during stress, suggesting common mediation by way of the sympathetic nervous system. Thus, psychological stress appears to induce changes in renal excretory functions that may play a critical role in long-term blood pressure regulation. Author

A83-28926* Naval Aerospace Medical Research Lab., Pensacola, Fla.
MOTION SICKNESS - ACQUISITION AND RETENTION OF ADAPTATION EFFECTS COMPARED IN THREE MOTION ENVIRONMENTS
A. GRAYBIEL and J. R. LACKNER (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 307-311. ISSN 0095-0562
(Contract NAS9-15147; NASA ORDER T-3384-G)

The acquisition and retention of adaptation effects in motion sickness was invetigated using a sudden-stop vestibulovisual interaction test for measuring susceptibility to motion sickness (Graybiel and Lackner, 1980). The test procedure included four successive assessments that provide not only an index of susceptibility to motion sickness but also the rates of acquisition and decay of adaptation effects. The 14 subjects who had participated in this test had previously served as subjects in parabolic flight experiments and seven of them had also taken part in the assessment of antimotion-sickness remedies in a slow rotation room. A study was conducted to determine whether these subjects' rates of acquisition and decay of adaptation to stressful motion represent consistent general features of their response across motion environments. It is found that an individual's rates of acquiring and losing adaptation are quite consistent in very different situations. In addition, the pattern of results indicate modifications of the sudden-stop vestibulovisual test that should increase its effectiveness as a motion-sickness screening procedure, both for orbital flight and for terrestrial conditions. N.B.

A83-28927
SPACE MOTION SICKNESS - PHENOMENOLOGY, COUNTERMEASURES, AND MECHANISMS
E. I. MATSNEV, I. I. IAKOVLEVA, I. K. TARASOV, V. N. ALEKSEEV, L. N. KORNILOVA, A. D. MATEEV, and G. I. GORGILADZE (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 312-317. refs ISSN 0095-0562

A summary of the incidence of Space Motion Sickness (SMS) in 27 Soviet cosmonauts who flew on missions varying from 2-185 d in the Salyut-6/Soyuz vehicle complex is presented. A questionnaire indicated that 88 percent (24) of the cosmonauts developed some type of 'illusionary sensations' while 44 percent (12) presented some degree of SMS. The SMS countermeasures used in flight included an antihistaminic drug, pneumatic cuffs applied to the thigh region, application of lower body negative pressure, a head cap that restricted head movement while simultaneously providing force stimulus to the cervical antigravity muscles, and finally the use of an insole counterpressure device that added pressure to the sole of the foot. Author

A83-28928
CORRECTION OF CHANGES IN FLUID-ELECTROLYTE METABOLISM IN MANNED SPACE FLIGHTS
A. I. GRIGOREV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 318-323. refs ISSN 0095-0562

In order to prevent and correct hypohydration and negative electrolyte balance, the effects of exercises, lower body negative pressure (LBNP) and water-salt supplements (WSS) were investigated in more than 100 test subjects during 14-, 49and 182-d headdown tilt tests (-4 deg). A combined use of WSS and LBNP during regular exercises led to a distinct water and sodium retention. These changes were mainly determined by the stimulation of the renin-angiotensin-aldosterone and antidiuretic systems. After these countermeasures were tested in simulation studies, they were used by 12 cosmonauts during the 63- and 185-d space flights. The detailed analysis of the postflight examinations of the crewmembers suggests that these countermeasures may exert a beneficial effect on fluid-electrolyte balance. Author

A83-28931
THE APPLICATION OF POSITIVE PRESSURE BREATHING FOR IMPROVING +GZ ACCELERATION TOLERANCE
J. DOMASZUK (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 334-337. refs ISSN 0095-0562

Investigations on +Gz acceleration tolerance were carried out in pilots using various values of positive pressure breathing (PPB) during centrifugation. The greatest improvement of +Gz tolerance - 2.2 +Gz - was achieved while applying PPB = 45 mm Hg and using a counterpressure suit. PPB prolonged the time at +5Gz from 2 min 35 s under control conditions to 6 min 53 s at PPB = 45 mm Hg. The mechanism of the increase in acceleration tolerance at PPB, is discussed, stressing its protective effect on the circulatory system. Author

A83-28936
HYPOXIA - USAF EXPERIENCE 1970-1980
R. B. RAYMAN (USAF, Hospital, England AFB, LA) and G. B. MCNAUGHTON (USAF, Inspection and Safety Center, Norton AFB, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 357-359. ISSN 0095-0562

During 1970-80, 298 USAF aircrewmen were reported as having experienced in-flight hypoxia. Although none of the incidents resulted in an aircraft accident, the potential was there in that many of the reported symptoms were incapacitating to some degree. Most often, the cause of the hypoxia incident was due to cockpit/cabin depressurization or some other malfunction of the oxygen system. However, it was sometimes due to poor oxygen discipline. The authors emphasize that, with a thorough preflight inspection of the mask, hose, and connections as well as a PRICE check, the risk of in-flight hypoxia would be significantly reduced. Author

A83-28937
TIMOLOL MALEATE - SIDE EFFECTS ON HEALTHY NONGLAUCOMATOUS VOLUNTEERS
J. DAVIDSON (Israel Air Force, Aeromedical Center, Ramat Gan; Asaf Harofe Hospital, Tserifin, Israel), J. RIBAK, D. ECKSTEIN (Isreal Air Force, Aeromedical Center, Ramat Gan, Israel), and R. BARISHAK (Asaf Harofe Hospital, Tserifin, Israel) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 360-362. refs ISSN 0095-0562

As the number of military pilots over the age of 40 increases, open-angle glaucoma becomes an important aeromedical problem. Epinephrine ophthalmic solution is the only antiglaucomatotic agent in use among flying personnel. Timolol maleate, a new antiglaucomatotic agent, is a nonselective beta-blocker. This drug has a potent hypotensive effect on intraocular pressure with a minimal effect on visual functions. The present data show that it

significantly decreases the pulse rate and may eventually be a basis for cardiac dysrythmias. Author

A83-29273
THE EFFECT OF VISION ON THE ENDURANCE BY HUMANS OF THE CONTINUOUS ACTION OF CORIOLIS ACCELERATION [O VLIIANII ZRENIIA NA PERENOSIMOST' CHELOVEKOM NEPRERYVNYKH VOZDEISTVII USKORENII KORIOLISA]
E. V. LAPAEV and O. A. VOROBEV Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia (ISSN 0002-3329), Mar.-Apr. 1983, p. 276-281. In Russian. refs ISSN 0002-3329

The susceptibility of humans to motion sickness induced by sign-alternating Coriolis accelerations is studied using various combinations of visual stimuli fixed and moving relative to the subject. Results show that visual, in particular optokinetic, stimuli can both improve and worsen the endurance of a subject to continuous Coriolis acceleration in comparison with the endurance with closed eyes. It is shown that the expression of the symptoms of motion sickness under the simultaneous action of vestibular and optokinetic stimuli is proportional to the rate of the development and the intensity of the vestibular-sensory (illusory) reactions which form in these conditions. N.B.

A83-29301
THE ASYMMETRY OF THE SENSITIVITY OF THE AUDITORY SYSTEM OF HUMANS DETERMINED BY A METHOD OF CONSTANT STIMULI [ASSIMETRIIA CHUVSTVITEL'NOSTI SLUKHOVOI SISTEMY CHELOVEKA, OPREDELENNAIA METODOM POSTOIANNYKH RAZDRAZHITELEI]
V. G. KAMENSKAIA (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 179-186. In Russian. refs ISSN 0131-1646

The characteristics of the threshold zone of the right and left ears were studied in subjects with normal hearing. Discrete tonal pulses with constant temporal characteristics and values of the fill frequencies, which were selected on the basis of the width of the critical auditory band of humans, were utilized as stimuli. Results show that an asymmetry of sensitivity was observed in all subjects, although the asymmetry was expressed in different degrees. In four subjects, the asymmetry had a monotonic character: the left ear was more sensitive than the right to a majority of frequencies. One subject did not display a predominance of the lower threshold characteristics for either ear. N.B.

A83-29302
EVOKED POTENTIALS OF THE POSTERIOR ASSOCIATIVE REGIONS OF THE CEREBRUM DURING THE DISCRIMINATION AND IDENTIFICATION OF HUMAN FACIAL IMAGES [VYZVANNYE POTENTSIALY ZADNIKH ASSOTSIATIVNYKH OBLASTEI KORY PRI RAZLICHENII I OPOZNANII IZOBRAZHENII CHELOVECHESKIKH LITS]
T. P. ZELENKOVA Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 187-194. In Russian. refs ISSN 0131-1646

The visual evoked potentials (EV) of healthy subjects in the posterior associative regions of both cerbral hemispheres were investigated during the perception of a random sequences of a diffusely illuminated stimulus field ('clear slide') and three human facial images with insignificant differences in the drawing of the eyes and mouths. The dependence of the expression of P180 waves on the basic perception problem was shown in conditions of roughly differentiated images and 'clear slides.' An analysis of relations of EV to the images in conditions which finely differentiated their distinguishing details showed the unidirectional differences of waves in a definite temporal sequence: in the right hemisphere in the earliest components (N140 and P180), in the left hemisphere in the latest (P300 and N350), which were higher during the presentation of the signal images. It is concluded that functional reorientations of the interhemispheral relations, which ensure the identification and selection of visual images, are reflected in the amplitude parameters of the EV of the associative regions of the cerebral hemispheres. N.B.

A83-29303
THE ASYMMETRY OF THE FUNCTIONAL CONDITION OF THE CEREBRAL HEMISPHERES DURING THE ADAPTATION TO NEW CLIMATIC AND GEOGRAPHICAL CONDITIONS [ASIMMETRIA FUNKTSIONAL'NOGO SOSTOIANIIA POLUSHARII GOLOVNOGO MOZGA PRI ADAPTATSII K NOVYM KLIMATO-GEOGRAFICHESKIM USLOVIIAM]
V. V. KOLYSHKIN (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 195-202. In Russian. refs ISSN 0131-1646

The functional interaction of the cerebral hemispheres was studied during the adaptation of 8 clinically healthy right-handed humans to new climatic and geographical conditions in Novosibirsk and Kamchatka. The functional interaction was determined using a modification of the dichotomy test, which ensured a quantitative evaluation of the traces by the hemispheres with the simultaneous bilateral registration of a series of functional parameters. A multiparametric analysis of the functional condition of humans in polar conditions was conducted. Results show the active role of interhemisphere mechanisms in the formation of a new adaptive state. The effect of external factors on the activity of both hemispheres was observed. It is found that the functioning of the left hemisphere depends to a great degree on the functional condition of the body, which changes under the influence of environmental factors. The significant activation of the right hemisphere in new climatic and geographical conditions is shown. Possible physiological mechanisms for these phenomena are discussed. N.B.

A83-29304
A COMPARATIVE ANALYSIS OF THE AMPLITUDE-FREQUENCY CHARACTERISTICS OF THE MICROPHONE POTENTIALS OF HUMANS AS DETERMINED BY EXPERIMENTS AND WITH A MATHEMATICAL MODEL [SRAVNITEL'NYI ANALIZ AMPLITUDNO-CHASTOTNOI KHARAKTERISTIKI MIKROFONNYKH POTENTSIALOV CHELOVEKA, POLUCHENNYKH EKSPERIMENTAL'NO I S POMOSHCH'IU MATEMATICHESKOGO MODELIROVANIIA]
L. N. BABKINA, A. P. MOLCHANOV, and T. I. TERESHCHUK (Ministerstvo Zdravookhraneniia RSFSR, Leningradskii Nauchno-Issledovatel'skii Institut po Bolezniam Ukha, Gorla, Nosa i Rachi, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 223-231. In Russian. refs ISSN 0131-1646

The amplitude-frequency characteristics (AFCs) of variable potentials registered in the tympanic membrane of humans were compared with the AFCs obtained by using a mathematical model of the peripheral region of the auditory system. Results showed a significant discrepancy between the AFCs in the low-frequency region. The possible reasons for this discrepancy were investigated by comparing these data with the results of experiments using various animals. It is found that at frequencies below 1-1.5 kHz the phase coincident component of the potentials of the action of the auditory nerve fibers constitutes a significant portion of the total cochlear potentials. N.B.

A83-29305
THE EFFECT OF HIGH-INTENSITY SOUND ON THE THRESHOLD OF VIBRATIONAL SENSITIVITY [O VLIIANII SHUMA VYSOKOI INTENSIVNOSTI NA POROGI VIBRATSIONNOI CHUVSTVITEL'NOSTI]
IU. V. KRYLOV Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 232-236. In Russian. refs ISSN 0131-1646

It is determined that during the action on humans of acoustic energy at intensities of 125 dB and greater, the initial stimulation of the vibration receptors may lead to the formation of an unfavorable response reaction that is independent of the stimulation of the auditory system. A recommendation is proposed for humans in conditions of high-intensity sound which is based on the principle of 'total defense.' It is shown experimentally that the responses of the auditory and the vibratory tactile systems have a common character in masking and fatigue parameters, as well as in the

zone of the largest increase in the threshold sensitivity, which are formed during the action of high-intensity acoustical energy on these two systems. Based on these results, a method is suggested which can be employed for the rehabilitation of several categories of deaf individuals. N.B.

A83-29306
THE REACTION OF THE CENTRAL BLOOD CIRCULATION OF HEALTHY INDIVIDUALS TO THE DECOMPRESSION OF VARIOUS AREAS OF THE BODY [REAKTSIIA TSENTRAL'NOGO KROVOOBRASHCHENIIA ZDOROVOGO CHELOVEKA NA DEKOMPRESSIIU RAZLICHNYKH OBLASTEI TELA]

V. E. KATKOV, V. V. CHESTUKHIN, E. M. NIKOLAENKO, V. V. RUMIANTSEV, S. V. GVOZDEV, O. KH. ZYBIN, and E. V. KOLPAKOV Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 237-241. In Russian. refs ISSN 0131-1646

The effect of decompression of various areas of the human body (including the lower half of the body and the area near the hydrostatic indifferent point) on the central hemodynamics was studied. The method used in this investigation was the catheterization of the heart in 8 healthy males whose bodies were in an antiorthostatic position at an angle of 15 degrees. It was found that significantly greater changes in the central hemodynamics (the lowering of the central venous pressure and the lowering of the pressure in the pulmonary arteries) occurred during the decompression of the areas of the body near the hydrostatically indifferent point than during the decompression of other areas. It was determined that the largest effect of the decompression of the area of the hydrostatically indifferent point on the central hemodynamics is linked with the anatomical and physiological characteristics of this area. It is concluded that this area of the body will be the most critical area for the protection of the blood circulation during the acute period of adaptation to weightlessness in comparison with other areas of the human body. N.B.

A83-29307
THE PHASE CHARACTER OF THE COMPENSATORY REACTIONS OF THE CARDIOVASCULAR SYSTEM DURING ACTIVE ORTHOSTATIC TESTS [FAZNOST' KOMPENSATORNYKH REAKTSII SERDECHNO-SOSUDISTOI SISTEMY PRI AKTIVNOI ORTOSTATICHESKOI PROBE]

SH. T. AVETIKIAN (Nauchno-Issledovatel'skii Neirokhirurgicheskii Institut, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 242-248. In Russian. refs ISSN 0131-1646

The dynamic reactions of the cardiovascular system during active orthostatic tests were studied in 46 healthy males 22-50 years of age. The cardiac intervals, rheoencephalograms, seismocardiograms, and arterial pressures were recorded. Results show the presence of three transition phases of the adaptation process. In the first phase, hypotonic changes of the rheoencephalogram, pronounced tachycardia, and a rise in the amplitude of the systolic jumps of the seismocardiogram were observed. In the second phase, a tendency of the rheoencephalogram changes toward the hypertonic form, relatively fewer systoles, and a further rise in the amplitude of the seismocardiogram were found. In the third phase, a rise in the arterial pressure, a return of the rheoencephalogram to a normal tonic form, a gradual stabilization of the pulse rate, and the return of the amplitude of the seismocardiogram to a level slightly above the initial level were detected. These phases reflect the shift of the initial local compensatory reactions, which are manifested in the autoregulatory decrease of the tonus of the brain vessels, as well as in the stronger and more frequent heart contractions subsequent to the systemic reactions in the form of increased arterial pressure. N.B.

A83-29308
CIRCADIAN RHYTHMS OF WORK CAPACITY, THE ACTIVITY OF THE SYMPATHOADRENAL SYSTEM AND MYOCARDIAL INFARCTION [SUTOCHNYE RITMY RABOTOSPOSOBNOSTI, AKTIVNOSTI SIMPATIKO-ADRENALOVOI SISTEMY I INFARKT MIOKARDA]

I. E. GANELINA and I. IU. BORISOVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 249-256. In Russian. refs ISSN 0131-1646

A83-29309
AN INVESTIGATION OF THE RESONANCE CHARACTERISTICS OF THE CARDIOVASCULAR SYSTEM [ISSLEDOVANIE REZONANSNYKH KHARAKTERISTIK SERDECHNO-SOSUDISTOI SISTEMY]

E. G. VASHCHILLO, A. M. ZINGERMAN, M. A. KONSTANTINOV, and D. N. MENITSKII (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 257-265. In Russian. refs ISSN 0131-1646

The pattern of the human cardiovascular system was studied using the classical method of frequency analysis in the theory of automatic control. The harmonic test excitations were produced by the voluntary modulation of the heart rate according to the sinusoidal law with the use of a feedback apparatus. The amplitude-phase frequency characteristics of the cardiovascular system were determined by the heart rate yield and the arterial pressure yield. The presence of a functional resonance of the cardiovascular system was found in the frequency range of 0.01-0.14 Hz. The possible regulatory mechanisms which form the resonance properties are examined. N.B.

A83-29310
THE EFFECT OF HYPOXIA ON THE FUNCTIONAL CONDITION OF THE EXTERNAL RESPIRATORY SYSTEM IN MATURE AND OLD AGE [VLIIANIE GIPOKSII NA FUNKTSIONAL'NOE SOSTOIANIE SISTEMY VNESHNEGO DYKHANIIA V POZHILOM I STARCHESKOM VOZRASTE]

L. A. IVANOV (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 273-280. In Russian. refs ISSN 0131-1646

The parameters of pulmonary ventilation, the partial pressures of oxygen and carbon dioxide gas in the alveolar air (PA O2 and PA CO2, respectively), and the oxygen tension in the arterial blood were determined for 11 healthy young males (19-32 years of age) and for 22 old males (60-80 years of age) while breathing air mixtures containing 12.5 and 17 percent oxygen. Results show that during the breathing of gas mixtures containing 17 percent oxygen, the old subjects exhibited a greater increase in pulmonary ventilation, a smaller decrease in the alveolar arterial gradient of PO2, and a larger decrease in PaO2 than in the control group. In addition, the old group showed a lowered effectiveness of pulmonary ventilation, an absence of a decrease in the rheographic index of the lungs, and a decrease in PA CO2. No age differences were found in the PA O2 pattern. During the breathing of gas mixtures with 12.5 percent oxygen, a smaller increase in pulmonary ventilation and a larger decrease in PA O2 was found for the old group than for the control group. An age difference was found at both levels of hypoxia in the pattern of the oxygen saturation of the arterial blood, as well as in the slow recovery of the investigated parameters of pulmonary ventillation and gas exchange after the influence of a lack of oxygen. N.B.

A83-29311
THE CIRCADIAN RHYTHM OF THE BODY TEMPERATURE, ARTERIAL PRESSURE, AND HEART RATE [K VOPROSU O SUTOCHNOM RITME TEMPERATURY TELA, ARTERIAL'NOGO DAVLENIIA, CHASTOTY SEROLECHNYKH SOKRASHCHENII]
G. P. DERIAGINA and IA. M. KRAEVSKII (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 281-289. In Russian. refs ISSN 0131-1646

The circadian periods of the body temperature (BT), heart rate (HR), and the systolic and diastolic arterial pressure (SAP and DAP) were studied in 41 healthy individuals and in 19 individual patients with ischemic heart disease. The circadian rhythms of the BT, HR, and the APs were compared with the excretion of adrenal hormones with the urine. The individual character of the circadian periods of the BT, HR, and APs were determined, and four types of diurnal rhythms were found. The circadian rhythm of BT and SAP in the healthy individuals and the patients were determined at night and during the working day. A rhythmic oscillation was found in the HR of the healthy individuals and in the HR and DAP of the patients. No correlation between the diurnal rhythms of BT, HR, and APs and the excretion of adrenal hormones with the urine was found. Identical structures of the diurnal rhythms of the BT, HR, and APs were found in healthy individuals and patients with various psychological personality characteristics. A conclusion is presented about the normalizing influence of work on the circadian patterns of the HR and APs in healthy individuals and in patients with ischemic heart disease. N.B.

A83-29312
DIURNAL RESPIRATORY RHYTHMS IN YOUNG HEALTHY PEOPLE IN SIBERIA AND THE FAR NORTH [SUTOCHNYE RITMY DYKHANIIA U MOLODYKH ZDOROVYKH LIUDEI V USLOVIIAKH SIBIRI I KRAINEGO SEVERA]
A. I. ARAKCHEEV (Ministerstvo Zdravookhraneniia, Tsentral'nyi Nauchno-Issledovatel'skii Institut Travmatologii i Ortopedii, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 290-294. In Russian. refs ISSN 0131-1646

A83-29313
THE THERMAL CONDITION AND SYSTEMIC BLOOD CIRCULATION OF THE HUMAN BODY IN THE CASE OF MODERATE (PHYSIOLOGICAL) LEVELS OF COOLING [TEPLOVOE SOSTOIANIE I SISTEMNOE KROVOOBRASHCHENIE ORGANIZMA CHELOVEKA PRI UMERENNYKH (FIZIOLOGICHESKIKH) STEPENIAKH EGO OKHLAZHDENIIA]
E. V. MAISTRAKH, S. N. TIGLIEVA, N. M. CHEKINA, V. A. AVERIANOV, I. S. KAREV, and O. A. KOROBKINA (Gosudarstvennyi Institut Usovershenstvovaniia Vrachei, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 295-300. In Russian. refs ISSN 0131-1646

A83-29314
NITROGEN METABOLISM DURING HEAT STRESS [AZOTISTYI OBMEN PRI TEPLOVOM STRESSE]
G. N. NOVOZHILOV and K. K. SILCHENKO (Voenno-Meditsinskaia Akademiia, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 301-306. In Russian. refs ISSN 0131-1646

Results are presented of an investigation of the energy balance and nitrogen metabolism in males who performed moderate physical work in conditions of heat stress. The subjects showed an increase in their need for energy, which was satisfied in part during their adaptation to basic influences by an intensification of the nitrogen metabolism. The products of nitrogen metabolism were eliminated in the perspiration to a greater extent in conditions of heat stress than when the subjects were in more comfortable conditions. N.B.

A83-29315
OXYGEN UPTAKE AND ELIMINATION OF NONMETABOLIC CO2 EXCESS IN AN INITIAL PERIOD OF HEAVY MUSCULAR EXERCISE [POTREBLENIE KISLORODA I VYDELENIE NEMETABOLICHESKOGO IZLISHKA CO2 V NACHAL'NYI PERIOD NAPRIAZHENNOI MYSHECHNOI DEIATEL'NOSTI]
N. D. ALTUKHOV, N. I. VOLKOV, A. N. KONRAD, and I. A. SAVELEV (Gosudarstvennyi Tsentralnyi Institut Fizicheskoi Kultury, Moscow, USSR; Latviiskii Gosudarstvennyi Institut Fizicheskoi Kultury, Riga, Latvian SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 307-315. In Russian. refs ISSN 0131-1646

A83-29316
VARIATIONS IN HEART RATE (PULSE 'DRIFT') IN THE COURSE OF WORK OF CONSTANT AEROBIC INTENSITY IN ATHLETES AND NONATHLETES [IZMENENIIA V CHASTOTE SERDECHNYKH SOKRASHCHENII (PUL'SOVOI 'DREIF') NA PROTIAZHENII RABOTY POSTOIANNOI AEROBNOI MOSHCHNOSTI U SPORTSMENOV I NESPORTSMENOV]
V. M. ALEKSEEV and IA. M. KOTS (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 316-322. In Russian. refs ISSN 0131-1646

A83-29317
AN INVESTIGATION OF THE ACHILLES REFLEX IN STANDING HUMANS [ISSLEDOVANIE AKHILLOVA REFLEKSA U STOIASHCHEGO CHELOVEKA]
B. N. SMETANIN and A. V. NAIDEL (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 323-329. In Russian. refs ISSN 0131-1646

The influence of the forward inclination of the body on the dependence of the Achilles reflex according to the force of the blow to the tendon was studied in conditions of vertical posture. Varied changes in this dependence were found in individual subjects. It is shown that this dependence has a varying strength as a consequence of the simultaneous action on the Achilles reflex of facilitating and hindering influences. The facilitating effect is linked with the increase of the forward tilting moment of the body and reflects the compensatory increase of the activity of the motoneurons of the triceps of the calf. It is proposed that two mechanisms participate in the genesis of the hindering effect: a presynaptic inhibition which develops at the level of the terminal afferents, and a change in the size of the action potentials of the muscle fibers which is linked with the decreases of their diameters during the tensing of the muscles. N.B.

A83-29318
AN INVESTIGATION OF THE RIGIDITY OF A HUMAN MUSCLE DEPENDING ON ITS LENGTH [ISSLEDOVANII ZHESTKOSTI MYSHTSY CHELOVEKA V ZAVISIMOSTI OT EE DLINY]
D. M. GORINEVSKII (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR) and T. B. KIREEVA (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 330-336. In Russian. refs ISSN 0131-1646

The rigidity of muscles in a small range of changes of the length of an equivalent forearm flexing was studied in 6 healthy subjects using a method of rapid tensings. The rigidity of the tensed muscle was determined from the equalization of the pattern of rotation in three different lengths of relaxed and tensed muscles. In the determination of the dependence of the rigidity on the presence of a load (for a force of about 20 percent of maximal), it was found that in these conditions the rigidity increased not greater than 1.5 times for all of the muscle lengths studied. It is proposed that the mechanical properties of the passive muscles possibly exert a greater effect on the pattern of motion. The curve which shows the dependence of the rigidity on the length of both the relaxed and tensed muscles has a V-shaped form. The rigidity is at a minimum in the medium-length muscle and is greater in short and long muscles. N.B.

A83-29319
THE CHANGE OF THE CONTRALATERAL REFLEX EFFECTS ON THE BACKGROUND OF THE JENDRASSIK TECHNIQUE [IZMENENIE KONTRALATERAL'NYKH REFLEKTORNYKH VLIIANII NA FONE PRIEMA IENDRASSIKA]
A. M. ELNER (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 9, Mar.-Apr. 1983, p. 337-340. In Russian. refs ISSN 0131-1646

A mutual hindering of two effects is found on the functional condition of the segmental system of the spinal cord, in which each effect evokes an increase of the reflexes to tension. These results were obtained during an investigation of the bilateral reflex effects on the background of an artificial increase in the tendon reflexes using the Jendrassik technique. In these conditions, after evoking a conditioned knee reflex in one leg, the knee reflex tested in the other leg was found to be changed differently than in usual conditions: an inhibition occurs instead of a late (and in some of the subjects an early) facilitation. The effect of the Jendrassik technique is also decreased in these conditions. In conditions where the Jendrassik technique is ineffective, the bilateral effect remains unchanged. The possible mechanisms for these phenomena are examined. N.B.

A83-29710* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WHAT DOES THE EYE SEE BEST?
A. B. WATSON (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, CA), H. B. BARLOW, and J. G. ROBSON (Cambridge University, Cambridge, England) Nature (ISSN 0028-0836), vol. 302, March 31, 1983, p. 419-422. refs ISSN 0028-0836

The quantum efficiency of the human eye is measured for detecting a wide variety of spatiotemporal patterns using foveal vision in bright light. The performance of an ideal visual detector whose weighting function is matched to the signal is analyzed in the abstract, and the conditions of a two-interval forced-choice experiment are described. The best stimulus found is a small, briefly exposed circular patch of sinusoidal grating having a spatial frequency of about 7 c/deg, drifting at about 4 Hz. It is proposed that this is the weighting function of the most efficient human contrast detector. This function resembles the receptive field sensitivity profiles of many cortical neurons. The detectors resemble those derived from other recent experiments on both detection and discrimination and may account for a broad range of previous psychophysical results. C.D.

N83-21760# Joint Publications Research Service, Arlington, Va.
ULTRASONIC DOPPLER CARDIOGRAPHY AS A METHOD OF STUDYING INFLIGHT CARDIODYNAMICS (RESULTS OF PATENT AND INFORMATION ANALYSIS)
V. S. BEDNENKO and A. N. KOZLOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 1-8 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 4-8
Avail: NTIS HC A07/MF A01

Patent and information data on the methods of cardiac location using ultrasound Doppler cardiography, as well as on the design and development of onboard equipment to be used for medical monitoring of aircraft and spacecraft crewmembers inflight were reviewed. It is emphasized that Doppler cardiography, being a very informative, noise proof and relatively simple technique, holds high promise for operational medical monitoring. Author

N83-21761# Joint Publications Research Service, Arlington, Va.
VITAMIN LEVELS IN COSMONAUTS IN PREFLIGHT TRAINING PERIOD
M. S. BELAKOVSKIY, N. D. RADCHENKO, N. G. BOGDANOV, and V. B. SPIRICHEV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 9-12 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 8-10
Avail: NTIS HC A07/MF A01

Measurement of vitamin supply of cosmonauts during their intensive training a month preflight showed moderate deficiency of thiamine, riboflavine, pyridoxine, nicotinamide and ascorbic acid. A regular uptake of the vitamin complex for 2 weeks optimized significantly vitamin metabolism. Author

N83-21762# Joint Publications Research Service, Arlington, Va.
EFFECT OF LONG-TERM SPACEFLIGHTS ON HUMAN AMINO ACID METABOLISM
A. S. USHAKOV, T. F. VLASOVA, Y. B. MIROSHNIKOVA, V. M. MIKHAYLOV, and Y. N. BIRYUKOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 13-18 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 10-15
Avail: NTIS HC A07/MF A01

The amino acid composition of the plasma and serum of Salyut 6 crewmembers who performed flights of different duration was investigated. The parameter was found to vary depending on the flight time and use of different countermeasures. The 75 and 185 day cosmonauts who did not exercise in a full measure showed a decrease in the amino acid pool typical of emergency situations. The 96, 140 and 175 day crewmembers who exercised as prescribed exhibited the lack of changes in the total content of amino acids and variations in the content of individual amino acids. The results of the study of the amino acid composition can be applied to the evaluation of inflight countermeasures, e.g., exercises, and to the development of rehabilitation measures postflight. Author

N83-21763# Joint Publications Research Service, Arlington, Va.
FREE AMINO ACIDS IN BLOOD OF SALYUT-5 CREW BEFORE AND AFTER 21-DAY MISSION (SECOND EXPEDITION)
I. G. POPOV and A. A. LATSKEVICH *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17. No. 1, Jan. - Feb. 1983 (JPRS-83007) p 19-43 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 15-20
Avail: NTIS HC A07/MF A01

Measurements of free amino acids in the plasma of the Salyut 5 crewmembers (the second expedition) before and after their 21 day spaceflight were determined. The measurements were performed in a Hitachi KLA-3B automatic amino acid analyzer. The changes in amino acid metabolism were associated with the chemical composition of the space diet, actual food intake and spaceflight effects. The conclusion is made that the dietary content of cystine and methionine, as well as phenylalanine, tyrosine, glycine, glutamic acid and serine should be increased. No signs of hepatic or renal dysfunction were detected. It is recommended to control strictly food consumption inflight. Author

N83-21764# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF PHASE STRUCTURE OF CARDIAC CYCLE DURING LBNP TESTS IN LONG-TERM (140-185 DAY) SPACEFLIGHTS
A. D. YEGOROV and A. P. POLYAKOVA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 44-49 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 33-37
Avail: NTIS HC A07/MF A01

Before and during prolonged space flights changes of systolic time intervals in response to lower body negative pressure (LBNP)

tests were qualitatively similar and corresponded to the syndrome *of myocardial hypodynamics due to insufficient venous return.* However, the level of the changes in systolic time intervals seen in flight may be attributed to larger blood shifts to the abdomen and legs. Author

N83-21765# Joint Publications Research Service, Arlington, Va.
EFFECT OF IMMERSION IN WATER AS A WEIGHTLESSNESS MODEL ON LUNG CLOSING VOLUMES
M. A. TIKHONOV, A. V. KONDAKOV, N. M. ASYAMOLOVA, and M. Y. VOLKOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 50-61 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 37-40
Avail: NTIS HC A07/MF A01

The effect of 7 day water immersion combined at night with head down (6 deg) tilting on the volumes of lung expiratory closing was examined in 6 healthy male test subjects aged 26 to 35. During immersion they showed, along with a stable reduction of the lung vital and functional residual capacity (by 4.2 and 14.8%, respectively), an increase in the fraction parameters of the expiratory closing volumes. The increase in the closing volume (up to 40%) (P 0.05) was particularly distinct in immersion day 2. Subsequent changes indicated gradual recovery of the closing volumes and a decline in regional nonuniformity of lung ventilation. The time course variations in the closing volumes may be attributed to an increase in the intrapulmonary blood volume at the early stage of adaptation to immersion and to a decrease in the nonuniformity of the ventilation perfusion ratios. Author

N83-21766# Joint Publications Research Service, Arlington, Va.
EXERCISE TOLERANCE FOLLOWING WATER IMMERSION
Y. B. SHULZHENKO, K. I. GOGOLEV, and S. M. BELYAYEV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan.-Feb. 1983 (JPRS-83007) p 55-60 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan.-Feb. 1983 p 40-45
Avail: NTIS HC A07/MF A01

Before and after 24 hour water immersion test subjects performed a submaximal workload on a bicycle ergometer. Changes in their hematocrit, circulating plasma volume and fluid balance were compared with those during immersion. As a result, the test subjects were subdivided into two groups. For one group the workload was very hard; adaptation to immersion was accompanied by significant renal losses of fluid from the intra- and extravascular space. The bicycle ergometry test after immersion demonstrated a decrease of exercise tolerance combined with circulatory disorders. The other group showed a higher exercise tolerance; after immersion exercise tolerance remained high at the expense of the reserves that maintained optimal blood supply to the working muscles. Author

N83-21767# *Joint Publications Research Service, Arlington, Va.*
BLOOD COAGULATION PLASMA FACTORS AND CHANGE IN FIBRINOLYSIS DURING NEUTRAL TEMPERATURE WATER IMMERSION IN SUBJECTS WITH BORDERLINE HYPERTENSION
V. N. ORLOV, L. L. KIRICHENKO, and M. A. YUNUSOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 62-65 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 45-48
Avail: NTIS HC A07/MF A01

The effect of 7 day dry immersion on the hemocoagulation system of male test subjects, aged 45 to 55, was examined. The experiments were carried out on 15 volunteers, 11 of whom had boundary arterial hypertension (BAH) (according to the WHO classification) and 4 were healthy controls. The data obtained (thromboelastograms and coagulograms) show that dry immersion induces hypercoagulopathic changes in the hemocoagulation system. The BAH patients have displayed a more marked fibrinolysis depression, indicating a decline of their reserve-adaptive *capabilities.* Author

N83-21768# Joint Publications Research Service, Arlington, Va.
HUMAN HEMODYNAMIC PARAMETERS DURING EXPOSURE TO CONTINUOUSLY INCREASING ACCELERATIONS
D. Y. ARKHANGELSKIY and L. S. PLAKHOTNYUK *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 66-71 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 48-52
Avail: NTIS HC A07/MF A01

The effect of acceleration on central hemodynamics was investigated in centrifugation experiments. Also examined was the protective effect of muscle tension, anti G suit, and of an altered acceleration vector. It was demonstrated that visual disorders were caused by a decrease in cardiac output. The countermeasures diminished the rate with which cardiac output declined due to the higher values of stroke volume that were produced by the anti G suit and a changed body position. Arbitrary muscle tension ensured the effect only as a result of increased heart rate. Author

N83-21772# Joint Publications Research Service, Arlington, Va.
EFFECT OF LONG-TERM HYPOKINESIA ON THYROID C CELLS
G. I. PLAKHUTA-PLAKUTINA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 88-92 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 63-66
Avail: NTIS HC A07/MF A01

The state of C-cells of the thyroid gland of Wistar rats during prolonged (30-165 days) hypokinesia was examined. A gradual decline in the function of C-cells during hypokinesia and its return to normal after 2 month readaptation was found on histology and morphology. The decline was most distinct by hypokinesia day 90 when a decrease in the number and size of nuclei, prevalance of small cells with densely packed granules in the cytoplasm occurred. The decline in the function of C-cells during hypokinesia may be one of the factors leading to increased calcium elimination from bones. The state of C-cells in animals exposed to weightlessness and hypokinesia is compared. E.A.K.

N83-21775# Joint Publications Research Service, Arlington, Va.
EXCRETION OF EPINEPHRINE AND NOREPINEPHRINE IN URINE IN PRESENCE OF PRESSURE-CHAMBER HYPOXIA IN MAN
I. P. YAKOVLEVA, I. S. BALAKHOVSKIY, V. N. POLYAKOV, V. K. STEPANOV, and M. V. DVORNIKOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 102-107 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 71-75
Avail: NTIS HC A07/MF A01

The effect of altitude chamber hypoxia of different intensity and duration on epinephrine and norepinephrine excretion was investigated. The hypoxia tolerance as a function of catecholamine excretion was also examined. Subjects were kept for a short time at altitudes of 5000 and 6500-7000 m and at 3500-4500 m for 24 hours. The subjects with high hypoxia tolerance showed an increased and those with low tolerance a decreased epinephrine excretion. The epinephrine excretion did not increase with the intensity and duration of the hypoxia effect. Variations in the norepinephrine excretion were insignificant in all tests. E.A.K.

N83-21780# Joint Publications Research Service, Arlington, Va.
EFFECT OF PROLONGED HYPOKINESIA ON MINERALIZATION OF HUMAN CALCANEUS
Y. Y. OSIPOV and V. S. SHASHKOV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 127-131 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 86-88
Avail: NTIS HC A07/MF A01

The effect of long term hypokinesia and physical exercises on mineralization of human os calcis was investigated. The problem of demineralization of bones in weightlessness and with restricted motor activity continues to draw much attention on the part of researchers. Data are indicative of appreciable decrease in bone mineralization, whereas demineralization is not noted in others (4-5). E.A.K.

N83-21782# Joint Publications Research Service, Arlington, Va.
EFFECT OF ACETAZOLAMIDE ON CATECHOLAMINE EXCRETION IN THE PRESENCE OF ALTITUDE HYPOXIA (4.5 KM)
I. P. YAKOVLEVA, I. S. BALAKHOVSKIY, V. B. MALKIN, and N. F. LANDUKHOVA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 136-138 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 91-92
Avail: NTIS HC A07/MF A01

The role of catecholamine reactions in endurance of oxygen deficiency which can give prospects of developing antihypoxia therapy is discussed. Extreme degrees of hypoxia in animals cause release of epinephrine (E) and norepinephrine (NE) into blood. It is not clear, however, what role is played by hypoxia itself and the inevitable concomitant disturbances in acid base equilibrium. The effect of hypercapnia on catecholamine (CA) excretion was studied. The effect of hypocapnic and normocapnic hypoxia was compared. It was found that overall excretion of E and NE increased drastically only in the latter case. Acetazolamide is capable of inhibiting the enzyme, carbonate dehydratase (carboanhydrase), so that carbon dioxide is retained, and this causes less hypocapnia and related disturbances of acid base equilibrium. E.A.K.

N83-21783# Joint Publications Research Service, Arlington, Va.
EFFECT OF PHARMACOLOGICAL AGENTS ON FLUID-ELECTROLYTE METABOLISM AND HUMAN RENAL FUNCTION DURING ANTIORTHOSTATIC HYPOKINESIA
V. B. NOSKOV and V. V. SABAYEV *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 139-141 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 92-93
Avail: NTIS HC A07/MF A01

The theoretical feasibility to correct pharmacologically the adverse effect of weightlessness on man is demonstrated. Implementation of preventive measures at the earliest stages of spaceflights, questions of pharmacological support of spacecraft crews are discussed. Pharmacological preventive agents was investigated. The effects of drugs referable to different groups of chemical compounds and combinations thereof on fluid electrolyte metabolism and renal function in healthy man, since typical changes develop in fluid and electrolyte metabolism in weightlessness and with factors that simulate its effects is assessed. E.A.K.

N83-21784* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 242, FEBRUARY 1983
Feb. 1983 82 p
(NASA-SP-7011(242); NAS 1.21:7011(242)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 299 reports, articles and other documents introduced into the NASA scientific and technical information system in January 1983. Author

N83-21785* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION BEAM SPUTTER-ETCHED VENTRICULAR CATHETER FOR HYDROCEPHALUS SHUNT Patent
B. A. BANKS, inventor (to NASA) 10 Jun. 1983 7 p Filed 10 Jun. 1981 Supersedes N81-27786 (19 - 18, p 2531)
(NASA-CASE-LEW-13107-1; US-PATENT-4,377,169; US-PATENT-APPL-SN-272407; US-PATENT-CLASS-604-8; US-PATENT-CLASS-604-280) Avail: US Patent and Trademark Office CSCL 06C

A cerebrospinal fluid shunt in the form of a ventricular catheter for controlling the condition of hydrocephalus by relieving the excessive cerebrospinal fluid pressure is described. A method for fabrication of the catheter and shunting the cerebral fluid from the cerebral ventricles to other areas of the body is also considered. Shunt flow failure occurs if the ventricle collapse due to improper valve function causing overdrainage. The ventricular catheter comprises a multiplicity of inlet microtubules. Each microtubule has both a large openings at its inlet end and a multiplicity of microscopic openings along its lateral surfaces.
Official Gazette, U.S. Patent and Trademark Office

N83-21786# Gewerkschaft Kermachemie, Siershahn (West Germany).
REDUCTION OF HEALTH HAZARDS BY REPLACEMENT OF ABESTOS IN CHEMICALLY RESISTANT STRUCTURAL COMPONENTS Final Report, Nov. 1980
E. SCHACHT and K. J. SCHWICKART Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 53 p refs *In* GERMAN; ENGLISH summary
(BMFT-FB-HA-82-030; ISSN-0171-7618) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11

Tests were carried out to replace asbestos. It was attempted to adapt to a large extent the properties of the asbestos-free moulding material regarding processing, physical properties, and chemical resistivity to those of the asbestos-reinforced compound. After tests of raw materials and test mixtures on the laboratory and technical scale, five basic recipes were elaborated and the suitability of such compounds in the manufacture of experimental structural components was investigated. It was demonstrated that especially materials with combinations of carbon fibers, carbon black, and coke grit as well as special glass fibers with mica, as far as their qualities are concerned, come close to the asbestos containing materials but that they have considerably higher costs of raw material and of mechanical processing. The proof of the suitability in practice was started for some typical cases of application by the manufacture of structural members from asbestos-free materials. Author

N83-21787# Siemens A.G., Munich (West Germany). Forschungslab.
THERMOPLASTIC DEVELOPMENT OF ELECTRORADIOGRAPHIC CHARGE PATTERNS FOR MEDICAL APPLICATIONS Final Report, Aug. 1980
P. CLEMENS, G. GOLDMANN, E. STORCK, and U. WOLFF Bonn Bundesministerium fuer Forschung und Technologie Feb. 1982 61 p refs *In* GERMAN: ENGLISH summary
(BMFT-FB-T-82-002; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformations-zentrum, Karlsruhe, West Germany GM 13

A direct development technique with high sensitivity for electroradiographic charge patterns to obtain a relief pattern on a thermoplastic material was investigated. Ionography and Xeroradiography using toner development are much less sensitive than x-ray recording on screen film systems. For the ionography as well as for the xeroradiography new carrier frequency techniques were developed which permit the screening of the signal charge due to the X-ray without screening the biascharge. Combining suitable plastic and elastic components the thermal and electric properties of the thermoplastics were adapted to the special

requirements of electroradiography. It is concluded that this technique is not suitable for practical applications. E.A.K.

N83-21788*# National Aeronautics and Space Administration, Washington, D. C. Office of Space Science and Applications.
STS-5 POSTFLIGHT MEDICAL OPERATIONS REPORT
23 Mar. 1983 18 p refs
(NASA-TM-85281; E-989-82-05; NAS 1.15:85281) Avail: NTIS HC A02/MF A01 CSCL 06P

Space Transportation System medical objectives, crew health assessment and support activities, environmental medicine, and life sciences-related test operations, are discussed. N.W.

N83-21789# Johns Hopkins Univ., Baltimore, Md. Dept. of Chemistry.
QUANTUM CHEMICAL AND THEORETICAL INVESTIGATIONS OF TOXICITY Annual Technical Progress Report, 16 Nov. 1981 - 15 Nov. 1982
J. J. KAUFMAN and W. S. KOSKI 22 Nov. 1982 68 p refs
(Contract N00014-81-K-0007)
(AD-A122812; AR-2) Avail: NTIS HC A04/MF A01 CSCL 15B

The feasibility of quantum chemical and other theoretical techniques in the correlation and prediction of toxicity of a specific class of compounds was demonstrated. The family compounds chosen were the organophosphorus pesticides and nerve gas family, since these both have relatively clear cut one dose acute lethal toxicity, LD50, and ED50 for the triggering event, inhibition of acetylcholinesterase, to serve as well defined and points. Particular quantum chemical requisites which are related to and predictive of the toxic effects of these molecules were identified. GRA

N83-21790# Naval Medical Research Inst., Bethesda, Md.
COMPUTER-ASSISTED SYSTEM FOR DIGITAL DATA ACQUISITION OF RESPIRATORY FUNCTION TESTS AND ANALYSIS OF ISOVOLUME RESISTANCE Final Medical Research Progress Report
R. P. LAYTON, P. W. CATRON, and S. H. PRINCE Apr. 1982 80 p
(AD-A122551; NMRI-82-2) Avail: NTIS HC A05/MF A01 CSCL 06E

Computerized methods for collection and transfer of data from pulmonary function tests and for analysis of isovolume resistance data are described. Detailed user instructions are provided for the programs, which are written for a desktop computer. Author (GRA)

N83-21791# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
RESEARCH PROGRAM REVIEW OF AIRCREW PHYSIOLOGY
G. T. CHISUM, ed., P. E. MORWAY, ed., and H. ROSENWASSER, ed. (Naval Air Systems Command) Jun. 1982 104 p refs
(Contract RR04101001)
(AD-A122076; NADC-82232-60) Avail: NTIS HC A06/MF A01 CSCL 06S

Presented is an overview of the helmet mounted display; progress in real time monitoring of the visual evoked potential; visual and auditory localization; detection of retinal ischemia prior to blackout by electrical evoked cortical response; intracortical interactions for orientation contrast; chemical aspects of visual transduction; and spectrally selective adaptation effects. R.J.F.

N83-21792# Ohio State Univ., Columbus. Dept. of Psychology.
OPTICAL TRANSFORMATION DURING MOVEMENT: REVIEW OF THE OPTICAL CONCOMITANTS OF EGOMOTION Final Report, 1 Mar - 30 Nov. 1981
R. WARREN Oct. 1982 80 p refs
(Contract AF-AFOSR-0108-81)
(AD-A122275; AFOSR-82-1028TR) Avail: NTIS HC A05/MF A01 CSCL 06P

The primary goals of this report are to make the formal mathematical descriptions of the optical concomitants of rectilinear self-motion through the environment more useful by consolidating, clarifying, and extending them. The report includes: (1) a critical review of the literature on the optical bases for the perception of rectilinear self-motion; (2) an outline of a comprehensive framework for the study of self-motion perception based on J. J. Gibson's ecological approach; and (3) an introduction to a unified mathematical treatment of the global optical effects of rectilinear self-motion. A careful distinction is maintained between geometrical facts and perceptual or psychological aspects of self-motion. The report is written in a tutorial style. Author (GRA)

N83-21793# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BIOMECHANICS OF ATLANTO-OCCIPITAL AND ATLANTO-AXIAL JOINT INJURIES
A. A. RUMYANTSEVA and V. I. YEVSEYEV 12 Nov. 1982 15 p refs Transl. into ENGLISH from Chirurgia Narzadow Ruchu i Ortopedia Polska (Poland), v. 43, no. 2, 1978 p 97-104
(AD-A122780; FTD-ID(RS)T-1316-82) Avail: NTIS HC A02/MF A01 CSCL 06S

Usin mathematical modeling, the biomechanics of two upper cervical vertebrae are discussed. On the basis of an analysis of 73 patients, conclusions are proposed for the diagnosis and therapy of changes resulting from injuries to the upper cervical segment of the spine. R.J.F.

N83-21794# Argonne National Lab., Ill.
RADIOLOGICAL AND ENVIRONMENTAL RESEARCH DIVISION, CENTER FOR HUMAN RADIOBIOLOGY Annual Report, Jul. 1980 - Jun. 1981
R. E. ROWLAND, A. F. STEHNEY, and J. RUNDO Mar. 1982 252 p 2 Vol.
(Contract W-31-109-ENG-38)
(DE82-013571; ANL-81-85-PT-2; AR-12-PT-2) Avail: NTIS HC A12/MF A01

Various topics in the fields of radiobiology and health physics are discussed. A novel approach to the problem of risk analysis for radionuclides deposited in bone is discussed. The induction of osteosarcoma by alpha particle irradiation of cells lining the bone surface is discussed. Different aspects of the metabolism and biological effects of radium and plutonium are discussed. R.J.F.

N83-22249# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SPACE MEDICINE
O. G. GAZENKO and N. PANFILOVA *In its* USSR Rept.: Space, No. 20 (JPRS-82970) p 78-81 28 Feb. 1983 Transl. into ENGLISH from Meditsinskaya Gazeta (Moscow), 1 Oct. 1982 p 3
Avail: NTIS HC A08

A brief history of the development of space biology and medicine is presented along with comments concerning the current state of knowledge. M.G.

N83-22250# Joint Publications Research Service, Arlington, Va.
BLOOD CIRCULATION IN WEIGHTLESSNESS
O. G. GAZENKO and A. M. GENIN *In its* USSR Rept.: Space, No. 20 (JPRS-82970) p 82-84 28 Feb. 1983 Transl. into ENGLISH from Zdorovye (Moscow), no. 4, Apr. 1982 p 10-11
Previously announced as A82-35700
Avail: NTIS HC A08

The characteristics of blood circulation under conditions of weightlessness are discussed. The effects of normal gravity on the circulatory system are first considered with particular attention given to the gravitational distention of vascular walls and the necessary increase in blood volume to fill the expanded vessels. The absence of gravity is then shown to be accompanied by a contraction of the distended vessels in the lower extremities, the loss of the hydrostatic blood store and the shift of blood and intercellular fluids to the upper part of the body, resulting in an impairment in cerebral circulation, increased load on the right ventricle and an increased risk of pulmonary insufficiency. Mechanisms of decreasing circulating blood volume under weightless conditions are then examined. M.G.

N83-22952# Argonne National Lab., Ill.
NEUTRON AND GAMMA RAY TOXICITY STUDIES
J. F. THOMSON, D. GRAHN, L. S. LOMBARD, F. S. WILLIAMSON, K. H. ALLEN, G. L. HOLMBLAD, J. L. HULESCH, V. A. LUDEMAN, A. R. SALLESE, E. F. STAFFELDT et al. *In* ANL Biol. and Med. Res. p 7-9 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The late effects of low doses of high-LET and low-LET ionizing radiation in rodents, to predict radiation hazards to man, was investigated. The data aid in the construction of dose response curves for somatic effects, for single and fractionated exposures to both high-LET and low-LET radiation. E.A.K.

N83-22954# Argonne National Lab., Ill.
RADIATION-INDUCED HEMOPATHOLOGIES
T. M. SEED and L. V. KASPAR *In* ANL Biol. and Med. Res. p 15-17 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The early cellular events which take place in the initial stages of aplastic anemia and leukemia were characterized. The nature of pathological progression in aplastic anemia and myeloid leukemia in beagles who are continuously exposed to low daily doses of gamma irradiation is defined. Cellular mechanisms of hematopoietic accommodation under chronic low dose irradiation, and the relationship between the accommodation and the induction and the development of the major hemapathological end points are outlined. E.A.K.

N83-22957# Argonne National Lab., Ill.
MOLECULAR AND CELLULAR EFFECTS OF SOLAR ULTRAVIOLET LIGHT
M. J. PEAK, J. G. PEAK, R. W. TUVESON (Illinois Univ.), M. A. TURNER (Missouri Univ.), and L. A. NERAD (Illinois Univ.) *In* ANL Biol. and Med. Res. p 41-44 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The basic nature and mechanism of lethality, mutagenesis and transformation caused by environmentally important nonionizing solar radiation which is present in the ecosystem was addressed. The possibility of enhanced fluxes of UVB from attenuation of stratospheric ozone due to release of halocarbons is emphasized. Th DNA damages which lead to lethal and mutagenic effects, and the occurrence of natural and experimental added molecular probes in the mechanisms of these events are outlined. E.A.K.

N83-22958# Argonne National Lab., Ill.
METAL METABOLISM AND TOXICITY
M. H. BHATTACHARYYA, R. P. LARSEN, P. A. BENIOFF, H. C. FURR (Illinois Benedictine College), E. S. MORETTI, R. D. OLDHAM, D. P. PETERSON, M. I. SPALETTO, and M. E. SHACKELFORD (Illinois Univ.) *In* ANL Biol. and Med. Res. p 51-53 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The metabolism and toxicity of metal compounds in animals and man were examined. Metal compounds which are related to specific energy technologies, and exposure conditions related to human exposure were studied. Three areas are identified: (1) metabolism and toxicity of nonnuclear toxic metals; (2) gastronintestinal absorption of actinide elements; and (3) assessment of health and environment effects of battery energy storage technologies. E.A.K.

N83-22959# Argonne National Lab., Ill.
TOXICOLOGY OF COAL GASIFICATION
C. A. REILLY, JR., F. R. KIRCHNER, T. MATSUSHITA, M. J. PEAK, K. E. WILZBACH, R. E. JONES, J. M. LEONARDO, G. KAUFMAN, K. T. BLANKENSHIP (Chatham College), and R. M. BRESSETTE (St. Benedict College) *In* ANL Biol. and Med. Res. p 59-63 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

Toxicants present in coal conversion process streams and effluents and their impact on human health and environment were investigated. Information is provided on toxicological screening in coal gasification effluents. The organic by products of coal gasification are emphasized. The materials from the following three gasifiers were studied: fluidized beds, slagging fixed bed and coal pyrolysis. E.A.K.

N83-22960# Argonne National Lab., Ill.
TOXICOLOGY OF COAL GASIFICATION: CHEMICAL CHARACTERIZATION
D. A. HAUGEN, M. J. PEAK, V. C. STAMOUDIS, A. S. BOPARAI, C. A. REILLY, JR., K. E. WILZBACH, K. M. SUHRBIER, S. S. DORNFELD, D. VENTERS, and F. J. TREMMEL (Iowa Univ.) *In* ANL Biol. and Med. Res. p 65-68 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The organic chemicals which are primarily responsible for the toxicological activity of synfuel materials, their mode of action and biological fate and their toxic activity when present in complex mixtures were investigated. The long range objectives are to provide information which is useful to: (1) establish chemical analysis and bioassays to predict toxic effects; and (2) direct possible alterations of process and cleanup conditions to decrease the potential for adverse health effects. E.A.K.

N83-22961# Argonne National Lab., Ill.
NEUROBEHAVIORAL CHRONOBIOLOGY AND TOXICOLOGY
C. F. EHRET, A. L. CAHILL, R. S. ROSENBERG, P. H. DUFFY, K. R. GROH, J. J. RUSSELL, J. V. BARNETT (Indiana State Univ.), A. S. GULCZYNSKI (Northeastern Illinois College), R. SCOTT (Cheyney State College), and G. H. THOMSEN (Tampa Univ.) *In* ANL Biol. and Med. Res. p 69-72 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

Neurotoxic damage caused by energy related agents and conditions was measured. Changes in established biological rhythms are studied and investigations on physiological, neurochemical and behavioral effects are included. E.A.K.

N83-22962# Argonne National Lab., Ill.
BIOSTATISTICS AND HEALTH IMPACTS OF ENERGY TECHNOLOGIES
M. E. GINEVAN, B. A. CARNES, J. J. COLLINS, C. D. BROWN, J. R. B. CURTISS, N. DEVINE, and A. ROCK (Michigan Univ.) *In* ANL Biol. and Med. Res. p 73-76 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

Statistical methodology and mathematical models relevant to the assessment of health impacts of energy technologies were developed. Efforts include: (1) development of a statistical procedure for reducing dimensionality in studies of disease environment association; (2) development of maximum eigenvalue least squares (MELS) theory for identifying, quantifying, and circumventing collinearity in regression models; (3) evaluation of statistical model violations in an analysis of covariance study of air pollution; and (4) development of an age period cohort model of breast cancer. E.A.K.

N83-22963# Argonne National Lab., Ill.
THE HUMAN PROTEIN INDEX
N. G. ANDERSON, N. L. ANDERSON, J. J. EDWARDS, C. S. GIOMETTI, J. TAYLOR, K. E. WILLARD, M. A. GEMMELL, S. L. NANCE, A. E. SCANDORA (Science Applications, Inc.), and S. L. TOLLAKSEN (Tougaloo College) *In* ANL Biol. and Med. Res. p 79-83 Jun. 1982 refs
Avail: NTIS HC A08/MF A01

The use of dimensional electrophoresis to establish an annotated index of human proteins which will include data on normal proteins, genetic variations, and disease related changes is outlined. The establishment of such a human protein index required the development of methods for running large numbers of analyses in a reproductible manner, the development of computerized image analysis and data base systems, and the production of protein maps of major body fluids and accessible cells and tissues. E.A.K.

N83-22975# Joint Publications Research Service, Arlington, Va.
USE OF LASERS IN HYGIENIC STUDIES
V. A. KASHUBA and M. A. MATYASHOVA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) p 36-40 21 Jan. 1983 refs Transl. into ENGLISH from Gig. Sanit. (Moscow), no. 7, Jul. 1982 p 55-58
Avail: NTIS HC A06/MF A01

Methods of monitoring and assessing the degree of pollution of the environment using various types of lasers are reviewed. Air, water, and soil pollution are addressed. M.G.

N83-22983# Joint Publications Research Service, Arlington, Va.
EFFECT OF SOME PHARAMACOLOGICALLY ACTIVE SUBSTANCES ON CYSTAMINE TRANSFORMATION IN MOUSE TISSUES
L. G. TARNOPOLSKAYA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 56-60 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 246-249
Avail: NTIS HC A05

It is known that sulfur containing radioprotective agents, in particular, cystamine, are subject to rather rapid transformation in the body, and intensity of metabolism of the agent increases as its dosage decreases. This circumstance is largely the reason for administering the protective compound in doses that are close to the maximum tolerated level in order to create and maintain a high level of the active form, with respect to radioprotection, of this agent in tissues by the time of exposure to radiation. However, it is very probable that accumulation of the required amount of cystamine for protection could also be obtained with smaller than optimum radioprotective doses, if there is slower conversion of the radioprotective agent. Since cystamine metabolism is closely related to oxidative processes in tissues, it was assumed that its combined use with pharmacologically active agents capable of altering the level of metabolic processes in the organism would lead to a change in rate of breakdown of the sulfur containing radioprotector. Author

N83-22984# Joint Publications Research Service, Arlington, Va.
PROTECTIVE EFFECT OF HYPOXIC GAS MIXTURE ON COMBINED EXPOSURE TO RADIATION AND PHYSICAL LOAD
A. I. BRITUN, R. B. STRELKOV, N. G. KUCHERENKO, and O. I. KUROCHKINA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 61-64 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 250-252 Original language document was announced as A82-35653
Avail: NTIS HC A05

Breathing a hypoxic gas mixture containing 10% oxygen and 90% nitrogen (HGM-10) enhances radioresistance of different animal species. The radioprotective effect of HGM-10 in the presence of a physical load was investigated. Knowledge about the oxygen effect enabled us to broaden use of HGM-10 for practical purposes. Author

N83-22987# Joint Publications Research Service, Arlington, Va.
RADIOPROTECTIVE AND TOXICOLOGICAL PROPERTIES OF PHENYLETHYLAMINE DERIVATIVES MODIFIED WITH ALPHA AMINO ACIDS
T. Y. ILYUCHENOK, K. S. SHADURSKIY, S. V. ROGOZHIN, V. G. YASHUNSKIY, L. M. FRIGIDOVA, V. I. BUTAYEVA, and Y. A. DAVIDOVICH *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 29 (JPRS-82998) p 73-79 3 Mar. 1983 refs Transl. into ENGLISH from Radiobiol. (Moscow), v. 22, no. 2, Mar. - Apr. 1982 p 269-275
Avail: NTIS HC A05

Radioprotective agents among derivatives of alpha and beta-phenylethylamine were sought. A continuation of this search resulted in synthesis of 27 chemical compounds modified by alpha amino acids. In recent years, it was demonstrated that some amino acids have marked radioprotective activity. They were used extensively to correct some of the undesirable properties (reduce irritating and ulcer producing activity, lower toxicity, improve solubility, etc.), as well as to enhance the efficacy of drugs. Results of investigation of toxicity and radioprotective properties of alpha amino acid derivatives of beta phenylethylamine, which differ from one another in substituent in the para position of the benzene ring are presented. Author

N83-22990 Joint Publications Research Service, Arlington, Va.
LASER THERAPY
A. RAKHISHEV *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 12-14 11 Mar. 1983 Transl. into ENGLISH from TRUD (Moscow), 22 Sep. 1982 p 3
Avail: NTIS HC A07

With the discovery of artificial light sources, radiation therapy began to be used extensively. A qualitatively new stage is linked to the discovery of lasers. Their beams made it possible to administer treatment with strict dispensing of energy, for both the entire body and specific regions or active points. Two directions emerged in medicine in the early 1970's. Some researchers use high-power lasers, using their 'hard' radiation, as medical people say, as a light scalpel. Much work in this direction is being done in oncology, stomatology, ophthalmology and surgery. It is stated that surgery has become the laser's first medical profession. Researchers pursuing the other direction are studying the effects of low-intensity 'soft' radiation from gas lasers. Therapy became the second medical profession of lasers. Author

N83-22991 Joint Publications Research Service, Arlington, Va.
ELECTRON MICROSCOPE STUDY OF CHANGES IN OTIC LABYRINTH RECEPTORS UNDER EFFECT OF LASERS
M. P. NIKOLAYEV, V. F. ANICHIN, O. P. TOKAREV, and Y. L. TVERSKOY *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 15-19 11 Mar. 1983 refs Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), no. 4, Jul.-Aug. 1982 p 39-43
Avail: NTIS HC A07

Technological progress serves as grounds for physicians to search for the most effective and, at the same time, conservative forms of therapy. In this respect, use of lasers in medicine is spreading more and more. At the same time, this agent is still at the initial stage of development in otology, although the prospects (as applied to the otic labyrinth) are unquestionable. Laser radiation aimed at the cochlea elicits changes within a relatively limited area at the site of exposure to it, whereas other structures remain unchanged. When the vestibular part of the labyrinth (horizontal or posterior semicircular canals) of monkeys with overt vestibular disturbances was exposed to laser, hearing was retained. Use of pulsed neodymium laser aimed at the horizontal semicircular canal of monkeys, caused morphological changes to appear and they are strictly localized in the ampulla of the irradiated canal (deviation of cupula, consolidationa and fragmentation, dystrophic changes in receptor elements with sloughing off of the base of the cupula). Author

N83-22992 Joint Publications Research Service, Arlington, Va.
EFFECT OF ULTRAVIOLET LASER ON UNHEALING WOUNDS
I. Z. NEMTSEV and L. I. GERASIMOVA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 20-24 11 Mar. 1983 refs Transl. into ENGLISH from Vestn. Khir. imeni I. I Grekova (Leningrad), v. 128, no. 1, Jan. 1982 p 95-98
Avail: NTIS HC A07

There has been worldwide recognition of work dealing with the use of lasers for treatment of burns. It should be noted that, in burn treatment, lasers were used as a surgical tool that effected bloodless removal of necrotic tissues. At the same time, there are several works on therapeutic use of low-intensity lasers in the treatment of surgical wounds, burns and dermatosis. Burn wounds remaining after autoplastic surgery, the onset of which was most often related to autoimmune conflict, which were small in area and scattered in localization, that failed to heal for a long time served as an indication for the choice of this method of therapy. Laser therapy was also used to accelerate epithelialization of small wounds remaining after healing of 3A degree burns, which could

not be prepared for autografting, in spite of use of the available assortment of resources in the specialized burn department.
Author

N83-22995 Joint Publications Research Service, Arlington, Va.
POSSIBILITIES FOR RAISING THERAPEUTIC EFFECT OF MAGNETOTHERAPY
M. S. BRUVELE *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 49-54 11 Mar. 1983 refs Transl. into ENGLISH from Izv. Akad. Nauk Latv. (Riga), no. 9, Sep. 1982 p 118-121
Avail: NTIS HC A07

The period of cautious introduction of magnetotherapy into clinical practice following experimental research has come to an end. The suitability of using this new physical factor was demonstrated, and procedures were developed for treating patients with different pathologies: vascular diseases of the brain and limbs, bone fractures, cerebrocranial injuries, the consequences of burns (contractures and scars), osteochondrosis, prevention of thrombus formation following injury and application of sutures, and many other diseases. Author

N83-22996* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 243)
Mar. 1983 80 p
(NASA-SP-7011(243); NAS 1.21:7011(243)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 282 reports, articles and other documents introduced into the NASA scientific and technical information system in February 1983. Author

N83-22997# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
HUMAN RECTIONS TO ELF ELECTRIC AND MAGNETIC FIELDS. AN ANNOTATED BIBLIOGRAPHY OF CURRENT LITERATURE, 2ND EDITION
J. P. REILLY Jul. 1982 75 p
(PB83-110718; PPSP/JHU/PPSE-T-24) Avail: NTIS HC A04/MF A01 CSCL 06P

This annotated bibliography lists literature which applies to human reactions to electric and magnetic fields from 10 hz to 100 hz, with an emphasis on power frequency fields. This includes direct experimental work with humans, epidemiological studies, work which use animal studies to draw interferences about human reactions, studies concerning human dosimetry, and works which discuss means for human protection. GRA

N83-22998# Duke Univ., Durham, N. C.
EFFECTS OF 200, 591 AND 2450 MHZ MICROWAVES ON CEREBRAL ENERGY METABOLISM
A. P. SANDERS and W. T. JOINES Oct. 1982 72 p refs
(Contract EPA-66-92-3233)
(PB83-116913; EPA-600/1-82-014) Avail: NTIS HC A04/MF A01 CSCL 06P

Earlier work has shown that levels of key biochemicals in the energy production system of rat brain are affected by exposure to 591 MHz microwave radiation at 13.8 mW/sq cm. The objectives of this study were to determine whether there are direct microwave effects on the biological system or whether they are secondary to the hyperthermia produced in the tissue, to establish dose-response relationships for the effects, and to investigate different frequencies of exposure and modulation of the carrier signal. The fluorescence of reduced nicotinamide adenine dinucleotide (NADH) in the rat brain was measured in vivo during exposure to the microwave radiation, and adenosine triphosphate (ATP) and creatine phosphate (CP) levels were measured chemically after exposure.
Author (GRA)

N83-22999# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
MEDICAL ASPECTS OF SURVIVAL: TRAINING FOR AIRCREW
T. VERHEIJ Loughton, England Jan. 1983 23 p refs
(AGARD-AG-283; ISBN-92-835-1442-4) Avail: NTIS HC A02/MF A01

Maintenance of health, medical aid to survivors, general management of injuries, heat and cold exposure, specific injuries, survival illnesses, and medical aspects of escape and evasion are discussed. Author

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A83-27900
DETECTION AND IDENTIFICATION OF MOVING TARGETS
K. BALL, R. SEKULER, and J. MACHAMER (Northwestern University, Evanston, IL) Vision Research, vol. 23, no. 3, 1983, p. 229-238. refs
(Contract AF-AFOSR-80-0246)

Though they could distinguish a moving target from a blank field, subjects in earlier work often greatly misperceived the direction of the movement. This observation was followed up in three experiments comparing detection of moving random-dot patterns to identification of the patterns direction of movement. Two different theoretical treatments indicate that in order to be detected by entirely independent mechanisms, two directions must differ by at least 120. (Author)

A83-28754*# Worcester Polytechnic Inst., Mass.
ENTROPY, INSTRUMENT SCAN, AND PILOT WORKLOAD
J. R. TOLE, M. VIVAUDOU (Worcester Polytechnic Institute, Worcester, MA), A. T. STEPHENS (Boeing Co., Renton, WA), R. L. HARRIS, SR. (NASA, Langley Research Center, Hampton, VA), and A. EPHRATH (Bell Telephone Laboratories, Inc., Piscataway, NJ; MIT, Cambridge, MA) Institute of Electrical and Electronics Engineers, Conference on Systems, Man and Cybernetics, Seattle, WA, Oct. 28-30, 1982, Paper. 8 p. refs
(Contract NCC1-23; NCC1-56)

Experimental results are presented from a set of experiments designed to explore the relationship between the performance, skill, and visual scanning behavior of pilots under varying levels of mental workload. Instrument fixations were recorded as groups of pilots with widely differing levels of skill simultaneously performed a continuous instrument flight task and a verbally presented loading task with four discrete levels. Pilot scanning patterns were found to be significantly affected by the level of mental workload in a manner that was dependent on skill. These scanning alterations were quantified by the methods of entropy and autocorrelation, where the former concerns visual scan path and the latter assesses the relations among scan periodicity, skill level and mental task periodicity. O.C.

A83-28933
PERIPHERAL CIRCULAR CONTOURS INHIBIT THE VISUAL ORIENTATION CONTROL SYSTEM
S. M. EBENHOLTZ and J. W. UTRIE, JR. (Wisconsin, University, Madison, WI) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 343-346. refs ISSN 0095-0562
(Contract NSF BNS-82-01411; NIH-EY-02264)

Peripheral visual stimulation with a tilted luminous frame has long been known to influence both body orientation and the apparent tilt of objects. Peripheral visual inputs along with vestibular and somaesthetic components thus constitute a multi-channel

perceptual orientation control system. Surrounding the visual induction pattern with a luminous circle reduced the effectiveness of the visual channel to about 23 percent of maximum, whereas inscribing a circle within the luminous frame was without effect. This finding suggests a simple method for dealing with undesirable visual-vestibular interactions and an explanation for some instances of disorentation. Author

A83-28935
GENERAL AVIATION ACCIDENT RATES AND PILOT COMMUNITY POPULATION SIZE - AN EXAMINATION OF RURAL-URBAN DIFFERENCES
R. F. URBAN (Colorado, University, Boulder, CO) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 351-356. refs ISSN 0095-0562

The relationship between general aviation accident rates and the population size of the involved pilots' communities of residence is studied. An analysis of 48 Colorado communities reporting at least one 1978 accident-involved pilot showed a correlation of -0.51 between accident rate per 1000 pilots and community size. The smallest, and generally the most rural, communities were found to produce total and fatal accident rates of respectively 2.55 and 5.36 times greater than those for the largest metropolitan area. A similar trend is found to characterize US nationwide aviation accidents and appears as well for automobile mishaps. Discriminant analysis of individual-level data for 92 of the accidents showed that the conventional explanations of airport facilities. Terrain, pilot qualifications and exposure, and aircraft complexity failed to exert substantial effects and differences among the categories of accidents grouped by community size. It is suggested that the rural-urban accident differential may represent a function of variations in 'pilot density', and that the observed differences may be attributed to attitudinal differences between rural and urban pilots produced by the former group's exposure to a type of 'rural subculture'. N.B.

A83-29202#
CURRENT AIR FORCE NAVIGATOR TRAINING
R. D. PAUL (USAF, Mather AFB, CA) IN: Institute of Navigation, Annual Meeting, 38th, Colorado Springs, CO, June 14-17, 1982, Proceedings . Washington, DC, Institute of Navigation, 1982, p. 1-5.

The evolution of the U.S. Air Force navigator training program is examined, focusing on the current Undergraduate Navigator Training program. Topics discussed include the need for navigators, candidate sources, and the roles navigators play in meeting the Air Force mission. The Undergraduate Navigator Training production facility, the syllabus, and the training hardware are examined. Also considered are the instructor manpower, evaluation, and other training courses. N.B.

N83-21795# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Experimental Psychology Group.
STRESS, INFORMATION PROCESSING AND COPING WITH DEPTH: PROBLEMS OF INDIVIDUAL DIVERS
P. G. A. M. JORNA Jun. 1982 26 p refs
(Contract A79/KM/030)
(IZF-1982-14; TDCK-76862) Avail: NTIS HC A03/MF A01

The diver's ability to cope with the underwater situation is an important factor with respect to the diver's performance and physiological reactions. The aim of the present study was to assess a possible increase in psychological load, requiring additional coping, as a consequence of diving at greater depths during advanced diver training. Performance (Continuous Memory Task: CMT) and physiological measures (heart rate, blood pressure component, respiration) were obtained for dives at twenty meters depth and a narcotic dive at fifty meters depth. These measures were compared with control measures obtained during the basic training course involving shallow dives at about three meters. It was found that an increased depth is not necessarily accompanied by an increased psychological response, provided that the diver coped well during the shallow conditions. For divers less efficient under such conditions, performance effectiveness is reduced by an increase in depth. Such divers were characterized by a decreased blood pressure component of heart rate variability, an increased response to task load, a suppressed bradycardia and a less efficient performance level. B.W.

N83-21796# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Traffic Behavior Group.
AGE AND INFORMATION PROCESSING: AN APPLICATION OF STERNBERG'S ADDITIVE FACTOR METHOD
J. MORAAL Jun. 1982 20 p refs
(IZF-1982-18; TDCK-76864) Avail: NTIS HC A02/MF A01

Previous research suggests the encoding stage of central information processing as the locus of differences in choice reaction time between younger and older subjects. An experiment was conducted to test whether this could be confirmed using Sternberg's Additive Factor Method. Two groups of subjects (mean ages 23 and 64) performed a four-choice reaction time task in which reaction time and movement time were the response measures. Independent variables were stimulus intensity, stimulus-response compatibility, foreperiod duration and age. Results showed additivity of the effects of the first three variables which is in line with earlier research findings. Age had a main effect and a marginal interaction with stimulus intensity. With regard to movement time the results suggest that compared with younger subjects, elderly subjects may have more problems in separating the processing of information from the execution of the response. Author

N83-21797# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Traffic Behavior Group.
STIMULUS PREPROCESSING AND ENCODING OF INFORMATION: AGE-RELATED DIFFERENCES
J. MORAAL Jun. 1982 11 p refs
(IZF-1982-19; TDCK-7686) Avail: NTIS HC A02/MF A01

It was investigated whether slowing down with age might selectively be localized at the input side of visual information processing. Using Sternberg's Additive Factor Method two groups of subjects (mean ages 22 and 66 years) performed a visual choice reaction task with stimulus intensity and stimulus degradation as the within-subjects independent variables, respectively affecting the preprocessing and encoding stages of information processing. Results showed that age effects did not selectively affects either one of these stages. The main age effect was not significant which may be due to the type of motor response. Author

N83-21798# Federal Aviation Agency, Atlantic City, N.J.
PILOT PERFORMANCE MEASUREMENT: AN ANNOTATED BIBLIOGRAPHY Final Report
J. T. REHMANN Dec. 1982 62 p
(Contract FAA PROJ. 161-301-150)
(FAA-EM-81-16; FAA-CT-82-24) Avail: NTIS HC A04/MF A01

One hundred references relating to pilot performance were selected and summarized as part of the Cockpit Display of Traffic Information (CDTI) studies currently being conducted by the Federal Aviation Administration Technical Center in Atlantic City, N.J. A comprehensive search of the scientific literature was conducted using several sources, including books, scientific journals, proceedings of technical meetings, and computerized information retrieval. Specific topics covered in this annotated bibliography, as they relate to pilot performance, include behaviors, measures, and instruments for performance evaluation in actual and simulated environments, task taxonomies and modeling, physiological measurement, and automated performance measures. Author

N83-21799# Yale Univ., New Haven, Conn. School of Organization and Management.
A SET OF METHODS FOR RESEARCH ON WORK TEAMS Interim Report
J. R. HACKMAN Dec. 1982 180 p refs
(Contract N00014-80-C-0555; NR PROJ. 170-912)
(AD-A122123; REPT-1) Avail: NTIS HC A09/MF A01 CSCL 05I

A set of instruments that can be used in research on the effectiveness of work teams in organizations is described. The instruments are based on an action-oriented model of group task effectiveness. They were developd as part of a research program in which multiple methods are used to assess the performance-relevant characteristics of work teams and their organizational contexts. The instruments are: (1) a guide for conducting observations of work teams in situ, (2) an interview protocol for use in obtaining group members' own assessments of their team and the surrounding organization, and (3) two questionnaires (one appropriate for group members, one for nonmembers) that assess member perceptions of the variables in the group effectiveness model. Copies of all instruments and their manuals or scoring keys are appended. GRA

N83-21800# Colorado Univ., Boulder. Inst. of Cognitive Science.
A FRAMEWORK FOR FORMING, MODIFYING, AND USING MULTIMEDIA CONCEPTS IN MEMORY. PART 1: MATHEMATICAL FORMULATION
P. BAGGETT and A. EHRENFEUCHT Nov. 1982 58 p refs
(Contract N00014-78-C-0433; NR PROJ. 157-422)
(AD-A122580; TR-118-ONR) Avail: NTIS HC A04/MF A01 CSCL 05B

A theoretical framework for the structures and processes of memory is presented. The model is based on three main notions: memory, concepts, and processors. Part I puts forth the notions in mathematical terms. (Part II will give an interpretation in psychological terms. Memory is viewed as a set of locations, and locations have values. An evaluation function attaches a value to a location. The basic unit in memory is the concept. Concepts have a hierarchical structure. They are related by the relation "is a subconcept of'. At a given time, each concept has a set of locations assigned to it. The assignment is made by an allocation function. A state of memory is defined as a set of concepts, the relation 'is a subconcept of', an allocation function, and an evaluation function. Processors change the state of memory and provide interaction with the environment (input/output). Each processor operates with a limited number of concepts at a given time. The action of a processor is determined by concepts, mainly by the values of locations allocated to a given concept and by the input stimulus from the environment. For a given processor, the concepts which determine the action of the processor will be called the excutable concepts for the processor. GRA

N83-21801# Stanford Univ., Calif. Dept. of Computer Science.
LEARNING AND INDUCTIVE INFERENCE
T. G. DIETTERICH, B. LONDON, K. CLARKSON, G. DROMEY, P. R. COHEN, and E. A. FEIGENBAUM Jul. 1982 209 p refs
(Contract MDA903-80-C-0107)
(AD-A122351; SU-STAN-CS-82-913; HPP-82-10) Avail: NTIS HC A10/MF A01 CSCL 05J

The main results of the report are: (1) a simple model that serves to generate a taxonomy of learning systems, (2) the explication and clarification of four methods of learning single concepts, (3) some understanding of the underlying causes of the credit-assignment problem (and possible solutions), and (4) some identification of open research problems and areas that have received little attention. The report is structured as a set of articles. Seven of the articles present the main problems and issues in learning research, while the remaining fifteen articles describe particular learning systems that have been developed. GRA

N83-21802# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
THE EFFECT OF AN EYE MOVEMENT RECORDER ON HEAD MOVEMENTS
A. J. BEACH and M. W. HILL Jul. 1982 10 p refs
(AD-A121664; DCIEM-82-R-25) Avail: NTIS HC A02/MF A01 CSCL 05E

The present study had two major objectives: (1) to determine whether the NAC Eye Mark system alters the normal pattern of subject head movement in a typical simulated helicopter piloting tasks; and (2) to obtain subjective evaluations from subjects while wearing the NAC eye mask concerning field of view, acuity, comfort and safety. Concerning the analysis technique, it was shown that the measurement of total movement of the subjects head could be reliably accomplished with the equipment and method used. The unmodified NAC eyepiece was found to cause significantly more head movement in IFR flight than a no mask condtion. It was also demonstrated that an NAC mask with the lower horizontal section removed and semisilvered lenses on both eyes did not differ significantly from the no mask condition in terms of head movements; in contrast, the unmodified Mark 7 mask was the preferred choice of the subjects since the eye pieces did not cause eye fatigue with the lightning conditions in the simulator. Subsequent work has shown that in actual flight conditions, the Mark 2 mask was preferred, since the increased light levels of actual flight alleviated the problem of eye fatigue. GRA

N83-22989 Joint Publications Research Service, Arlington, Va.
PSYCHOLOGICAL COMPATIBILITY OF COMBAT FLIGHT CREWS
E. BESSCHETNOV *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 20 (JPRS-83057) p 1-6 11 Mar. 1983 Transl. into ENGLISH from Aviat. Kosmonavt. (Moscow), no. 12, Dec. 1982 p 30-31
Avail: NTIS HC A07

Aviators are presented complex and responsible tasks of further increasing vigilance and combat readiness and improving fighting skills. Their successful solution depends upon many factors, including correct, scientifically-based manning of flight crews. The concept of psychological compatibility is reviewed. Author

N83-23000# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
REGISTER OF RESEARCH IN PROGRESS ON MENTAL WORKLOAD
T. R. METZLER and C. A. SHINGLEDECKER Jul. 1982 120 p refs
(Contract AF PROJ. 7184)
(AD-A122428; AFAMRL-TR-82-42) Avail: NTIS HC A06/MF A01 CSCL 05I

This report documents current research on operator workload. The register was compiled from responses to a questionnaire data form sent to 76 scientists who are active in basic and applied workload research. The six sections of the register include name and key-term indexes, current project descriptions, listings of workload laboratories and potential sources of research support, and a bibliography of significant publications in the area. Author (GRA)

N83-23001# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Human Engineering Div.
CONJOINT MEASUREMENT AND CONJOINT SCALING: A USERS GUIDE Technical Progress Report, Jun. - Aug. 1981
T. E. NYGREN Apr. 1982 135 p refs
(Contract AF PROJ. 7184)
(AD-A122579; AFAMRL-TR-82-22) Avail: NTIS HC A07/MF A01 CSCL 12A

Conjoint measurement methodology offers a new and potentially useful approach for obtaining psychological scale values for components of multidimensional attributes. This report describes the mathematical foundations of this methodology. Six computer based algorithms that can be used to perform specific kinds of conjoint analysis have been generalized and documented for

application as subjective assessment techniques. The six programs (CONJOINT, PCJM2, NONMETRG, MONANOVA, DISTRIB, and DUALDIST) are each summarized with respect to their function as conjoint analysis techniques. Additionally, the appendix provides a step-by-step explanation of data deck arrangements for the programs described. Author (GRA)

N83-23233# South African Airways, Johannesburg.
CHARACTERISTICS REQUIRED FOR PILOT SELECTION IN SOUTH AFRICAN AIRWAYS
P. H. J. PIENAAR *In* CSIR Ann. Transportation Conv., Vol. 4 15 p 1982 refs
Avail: NTIS HC A20/MF A01

Over the last few years aircraft have achieved an amazing degree of reliability and safety. The human factor is usually regarded as the weak link in the chain. Analyses performed by the International Air Transport Association indicate that 70 percent of the take off climb and descent approach and accidents involve human error. The objective of the pilot selection process is to find individuals who have captain potential, are of above average intelligence, are technically skilled, and possess leadership qualities. In addition, certain personality traits in candidate pilots are evaluated. These include their reasons for wishing to become pilots, and any over or under reaction to certain factors which produce tension, stress, conflict and could possibly interfere with flight proficiency and safety. Author

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

A83-27469#
STS MANNED MANEUVERING UNIT PROPULSION SYSTEM
L. L. ALDRIDGE, E. BERLINER, and J. H. SMITH, JR. (Martin Marietta Aerospace, Denver, CO) In: Shuttle propulsion systems; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 15-25.

The Space Shuttle Manned Maneuvering Unit (MMU), based on the highly successful Skylab M-509 maneuvering unit, offers astronauts extravehicular mobility for work outside the confines of the Space Shuttle Orbiter payload bay. The MMU propulsion system offers complete redundancy, with two identical systems. Each of these comprises a high pressure gaseous nitrogen tank, an isolation valve, a regulator, and 12 1.7-lbf thrusters that are packaged to provide crew members with six-degree-of-freedom control in response to commands from translational and rotational hand controllers. The MMU includes the Flight Support Station, which offers a propulsion subsystem recharge capability. O.C.

A83-28329
THE CHARACTERIZATION OF CARBON DIOXIDE ABSORBING AGENTS FOR LIFE SUPPORT EQUIPMENT; PROCEEDINGS OF THE WINTER ANNUAL MEETING, PHOENIX, AZ, NOVEMBER 14-19, 1982
M. L. NUCKOLS, (ED.) and K. A. SMITH (U.S. Navy, Naval Coastal Systems Center, Panama City, FL) Meeting sponsored by the American Society of Mechanical Engineers New York, American Society of Mechanical Engineers (Ocean Engineering Symposia Series. OED Volume 10), 1982. 212 p
$40

The absorption methods, relevant laboratory investigations, equipment evaluations, and modeling of carbon dioxide absorbing agents for life support equipment are discussed. The topics treated include: carbon dioxide scrubbing materials in life support equipment; potassium superoxide characteristics and applications; air revitalization compounds; chemical and physical factors affecting the absorption capability of calcium hydroxide based carbon dioxide absorbents; and airflow and pressure drop in hyperbaric baralyme beds. Also considered are: lithium hydroxide as a carbon dioxide scrubber in closed circuit breathing apparatus; a theoretical model of carbon dioxide absorption in a mixed alkali bed under hyperbaric conditions; model for the absorption rate of carbon dioxide by solid hydroxides; absorption of carbon dioxide by solid hydroxide sorbent beds in closed loop atmospheric revitalization systems; and applications of permeable membranes as carbon dioxide scrubbers. C.D.

A83-28330#
CARBON DIOXIDE SCRUBBING MATERIALS IN LIFE SUPPORT EQUIPMENT
T. C. WANG (Harbor Branch Foundation, Fort Pierce, FL) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 1-21. refs

This review paper gathers information on carbon dioxide (CO2) scrubbing materials in life support systems. Four groups of scrubbing materials are classified: alkali metal hydroxides, alkali metal superoxides and peroxides, regenerative types of adsorbents, and other methods such as membrane separation, freeze-out, and photosynthetic gas exchange. The advantages and disadvantages of each material are discussed in the paper. For short duration operations, alkali metal hydroxides are the most attractive material to control carbon dioxide. Economics, simplicity and a well developed state-of-the-art are the reasons for the wide acceptance of this material. However, since alkali metal superoxides or peroxides simultaneously remove CO2 and generate O2, they appear to be promising. For moderate to long duration operations, regenerable adsorbents become necessary. At the same time the need for oxygen recovery from carbon dioxide begins to enter the picture. (Author)

A83-28331#
REVIEW OF POTASSIUM SUPEROXIDE CHARACTERISTICS AND APPLICATIONS
J. W. MAUSTELLER (MSA Research Corp., Evans City, PA) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 23-31. refs

Potassium superoxide has been used for many years to supply oxygen and remove carbon dioxide in breathing apparatus or habitats. Emphasis in this paper is on application characteristics and demonstrated equipment using potassium superoxide. Overproduction of oxygen relative to carbon dioxide absorbed, can be reduced by controlling moisture in the inlet stream and temperature in the reaction bed. With an auxiliary CO2 sorbent, a system can be controlled for best CO2/O2 performance. Applications are given ranging from personal rebreathers to habitat use where atmosphere maintenance for hundreds of people is required. (Author)

A83-28332#
AIR REVITALIZATION COMPOUNDS - A LITERATURE SURVEY
J. O. STULL and M. G. WHITE (Georgia Institute of Technology, Atlanta, GA) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 33-46. refs
(Contract N00612-79-D-8004)

A chemical process for air revitalization has been used for some closed life support systems in the applications of space and marine explorations. A review of the literature is given for the purpose of evaluating potential candidates as air revitalizing chemicals based upon a set of criteria including theoretical oxygen yields, chemical reactivity to breathing atmospheres, and commercial availability. The preliminary evaluation shows potassium

and sodium superoxides as prime candidates for further evaluation against the practical considerations of actual use. Upon closer scrutiny, potassium superoxide is the desired chemical for air revitalization in closed life support systems according to the present technology. (Author)

A83-28333#
CHEMICAL AND PHYSICAL FACTORS AFFECTING THE ABSORPTION CAPABILITY OF CALCIUM HYDROXIDE BASED CARBON DIOXIDE ABSORBENTS
D. E. VEINOT (Defence Research Establishment Atlantic, Dartmouth, Nova Scotia, Canada), A. Y. MACLEAN (Martec, Ltd., Halifax, Canada), and C. D. MACGREGOR (Seatech Investigation Services, Ltd., Halifax, Canada) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 47-56. refs

The effects of water content, added sodium hydroxide and the bulk density of absorbent granules on the absorption capability of calcium hydroxide based carbon dioxide absorbents have been studied. Water content and bulk density were found to have a significant influence on absorption capability and appear to be interrelated through a single quantity, the water film thickness surrounding individual absorbent granules. These findings support a reaction mechanism for the absorption process involving direct reaction of gaseous carbon dioxide and solid calcium hydroxide granules in the presence of water. (Author)

A83-28334#
CARBON DIOXIDE ABSORPTION DYNAMICS OF LITHIUM HYDROXIDE
D. A. BORYTA and A. J. MAAS (Foote Mineral Co., Exton, PA) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 83-101. refs

An investigation was made of the CO2 absorption dynamics of a sample of LiOH specifically developed for portable life support systems. The study used a balanced two-level factorial design with fractional replication composed of thirty-nine tests including center points. The independent variables studied were bed length, gas velocity, input CO2 concentration, CO2/LiOH ratio, temperature and humidity. The results indicate that CO2 absorption capacity and breakthrough times are predictable over the range studied, primarily in terms of the first four variables. The implications of the results on canister design and absorbent utilization are discussed. (Author)

A83-28335#
LITHIUM HYDROXIDE AS A CO2 SCRUBBER IN CLOSED CIRCUIT BREATHING APPARATUS
E. E. BUBEN and J. R. HAUGHEY (Mine Safety Appliances Co., Pittsburgh, PA) In: The characterization of carbon dioxide absorbing agents for life support equipments; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 151-155.

In the design of a long life breathing apparatus such as a four hour rebreather used in mine rescue, the size and weight of the system are of primary importance. These characteristics apply particularly to the design of the CO2 Scrubber. Lithium hydroxide rather handily becomes the material choice when compared to other chemical scrubbers based on the size and weight of the final CO2 scrubbing canister. Material cost of LiOH, considering the resultant advantages of apparatus size and weight, becomes less important. Tests have been run on various designs of canisters relative to straight through, radial, and semiradial flow patterns and the effect on efficiency and breakthrough. Chemical characteristics and granular size and the effect on breakthrough have been studied using bench tests at constant flow conditions, machine tests at cyclic flow and actual apparatus/man tests at hard work conditions. (Author)

A83-28336#
A THEORETICAL MODEL OF CO2 ABSORPTION IN A MIXED ALKALI BED UNDER HYPERBARIC CONDITIONS
J. CUELLAR and E. H. WISSLER (Texas, University, Austin, TX) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 157-165. Navy-supported research. refs

It is noted that because of the complexity of the problem, the development of absorption canisters for new conditions is usually carried out by trial-and-error, which is not an efficient process. As part of a program to develop more rational bases for designing canisters, a mathematical model is constructed for CO2 absorption in one-dimensional, nearly isothermal packed beds. The model relies on experimental data reported over the past 25 years. Equations defining the model and the numerical methods used to solve the equations are presented. More recent experimental data are employed in evaluating parameters not adequately defined by early studies. Those aspects of the problem which remain unsolved at the present time are discussed. C.R.

A83-28337#
MODEL FOR THE ABSORPTION RATE OF GASEOUS CO2 BY SOLID HYDROXIDES
D. B. HOUSTON, T. L. BAILEY, and P. KUMAR (Florida, University, Gainesville, FL) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 167-178
(Contract N61331-79-C-0049)

A computational study for solid hydroxide granule scrubbers of the functional dependence of the CO2 removal rate term on local gas phase CO2 concentration and on the local concentration of absorbent remaining in the bed is described. A simplified flow model appropriate for axial, isothermal flow of CO2-laden gas through small cylindrical absorbent samples is constructed. Predictions of the model are computed for several assumed forms of rate term, each containing one or more free parameters, and the calculations are compared with existing small-sample experimental data. It is found that assumed rate terms of power law form are in poor agreement with observation, whereas a parametrized rate term which contains a smoothed step function dependence on absorbent concentration agrees with experiment fairly well. It is concluded that the step function model is a realistic one, and may be useful in modelling full-sized CO2 scrubbers. C.D.

A83-28338*# Rice Univ., Houston, Tex.
ABSORPTION OF CARBON DIOXIDE BY SOLID HYDROXIDE SORBENT BEDS IN CLOSED-LOOP ATMOSPHERIC REVITALIZATION SYSTEM
S. H. DAVIS, JR. (Rice University, Houston, TX) and L. D. KISSINGER (NASA, Johnson Space Center, Houston, TX) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 179-196. refs

The reactions of carbon dioxide with various metals are discussed. The equations which govern the rates of CO2 removal from the atmosphere in spacecraft environmental control systems are discussed. Results from performance testing of various Space Shuttle environmental control systems are presented with the correlation of the equations to the performance given. (Author)

A83-28339#
APPLICATIONS OF PERMEABLE MEMBRANES AS CARBON DIOXIDE SCRUBBERS
A. J. SARICH (U.S. Naval Academy, Annapolis, MD) In: The characterization of carbon dioxide absorbing agents for life support equipment; Proceedings of the Winter Annual Meeting, Phoenix, AZ, November 14-19, 1982. New York, American Society of Mechanical Engineers, 1982, p. 197-208. refs

The problem of the removal of excessive carbon dioxide from closed or semi-closed life sustaining environments is examined and the potential applications of permeable membrane separators, or permeators, for carbon dioxide removal (scrubbing) is discussed. Basic membrane theory, the design of permeators, and the use of permeators in cascade systems are presented. Tables of gas selectivities and permeabilities for candidate membranes for carbon dioxide scrubbing are given. The potential applications of permeable membrane systems are considered in the areas of collective protection shelters (citadel systems), submarine atmosphere control, air recompression and treatment chambers, saturation diving systems, self-contained breathing systems, and underwater habitats. N.B.

A83-28929
EFFECTS OF PARTIAL ANTI-G SUIT INFLATION ON THORACIC VOLUME AND BREATHING PATTERN
T. S. CHADHA, F. LOPEZ, G. JENOURI, S. BIRCH, and M. A. SACKNER (Mount Sinai Medical Center, Miami Beach, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 324-327. refs ISSN 0095-0562
(Contract NIH-HL-10622)

The purpose of the study is to determine the changes in thoracic volume and the pattern of breathing during partial anti-G suit (PAGS) inflation by respiratory inductive plethysmography (RIP). The nine subjects first breathe with closed glotis at functional residual capacity while the suit is suddenly inflated to 140 mm Hg using a calves-to-thighs sequence. The increase in thoracic volume, measured from deflection of the RIP baseline, is 252 ml, which reflects the displacement of blood from the lower extremities into the thorax. On resuming normal breathing, the thoracic volume returns to the baseline level. The breathing pattern is then monitored for a 15-min baseline period, the PAGS is inflated, the expiratory reserve volume (ERV) is measured by spirometry, and the breathing pattern is monitored for another 15 min. The ERV decreases 227 ml (+ or - 60) after the inflation of the PAGS. This it is noted, did not differ from the change in thoracic volume expected from displacement of blood into the thorax. No changes occur in minute ventilation, tidal volume, frequency, inspiratory time, fractional inspiratory time, and mean inspiratory flow from deflation to PAGS inflation. C.R.

A83-28930
CARDIAC FUNCTION MONITORED BY IMPEDANCE CARDIOGRAPHY DURING CHANGING SEATBACK ANGLES AND ANTI-G SUIT INFLATION
J. S. LOGAN, J. H. VEGHTE, M. A. B. FREY, L. M. J. ROBILLARD, B. L. MANN, and R. J. LUCIANI (Wright State University, Dayton; USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 328-333. Research supported by the American Heart Association. refs ISSN 0095-0562

Impedance cardiography (IC) appears to be a promising noninvasive technique for monitoring small changes in pilot cardiovascular status during conditions simulating flight. Heart rate (HR), stroke volume (SV), cardiac output (CO), ventricular ejection time (VET), and thoracic impedance (Zo) were monitored in ten volunteers for 5 min at each of four seatback angles from vertical: 12, 30, 45, and 60 deg. Data were also obtained at three seatback angles (12, 30, 60 deg) for 6 min each, before, during, and after inflation of the standard USAF anti-G suit to 1.5 psi. Significant differences (p less than 0.05) in HR, SV, CO, VET and Zo were observed among the four positions. Inflation of the standard anti-G suit to 1.5 psi at 1.0 +Gz did not significantly alter HR, SV, or CO; whereas, 1 min of deflation of the anti-G suit significantly altered HR, SV, CO compared to inflation values. The results suggest IC can detect small differences in HR, SV, CO, VET, and Zo within subjects as a function of minor changes in body position. Author

A83-28932* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMBINING TECHNIQUES TO ENHANCE PROTECTION AGAINST HIGH SUSTANIED ACCELERATIVE FORCES
M. M. COHEN (NASA, Ames Research Center, Moffett Field, CA; U.S. Naval Material Command, Naval Air Development Center, Warminster, PA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, April 1983, p. 338-342. refs ISSN 0095-0562

Five volunteer subjects were tested for acceleration tolerance under eight different experimental conditions representing relaxed and unprotected tolerance and tolerance with all possible combinations of the anti-G suit, and M-1 maneuver, and supination in a PALE seat. The individual and combined effects of the various acceleration protective techniques were examined as they related to various models for acceleration protection, and the data revealed no statistically significant deviations from a simple additive model. The apparent net additivity was interpreted as resulting from a combination of additive, synergistic, and overlapping mechanisms. Author

A83-29325
CALCULATION OF THE PARAMETERS OF THE OPTICAL SYSTEM OF THE IMAGE CONVERTER OF AN ADAPTIVE INDUSTRIAL ROBOT [RASCHET PARAMETROV OPTICHESKOI SISTEMY PREOBRAZOVATELIA IZOBRAZHENII ADAPTIVNOGO PROMYSHLENNOGO ROBOTA]
V. M. KOMAROV (Rybinskii Aviatsionnyi Tekhnologicheskii Institut, Rybinsk, USSR) Priborostroenie (ISSN 0021-3454), vol. 26, March 1983, p. 90-95. In Russian. refs ISSN 0021-3454

A83-29331
OPTICAL DEVICES FOR INVESTIGATIONS OF THE EYE [OPTICHESKIE PRIBORY DLIA ISSLEDOVANIIA GLAZA]
P. M. TAMAROVA Moscow, Izdatel'stvo Meditsina, 1982, 176 p. In Russian. refs

The physical bases and principles of the optical instruments used in studies of the eye are examined. Methods for investigating, analyzing, and diagnosing the value of these instruments and the means for increasing their effectiveness are discussed. Problems of the technology of ophthalmoscopes are considered, including magnification, resolving power, and the illumination and nonreflectivity of the image of the anterior part of the eye. Conclusions are presented concerning the actual precision of the measurement of the elements of the anterior part of the eye. Also discussed are future trends in microphthalmoscopy, based on the application of contact lenses in combination with the increased use of instruments for studies of the pupil. Attention is given to polarization studies of the eye. N.B.

A83-29373
STRESSES AFFECTING THE COCKPIT PERSONNEL AND AUTOMATION [BELASTUNG DES COCKPITPERSONALS AND AUTOMATISIERUNG]
G. WESTPHAL (Interflug Gesellschaft fuer Internationalen Flugverkehr mbH, Berlin, East Germany) Technisch-oekonomische Information der zivilen Luftfahrt (ISSN 0232-5012), no. 5, 1982, p. 163-172. In German. ISSN 0232-5012

There are currently developments directed towards an automation of aircraft control operations. The reasons for the implementation of automation projects with the considerable expenses involved were in the past mainly related to a resulting improvement with respect to safety. Recently, the most significant motivating factor regarding such developments involves the relief of the cockpit personnel from operational procedures and activities. Basic investigations are being conducted concerning a definition and measurement of the stresses to which the cockpit personnel is subjected. The problem of optimum stress conditions is explored,

taking into account the value zero, which corresponds to full automation. The stress conditions existing for personnel in the cockpit of conventional airliners in the absence of automation are found to make automation in the cockpit a necessity. However, complete automation is not recommended. It has been found that the performance capability of a human being is significantly greater than it has been assumed previously, and man's complete relief from the functions of the man-machine system is not advantageous. G.R.

N83-21778# Joint Publications Research Service, Arlington, Va.
DETERMINATION AND CLINICAL ASSESSMENT OF PHYSICAL WORK CAPACITY OF FLIGHT PERSONNEL
V. M. KONDRAKOV, V. I. KOLEDENOK, and L. I. ARSENYEVA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 119-123 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 82-84
Avail: NTIS HC A07/MF A01

The work capacity of 375 aircraft crewmembers, aged 20 to 49 doing submaximal exercises was investigated. The work capacity declined slightly with age. Factors which most frequently cause its decrease were identified in healthy and diseased people and methods of its measurement were refined. It was shown that the work load, chronotropic reserve index and cardiac index may give indirect evidence of the coronary blood flow rate, and the inotropic reserve index of the cardiac contractile function. Determination of work capacity of the flight personnel allows improvement of medical supervision, detect cardiovascular abnormalities at an early stage and substantiates expertise conclusions. E.A.K.

N83-21779# Joint Publications Research Service, Arlington, Va.
DEVICE FOR ACTIVE AND PASSIVE ORTHOSTATIC TESTS UNDER LABORATORY AND FIELD CONDITIONS
V. A. DARTSMELIYA and G. S. BELKANIYA *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 17, No. 1, Jan. - Feb. 1983 (JPRS-83007) p 124-126 4 Mar. 1983 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 1, Jan. - Feb. 1983 p 85-86
Avail: NTIS HC A07/MF A01

A system of immobilization on a turntable based on a parachute suspension, which was developed to conduct passive orthostatic tests is described. The active orthostatic test which is used for a long time in clinical practice for functional assessment of the cardiovascular system is discussed. Orthostatic circulatory insufficiency is the most consistently demonstrable consequence of man's exposure to weightlessness or conditions simulating the physiological effects of weightlessness. E.A.K.

N83-21803# Presswerke Krefeld G.m.b.H. und Co., K.G. (West Germany).
USE OF HANDLING SYSTEMS TO REDUCE MULTIPLE PHYSICAL EXERTION IN DROP FORGES Final Report, Jun. 1981
B. SCHULZE Bonn Bundesministerium fuer Forschung und Technologie Nov. 1982 27 p refs *In* GERMAN; ENGLISH summary
(BMFT-FB-HA-82-032; ISSN-0171-7618) Avail: NTIS HC A03/MF A01

The implementation of flexible handling systems for the handling of forgings of small and medium weight is discussed. The performance of the system and its effect on the work environment are addressed. M.G.

N83-21804# Albany International Corp., Dedham, Mass.
RESISTANCE OF NAVY SHIPBOARD WORK SLOTHING MATERIALS TO EXTREME HEAT Final Report, 3 Dec. 1980 - 31 Jul. 1982
M. M. SCHOPPEE, J. M. WELSFORD, and N. J. ABBOTT Natick, Mass. Navy Clothing and Textile Research Facility. Oct. 1982 176 p refs
(Contract N00140-81-C-BA83)
(AD-A122348; NCTRF-TR-148) Avail: NTIS HC A09/MF A01 CSCL 11E

Estimates of burn injury potential of Navy work clothing materials have been made by measuring retention of tensile properties during exposure to radiant heat; resistance to ignition; heat transfer during exposure to either radiant heat or flame impingement. Seventeen outerwear fabrics were tested, including polyester, cotton (normal and FR), wool, polyester/cotton, polyester/wool, polyester/rayon, nylon/cotton and Nomex/Kevlar blends of weights ranging from 3.5 to 10.3 oz/sq yd. Four underwear fabrics, both woven and knit, made from 100% cotton and 65/35 polyester/cotton were also included, as well as various outerwear/underwear combinations. The analytical work of Alice M. Stoll and her associates was extended to obtain an estimate of burn injury potential from heat transfer data. Author (GRA)

N83-21805# Naval Coastal Systems Center, Panama City, Fla. Diving and Salvage Ship Husbandry Branch.
THE EFFECTS OF PULSATILE FLOW ON CARBON DIOXIDE ABSORPTION BY HIGH PERFORMANCE SODASORB
A. PURER, G. A. DEASON, M. L. NUCKOLS, and R. TAYLOR Dec. 1982 13 p refs
(AD-A122668; AD-F200046; NCSC-TM-364-82) Avail: NTIS HC A02/MF A01 CSCL 06K

The effects of pulsatile flow on carbon dioxide absorption by high performance Sodasorb was investigated using previously developed methods. This investigation covers both a saturated and dry carrier gas with average linear velocities from about 2 to 20 centimeters per second at a pulse rate of 20 to 110 cycles per minute. A small breathing machine was used to generate the pulsatile flow. Pulsatile flow was found to be more efficient than constant flow with a dry carrier gas. A more complex relationship was observed for a saturated carrier gas; however, the trend was for pulsatile flow to be less efficient at high linear velocities. At low linear velocities, the efficiencies of the pulsatile flow approached that of constant flow. Author (GRA)

N83-21806# BioTechnology, Inc., Falls Church, Va.
ALLOCATION OF FUNCTIONS IN MAN-MACHINE SYSTEMS: A PERSPECTIVE AND LITERATURE REVIEW
H. E. PRICE, R. E. MAISANO, and H. P. VANCOTT Jun. 1982 149 p refs
(Contract W-7405-ENG-26)
(DE82-016191; NUREG/CR-2623; ORNL/SUB-81/9027/1)
Avail: NTIS HC A07/MF A01

This report reviews the literature relevant to allociation of functions and presents a procedure for the allocation process applicable to nuclear power plant control rooms. An historical perspective of man's relationship with technology is given as background. Methods and models that have been developed to aid the allocation process are then considered, followed by examples of real-world applications. The relationship of allocation of function to the system development process is outlined. The report then turns to the proposed procedure of the allocation process. DOE

N83-21807# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
HUMAN-ENGINEERING DESIGN CONSIDERATIONS FOR CATHODE-RAY-TUBE-GENERATED DISPLAYS
W. W. BANKS, D. I. GERTMAN, and R. J. PETERSEN Apr. 1982 313 p refs
(Contract DE-AC07-76ID-01570)
(DE82-015231; NUREG/CR-2496; EGG-2161) Avail: NTIS HC A14/MF A01

Relevent issues related to human performance in conjunction with the use of cathode ray tube-generated display are discussed. Twelve primary source documents were identified for human engineering content review. From these documents a set of 22 variables were selected and analyzed. Each variable is discussed in terms of its impact, relevance, and validity with regard to various standards that evolved over the past 20 years. Studies related to each standard were also identified and cited that either support or weaken a particular standard. The conclusion drawn indicate that there are areas needing further investigation before valid standards can be generated. However, there are many current standards that have ample research support to justify them as candidate standards for use by the Nuclear Regulatory Commission. Suitability of these various standards is discussed. DOE

N83-22252# Joint Publications Research Service, Arlington, Va.
EQUIPMENT FOR COSMONAUT EVA
G. G. BEBENIN and Y. N. GLAZKOV *In its* USSR Rept.: Space, No. 20 (JPRS-82970) p 92-98 28 Feb. 1983 Transl. into ENGLISH from Zemlya Vselennaya (Moscow), no. 3, May - Jun. 1982 p 31-34
Avail: NTIS HC A08

The design of an extravehicular movement pack comprised of a life support system, thermal regulation system, reaction motor, and orientation and stabilization system is described. Possible performance problems are also discussed. M.G.

N83-22978# Joint Publications Research Service, Arlington, Va.
HUMAN FACTOR IN CONTROL SYSTEMS
G. L. SMOLYAN and K. V. TOBOLEV *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 28 (JPRS-82696) p 69-107 21 Jan. 1983 refs Transl. into ENGLISH from Novoye v Zhizni, Nauke, Tekhn.: Ser. Mat., Kibernetika (Moscow), no. 9, Sep. 1974 p 1-62
Avail: NTIS HC A06/MF A01

Functional distinctions of the human element in automated control systems are defined and discussed. Operator training by means of so-called algorithmic model of a control system and evaluation of efficiency of automated systems are also addressed. M.G.

N83-23002*# National Academy of Sciences - National Research Council, Arlington, Va. Ad Hoc Committee on Aircrew-Vehicle System Interaction.
AN EVALUATION OF NASA'S PROGRAM IN HUMAN FACTORS RESEARCH: AIRCREW-VEHICLE SYSTEM INTERACTION
National Academy Press 1982 37 p refs
(Contract NASW-3455)
(NASA-CR-170143; NAS 1.26:170143) Avail: NTIS HC A03/MF A01 CSCL 05H

Research in human factors in the aircraft cockpit and a proposed program augmentation were reviewed. The dramatic growth of microprocessor technology makes it entirely feasible to automate increasingly more functions in the aircraft cockpit; the promise of improved vehicle performance, efficiency, and safety through automation makes highly automated flight inevitable. An organized data base and validated methodology for predicting the effects of automation on human performance and thus on safety are lacking and without such a data base and validated methodology for analyzing human performance, increased automation may introduce new risks. Efforts should be concentrated on developing methods and techniques for analyzing man machine interactions, including human workload and prediction of performance. S.L.

N83-23003# University of Southern California, Redondo Beach. Behavioral Technology Labs.
PROFILE: A TECHNIQUE FOR PROJECTING MAINTENANCE PERFORMANCE FROM DESIGN CHARACTERISTICS Technical Report, 1 Jul. 1981 - 1 Sep. 1982
D. M. TOWNE, M. C. JOHNSON, and W. H. CORWIN Nov. 1982 75 p refs
(Contract N00014-80-C-0493)
(AD-A122452; TR-100) Avail: NTIS HC A04/MF A01 CSCL 09B

The report describes PROFILE, a computer-aided technique for assessing the maintainability of a system, based upon a specification of the system's design. For each fault of interest, PROFILE generates a sequence of actions required to isolate and correct the malfunction, and it determines the time to perform the generated procedure by accessing a data bank of standard times for generic maintenance actions. The projections are sensitive to design characteristics which determine what actions must be performed to isolate and rectify the fault, and to factors which affect the time to perform those actions. A PROFILE analysis of a representative sample of failures yields a distribution of maintenance times and actions performed, to aid decision making throughout the design cycle. The projections of maintenance actions also are of potential value in assessing training requirements. Two experiments, using different electronic systems and technician populations, were conducted to obtain detailed corrective maintenance data. The corrective maintenance performances predicted by the model correspond well with the observed performances. Author (GRA)

N83-23004# Navy Clothing and Textile Research Unit, Natick, Mass.
THE EXPERIMENTAL MOD 2 FIREFIGHTERS' ALUMINIZED CRASH-RESCUE FIRE-PROXIMITY HOOD: LIMITED SERVICE TEST Interim Report
H. P. WINER Jul. 1982 16 p
(AD-A122409; NCTRF-143) Avail: NTIS HC A02/MF A01 CSCL 06Q

The Navy Clothing and Textile Research Facility (NCTRF) has developed the experimental Mod II Firefighters' Aluminized Crash-Rescue Fire-Proximity Hood, which improves upon the standard firefighters' aluminized hood (MIL-H-29144). Reports from the firefighting community have indicated that the standard hood is not compatible with the current self-contained breathing apparatus. To allow for the self-contained breathing apparatus, a new aluminum frame with a greater front radius has been developed, and a liftup visor with an enlarged area for improved vision and voice communications has been incorporated in the experimental hood. This visor also reduces fogging of the face shield. Also, a bib is attached to the front to serve as a protective flap over the vacuum-deposited gold-coated facepiece when the hood is not being worn. NCTRF has conducted a limited service evaluation of the experimental Mod II hood. As a result of this evaluation, NCTRF recommends that a new latch system be developed for securing the visor. After completion of this development, another service evaluation of the experimental fire-proximity hood should be conducted. Author (GRA)

N83-23005# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
SUPERVISORY CONTROL OF UNDERWATER TELEMANIPULATORS: DESIGN AND EXPERIMENT Ph.D. Thesis
D. R. YOERGER 30 Aug. 1982 227 p refs
(Contract N00014-77-C-0256; NR PROJ. 196-158)
(AD-A123632) Avail: Issuing Activity

Supervisory control was investigated as a means to improve the performance of remotely controlled underwater manipulator systems. A system was designed and implemented on a laboratory manipulator and on an underwater device. Author

N83-23006# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
SPACE ROBOTICS Interim Report
R. E. KORF Aug. 1982 59 p refs
(Contract ARPA ORDER 3597)
(AD-A121484; CMU-RI-TR-82-10) Avail: NTIS HC A04/MF A01 CSCL 22B

This report surveys the possible applications and technical feasibility of robots in space. The future space program in the time frame of 1980-2000 is first assessed, including space exploration, global information services and space utilization. The critical technologies needed to support the projected space program are then considered, including the need for general purpose, remote intelligence and manipulation. Teleoperators are discussed as a possible means of meeting this requirement and are found not to be satisfactory due to communication time delays and bandwidth limitations, and human costs and performance limits. Autonomous space robots are proposed as a solution and several detailed scenarios for their use are presented. The technical feasibility of space robotics is evaluated by examining the requirements, state of the art, and research needed for each of the subsystems of a space robot. These include manipulators, sensors, navigation, guidance, propulsion, surface locomotion, computing and control, communications, electrical power, and spacecraft structure. Finally, a research program is outlined for the development of autonomous space robots. Author (GRA)

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PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

A83-29422* Alabama Univ., Birmingham.
HIGHLY EFFICIENT PEPTIDE FORMATION FROM N-ACETYLAMINOACYL-AMP ANHYDRIDE AND FREE AMINO ACID
D. W. MULLINS, JR. and J. C. LACEY, JR. (Alabama, University, Birmingham, AL) Journal of Molecular Evolution (ISSN 0022-2844), vol. 19, March 1983, p. 176-178. refs ISSN 0022-2844
(Contract NGR-01-010-001)

The kinetics of formation of the N-blocked dipeptide, N-acetylglycylglycine, from N-acetylglycyl adenylate anhydride and glycine in aqueous solution at 25 C, and at various PH's are reported. The reaction is of interest in that over a physiologically relevant pH range (6-8), peptide synthesis proceeds more rapidly than hydrolysis, even at those pH's at which this compound becomes increasingly susceptible to base-catalyzed hydrolysis. Under similar conditions, the corresponding unblocked aminoacyl adenylate anhydrides are considerably more unstable, and undergo appreciable hydrlysis in the presence of free amino acid. Because N-blocked aminoacyl adenylate anhydrides serve as model compounds of peptidyl adenylate anhydrides, these results suggest that primitive amino acid polymerization systems may have operated by cyclic reactivation of the peptidyl carboxyl group, rather than that of the incoming amino acid. Author

A83-29423
A PROBABLE PREBIOTIC PEPTIDE FORMATION FROM GLYCINEAMIDE AND RELATED COMPOUNDS IN A NEUTRAL AQUEOUS MEDIUM PARTICIPATION OF NUCLEOSIDE AND 5'-MONONUCLEOTIDE
M. NISHIZAWA, Y. MAKINO, and F. EGAMI (Mitsubishi-Kasei Institute of Life Sciences, Machida, Tokyo, Japan) Journal of Molecular Evolution (ISSN 0022-2844), vol. 19, March 1983, p. 177-183. refs ISSN 0022-2844

A83-29424
RADIOLYSIS OF AQUEOUS SOLUTIONS OF HYDROGEN CYANIDE (PH ABOUT 6) - COMPOUNDS OF INTEREST IN CHEMICAL EVOLUTION STUDIES
V. NIKETIC, S. NESKOVIC (Beograd, Univerzitet, Belgrade, Yugoslavia), Z. D. DRAGANIC, I. G. DRAGANIC (Mexico, Universidad Nacional Autonoma, Mexico City, Mexico), and S. JOVANOVIC (Institut za Nuclearne Nauke, Belgrade, Yugoslavia) Journal of Molecular Evolution (ISSN 0022-2844), vol. 19, March 1983, p. 184-191. refs ISSN 0022-2844

Oxygen-free aqueous solutions of hydrogen cyanide, with 0.1 M and pH of about 6, were exposed to gamma rays from a Co-60 source, the mixture of nonvolatile products was fractionated, and the fractions were analyzed. It has been found that the complex mixture contains oligomers and polymers with molecular weights up to 20,000 daltons, mainly polyamides with urea and peptidic fragments. Among the constituents are carbamyl glycinonitrile and carbamyl glycinamide, that represent 6.4 percent and 3.1 percent of the total of unfractionated material respectively. Urea content is 2.6 percent, but the derivatives of urea are more abundant. Acid hydrolysis releases several amino acids. Glycine is the most abundant (75 percent or more of total amino acid content), and its concentration considerably increases in some fractions when the hydrolysis is carried out at 130 C. The role of free radicals in reactions leading to the formations of radiolytic products is considered. Some comparisons are made between findings in the present work, at initial pH of about 6, and an earlier study of ammonium cyanide at pH 9. Author

A83-29425
THE INSTABILITY OF THE AUTOGEN
G. F. JOYCE (California, University, La Jolla, CA) Journal of Molecular Evolution (ISSN 0022-2844), vol. 19, March 1983, p. 192-194. refs ISSN 0022-2844
(Contract PHS-GM-07198)

The stability of the components of the autogen is investigated. The autogen theory has been proposed to provide a mechanism for the rapid origin of a self-replicating chemical system from short, random oligomers. The autogen is studied in terms of hypercycle theory, and the dynamic behavior of the autogen is determined by fixed point analysis. It is found that the components are incapable of stable coexistence. N.B.

A83-29451
SPACE VACUUM HINDERS RADIOPANSPERMIA
M. D. NUSINOV and S. V. LYSENKO (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR) British Interplanetary Society, Journal (Interstellar Studies) (ISSN 0007-084X), vol. 36, May 1983, p. 195-200. refs ISSN 0007-084X

This paper reviews the published experimental works on the exposure of microorganisms to the effect of vacuum and temperatures (thermal vacuum conditions, tv). Generalising the results of these works the authors substantiate the mechanism of irreversible damage of the cells at tv space conditions. This damage is caused by rapid evaporation of intracellular water and subsequent relative high intracellular pressures. On this basis the assumption was made and substantiated that, regardless of the widespread viewpoint, space vacuum is a serious obstacle to radiopanspermia. Author

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Supplement 247)* JULY 1983

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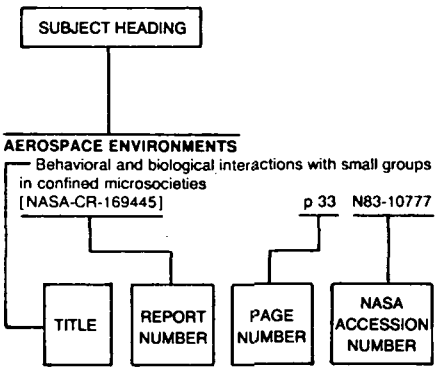

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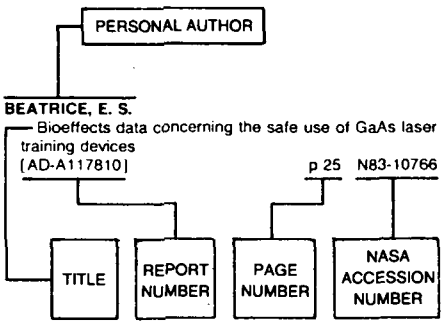

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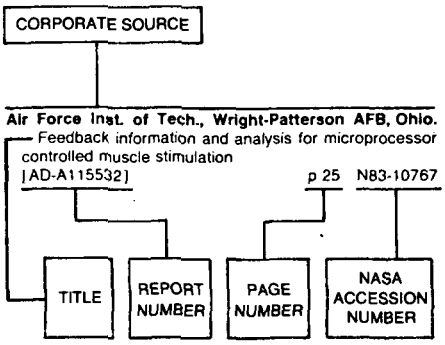

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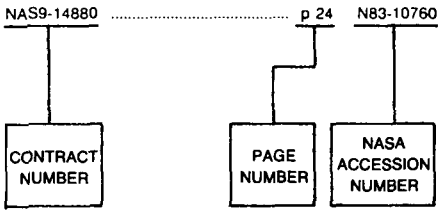

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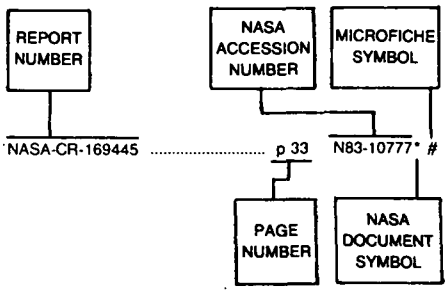

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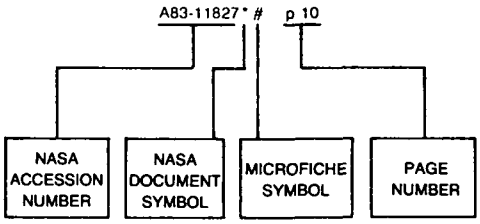

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