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A Continuing Bibliography with Indexes

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NASA SP-7011(259)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 259)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1984 in

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

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 476 reports, articles and other documents announced during May 1984 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.

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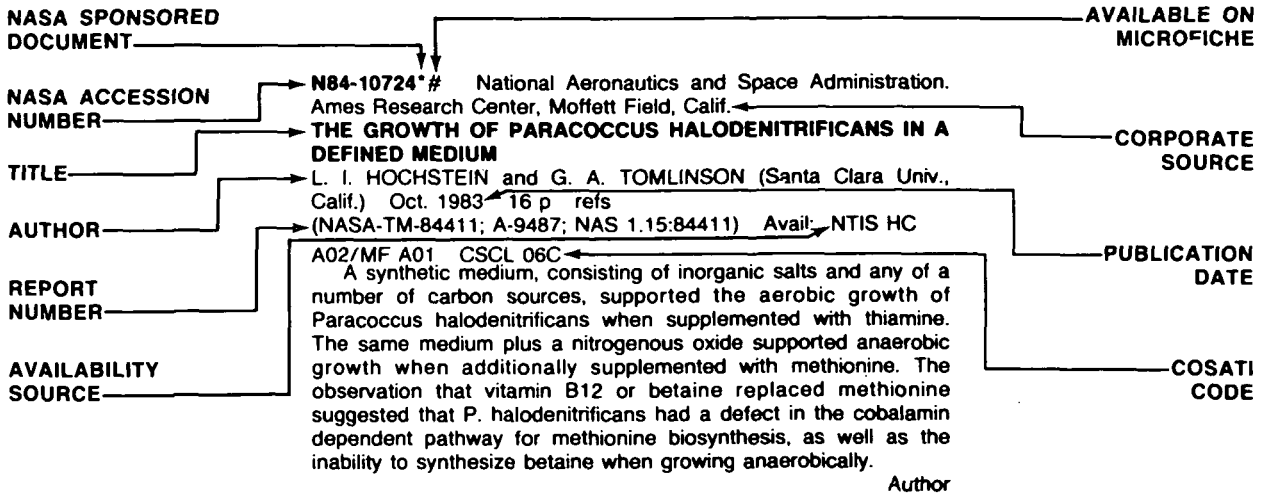

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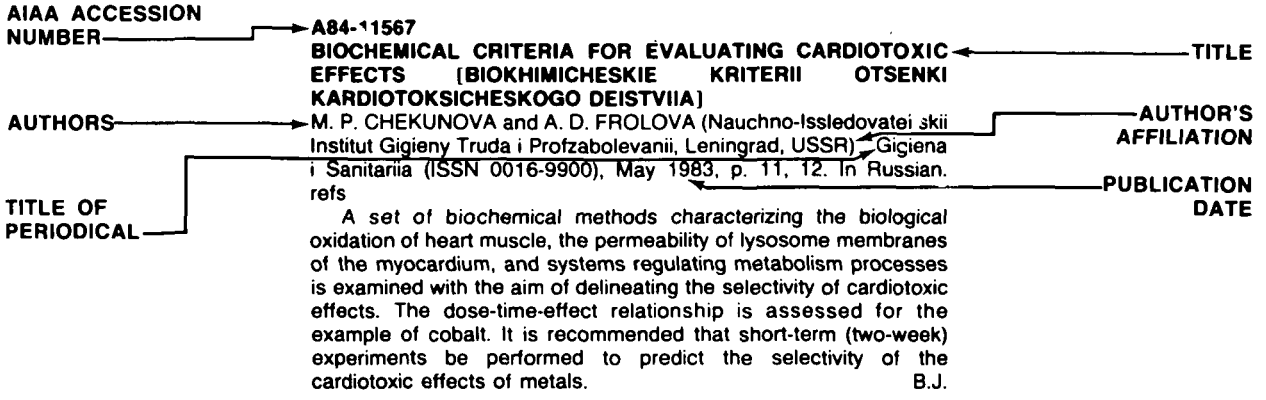

AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 259)

JUNE 1984

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LIFE SCIENCES (GENERAL)

Includes genetics.

A84-23323
PREVENTION OF THE DEPRESSION OF NATURAL-KILLER ACTIVITY AND THE CONTRACTILE FUNCTION OF THE MYOCARDIUM DURING LONG-TERM STRESS BY MEANS OF PRELIMINARY ADAPTATION OF THE ORGANISM TO SHORT-TERM STRESS EFFECTS [PREDUPREZHDENIE DEPRESSII AKTIVNOSTI ESTESTVENNYKH KILLEROV I SOKRATITEL'NOI FUNKTSII MIOKARDA PRI DLITEL'NOM STRESSE S POMOSHCH'IU PREDVARITEL'NOI ADAPTATSII ORGANIZMA K KOROTKIM STRESSORNYM VOZDEISTVIIAM]
F. Z. MEERSON (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), G. T. SUKHIKH, L. S. KATKOVA, and L. V. VANKO Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 274, no. 1, 1984, p. 241-243. In Russian. refs

A84-23474
MAIN MECHANISMS FOR FUNCTIONAL DISTURBANCES IN THE BODY DURING OXYGEN BREATHING UNDER EXCESS PRESSURE [OSNOVNYE MEKHANIZMY FUNKTSIONAL'NYKH NARUSHENII V ORGANIZME PRI DYKHANII KISLORODOM POD IZBYTOCHNYM DAVLENIEM]
I. N. CHERNIAKOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Dec. 1983, p. 50-52. In Russian.

Experimental results are presented which demonstrate that there is a close connection between general disturbances in the body during breathing under excess pressure (without compensation) and the development of circulatory hypoxia in the general circulation system due to blood congestion in extrathoracic veins. The first cause of this congestion is elevated intrathoracic pressure, which hinders the return of venous blood from the periphery to the right ventricle. It is noted that the present results should be taken into account in training flight personnel in conditions of excess-pressure breathing. B.J.

A84-23697
MUSCLE SOUNDS
G. OSTER (New York, City University, New York, NY) Scientific American (ISSN 0036-8733), vol. 250, March 1984, p. 108-114.

The detection methods and subsequent beneficial applications of muscle sound are described in addition to the sound research on human heart, leg and eye muscles, and certain frog, quail and gerbil muscles. An electronic stethoscope amplifies the low-frequency sounds fast-twitch fiber generated by converting pressure waves (ie., waves carrying sounds to the ear) into electric signals with a piezoelectric crystal. Autocorrelation, used to filter out background noise, shows muscle tone to have a range of frequencies with a maximum at 25 + or - 2.5 Hz. Testing with the fast Fourier program shows that sound amplitude is proportional to load; consequently muscle sounds can be used to reveal the work done by a particular muscle. Muscle sound measurement can be used to detect heart muscle degeneration, to evaluate the training progress of athletes, and to explain animal behavior. C.M.

A84-23720
CHANGES IN THE STRUCTURE OF LYMPHOID ORGANS OF RATS UNDER LONG-TERM HYPOKINESIA [IZMENENIIA STRUKTURY LIMFOIDNYKH ORGANOV KRYS PRI DLITEL'NOI GIPOKINEZII]
G. N. DURNOVA and A. S. KAPLANSKII (Ministerstvo Zdravookhraneniia SSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Aug. 1983, p. 17-21. In Russian. refs

Histological methods were used to study the thymus and spleen in male rats sacrificed on the 30th, 60th, 90th, 120th, and 165th days of hypokinesia, as well as two and three months after its termination. It was found that involution of the organs resulted from the development of hypokinetic stress. The most acute changes occurred during the first month of hypokinesia, coinciding with the alarm stage of the stress reaction. Subsequently, the rats gradually adapted to the new conditions, corresponding to the resistance stage of the general adaptation syndrome. The mass and structure of the thymus did not normalize during the readaptation period after hypokinesia. It is noted that this can produce premature immunological aging of the organism. B.J.

A84-23721
THE EFFECT OF LONG-TERM HYPOKINESIA ON GROWTH AND SKELETAL MUSCLE IN RATS [VLIIANIE DLITEL'NOI GIPOKINEZII NA ROST I SKELETNUIU MUSKULATURU KRYS]
E. I. ILINA-KAKUEVA and Z. F. SAVIK (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 85, Aug. 1983, p. 27-33. In Russian. refs

Hypokinesia lasting for 1-5.5 months in rats is not shown to produce muscular atrophy, but results in a cessation of the growth of muscles, muscle fibers, and of the animal as a whole. So far as the extremity muscles are concerned, essential structural changes occur only in the soleus muscle. Manifested as a focal sclerosis and as the formation of new muscle fibers, these changes are considered to be due to disturbed hemodynamics occurring during the first days of hypokinesia. The animals and their muscles begin to grow again during the readaptation period. It is suggested that one of the pathogenic causes leading to the cessation of growth is stress that affects the somatotrophic function of the hypophysis. B.J.

A84-23722
MATHEMATICAL MODEL OF THE SIMULTANEOUS COMBINED EFFECT OF IONIZING RADIATION AND HYPERTHERMIA [MATEMATICHESKAIA MODEL' ODNOVREMENNOGO KOMBINIROVANNOGO VOZDEISTVIIA IONIZIRUIUSHCHEI RADIATSII I GIPERTERMII]
V. P. KOMAROV and V. G. PETIN (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, July-Aug. 1983, p. 484-488. In Russian. refs

A84-23723
RADIOSENSITIZING AND DAMAGING EFFECTS OF HYPERTHERMIA ON VARIOUS BIOLOGICAL SYSTEMS - RADIOSENSITIZING AND DAMAGING EFFECT OF HYPERTHERMIA ON MOUSE LEUKOSIS LA CELLS [RADIOSENSIBILIZIRUIUSHCHEE I POVREZHDAIUSHCHEE DEISTVIE GIPERTERMII NA RAZLICHNYE BIOLOGICHESKIE SISTEMY RADIOSENSIBILIZIRUIUSHCHEE I POVREZHDAIUSHCHEE DEISTVIE GIPERTERMII NA KLETKI MYSHINOGO LEIKOZA LA]
L. V. SHTEIN and A. G. KONOPLIANNIKOV (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, July-Aug. 1983, p. 489-492. In Russian. refs

A84-23724
SYNERGISTIC EFFECT OF GAMMA RAYS AND A CONSTANT MAGNETIC FIELD [SINERGIZM V DEISTVII GAMMA-RADIATSII I POSTOIANNOGO MAGNITNOGO POLIA]
A. M. KUZIN (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) and S. E. NIZKII (Vserossiiskii Nauchno-Issledovatel'skii Institut Soi, Blagoveshchensk, USSR) Radiobiologiia (ISSN 0033-8192), vol. 23, July-Aug. 1983, p. 510-512. In Russian.

A84-23730
MYOCARDIAL ISCHEMIA IN RATS DURING EXPOSURE TO INFRASOUND [ISHEMIIA MIOKARDA KRYS PRI DEISTVII INFRAZVUKA]
S. V. ALEKSEEV, V. V. GLINCHIKOV, and V. R. USENKO (Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1983, p. 34-38. In Russian.

The effect of infrasound of different frequencies (4-16 Hz) and intensities (90-145 dB) on the myocardium was studied experimentally in rats and guinea pigs over the course of 45 days with a daily exposure of 3 hours. The infrasound was found to produce spasms in the main vessels, leading to the development of ischemia, which in turn resulted in lesions and the destruction of part of the myocardiocytes. Exposure at 10-15 Hz and 135-145 dB was found to be especially harmful. Intracellular regeneration with a complete recovery of cells that have been damaged relatively little takes place in the intact structures. B.J.

A84-23734
THE BIOELECTROCHEMICAL ACTIVITY OF THE BRAIN AT THE SURFACE OF METAL ELECTRODES [BIOELEKTROKHIMICHESKAIA AKTIVNOST' GOLOVNOGO MOZGA NA POVERKHNOSTI METALLICHESKIKH ELEKTRODOV]
T. B. SHVETS-TENETA-GURII (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 14, July-Sept. 1983, p. 6-42. In Russian. refs

Current theory regarding the inherent electrochemical activity of living tissue is summarized, and works dealing with such activity in the central nervous system are surveyed. It is believed that a knowledge of this activity can shed light on changes in the local metabolism of the brain. Experimental results obtained in an investigation of the bioelectrochemical activity at platinum and gold electrodes of cerebrospinal fluid from the surface of the cerebral cortex in rabbits are presented. The data describe various functional states and forms of brain activity. It is found that actions that traumatize the brain are attended by regular changes in bioelectrochemical activity. This is also the case with particular types of brain activity. These changes are of a local character. The results are seen as suggesting, that in a given situation, various substances enter the cerebrospinal fluid and that these substances may have a specific biological activity. C.R.

A84-23735
THE CONDITIONED REFLEX AND MOTIVATION [USLOVNYI REFLEKS I MOTIVATSIIA]
G. A. VARTANIAN and M. I. LOKHOV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 14, July-Sept. 1983, p. 43-65. In Russian. refs

The role of motivation in the formation of the conditioned reflex is examined, with the excitation of subcortical motivational structures of the brain taken as the equivalent of motivation. Published results and original experimental data obtained on models of the conditioned reflex with direct stimulation of the cerebral cortex and passive lifting of the extremities are analyzed, and it is concluded that closure of the temporal link and the formation of a stable conditioned reflex are impossible without a sufficient degree of excitation of the subcortical structures. It is confirmed that it is necessary to have multilevel closure of the temporal link in intact-brain conditions in order to form the conditioned reflex on any existing model of the phenomenon. B.J.

A84-23736
STAPHYLOCOCCIC ENTEROTOXINS [STAFILOKOKKOVYE ENTEROTOKSINY]
V. I. BUGROVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1983, p. 11-15. In Russian. refs

Data on the synthesis of staphylococcic enterotoxins (SEs) as well as the effect of physical and chemical factors on their activity and production are analyzed. Particular consideration is given to the use of various culture media and techniques for the large-volume production of entertoxins; the effect of incubation temperature on the formation of SEs; the aerobic growth of staphylococci; the thermal stability of SEs; and the effect of pH on the thermal inactivation of type A enterotoxin. B.J.

A84-23738
THE EFFECT OF THE DEFICIENCY OF FOOD PROTEIN AND GROUP B VITAMINS ON THE CONTENT OF CALCIUM-BINDING PROTEIN IN THE MUCOSA OF THE SMALL INTESTINE [VLIIANIE NEDOSTATOCHNOSTI PISHCHEVYKH PROTEINOV I VITAMINOV GRUPPY B NA SODERZHANIE KAL'TSII SVIAZYVAIUSHCHEGO BELKA V SLIZISTOI OBOLOCHKE TONKOI KISHKI]
SH. S. TAZHIBAEV and A. A. MAMYRBAEV (Akademiia Meditsinskikh Nauk SSSR, Alma Ata, Kazakh SSR) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1983, p. 48-50. In Russian. refs

A84-23739
THE EFFECT OF MEAT PATES OF DIFFERENT COMPOSITIONS ON THE GASTRIC SECRETION FUNCTION [VLIIANIE MIASNYKH PASHTETOV RAZLICHNOGO SOSTAVA NA SEKRETORNUIU FUNKTSIIU ZHELUDKA]
M. V. GONCHAROVA, A. I. ZHARINOV, and IU. A. SYSOEV (Akademiia Meditsinskikh Nauk SSSR; Moskovskii Tekhnologicheskii Institut Miasnoi i Molochnoi Promyshlennosti, Moscow, USSR) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1983, p. 51-54. In Russian. refs

Experiments on four dogs with Pavlovian pouches were carried out to investigate the effect on gastric secretion of a new type of meat patein which 20 percent of the basic raw matter was replaced by precipitated blood plasma proteins (the sample under study) and by a pateof conventional composition (the control sample). Both patesamples were shown to cause a characteristic gastric juice secretion which differs strongly from the secretion pattern during meat (non-pate) feeding. This is due to the presence in the pates of a significant amount of fat and to the homogenized nature of the patemass. The gastric juice thus obtained was characterized by a slightly decreased acidity, a low hydrochloric-acid content, a pH of 1.7-2.6, and a moderate pepsin concentration. B.J.

A84-23740
ELECTRICAL ACTIVITY OF SUBCORTICAL STRUCTURES AND THE CEREBRAL CORTEX DURING FASTING [ELEKTRICHESKAIA AKTIVNOST' PODKORKOVYKH OBRAZOVANII I KORY GOLOVNOGO MOZGA PRI GOLODE]
L. S. VASILEVSKAIA and B. V. ZHURAVLEV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1983, p. 57-61. In Russian. refs

A84-23741
THE ROLE OF BIOGENIC BRAIN MONOAMINES IN THE REGULATION OF HIBERNATION [O ROLI BIOGENNYKH MONOAMINOV MOZGA V REGULIATSII ZIMNEI SPIACHKI]
L. I. MURAVEVA and A. IU. BUDANTSEV (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 96, July-Aug. 1983, p. 117-131. In Russian. refs

Histochemical, biochemical, and physiological data on biogenic amines in the brains of hibernating animals are analyzed, and several hypotheses concerning the role of monoaminergic systems of brain neurons in the regulation of hibernation are stated. It is assumed that the processes determining the physiological state of the brain during hibernation as well as its neuroendocrine regulation depend on the interaction of monoaminergic, cholinergic, and other systems of neurons. B.J.

A84-23742
CURRENT IDEAS ON THE SIGNIFICANCE OF NORMAL MICROFLORA OF THE BODY IN NORMAL AND PATHOLOGICAL CONDITIONS [SOVREMENNYE PREDSTAVLENIIA O ZNACHENII NORMAL'NOI MIKROFLORY TELA V NORME I PATOLOGII]
T. A. NASONOVA and V. N. MALTSEV (Ministerstvo Zdravookhraneniia SSR, Institut Biofiziki, Moscow, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 96, July-Aug. 1983, p. 139-150. In Russian. refs

The published literature on the significance of the normal microflora for the human body is reviewed. It is noted that this microflora plays an important role in the life-activity of the organism; microbes of the autoflora have an antagonistic effect on pathogenic microorganisms, stimulate natural-immunity mechanisms, and participate in digestion and vitamin synthesis. Various adverse factors lead to changes in microbe associations, and dysbacteriosis arises, which (on the background of lowered body resistance) can lead to endogenous infection. B.J.

A84-23926* Texas Univ., Dallas.
INFLUENCE OF SUSPENSION HYPOKINESIA ON RAT SOLEUS MUSCLE
G. H. TEMPLETON, M. PADALINO, J. MANTON, M. GLASBERG, C. J. SILVER, P. SILVER, G. DEMARTINO, T. LECONEY, G. KLUG, H. HAGLER (Texas, University, Dallas, TX) et al. Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 278-286. refs
(Contract NAGW-140)

Hindlimb hypokinesia was induced in rats by the Morey method to characterize the response of the soleus muscle. Rats suspended for 1-4 wk exhibited continuous and significant declines in soleus mass, function, and contractile duration. Soleus speeding was in part explained by an alteration in fiber type. The normal incidence of 70-90 percent type I fibers in the soleus muscle was reduced after 4 wk of suspension to 50 percent or less in 9 of 11 rats. A significant decline in type I myosin isozyme content occurred without a change in that of type II. Other observed histochemical changes were characteristic of denervation. Consistent with soleus atrophy, there was a significant increase in lysosomal (acid) protease activity. One week of recovery after a 2-wk suspension was characterized by a return to values not significantly different from control for muscle wet weights, peak contraction force, one-half relaxation time, and type I myosin. Persistent differences from control were observed in maximal rate of tension development, contraction time, and denervation-like changes. Author

A84-23929
EFFECT OF ALVEOLAR HYPOXIA ON REGIONAL PULMONARY PERFUSION
P. H. NEUMANN, C. M. KIVLEN, A. JOHNSON, F. L. MINNEAR, and A. B. MALIK (Albany Medical College, Albany, NY) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 338-342. refs
(Contract NIH-HL-17355; NIH-HL-27016)

Effects of alveolar hypoxia levels on the regional distribution of pulmonary blood flow (PBF) in control-ventilated sheep are examined. For the baseline period and two hypoxemia levels, PBF regional distribution was measured with 15-micron-diam microspheres. Regional distribution of PBF in the prone position remained constant during the baseline period. During hypoxemia, regional distribution of PBF increased in the upper lung and decreased in the dependent lung. The degree of hypoxemia affected flow distribution by increasing mean pulmonary arterial pressure, not by increasing pulmonary blood flow. Consequently alveolar hypoxia increases regional pulmonary perfusion to the upper lung, dependent on the pulmonary hypertension level, and vasodilation or recruitment in the upper lung are suggested as perfusion effectors. C.M.

A84-23930
EFFECT OF AN EXERCISE REGIMEN ON DEVELOPMENT OF HYPERTENSION IN RATS
M. J. FREGLY (Florida, University, Gainesville, FL) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 381-387. refs
(Contract NIH-HL-14526-11)

The possibility that a forced exercise regime might prevent the development of hypertension induced in rats both by renal encapsulation and chronic administration of deoxycorticosterone acetate (DOCA) and NaCl has been studied. In renal hypertensive rats, forced exercise at 0.4 to 1.25 miles/day, 7 days/wk for 16-22 wk failed to prevent the development of hypertension and cardiomegaly and reduced renal concentrating ability accompanying the hypertension. In DOCA-treated rats (10 mg/wk), forced exercise at 0.4 and 0.8 mile/day, 7 days/wk for 16 wk also failed to prevent both the development of hyptertension and cardiomegaly. A review of data of others reveals that exercise may delay the development of hypertension in both Dahl salt-sensitive and spontaneously hypertensive (SHR) rats and may modestly reduce the maximal level of pressure attained. Of the four models of hypertension studied to date in rats, the Dahl salt-sensitive strain appears to be the one that responded best to exercise, although blood pressure eventually reached that of sedentary controls. Author

A84-23931* Texas Univ., Houston.
GLUCOSE UPTAKE AND GLYCOGEN SYNTHESIS IN MUSCLES FROM IMMOBILIZED LIMBS
W. F. NICHOLSON, P. A. WATSON, and F. W. BOOTH (Texas, University, Houston, TX) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 431-435. refs
(Contract NIH-AM-19393; NAS9-16478)

Defects in glucose metabolism in muscles of immobilized limbs of mice were related to alterations in insulin binding, insulin responsiveness, glucose supply, and insulin activation of glycogen synthase. These were tested by in vitro methodology. A significant lessening in the insulin-induced maximal response of 2-deoxyglucose uptake into the mouse soleus muscle occurred between the 3rd and 8th h of limb immobilization, suggesting a decreased insulin responsiveness. Lack of change in the specific binding of insulin to muscles of 24-h immobilized limbs indicates that a change in insulin receptor number did not play a role in the failure of insulin to stimulate glucose metabolism. Its inability to stimulate glycogen synthesis in muscle from immobilized limbs is due, in part, to a lack of glucose supply to glycogen synthesis and also to the ineffectiveness of insulin to increase the percentage

of glycogen synthase in its active form in muscles from 24-h immobilized limbs. Author

A84-23933
MECHANISMS PRODUCING TACHYCARDIA IN CONSCIOUS BABOONS DURING ENVIRONMENTAL HEAT STRESS
A. J. GORMAN (Texas, University, San Antonio, TX) and D. W. PROPPE (Southwest Foundation for Research and Education, San Antonio, TX) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 441-446. refs
(Contract NIH-HL-21451; NIH-HL-27504)

Increased heart rate caused by the effects of heat stress-induced hyperthermia on sympathetic activity, cardiac efferent vagal activity, and nonautonomic mechanisms in seven unanesthetized, chronically instrumented baboons is examined. Baboons were subjected to environmental heating (40-45 C), which raised their arterial blood temperature 2.3 C during one of four states: (1) control; (2) propanolol induced beta-adrenergic receptor blockade; (3) atropine induced cholinergic receptor blockade; and (4) a combination of states (2) and (3). Results illustrate a heart rate increasing linearly with arterial blood temperature during all four states: local temperature influences on pacemaker tissue are 40 percent responsible, and autonomic influences (vagal withdrawal and sympathetic activation) are 60 percent responsible. It is suggested that approximately 75 percent of autonomic control is caused by decreased parasympathetic outflow to the heart. C.M.

A84-23934
PRESYNAPTIC NEUROTRANSMITTER AND CHEMOSENSORY RESPONSES TO NATURAL STIMULI
M. POKORSKI and S. LAHIRI (Pennsylvania, University, Philadelphia, PA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 447-453. refs
(Contract NIH-HL-19737; NIH-HL-08899)

Release of acetylcholine from presynaptic nerve terminals in the carotid body may be responsible for the excitation of carotid body chemoreceptors by hypoxia and hypercapnia and central ventilatory stimulation by hypercapnia. 4-Aminopyridine, an agent known to release presynaptic transmitters including acetylcholine, was administered intravenously (1 mg per kg) or by close intra-arterial injection to the carotid body (200 microgram) in anesthetized cats. 4-Aminopyridine did not change the carotid chemosensory responses to any arterial PO2 or PCO2 levels studied, whereas it stimulated ventilation at all arterial PO2 and PCO2 levels. Atropine blocked the ventilatory effects of 4-aminopyridine but not the responses to hypoxia and hypercapnia. The results add to the evidence which shows that the presynaptic cholinergic mechanism is not germane to carotid body chemoreception. Also, acetylcholine does not seem to mediate the central hypercapnic stimulation of ventilation. Author

A84-23968
SLEEP REGULATION [REGULIATSIIA SNA]
N. A. VLASOV, A. M. VEIN, and IU. A. ALEKSANDROVSKII Moscow, Izdatel'stvo Nauka, 1983, 232 p. In Russian. refs

Various aspects of sleep regulation and the correction of sleep disorders through drugs, psychotherapy, acupuncture, and other methods are studied. Changes in the structure of sleep associated with borderline forms of nervous disorders are discussed, and the influence of L-tryptophan on the structure of sleep disturbances associated with neuroses is evaluated. The influence of gamma-aminobutyric acid derivatives on sleep structure is investigated for subjects with and without neuroses, and various preparations are analyzed for their influence on neurotic sleep structure, including Nitrazepamum, Phenazepamum, Chlordiazepoxid, and placebo. Hypno-suggestive therapy is considered, as well as combined effects of light, sound, and temperature. J.N.

A84-24099
TIME-VARYING MAGNETIC FIELDS - EFFECT ON DNA SYNTHESIS
A. R. LIBOFF, T. WILLIAMS, JR., D. M. STRONG, and R. WISTAR, JR. (U.S. Navy, Naval Medical Research Institute, Bethesda, MD) Science (ISSN 0036-8075), vol. 223, Feb. 24, 1984, p. 818-820. Navy-supported research. refs

Human fibroblasts have exhibited enhanced DNA synthesis when exposed to sinusoidally varying magnetic fields for a wide range of frequencies (15 hertz to 4 kilohertz) and amplitudes (2.3 x 10 to the -6th to 5.6 x 10 to the -4th tesla). This effect, which is at maximum during the middle of the S phase of the cell cycle, appears to be independent of the time derivative of the magnetic field, suggesting an underlying mechanism other than Faraday's law. The threshold is estimated to be between 0.5 x 10 to the -5th and 2.5 x 10 to the -5th tesla per second. These results bring into question the allegedly specific magnetic wave shapes now used in therapeutic devices for bone nonunion. The range of magnetic field amplitudes tested encompass the geomagnetic field, suggesting the possibility of mutagenic interactions directly arising from short-term changes in the earth's field. Author

A84-24100
MICRODIFFERENTIAL HOLOGRAPHY AND THE POLYSARCOMERIC UNIT OF ACTIVATION OF SKELETAL MUSCLE
M. SHARNOFF, T. H. KARCHER, and L. P. BREHM (Delaware, University, Newark, DE) Science (ISSN 0036-8075), vol. 223, Feb. 24, 1984, p. 822-825. Research supported by the University of Delaware Research Foundation. refs
(Contract NSF BNS-78-22199)

Unbalanced holographic difference images of contracting skeletal muscle fibers reveal that activation affects the amplitude of the light scattered by individual myofibrils. The results suggest that the unit of activation is not the sarcomeric structural unit, but a monomyofibrillar segment containing 20 to 40 contiguous sarcomeres. Author

A84-24327*# National Aeronautics and Space Administration, Washington, D. C.
PIONEERING IN GRAVITATIONAL PHYSIOLOGY
G. A. SOFFEN (NASA, Washington, DC) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-3 to S-8.

Gravity affects biology at almost all levels above that of the cell organelle. Attention is presently given to progress made in the understanding of gravitational effects through studies employing centrifuges, clinostats, inverted preparations, linear devices, water immersion, free fall, and short- and long-term spaceflight. The cardiovascular changes which cause malaise and illness during the first few days of extended space missions are the direct result of fluid translocation from the lower extremities. Upon reentry, there is hypovolumnia and a cardiovascular deconditioning that can include tachycardia, changes in arterial blood pressure, narrow pulse pressure, and syncope. Attention is also given to NASA's gravitational physiology reseach program. O.C.

A84-24332#
INTERSEROSAL FORCES, THE PRESSURE ENVIRONMENT OF THE CENTRAL CIRCULATIONS AND NATURES INTERNAL 'G SUIT'. I
E. H. WOOD and E. A. HOFFMAN (Mayo Foundation, Rochester, MN) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-20 to S-23. refs

The importance of interserosal and associated interstitial pressures relative to tissue perfusion is exemplified by the eyes. Because of positive intraoccular pressure, and the fact that the eyes are outside of the cranial vault, retinal perfusion is not facilitated by the highly negative intracranial pressure during +g(z)

acceleration as is the case for the brain. These and other considerations are the basis for the present suggestion that the thoracic hyperemia and resulting cardiovascular deconditioning which occur in the near zero-g force environment of outer space may be prevented by concomitant exposure of the head and airways to a moderate degree of positive pressure. O.C.

A84-24337*# Louisville Univ., Ky.
THE VALIDITY OF AN ANIMAL MODEL FOR EXPERIMENTS RELATED TO WEIGHTLESSNESS
X. J. MUSACCHIA and J. M. STEFFEN (Louisville, University, Louisville, KY) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-37 to S-40. refs
(Contract NSG-2325; NAGW-70)

Animal evolution has witnessed morphological and physiological adaptations to gravitational forces. In the rat, hind limb muscles can be used to illustrate a range of load bearing functions: soleus - gastrocnemius = plantaris - extensor digitorum longus (EDL). A harness suspension apparatus is used to induce hypokinesia and hypodynamia (H&H) and to simulate responses comparable to those seen in weightlessness (i.e., COSMOS experiments). After one and two weeks of suspension H&H, there is muscle atrophy with a loss in muscle mass; the result of loss in muscle protein. Concommitantly, there is a decrease in RNA, but not in DNA content. The effects are greatest in the soleus and least in the EDL. These recent findings, in concert with earlier reports of increased nitrogenous excretion, suggest that both decreased protein synthesis and increased protein catabolism are characteristic of muscle atrophy. Recovery is seen in terms of reversal of these effects after removal from suspension. Author

A84-24338#
SUBCELLULAR INVESTIGATION OF THE INFLUENCE OF REAL AND MODULATED WEIGHTLESSNESS UPON PERFORMANCE AND REGENERATION PROCESSES IN MUSCULAR TISSUE
S. BARANSKI (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, july 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-41 to S-44. refs

The muscular systems of rats subjected over various periods of time to a hypokinetic environment and to 21-day flights in biosatellites 782 and 936 are analyzed on the basis of electrophysiological and stereological studies of cell structures, as well as diffractometric analysis of the mitochondria. Under weightless conditions, slight degenerative changes were observed in the mitochondria, and a decrease in relative volume of smooth sarcoplasmic reticulum was noted in both red and white fibers. Similar changes occurred under both weightlessness and hypokinesia. Muscle with a prevalence of red fiber was more sensitive and the heart muscle was more resistant to gravitation change effects. J.N.

A84-24339#
EXAMINATION OF EFFECT OF HYPOKINESIS ON STATE OF GASTROINTESTINAL TRACT IN RAT
J. HIDEG, T. GATI, F. GELENCSER, A. POZSGAI, E. FEHER, and E. TOTH (Hungarian Academy of Sciences, Intercosmos Council, Budapest, Hungary) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-45, S-46. refs

Lati: CFY male rats were subjected to hypokinesis for periods of 1-8 weeks, and then the transmucosal potential difference (PD) and mucosal ion flux were measured to estimate the functional state of gastric mucosa. The injurious effects of hypokinesis on the gastric mucosal barrier are seen in PD decrease and H(+) rediffusion increase, as well as in histological examination. Barrier function damage increases ulcer sensitivity in both reserpinous and distensional ulcer models. From the first days of hypokinesis, stomach motility increases, while small intestine motility decreases. J.N.

A84-24340#
THE ROLE OF CHRONIC ACCELERATION IN GRAVITATIONAL PHYSIOLOGY
A. H. SMITH (California, University, Davis, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-47 to S-50. refs

The role of chronic acceleration studies in providing greater understanding of the physiological consequences of earth gravity is reviewed. The relationship between accelerated field strength and physiological responses is discussed, and the possible continuity of gravitational effect on red cell mass is cited. The loss of proprioceptive reflexes in decreased gravity fields is mentioned as a factor in the space sickness that has been encountered in weightlessness, and the concept of a general threshold field strength for functions characteristic at earth gravity and greater fields is considered. J.N.

A84-24341*# California Univ., Berkeley.
THERMONEUTRAL ZONE AND SCALING OF METABOLIC RATE ON BODY MASS IN SMALL MAMMALS
N. PACE and D. F. RAHLMANN (California, University, Berkeley, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-51, S-52. refs
(Contract NSG-7336)

A 4-species animal model suitable for experimental study of the effect of change in gravitational loading on the scale relationship between metabolic rate and total body mass is used to study the effect of temperature on metabolic rate in six male animals, 8-10 months of age, of each of the four species in the ambient temperature range 20-36 C. The measurements taken permitted partitioning of total body heat output into sensible heat loss by radiation, conduction and convection, and into latent heat loss by evaporation of water from the body surface. It is shown that the condition of thermoneutrality is important for metabolic scale effect studies, and that the thermoneutral zone for the species considered here is a narrow one. J.N.

A84-24342#
THE REGULARITIES OF RELATIONSHIPS BETWEEN STRUCTURE AND FUNCTION UNDER DIFFERENT FUNCTIONAL LOADS (HOMEOSTASIS AND HOMEOMORPHOSIS)
A. M. UGOLEV, B. Z. ZARIPOV, and A. I. MAMATAKHUNOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-53 to S-56. refs

Relationships between the structure and function of the rat small intestinal mucosa under different functional loads are investigated using a model of hypo- and hyperfunctioning intestinal tube. Results are reported for three of the ten types of surgical operations performed on male Wistar rats: resection, isolation, and bypass. The observed homeostasis of the mucosal mass is considered as a maintenance of the steady-state structure independent of either increase or decrease in functional loads. J.N.

A84-24343#
EVOLUTIONARY AND PHYSIOLOGICAL ADAPTATION TO GRAVITY
G. P. PARFENOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-57 to S-59.

The mechanisms by which gravity affects and has affected living organisms are discussed from a general perspective. It is pointed out that molecular and cellular processes do not respond directly to gravity, while larger structures may be totally determined by it. Gravity's roles in determining the earth environment prior to the emergence of life 3.8 Gyr ago, in influencing natural selection, and as a physiological stress factor are characterized. The implications of these effects for the adaptation of earth life to the weightlessness of space are considered. T.K.

A84-24344#
GRAVIPERCEPTION IN PLANT CELLS
W. HENSEL and A. SIEVERS (Bonn, Universitaet, Bonn, West Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-60 to S-63. refs

Recent experimental studies are surveyed and their findings summarized. It has been established that graviperception is restricted to the statocytes, that cell polarity is a necessary precondition for graviperception, and that the interaction of amyloplast and the endoplasmic reticulum (ER) figures in stimulus transduction. It is hypothesized here that the interaction of amyloplasts and ER during gravistimulation could trigger a Ca(2+) release from the IR by membrane-bound Ca(2+) pumps. An altered Ca(2+) concentration in the cytoplasm of statocytes could provide an explanation for the rapid depolarization of the plasma membrane. It is believed that these may constitute steps of graviperception. C.R.

A84-24349#
VENOUS AFFERENT ELICITED SKELETAL MUSCLE PUMPING - A NEW ORTHOSTATIC VENOPRESSOR MECHANISM
F. J. THOMPSON and B. J. YATES (Florida, University, Gainesville, FL) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-74, S-75. refs
(Contract NIH-R01-HL-25619)

Experiments on decerebrate-spinal cats using controlled mechanical stretches of the wall of a segment of the femoral-saphenous vein reveal that stretches as small as 5 microns/mm could evoke cord dorsum potentials, and that stretches elicited motoneuron population excitatory potentials which were recorded from ventral root fibers of the seventh lumbar cord segment. It is proposed that these connections provide a means for limb venous afferent modulation of skeletal muscle tone. The venous afferents combine with their reflex connections to motoneurons to produce a substrate for an orthostatic muscle tonus-venopressor mechanism. J.N.

A84-24350#
ANTIORTHOSTATIC HYPOKINESIA IN MONKEYS (EXPERIMENTAL MORPHOLOGICAL STUDY)
E. A. SAVINA, A. S. KAPLANSKII, V. N. SHVETS, and G. S. BELKANIIA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-76, S-77. refs

The autopsy and histological examinations of organs and tissues of rhesus-monkeys have demonstrated that during head-down tilt they develop: (1) blood redistribution accompanied by increased masses of brain, lungs, heart, liver, and kidneys; (2) hyopokinesia-induced changes; (3) symptoms of an acute stress-reaction, and (4) morphological manifestations of adaptive reactions aimed at stabilizing hemodynamics and fluid-electrolyte balance. These findings are in agreement with clinical and physiological data obtained in humans during head-down tilt studies. Author

A84-24355*# California Univ., Riverside.
SLEEP-WAKE RESPONSES OF SQUIRREL MONKEYS EXPOSED TO HYPERDYNAMIC ENVIRONMENTS
C. A. FULLER (California, University, Riverside, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-90, S-91.
(Contract NAGW-309; PHS-RR-05816)

This study examines the sleep responses of primates to acute 3 Gz environments. To investigate this question, loosely-restrained squirrel monkeys were exposed to 70 minutes of 3 Gz during the day. The animals' behavioral state was polygraphically monitored (EEG, EMG, EOG) along with video and deep body temperature. During the control period, animals exhibited slow wave sleep (SWS) napping behavior. SWS occurred during approximately 20 percent of the control period. Body temperature was maintained at 38.7 C. At 3 Gz, SWS was inhibited for 5 minutes, after which SWS occurred at levels 50 percent lower than in the control period. During the post-centrifugation period, SWS was elevated above the control (50 percent) and hyperdynamic (100 percent) levels. Body temperature was depressed 1.5 C when the animals were at 3 Gz. Thus, hyperdynamic environments are capable of modifying primate sleep behavior, at least as a result of acute exposure. Further, the increased arousal in the hyperdynamic environment is correlated with a lower body temperature. This negative correlation differs from the normal positive correlation of arousal and body temperature. Author

A84-24356*# State Univ. of New York, Buffalo.
GLUCOCORTICOID SENSITIVITY, DISUSE, AND THE REGULATION OF MUSCLE MASS
R. R. ALMON and D. C. DUBOIS (New York, State University, Buffalo, NY) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-92, S-93. NASA-supported research.

A new noninvasive immobilization procedure to be used on rats has been developed to study immobilization-induced muscle hypersensitivity to normal glucocorticoid concentration, subsequent muscle atrophy, and atrophy recovery. The immobilization procedure involves encasing the hind limb in a light-weight plasticlike cast (10 percent the usual plaster weight), completely resistant to animal gnawing. The effects of right-angle immobilization of the ankle on the slow fiber soleus, and the fast fiber extensor digitorum longus, resemble the effects of weightlessness. The increased concentration of glucocorticoid receptor sites in immobilized and denervated muscle is discussed, along with the chronic loss of muscle mass that occurs in practically all dystrophies. It is concluded that lack of mechanical work in a zero gravity environment is a major cause of glucocorticoid hypersensitivity in the body's musculature. C.M.

A84-24357#
THE EFFECT OF IMMOBILIZATION ON THE RAT'S BONE
T. SZILAGYI, M. RAPCSAK, A. SZOOR, I. FOLDES, and JR. GYARMATI (Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-94, S-95. refs

The effects of an eight week, plaster cast immobilization of the right hindlimb in 12 Wistar female rats are examined; the role of the parathyroids and reduction of mechanical stimuli are

discussed as well. Results show reduced periosteal and endosteal diameters (more pronounced in the former); a thirty percent decrease in compact bone mass; fewer trabeculae; and reduced mineral content. Immobilized animals also showed generally broadened epiphyseal cartilage of the tibia; decreased vascularization; fewer cartilaginious cores; and a paucity of osteoblasts. It is concluded that immobilization affects bone retardation and demineralization. C.M.

A84-24358#
EFFECT OF PHYSOSTIGMINE ON IMMOBILIZED RAT TONIC AND TETANIC SKELETAL MUSCLES
A. SZOOR and M. RAPCSAK (Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-96, S-97. refs

The effect of 28-day immobilization on the physostigmine sensitivity of rat skeletal muscles is investigated experimentally. The right hind limbs of 230-250-g female albino Norway rats were immobilized, the left limbs being used as controls. Tension (T) and contraction speed (CS) were evaluated in glycerinated preparations of soleus (slow) and extensor digitorum longus (EDL; fast) muscle fibers with ATP stimulation and with and without treatment with 0.0005 M and 0.001 M physostigmine. Myofibrilar-superprecipitation tests and ATPase measurements were also performed, and the results are presented graphically. T and CS in both muscles were decreased significantly by immobilization, and the potentiation of T and CS by physostigmine, observed in the control fibers, was suppressed. Immobilization also decreased the degree and speed of superprecipitation and the effect of physostigmine on superprecipitation. This finding is attributed to decreased ATPase activity. T.K.

A84-24359*# Arizona Univ., Tucson.
PREVENTION OF METABOLIC ALTERATIONS CAUSED BY SUSPENSION HYPOKINESIA IN LEG MUSCLES OF RATS
M. E. TISCHLER, S. R. JASPERS, and J. M. FAGAN (Arizona, University, Tucson, AZ) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-98, S-99. refs
(Contract NAGW-227)

Rats were subjected to tail-cast suspension hypokinesia for 6 days with one leg immobilized in dorsal flexion by casting. Control animals were also tail-casted. The soleus, gastrocnemius and plantaris muscles of uncasted hypokinetic legs were smaller than control muscles. Dorsal flexion prevented atrophy of these muscles and caused the soleus to hypertrophy. The anterior muscles were unaffected by hypokinesia. The smaller size of the soleus of the uncasted leg relative to the dorsal flexed and weight bearing limbs correlated with slower protein synthesis and faster proteolysis. The capacity of this muscle to synthesize glutamine (gln), which carries nitrogenous waste from muscle was also measured. Although tissue homogenates showed higher activities of gln synthetase, the rate of de novo synthesis was not altered in intact muscle but the tissue ratio of gln/glutamate was decreased. Glutamate and ATP were not limiting for gln synthesis, but availability of ammonia may be a limiting factor for this process in hypokinesia. Author

A84-24361#
REVERSIBLE EFFECTS OF AN ALTERED GRAVITY FIELD ON MYOFIBRILLAR PROTEINS OF SKELETAL MUSCLES OF VARIOUS PHENOTYPES
M. A. ELOIAN, J. S. DAVTIAN, B. A. TIKUNOV, and S. S. OGANESIAN (Institute of Cardiology, Yerevan, Armenian SSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-102, S-103. refs

White Wistar rats were subjected to 5 Gz acceleration for daily 40 min periods over two weeks,, and were studied 1-day and 30-days after the end of the exposures to the hypergravity field. The results suggest that reversible adaptive changes appear not only in modulatory, but also in contractile proteins in myofibrils. Many different patterns were observed for the adaptive change in the two protein substrates in slow and fast muscles. J.N.

A84-24362#
THE EFFECT OF HYPOKINESIS AND HYPOXIA ON THE CONTRACTILE PROPERTIES OF MUSCLES WITH DIFFERENT FUNCTIONS IN RATS
M. RAPCSAK, A. SZOOR (Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary), J. HIDEG, A. POZSGAI, and E. TOTH (ROVKI, Kecskemet, Hungary) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-104, S-105. refs

Experiments were performed on three groups of male rats of CFY strain for periods of 4, 8, and 12 weeks to study the effect of hypokinesis and hypoxia on the contractile properties of the soleus and EDL muscles. The contraction rate was not changed appreciably due to either of the treatments, though it was established that immobilization decreases body weight growth, and that hypoxia results in the atrophy of the soleus muscle sooner than in the EDS muscle. J.N.

A84-24363*# National Aeronautics and Space Administration, Washington, D. C.
MUSCLE AND THE PHYSIOLOGY OF LOCOMOTION
P. C. RAMBAUT, A. E. NICOGOSSIAN, and S. L. POOL (NASA, Washington, DC) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-106, S-107. refs

NASA's past, current, and planned research on muscle deterioration at zero gravity and development of countermeasures are reviewed; Soviet studies are discussed as well. A definition of muscle mass and strength regulation factors, and improved measurement methods of muscle atrophy are needed. Investigations of tissue growth factors and their receptors, endogenous and exogenous anabolic protein synthesis stimulation, and a potential neurotropic factor are among the projects in progress or planned. At present, vigorous physical exercise during spaceflight is recommended as the most effective countermeasure against skeletal muscle atrophy. C.M.

A84-24365#
ARRESTED BONE FORMATION DURING SPACE FLIGHT RESULTS IN A HYPOMINERALIZED SKELETAL DEFECT
M. SPECTOR, R. T. TURNER, E. MOREY-HOLTON (Emory University, Atlanta, GA), D. J. BAYLINK, and N. H. BELL (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-110, S-111. refs

Rats flown in space for 19 days displayed a decrease in periosteal bone formation rate from 16.1 to 48.7 percent in tibio-fibular cross-sections. The least effect of space flight occurred at the posterior eminence of the tibia, where the normal formation rate was the highest, owing to intrinsic muscle forces. The arrest line separating flight and postflight bone was found to contain considerably fewer hydroxyapatite crystallites than surrounding bone. This hypomineralized defect appeared to be the result of an abnormal organic matrix. The arrest line was never found along the posterior aspect of the tibia. Author

A84-24366#
SPECIFIC REGULATION OF CALCIUM-PHOSPHORUS METABOLISM DURING HYPOKINESIA AND WEIGHTLESSNESS BY VITAMIN D3 ACTIVE METABOLITES
A. S. USHAKOV, I. N. SERGEEV, M. S. BELAKOVSKII, V. B. SPIRICHEV, A. S. KAPLANSKII, and V. N. SHVETS (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-112 to S-114. refs

Both calcium absorption and the effects of hormonally active forms of vitamin D in rats are studied in conjunction with hypokinesia and weightlessness. Small intestine absorption of calcium declines after one month of hypokinetic exposure, possibly because of a decrease in circulating 1,25 dihydroxy-vitamin D (1,25(OH)2D3). Bone growth inhibition is demonstrated by reduced length and width of the long bones, decreased thickness of the diaphyseal cortical plate and the growth cartilage plate, and osteoporosis of the trabecular bone spongiosa. Long bone growth and volume are restored by administering 24,25 dihydroxyvitamin D (24,25(OH)2D3) or a combination of 1,25(OH)2D3 and 24,25(OH)2D3, but similar procedures are ineffectual for restoration of the growth cartilage plate. Primary and secondary spongiosa volumes enlarge with 1,25(OH)2D3 treatment and attain control volume with 24,25(OH)2D3 administration. It is suggested that vitamin D3 dihydroxylated metabolites and/or target tissue sensitivity are related to a delay of bone growth and mineralization in hypokinetic rats. C.M.

A84-24367*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE EFFECTS OF IMMOBILIZATION ON CORTICAL BONE IN MONKEYS (M. NEMESTRINA)
W. J. NIKLOWITZ, T. E. BUNCH, and D. R. YOUNG (NASA, Ames Research Center, Moffett Field; San Francisco, University, San Francisco, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-115, S-116. refs

Rhesus and pigtail monkeys were restrained for up to seven months in a hypogravic-hypodynamic environment for the purpose of studying the osteoporotic process and its reversibility, particularly in relation to humans. In vivo bending, radiography and tomography are among the techniques that were used. Bone deterioration within one month was detectable only in histological preparation, where resorption and subsequent cavity formation were demonstrated in addition to demineralization of the remaining hard tissue. Norland bone mineral analysis showed the greatest bone demineralization in the proximal tibia (23 percent to 31 percent after six months restraint), recovery did not even necessarily occur after 15 months. The largest bone stiffness decrease was 36 to 40 percent after a six months restraint; normal bending properties but not mineral content were restored after 8-1/2 months. Contrary to earlier studies, it is concluded that bone recovery, though a lengthy process, is possible: cortical bone in the tibia required 40 months. C.M.

A84-24369*# Virginia Univ., Charlottesville.
DISTRIBUTION OF FLUIDS IN THE BODY OF THE CENTRIFUGED RAT
G. C. PITTS (Virginia, University, Charlottesville, VA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-119, S-120. refs
(Contract NGR-47-005-213; NSG-2225)

The effects of exposure to an elevated g-level throughout the period of rapid growth is investigated in a comparison of a group of female Sprague-Dawley rats centrifuged as adults with other groups centrifuged for prolonged intervals starting shortly after weaning. The fluid-solid composition of total body, heart, liver, gut, skin, and muscle for both study groups is compared with that of a control group. None of the changes as a result of centrifugation were truly persistent. The only increases in mass associated with centrifugation and the only responses to centrifugation per se were observed in the skin values. J.N.

A84-24370#
GENERAL PRINCIPLES AND METHODS OF ANIMAL EXPERIMENTS FLOWN ON COSMOS BIOSATELLITES
E. I. ILIN (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-121, S-122.

Research on rats conducted aboard Soviet Cosmos biosatellites is discussed and general recommendations for animal experiments are given. Aside from meeting the animal's biological needs, it is suggested that motor activity restriction be minimized in zero gravity and artificial gravity experiments. To study the combined effects of weightlessness and ionizing radiation, rats were irradiated with two doses of gamma-radiation, one of which was a maximum whole-body irradiation dose (800 + or - 85 rad) to elicit radiation sickness. Cosmos experiments were completely automated, tested in preflight mockup, and involved simultaneously performed ground controls. Postrecovery animal examination and sacrifice were conducted at the recovery site to eliminate gravity readaptation effects on the data. C.M.

A84-24371#
DEMOGRAPHIC CONSIDERATIONS IN GRAVITATIONAL BIOLOGY
J. R. CAREY (California, University, Davis and Berkeley, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-123, S-124. refs

The quantitative demography concepts of stable population model and demographic equivalence are reviewed and related to gravitational biology. To examine the effect of different gravitational fields on the age distribution of populations, a computer simulation study using a set of life table parameters for the flour beetle, Tribolium castaneum, was conducted. The results show that different gravitational fields result in intuitive effects on poplation growth rate, but may result in counter-intuitive effects on population age structure. J.N.

A84-24372*# California Univ., Berkeley.
SCALING OF METABOLIC RATE ON BODY MASS IN SMALL MAMMALS AT 2.0 G
N. PACE (California, University, Berkeley, CA) and A. H. SMITH (California, University, Davis, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-125, S-126. refs
(Contract NSG-7336)

It is postulated that augmentation of gravitational loading should produce a shift in the classic Kleiber mammalian allometric relationship between metabolic rate and total body mass by an increase in both these parameters. Oxygen consumption rate and body mass measurements of 10 male rabbits 8 months of age were obtained initially for 1.0 g, and then over a 9-week period of chronic centrifugation at 2.0 g. Analysis of covariance showed that the positioning constant at 2.0 g is increased by 17 percent from that at 1.0 g at the P less than 0.001 level, and the exponent is increased by 8 percent at the P = 0.008 level. It is concluded that abatement of gravitational loading in spaceflight will result in a lowering of both allometric parameters. J.N.

A84-24373#
THE EFFECT OF HYPERGRAVITATION ON NUCLEIC ACID METABOLISM IN THE RAT LIVER
V. F. MAKEEVA and I. A. EGOROV (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-127, S-128. refs

RNA polymerase activity, RNA transcription, and RNA and DNA concentration were measured in liver tissue from 10 pregnant 300-g female Wistar rats and their 21-day fetuses after centrifugation at 2 g during days 14 through 21 of gestation. Five control animals were kept in the same room during the centrifugation period. Liver nuclei for the RNA polymerase and transcription determinations were isolated by the hypertonic-sucrose technique of Widnell and Tata (1964). The results are presented in tables and discussed. No significant changes due to hypergravity were found in any of the parameters measured in either the adult or the fetal rats. T.K.

A84-24374#
IS THERE AN ORIENTATION OF THE NUCLEI IN MICROPLASMODIA OF PHYSARUM POLYCEPHALUM?
V. SOBICK, W. BRIEGLEB, and I. BLOCK (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugmedizin, Cologne, West Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-129, S-130. refs

The orientation behavior of the Physarum nuclei is studied and a first analysis of the phenomenon is made. Microplasmodia, a type of Physarum polycephalum slime mold, were grown in Shuttle cultures and were slightly pressed in a special microchamber, whereupon they differentiated into flat active forms of up to 200 microns. Results were obtained using three types of light microscopes differing in gravity orientation: normal vertical, horizontal, and fast clinostat (85 rpm). Light and gravity are most likely involved in growth orientation because of the polar structure of the Physarum nuclei and their orientation. It is suggested that light stimulus fixes nuclei orientation because of an inherent reference pattern and that such a regulatory mechanism simultaneously compensates for the effects of gravity. C.M.

A84-24375#
THE EFFECTS OF WEIGHTLESSNESS AND INCREASED GRAVITY ON HEMOPOIETIC STEM CELLS OF RATS AND MICE
A. VACEK, A. BARTONICKOVA, D. ROTKOVSKA (Ceskoslovenska Akademie Ved, Biofyzikalni Ustav, Brno, Czechoslovakia), T. V. MICHURINA, E. S. DAMARATSKAIA, and L. V. SEROVA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem; Academy of Sciences, Institute of Biology of Development, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-131, S-132. refs

Changes in the number of hemopoietic stem cell colony forming units (CFU) were studied in Wistar rats exposed to hypogravity for 18 days on the biosatellite Cosmos 1129 or to long-term hypergravitation on earth (+1.0 G, 5 hours, 5 days). In both instances, as compared to synchronous and vivarium control groups, the number of CFU in the spleen and the bone marrow decreased and then subsequently improved, after experimental conditions. There was a four- to five-fold decrease in bone marrow CFU in the Cosmos 1129 experiment and a maximum CFU decrease of 62 percent in the spleen and of 49 percent in the bone marrow in the hypergravitation experiment. Effects on spleen cellularity, thymus cellularity, and lymph organs are also included. C.M.

A84-24376*# Northrop Services, Inc., Houston, Tex.
HEMATOPOIESIS IN ANTIORTHOSTATIC, HYPOKINESIC RATS
C. D. R. DUNN (Northrop Services, Inc.; Baylor University, Houston, TX), P. C. JOHNSON (NASA, Johnson Space Center, Houston, TX), and R. D. LANGE (Tennessee, University, Knoxville, TN) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-133, S-134. refs
(Contract NAGW-308; NAS9-14525; NAS2-10801; NAS2-11586)

Rats exposed to antiorthostatic, hypokinesia showed the following effects which are comparable to those seen in man during or after space flight: weight loss, reduced food and water consumption, transient increases in peripheral hematocrit and RBC count, decreasing MCV and reduced reticulocyte count. In addition, the hemoglobin P50 was shifted to the right. A significant shortening of RBC t1/2 was only seen after suspension. Changes in leukocyte and platelet numbers in suspended rats were also comparable to those in man during space flight, but leukocyte PHA sensitivity in rats showed no consistent alteration. The results demonstrate that this model reproduces many of the hematological effects of space flight and has potential as a tool in understanding the hematopoietic response to zero gravity. Author

A84-24377*# Santa Clara Univ., Calif.
THE EFFECTS OF HYPERGRAVITY ON THE RATE OF ANTIBODY FORMATION IN THE RAT
S. M. SCIBETTA, L. D. CAREN (Santa Clara, University, Santa Clara, CA), and J. OYAMA (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-135, S-136.

This experiment was designed to measure the immune response in acutely stressed and chronically centrifuged hyper-G-adapted male rats. Rats were exposed to 2.1 and 3.1 G. Acutely stressed animals were injected with sheep red blood cells (SRBC) on the day of inital exposure to hyper-G, and were chronically centrifuged for 10 to 15 days after immunization. Hyper-G-adapted rats were chronically centrifuged for 28 days prior to antigen injection and for 21 days after injection. Booster injections were given and serum samples taken at intervals from 3 to 9 days after the initial and booster injections. Antigen dose, injected ip, ranged between 1.35 x 10 to the 6th and 1.38 x 10 to the 9th SRBC/100 g. body weight. Pair-fed and ad libitum fed noncentrifuged controls were used. No significant differences in anti-SRBC antibody titers were found between centrifuged and control animals, although there were some changes in WBC counts and a significant increase in adrenal-gland size in acutely stressed animals. Author

A84-24378#
THE EFFECT OF HYPERGRAVITY ON THE PRENATAL DEVELOPMENT OF MAMMALS
L. V. SEROVA, L. A. DENISOVA, N. A. CHELNAIA, and E. S. MEIZEROV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-137, S-138. refs

The effect of hypergravity on mammalian prenatal development during the last period of gestation is studied in five-month-old female Wistar rats, centrifuged at 2 g during gestation days 14 through 21 (rotation rate of 33.3 rpm with one daily 30 minute pause). There was no difference between centrifuged and synchronous control rats regarding embryonic mortality, abnormal fetus, and abnormal placenta, though rates for these parameters were lower in vivarium controls. Fetal weight of centrifuged rats (3.71 g) was lower than synchronous controls (4.24 g), and the former also exhibited delayed skeletal development and a lowered erythropoietic cell count. However, it is concluded that mammals

flown at 0 g may also produce normal fetuses and that gestation days 14-21 offer more resistance to adverse environmental effects than other developmental stages. C.M.

A84-24379#
THE EFFECT OF HYPERGRAVITY ON FLUID-ELECTROLYTE METABOLISM IN RAT FETUSES
L. A. DENISOVA, G. V. DOLGOPOLOVA, N. A. ILIUSHKO, E. A. LAVROVA, IU. V. NATOCHIN, L. V. SEROVA, R. I. RUDNEVA, and E. I. SHAKHMATOVA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow; Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-139, S-140.

The fluid-electrolyte metabolism in pregnant rats and developing rat embryos during chronic centrifugation was examined. Physiological samples were taken of ten rats exposed to 2 g at the last trimester of gestation, as well as five synchronous controls, and five vivarium controls. Samples of myocardium, liver, kidney, and tibia of pregnant rats were studied, in addition to placenta, whole fetus, and fetal kidney. Fetal weight was reduced by 12.1 percent in centrifuged females as compared to synchronous controls, but water and electrolyte balance remained unchanged. Amniotic fluid volume and fetal mineral concentrations were analyzed. The calcium concentration was found to be greater in centrifuged rat fetuses: a significant finding since microgravity reduces the calcium concentration in adult humans. Finally it was concluded that fetal cell generation proceeds normally, but that the mass of organic substances of extracellular origin decreases. C.M.

A84-24380#
BIOLOGICAL EFECTS OF WEIGHTLESSENESS AT CELLULAR AND SUBCELLULAR LEVELS
E. L. KORDIUM and K. M. SYTNIK (Akademiia Nauk Ukrain'skoi RSR, Institut Botaniki, Kiev, Ukrainian SSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-141, S142.

The structure and function of procaryotes and plant eucaryotes at different levels of evolutionary development are discussed in relation to space-flight effects. It has been shown that the scope of changes of the bacterial ultrastructure induced by weightlessness depends to a certain extent on the initial conditions of culture growth. Biological effects of weightlessness at the subcellular level of eucaryotes increase with flight time. They also enhance in more complex plant forms, which may be due to intercellular interactions in the tissue system. It is asumed that the cell differentiation in weightlessness develops within the framework of normal genetic programs. Biochemical and physiological processes vary significantly due to the lack of rigorous predetermination. The pattern of rearrangement in the structure and function of the plant cell in weightlessness is discussed with respect to the problem of adaptation to zero-g. Author

A84-24381*# Indiana Univ., Bloomington.
RESPONSE OF AMPHIBIAN EGG CYTOPLASM TO NOVEL GRAVITY ORIENTATION AND CENTRIFUGATION
A. W. NEFF, M. WAKAHARA, A. JURAND, and G. M. MALACINSKI (Indiana University, Bloomington, IN) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-143, S-144.
(Contract NAGW-60)

The effects of inversion and centrifugation on the compartmentalization of cytoplasm in Xenopus laevis eggs are investigated experimentally. The rearrangement of yolk-platelet compartments (YPC) characterized by morphology, density, and viscosity differences is studied in fertilized, unfertilized, and unfertilized electrically activated eggs in normal, and inverted positions and with and without centrifugation at 10-183 x g for 5 min. The eggs are fixed and embedded in plastic or paraffin prior to sagittal sectioning (0.5, 4, or 8 microns) and microscopic examination; the results are presented in a diagram and discussed. A density-compartment model combining both animal/vegetal and dorsal/ventral polarities is proposed: YPC determined without gravity orientation during oogenesis respond to both sperm entrance point and gravity after fertilization, and the response involves breaking of the radial symmetry of the egg. It is predicted that Xenopus eggs in a microgravity environment will encounter difficulties in establishing a primary embryonic axis. T.K.

A84-24382#
THE EFFECT OF A 90-DAY HYPODYNAMY ON THE NEUROHUMORAL SYSTEM, EGG LAYING AND METABOLISM OF PROTEINS IN JAPANESE QUAIL
M. JURANI, P. VYBOH, D. LAMOSOVA, Z. BAROSKOVA, E. SOMOGYIOVA, K. BODA, and M. GAZO (Slovenska Akademia Vied, Ustav Fyziologie Hospodarskych Zvierat, Kosice, Czechoslovakia) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-145 to S-148. refs

Plasma and hypothalamus catecholamines; plasma thyroxine, triiodothyronine, estradiol, and corticosterone; skeletal-muscle and liver dry matter, protein concentration, and RNA and DNA; body weight; and egg-laying were measured in Japanese quail (coturnix coturnix japonica) kept in individual cages (controls) or in movement-restricting jackets for 5, 30, 60, or 90 days. The results are presented in graphs and tables and discussed. The neuroendocrine response to the hypodynamy was most marked at the beginning of the exposure and at 90 days, with some temporary adaptation at 30-60 days. An enhanced total metabolism of muscle proteins (reflected in significantly increased RNA/DNA ratios) persisted throughout the experimental period. These findings are of importance for understanding the combined effects of weightlessness and hypodynamy in the space environment. T.K.

A84-24383*# Pennsylvania Univ., Philadelphia.
RESISTANCE OF MATURE ARABIDOPSIS PLANTS TO MECHANICAL DEFORMATION IN RELATION TO G-FORCE DURING DEVELOPMENT
A. H. BROWN (Pennsylvania, University, Philadelphia, PA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S149, S150.
(Contract NGR-39-010-104; NAS2-22432)

Arabidopsis plants were grown in centrifuge tubes under well standardized culture conditions. Each plant was subjected to centrifugation (roots out) for 10 min at one of a series of centripetal forces between 7 and 390g. No deformation was observed in plants centrifuged at less than 35g. An 'average' degree of deformation was attained at about 60g. All plants exposed to more than 95g were maximally deformed but none was broken nor otherwise damaged irreversibly even at 390g. In every case new shoot growth continued normally after the centrifugation. A plant population grown on horizontal clinostats (0.5 rpm) under culture conditions exactly the same as for the upright plants responded to centrifugation stress in a way that was not substantially different from the response pattern of the plants cultured upright at 1g. Author

A84-24384*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CLINOSTAT EFFECTS ON SHOOT AND ROOT OF ARABIDOPSIS
T. HOSHIZAKI (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-151, S-152. refs
(Contract NAS7-918)

In the clinostat environment, Arabidopsis thaliana (L.) Heynh. plants grown in cultures having limited gas exchange with the external atmosphere developed 'above' the agar media a large mass of roots which eventually covered the stem. Cultural conditions were 0.5 rpm, 350 ft.c. from cool white fluorescent lamps, and 25 C. Limited gas exchange culture tubes were covered with Saran Wrap or mylar film, while free gas exchange cultures were plugged with cotton or polyurethane foam. Average shoot-root dry weight ratio of clinostatted, limited gas exchange plants was 3.39 (p less than 0.001) as compared to 10.1 for upright stationary and 10.3 for vertically rotated controls. Average dry weight (48.3 mg) of all clinostatted shoots was greater than those reported by other investigators (15.1 mg). Finally, shoots of the clinostatted plants reported here were almost 2x heavier (p less than 0.01) than the controls (28.7 mg, 26.7 mg), a result contrary to findings of previous investigators, where the clinostatted plants are the lightest (clinostat 15.1 mg, controls 16.5 mg and 17.2 mg).
Author

A84-24385#
CHRONIC HYPOKINESIS AND 3 PERIODS OF THE STRESS REACTIVITY IN RATS
M. POPPEI, K. HECHT, and M. GRASSE (Berlin, Humboldt-Universitaet, Berlin, East Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-153, S-154.

After 1, 3, and 6 weeks of hypokinesis and 12 hours of intermittent free mobility, 19 parameters from the endocrine, brain-metabolic, behavioral, and visceral functions were tested. Results are presented for catecholamine levels, brain metabolism and avoidance learning, sleep behavior, and endocrine functions. Three stages of stress activity are observed: (1) inhibition against exogenic influences, (2) immobilization of adaptive processes, and (3) a dissociation of functions with permanent hyper- or hyporeactive reactions. J.N.

A84-24386#
THE INFLUENCE OF HYPOKINESIS ON THE ASYMMETRIC DISTRIBUTION OF NORADRENALINE IN THE NEOCORTEX, HIPPOCAMPUS AND SUBRENALS OF RATS
K. HECHT, H. HILSE, P. OEHME, and M. POPPEI (Berlin, Humboldt-Universitaet, Berlin, East Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-155, S-156.

A84-24387#
SLEEP CHANGES IN RATS INDUCED BY PROLONGED HYPOKINESIS AND TREATED BY SUBSTANCE P
E. WACHTEL, I. KOLOMETZEWA, K. HECHT, P. OEHME, and M. POPPEI (Berlin, Humboldt-Universitaet, Berlin, East Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-157, S-158. refs

The effects of prolonged recurrent immobilization on the qualitative and quantitative characteristics of sleep and of antistress are studied using a hypokinesis model. Forty 200-250 g Wistar rats comprised control, hypokinesis and hypokinesis + substance P groups. EEGs and EMGs were recorded 1 hour after injection of 125 micrograms/kg of substance P (Arg-Pro-Lys-Gln-Gln-Phe-Phe-Gly-Leu-Met-NH2) and 250 micrograms/kg of substance P-A (Lys-Phe-Ile-Gly-Leu-Met-NH2). In general controls showed a balanced sleep-structure, while during three weeks, hypokinesis rats reduced all sleep stages, in favor of wakefulness, particularly deep slow sleep (42.0 + or - 1.3 percent decreased to 23.3 + or - 4.1 percent). In addition, hypokinesis rats exhibited motor hyperactivity, unstable sleep behavior, and difficulty falling asleep. These symptoms generally disappeared with substances P and P-A injection; it is suggested that the beneficial effects work only for disturbed sleep, and several mechanisms for the substance P effect are proposed. C.M.

A84-24389#
THE EFFECT OF EMOTIONAL STRESS PRIOR TO THE ONSET OF CENTRIFUGATION ON ACCELERATION TOLERANCE IN PILOTS
M. WOJTKOWIAK (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-161, S-162.

Tests are carried out on 80 student pilots 21 and 22 years of age. The acceleration is increased linearly at a rate of 0.1 G/s until a loss of vision field is observed. Measurements are made of the heart rate, systolic and diastolic blood pressure, and blood flow velocity two minutes before the centrifuge is started. An increase in heart rate and blood flow velocity is seen as an effective compensatory reaction. The blood flow velocity should increase in parallel with the acceleration increase, until it reaches a level where a decrease on the head level begins. C.R.

A84-24390#
OSMO- AND VOLUMOREGULATION IN RATS WITH HEREDITARILY CHANGED HORMONAL BALANCE
L. N. IVANOVA, E. G. ELCHANINOVA, V. A. LAVRINENKO, and N. N. MELIDI (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-163, S-164.

Water and ion excretion after intragastric injection of 5 ml/100 g b.w. of water, complete Ringer or 1 percent NaCl solution was compared in Wistar rats (WR), homozygous Brattleboro rats, which lack the antidiuretic hormone (DI) and also in spontaneously hypertensive rats (SHR) which are characterized by a higher antidiuretic hormone (ADH) secretion. In response to the alteration in the body fluid volume and osmolality, the rats of all strains with varying hormonal balance were found to be able to excrete hypo- and isoosmotic loads successfully enough. However, they maintained the volume and osmotic homeostasis by different mechanisms. Depending on the pretest body hydration and the hormonal level, both regulating systems exhibit a prevalent effect respectively and thus determine different effectiveness of the correction and the structure of renal reaction to the load. Author

A84-24391#
THE ROLE OF TISSUE RECEPTORS AND SPECIFIC STRUCTURES OF MEDULLA OBLONGATA IN THE FLUID DISTRIBUTION
B. S. KULAEV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-164a, S-164b. refs

The effect of electrostimulation of afferant somatic-nerve fibers or of the chemoreceptor structures of the ventral surface of the brain stem (VSBS) on the response of the circulation to antiorthostasis/orthostasis is investigated experimentally in dogs. The results are presented graphically and discussed. Stabilization of the major circulation parameters is found to be quantitatively and qualitatively improved by electrostimulation of tibial nerve,

brachial plexus, or VSBS structures, with the best improvement observed for tibial-nerve stimulation. These results are applicable to the study and possible alleviation of motion sickness associated with weightlessness. T.K.

A84-24392#
INTERSEROSAL FORCES: THE PRESSURE ENVIRONMENT OF THE CENTRAL CIRCULATIONS AND NATURE'S INTERNAL 'G SUITS'. II - THE THORACIC CONTAINERS, ANALYSIS VIA THE DSR
E. A. HOFFMAN, E. L. RITMAN, and E. H. WOOD (Mayo Foundation, Rochester, MN) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Symposium on Gravitational Physiology, Sydney, Australia, Aug. 28-Sept. 3, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-165 to S-168. refs
(Contract NIH-HL-04664; NIH-HL-29886; NIH-RR-00007)

It is noted that the total picture of cardiopulmonary function as it is affected by the gravitational force environment requires a degree of simultaneity of measurements previously unobtainable. The area under cardiogreen indicator dilution curves is compared with the area under dilution curves obtained by X-ray volumetric imaging of the passage of a radiopaque contrast agent in the main pulmonary artery and its major branches. An 8-kg dog was anesthetized, and three levels of cardiac output are studied. The relative changes from control of the area under the dilution curves obtained by the two methods are found to differ by less than 10 percent. The experiment is seen as encouraging in developing an ability to measure regional flowing blood volumes throughout the lung. C.R.

A84-24393*# California Univ., Davis.
THERMOREGULATION IN COLD- AND NONCOLD-ACCLIMATED RATS COLD EXPOSED IN HYPERGRAVIC FIELDS
J. M. HOROWITZ, B. A. HORWITZ, and C. B. MONSON (California, University, Davis, CA) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Symposium on Gravitational Physiology, Sydney, Australia, Aug. 28-Sept. 3, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-169 to S-172. refs
(Contract NSG-2234)

The effect of hypergravity on thermoregulation processes is investigated experimentally in rats. Hooded male Long-Evans rats were kept for 6 weeks at 5 or 23 C (cold-acclimated and noncold-acclimated groups, CA and NCA) prior to testing. One test protocol comprised sequential 1-h exposures to 23 C at 1 G, 23 C at 3 G (in a 2.1-m radius centrifuge; -Gx), 8 C at 3 G, 8 C at 1 G, and finally 23 C at 1 G, with continuous measurement of the oxygen consumption. In a second protocol, restrained rats were exposed to 23 C at 1 G, 23 C at 3 G, and 10 C at 3 G, and core temperature changes were monitored. The results are presented in graphs and a table. Oxygen consumption doubled in both CA and NCA rats on exposure to cold at 1 G, but at 3 G NCA consumption decreased while CA consumption remained high. The CA rats were also more able to maintain core temperature at 3 G than the NCA rats. These differences are attributed to the nonshivering thermogenic processes developed in CA rats, which appear to be unaffected by hypergravity. T.K.

A84-24394#
BIOLOGICAL SCALING FROM CELLS TO ENVIRONMENT - A PRELUDE TO GRAVITIONAL EXPLANATIONS
W. A. CALDER, III (Arizona, University, Tucson, AZ) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Symposium on Gravitational Physiology, Sydney, Australia, Aug. 28-Sept. 3, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-173 to S-175. refs

Biological scaling laws and gravitational explanations for them are reviewed. The law relating basal metabolism (Emin) to body mass (M) to the power 0.75 (Kleiber, 1961) and its modifications b Heusner (1982, 1983) - giving an overall M exponent of 0.79 - are summarized, and the evidence from studies of thermoregulation, maximum aerobic activity, and field metabolic rate is examined. Gravity-based explanations for the Kleiber law (compromise between gravity loading and heat loss, elastic similarity of animals of different sizes, and metabolic cost of overcoming gravity forces plus a surface-area factor) are considered critically. Scaling factors in physiological time, life expectancy, reproduction, growth, and population density and turnover are related to Emin, lifetime metabolism, and field metabolic rate; it is shown that a causal link to gravity has not yet been established. Further studies on a broad interdisciplinary scale are proposed. T.K.

A84-24691
INTERHEMISPHERE INTERRELATIONSHIPS OF BRAIN STRUCTURES IN THE CASE OF VARIOUS FUNCTIONAL STATES OF THE CENTRAL NERVOUS SYSTEM [MEZHPOLUSHARNYE VZAIMOOTNOSHENIIA STRUKTUR MOZGA PRI RAZNYKH FUNKTSIONAL'NYKH SOSTOIANIIAKH TSENTRAL'NOI NERVNOI SISTEMY]
I. A. LAPINA, I. K. IAICHNIKOV, P. D. SHABANOV, and IU. S. BORODKIN (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 3-8. In Russian. refs

Multiminute oscillations of ultraslow activity in the range of 0-.1.0 Hz were recorded in rabbits with implanted gold electrodes. Changes in the functional state were achieved by: (1) unilateral microstimulation of the frontal neocortex at 1.5-2.5 micro-A; (2) administration of neutrotropic activators (aethimizole and its analogue); (3) prolonged administration of ethanol. These actions sharply increased the natural functional interhemispheric asymmetry, leading to a restructuring of intracentral relationships. The neurotropic activators aethimizole and IEM-476 temporarily restored the normal interaction between the hemispheres even in the case of marked functional asymmetry. B.J.

A84-24692
RESPONSES AND ORGANIZATION OF RECEPTIVE FIELDS OF NEURONS IN THE FROG TEGMENTUM'S BASAL OPTICAL NUCLEUS DURING VISUAL STIMULATION [O REAKTSIIAKH I ORGANIZATSII RETSEPTIVNYKH POLEI NEIRONOV BAZAL'NOGO OPTICHESKOGO IADRA POKRYSHKI NOZHKI MOZGA (TEGMENTUMA) LIAGUSHKI PRI ZRITEL'NOI STIMULIATSII]
T. V. ALEINIKOVA, V. V. KHRENKOVA, and O. N. KRIUKOVSKIKH (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 9-15. In Russian. refs

A84-24693
DYNAMICS OF THE CONJUGATION OF VENTILATION AND BLOOD FLOW IN CAT LUNGS IN THE CASE OF AN ELEVATED AMBIENT TEMPERATURE [DINAMIKA SOPRIAZHENIIA VENTILIATSII I KROVOTOKA V LEGKIKH U KOSHEK PRI POVYSHENNOI TEMPERATURE VNESHNEI SREDY]
D. P. DVORETSKII and V. A. TASHLIEV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 42-47. In Russian. refs

A84-24694
THERMOREGULATORY ACTIVITY OF THE MOTONEURONAL POOL IN RATS ADAPTED TO COLD AND HYPOXIA [TERMOREGULIATSIONNAIA AKTIVNOST' MOTONEIRONNOGO PULA U KRYS, ADAPTIROVANNYKH K KHOLODU I GIPOKSII]
L. V. SOROKINA, IU. V. LUPANDIN, and L. P. VLASOVA (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 75-80. In Russian. refs

The impulse activity of single motor units was investigated in anesthetized white rats during cold tremor. Cold adaptation was found to cause a decrease in the firing rate of the motor units, while adaptation to hypoxia produced an increase in the firing rate. These data are considered as evidence that postural

mechanisms are restructured during adaptation to cold and hypoxia. B.J.

A84-24695
DELAYED EFFECT OF SYNTHETIC TETRAPEPTIDAMIDE ON THE BRAIN MOTOR SYSTEM [OTSROCHENNOE VLIIANIE SINTETICHESKOGO TETRAPEPTIDAMIDA NA DVIGATEL'NUIU SISTEMU MOZGA]
E. L. DOVEDOVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 81-83. In Russian. refs

A84-24696
THE EFFECT OF CALCITONIN AND PARATHYROID HORMONE ON THE MYOCARDIUM DURING ADAPTATION OF THE HEART TO NITROGENEMIA [DEISTVIE KAL'TSITONINA I PARATIREOIDNOGO GORMONA NA MIOKARD V PROTSESSE ADAPTATSII SERDTSA K AZOTEMII]
V. V. BARABANOVA, R. B. MINKIN, A. V. ORLOV, T. A. SMIRNOVA, and K. I. SHLIAKHTER (Gosudarstvennyi Pedagogicheskii Institut, Leningrad, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 83-86. In Russian. refs

A84-24697
THE EFFECT OF VARIOUS REGIMES OF THERMAL ADAPTATION ON THERMOGENESIS IN ALBINO RATS [VLIIANIE RAZLICHNYKH REZHIMOV TEMPERATURNOI ADAPTATSII NA TERMOGENEZ U BELYKH KRYS]
Z. K. VYMIATNINA, M. A. DUKHANIN, and M. M. PRASOLOVA (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 87-90. In Russian. refs

A84-24698
A METHOD FOR THE LONG-TERM PRECISION THERMOMETRY OF ANIMAL BRAIN STRUCTURES IN CHRONIC EXPERIMENTS [METOD DLITEL'NOI PRETSIZIONNOI TERMOMETRII STRUKTUR GOLOVNOGO MOZGA ZHIVOTNYKH V KHRONICHESKOM EKSKPERIMENTE]
I. K. IAICHNIKOV (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 91-93. In Russian.

A84-24699
A TECHNIQUE FOR EVALUATING THE RHYTHM-DEPENDENT CHARACTERISTICS OF THE MECHANICAL ACTIVITY OF THE MYOCARDIUM [METODIKA OTSENKI RITMOZAVISIMYKH KHARAKTERISTIK MEKHANICHESKOI AKTIVNOSTI MIOKARDA]
V. IA. IZAKOV, IU. L. PROTSENKO, S. M. RUTKEVICH, S. V. ZHELAMSKII, and B. L. BYKOV (Nauchno-Issledovatel'skii Institut Gigieny Truda i Professional'nykh Zabolevanii, Sverdlovsk, USSR) Fiziologicheskii Zhurnal (ISSN 0015-329X), vol. 70, Jan. 1984, p. 97-101. In Russian. refs

A technique is proposed whereby the mechanical activity of the myocardium is investigated in the random mode of operation. A myocardium sample or the intact heart are stimulated by a random uncorrelated sequence of white-noise type; the distribution of interpulse intervals is either Gaussian or uniform; the responses of the myocardium are analyzed as a random process. An algorithm and block diagram of random-sequence generators is presented; a variant of such generators has been realized on the basis of a minicomputer. The proposed method has been validated by chronoinotropic studies of myocardium samples of a number of warmblooded and coldblooded animals. B.J.

A84-24729* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HYPERTHERMIC EFFECTS OF CENTRALLY INJECTED (D-ALA2, N-ME-PHE4, MET-(0)5-OL)-ENKEPHALIN (FK 33-824) IN RABBITS AND GUINEA-PIGS
S. B. KANDASAMY and B. A. WILLIAMS (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA) Neuropharmacology (ISSN 0028-3908), vol. 22, no. 10, 1983, p. 1177-1181. refs

A84-24730* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VASOPRESSIN RELEASE INDUCED BY WATER DEPRIVATION - EFFECTS OF CENTRALLY ADMINISTERED SARALASIN
L. C. KEIL (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, CA), R. L. DUNDORE, J. N. D. WURPEL, W. B. SEVERS (Pennsylvania State University, Milton S. Hershey Medical Center, Hershey, PA), and Y. R. BARBELLA Neuroendocrinology (ISSN 0028-3835), vol. 37, 1983, p. 401-405. refs
(Contract NCC2-127)

Uncertainty exists as to whether endogenous angiotensin activates brain mechanisms controlling vasopressin (AVP) secretion during dehydration. Various doses of saralasin were injected into a lateral cgrebroventricle (IVT) of conscious, male rats deprived of water for 48 h. The rats were killed at different times. The concentration of AVP in the plasma p(AVP), measured by radioimmunoassay, was unaffected by saralasin. IVT pretreatment with 1-Sar-8-Ile-angiotensin II blocked maximal AVP release by IVT angiotensin, but this pretreatment did not reduce p(AVP) after 24, 48 or 72 hr water deprivation. A 3-hour continuous IVT infusion of CSF or saralasin (10 micrograms/hour) into 48-hour water-deprived rats revealed equivalent p(AVP) concentration and urine volumes. When the infusions were continued for 3 h more with water available, control and saralasin-treated rats: (1) drank at similar rates, (2) excreted similar amounts of urine, and (3) reduced their p(AVP) concentration levels to the same extent. IVT saralasin did not affect p(AVP) concentration of rats dehydrated with hypertonic NaCl. Combined IVT saralasin and atropine reduced p(AVP) concentration of 48-hour water deprived rats about 30 percent (p less than 0.05). It is concluded that redundancy exists for sensing, integrating and releasing vasopressin in dehydrated rats. Author

A84-24736* Miami Univ., Coral Gables, Fla.
ANCIENT MICROSPHERES - ABIOGENIC, PROTOBIOGENIC, OR BIOGENIC?
S. W. FOX, R. M. SYREN (Miami, University, Coral Gables, FL), M. INGRAM, B. J. PRICE, and J. COSTELLO (Miami, University, Miami, FL) Precambrian Research (ISSN 0301-9268), vol. 23, 1983, p. 1-8. refs
(Contract NGR-10-007-008)

Criteria of biogenicity of microspheroidal objects, which have been interpreted as microfossils, are here reviewed in the light of additional data. Much weight has been placed by some commentators on constrained heterogeneity as a primary criterion of biogenicity. The data from the field and laboratory suggest the need for continuing reservation in the interpretation of these objects. On the basis of these and other data, reasons are given for the alternative explanation that the objects are lithified relics of protobiotic assemblages. The question remains open as to whether the early Archean spheroidal objects are abiotic, protobiotic, or biotic in origin. Author

A84-24959* California Univ., Riverside.
ACUTE PHYSIOLOGICAL RESPONSES OF SQUIRREL MONKEYS EXPOSED TO HYPERDYNAMIC ENVIRONMENTS
C. A. FULLER (California, University, Riverside, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 226-230. refs
(Contract NAS2-10536; NSF BNS-79-2441; PHS-BRS-RR-05816)

Physiological and behavioral responses to a hyperdynamic environment were examined in four adult male squirrel monkeys. After baseline monitoring at 1 G, monkeys were exposed to one

of three conditions: (1) +2 Gz for 60 minutes, (2) +2.9 Gz max for 8 minutes (simulating Space Shuttle launch), or (3) +1.7 Gz max for 19 minutes (simulating Space Shuttle reentry). During all experimental conditions, heart rate rose, and colonic temperature began to decline within the first ten minutes of centrifugation and decreased by as much as 2 C in some instances. Behaviorally, during centrifugation, the monkeys seemed to exhibit drowsiness and fall asleep, an observation not made during the control period. It is concluded that primates are susceptible to acute hyperdynamic field exposure. C.M.

A84-25132
PREVENTION OF STRESS-RELATED DAMAGE AND ENHANCEMENT OF THE ENDURANCE OF THE BODY TO PHYSICAL LOAD BY MEANS OF CHEMICAL FACTORS [PREDUPREZHDENIE STRESSORNYKH POVREZHDENII I POVYSHENIE VYNOSLIVOSTI ORGANIZMA K FIZICHESKOI NAGRUZKE S POMOSHCH'IU KHIMICHESKIKH FAKTOROV]
F. Z. MEERSON (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 11-19. In Russian. refs

Data are presented which characterize the transition of the positive adaptive effect of short-term stress effects (SSEs) to a damaging effect. It is shown that preliminary adaptation to multiple SSEs can, in principle, protect the body against the damaging effect of long-term stress. Certain chemical factors, limiting stress-related damage, can be used to enhance the efficiency of adaptive reactions of the body, which are accompanied by a more or less pronounced stress. In particular, the effect of the antioxidant ionol on the endurance to physical load is considered. B.J.

A84-25133
MECHANISMS OF OSTEODYSTROPHY IN WEIGHTLESSNESS [MEKHANIZMY OSTEODISTVOFII PRI NEVESMOSTI]
A. I. VOLOZHIN (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 19-27. In Russian. refs

The effects of weightlessness on osteodystrophy in animals were simulated by means of hypokinesia and hypodynamia of varying duration. The first stage of the study involved the effect of hypokinesia on mineralized bone tissue with preservation of the support function of the extremities. The second stage involved the use of an experimental hypokinesia-hypodynamia model in which the support function was removed by amputation. The third stage consisted in an analysis of the restructuring of the bone tissue and its biophysical characteristics in animals (rats and turtles) subjected to space flight. B.J.

A84-25134
THE EFFECT OF SODIUM SUCCINATE ON THE RESTORATION OF MITOCHONDRIAL FUNCTIONAL ACTIVITY IN THE CASE OF EXPERIMENTAL BURN SHOCK [VLIIANIE SUKTSINATA NATRIIA NA VOSSTANOVLENIE FUNKTSIONAL'NOI DEIATEL'NOSTI MITOKHONDRII PRI OZHOGOVOM SHOKE V EKSPERIMENTE]
N. I. KOCHETYGOV, T. IU. PANYSHEVA, and M. I. REMIZOVA (Leningradskii Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Leningrad, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 33-35. In Russian. refs

The succinate oxidase and cytochrome areas of the mitochondrial respiratory chain (MRC) of the rat liver in burn shock were investigated. It is shown that the MRC is incapable of the long-term maintenance of a high level of succinate dehydrogenase activity after burn. Injection of sodium succinate is shown to produce enzyme activation, to increase the cytochrome content in the MRC, and to improve the chances of survival. B.J.

A84-25135
THE EFFECT OF NICOTINIC ACID ON HORMONE-LEVEL CHANGES IN BURN DISEASE [VLIIANIE NIKOTINOVOI KISLOTY NA IZMENENIE UROVNIA GORMONOV PRI OZHOGOVOI BOLEZNI]
V. P. BALUDA, A. D. VAKULENKO, V. M. ZIABLITSKII, L. V. KOZELSKAIA, and A. N. STAROSELSKAIA (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 36-38. In Russian. refs

The level of thyroxine, triiodothyronine, and insulin in the blood of intact animals (Wistar rats) and in animals in different periods after burn shock was studied using radioimmunoassay. Nicotinic acid was found to have a normalizing effect on the level of these hormones in burn disease. The possible mechanisms of this normalizing effect are examined. B.J.

A84-25136
SULFHYDRYL GROUPS IN BURN ANEMIA [SUL'FGIDRIL'NYE GRUPPY PRI OZHOGOVOI ANEMII]
V. E. ROZANOV (Glavnyi Voennyi Klinicheskii Gospital', USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 38-41. In Russian. refs

Experiments were performed on 120 dogs with severe thermal skin burns. An investigation was made of the number of sulfhydryl groups in the red cell proteins and membranes and in hemoglobin, as well as of the activity of sulfhydryl heme-synthesizing enzymes, heme-synthetase, and delta-aminolaevulinic acid dehydratase in peripheral blood and internal organs. A close correlation was found between the number of red cells and the amount of hemoglobin found with gradual aggravation of the burn injury and reduction in the number of sulfhydryl groups in the red cell proteins and membranes, as well as in the activity of the enzymes, leading to the development of anemia. B.J.

A84-25137
POSSIBILITIES OF THE CORRECTION OF CIRCULATORY DISORDERS IN TRAUMATIC SHOCK BY THE COMBINED APPLICATION OF VASOACTIVE AGENTS [VOZMOZHNOSTI KORREKTSII RASSTROISTV KROVOOBRASHCHENIIA PRI TRAVMATICHESKOM SHOKE SOCHETANNYM PRIMENENIEM VAZOAKTIVNYKH VESHCHESTV]
S. A. SELEZNEV, V. I. GIKAVYI, and E. A. MUKHIN (Leningradskii Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Leningrad, USSR; Kishinevskii Meditsinskii Institut, Kishinev, Moldavian SSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 41-45. In Russian. refs

A84-25138
FUNCTIONAL CHARACTERISTICS OF THE LEFT VENTRICLE IN RABBITS UNDER EXPERIMENTAL ARTERIAL HYPERTENSION, DEVELOPING ON THE BACKGROUND OF CHRONIC ALCOHOL INTOXICATION [FUNKTSIONAL'NYE OSOBENOSTI LEVOGO ZHELUDOCHKA SERDTSA KROLIKOV PRI EKSPERIMENTAL'NOI ARTERIAL'NOI GIPERTONII, RAZVIVAIUSHCHEISIA NA FONE KHRONICHESKOI ALKOGOL'NOI INTOKSIKATSII]
V. A. FROLOV, V. E. DVORNIKOV, A. E. SAVASTENKO, and V. M. MOGILEVSKII (Universitet Druzhby Narodov, Moscow, USSR) Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Jan.-Feb. 1984, p. 50-52. In Russian. refs

A84-25145
KINETIC ANALYSIS OF THE POSSIBILITY OF THE EFFECT OF A CONSTANT MAGNETIC FIELD ON THE RATE OF ENZYMATIC REACTIONS [KINETICHESKII ANALIZ VOZMOZHNOSTI VLIIANIIA POSTOIANNOGO MAGNITNOGO POLIA NA SKOROST' FERMENTATIVNYKH REAKTSII]
V. K. VANAG and A. N. KUZNETSOV (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, Jan.-Feb. 1984, p. 23-29. In Russian. refs

A84-25146
CHANGES IN THE AGGREGATION OF ERYTHROCYTES AND THROMBOCYTES UNDER ULTRAVIOLET RADIATION [IZMENENIE AGREGATSII ERITROTSITOV I TROMBOTSITOV POD DEISTVIEM UL'TRAFIOLETOVOGO IZLUCHENIIA]
M. A. MURINA, A. K. ANOSOV, and D. I. ROSHCHUPKIN (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, Jan.-Feb. 1984, p. 92-95. In Russian. refs

A84-25147
DEPENDENCE OF THE PHOTODAMAGE OF ERYTHROCYTES ON THE ULTRAVIOLET-RADIATION INTENSITY [ZAVISIMOST' FOTOPOVREZHDENIIA ERITROTSITOV OT INTENSIVNOSTI UL'TRAFIOLETOVOGO OBLUCHENIIA]
D. I. ROSHCHUPKIN and A. T. LORDKIPANIDZE (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, Jan.-Feb. 1984, p. 155, 156. In Russian.

A84-25181#
INFLUENCE OF THE LONG-TERM REPEATED CENTRIFUGATION STRESS (-2GX) ON BLOOD COMPONENTS IN RATS
E. KAMEI and H. FUJIWARA (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports (ISSN 0023-2858), vol. 24, Sept. 1983, p. 117-132. In Japanese, with abstract in English. refs

The effect of long-term repetitive -2Gx centrifugation on the blood components in male and female Sprague-Dawley rats was investigated by analyzing blood samples obtained from the right ventricle of the heart at 24 hours after the final exposure. The RBC, Hb, MCV, MCH, MCHC, WBC, Glu., P, Ca, and LDH were determined. It is suggested that the increase of WBC, RBC, Ht, and Hb in the 12 hour centrifuged group may be caused by hemoconcentration due to induced dehydration. J.N.

A84-25351
MOLECULAR MECHANISMS OF THE HYPERTROPHY AND WEAR OF THE MYOCARDIUM [MOLEKULIARNYE MEKHANIZMY GIPERTROFII I IZNASHIVANIIA SERDECHNOI MYSHTSY]
F. Z. MEERSON and M. P. IAVICH (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 5-11. In Russian. refs

The development of cardiac compensatory hypertrophy (CCH) during the adaptation of the heart to an increased load is shown to be conditioned by two simultaneous processes: accelerated synthesis and slower degradation of protein. Organ-nonspecific cytoplasmic protein factors are identified which participate in the mechanism initiating accelerated transcription during CCH. A standard complex of biochemical changes in the metabolism of the myocardium occurs at the wear stage and during physiological aging: RNA concentration decreases, and the rates of its synthesis and degradation are reduced along with protein synthesis and degradation rates. The administration of tRNA is shown to accelerate protein synthesis in such a heart. B.J.

A84-25357
THE ROLE OF CORONARY VASCULAR REACTIVITY IN THE REGULATION OF MYOCARDIAL BLOOD SUPPLY [ROL' REAKTIVNOSTI KORONARNYKH SOSUDOV V REGULIATSII KROVOSNABZHENIIA MIOKARDA]
A. G. BEZUSKO and V. V. BRATUS (Ministerstvo Zdravookhraneniia Ukrainian SSR, Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 86-91. In Russian. refs

A84-25369
ANALYSIS OF THE RESULTS OF A TOXICOLOGICAL STUDY OF POLYURETHANE-FOAM COMBUSTION PRODUCTS [ANALIZ REZUL'TATOV TOKSIKOLOGICHESKOI EKSPERTIZY PRODUKTOV GORENIIA PENOPOLIURETANOV]
V. S. ILICHKIN, V. N. BUTIN, L. S. LANTSOV, M. V. IANENKO, and G. N. PETROV Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1983, p. 71-73. In Russian. refs

A84-25371
VALIDATION OF A METHOD FOR ESTABLISHING THE DANGER LIMITS OF THE EFFECT OF CHEMICAL SUBSTANCES DURING EMERGENCIES [OBOSNOVANIE METODICHESKOGO PODKHODA K USTANOVLENIIU AVARIINYKH PREDELOV VOZDEISTVIIA KHIMICHESKIKH VESHCHESTV]
A. I. EITINGTON, T. A. SHASHINA, and K. A. VESELOVSKAIA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1983, p. 87, 88. In Russian. refs

A method is proposed which makes it possible to establish the danger limits of the effect of a chemical substance for a strictly defined exposure time. These are the limits which allow the vital functions of the body to be preserved and the affected person to escape the danger zone by himself. In addition, these limits allow a definite level of mental and physical work capacity (70-90 percent) in the environment of the emergency. The danger level of CO is shown to be 4000 mg/cu m and its maximum admissible concentration is shown to be 1000 mg/cu m for a five-minute exposure. B.J.

A84-25627
ARCHAEBACTERIA - A NEW KINGDOM OF LIVING ORGANISMS [ARKHEBAKTERII - NOVOE TSARSTVO ZHIVYKH ORGANIZMOV]
V. A. DUDA (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR) Priroda (ISSN 0032-874X), Feb. 1984, p. 13-25. In Russian. refs

Archaebacteria are characterized by a number of biochemical processes which are not peculiar to any other living organisms. On the basis of their phenotype characteristics and the evolution of their ribosomal RNA, they appear to represent one of the oldest groups of living organisms, which explains the name 'archaebacteria'. This paper discusses the significance of archaebacteria to microbiology as a whole, relates how they were discovered, describes their main charcteristics, and considers questions of taxonomy and evolution. B.J.

A84-25631
ANTIOXIDANTS AND AN INCREASE IN LIFETIME [ANTIOKSIDANTY I UVELICHENIE PRODOLZHITEL'NOSTI ZHIZNI]
N. M. EMANUEL (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 1-8. In Russian. refs

Aging is treated here as an accumulation of injuries and impairments in the organism and free radicals are seen as one of the agents causing these injuries. Synthetic antioxidants, that is, substances controlling free-radical processes, are considered as preparations able to prolong the lifetime of experimental animals. Two such preparations are found to be effective. These are the hydrochloride of 2-ethyl-6-methyl-3-oxypyridine and 2,6-dimethyl-3,5-diethoxycarbonyl-1,4-dihydropyridine. It is established that the first of these prevents the accumulation of defects in the secondary structure of DNA. C.R.

A84-25632
THE ENDOCRINE STATE DURING AN EXPERIMENTAL PROLONGATION OF LIFE [ENDOKRINNAIA SITUATSIIA PRI EKSPERIMENTAL'NOM PRODLENII ZHIZNI]
V. N. NIKITIN, E. S. GRINCHENKO, M. P. DRUZHININA, S. TS. ZILBERMAN, O. A. KONOVALENKO, R. K. MAKOVOZ, G. A. NESTERENKO, and L. I. STAVITSKAIA (Khar'kovskii Gosudarstvennyi Universitet, Kharkov, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 8-16. In Russian. refs

Results are presented from a study of the effect that a long-term, periodic growth-inhibiting diet that is insufficient in calories and that significantly prolongs the life of albino rats of the Wistar line has on the animal's endocrine state. Various consequences are cited as possible causes of the animals' longevity. The marked shifts seen in the hormonal formula of the animals is accompanied by a marked activation of the hypophysial-adrenal system, an activation of the islands of Langerhans that is much less pronounced, suppression in young and adult rats of the hypophysial-thyroid system (with activation in old age), and a prolonged retardation during the first half of ontogeny of the development of the reproductive system. C.R.

A84-25633
VITAMINS AND PERIODIC FASTING AS POSSIBLE FACTORS IN THE EXPERIMENTAL PROLONGATION OF LIFE [VITAMINY I PERIODICHESKOE GOLODANIE KAK VOZMOZHNYE FAKTORY EKSPERIMENTAL'NOGO PROLONGIROVANIIA ZHIZNI]
E. F. KONOPLIA, T. L. DUBINA, G. A. ZELEZINSKAIA, V. A. DIUNDIKOVA, R. V. POKROVSKAIA, V. V. GULKO, L. M. MAZHUL, and G. G. GATSKO (Akademiia Nauk Belorusskoi SSR, Sektor Gerontologii, Minsk, Belorussian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 16-24. In Russian. refs

A regimen of periodic fasting affects metabolic processes and the state of connective tissue. The changes are most pronounced in the amount of glycogen in the liver and collagen in the aorta and heart. If begun when experimental animals are young, a program of periodic fasting increases biological aging. If such a regimen is combined with the administration of vitamins, it is found that certain enzymes are activated and that biological aging is decreased. The results are seen as suggesting ways of acting on the process of aging. C.R.

A84-25634
A COMPARATIVE ANALYSIS OF THE EFFECT OF VARIOUS QUANTITIES OF FOOD PROTEINS AND FREE AMINO ACIDS ON THE LIFE SPAN OF ANIMALS [SRAVNITEL'NAIA OTSENKA VLIIANIIA RAZLICHNYKH KOLICHESTV BELKA PISHCHI, SVOBODNYKH AMINOKISLOT NA PRODOLZHITEL'NOST' ZHIZNI ZHIVOTNYKH]
IU. G. GRIGOROV, B. IA. MEDOVAR, and L. L. SINEOK (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 24-29. In Russian. refs

The effect that food containing 22 percent protein has on the life span, nitrogenous metabolism, and acid-base balance of old rats is compared with the effect of food containing 12 percent protein. The comparison also includes food containing 12 percent protein and an addition of free amino acids. The experiment is carried out over a period of 13 months. It is found that food containing 22 percent protein lowers the average life span, activates nitrogenous metabolism, and intensifies acidotic alterations in the organism. Food containing 12 percent protein, however, increases the survival rate percentage and prolongs the average life span; it does this while lowering the intensity of nitrogenous metabolism and alkalizing the internal medium. The introduction of free amino acids at the level of nitrogen corresponding to 12 percent protein is found to lessen the maximum life span, increase the content of branched amino acids in the blood, and bring about a pronounced acidotic condition. C.R.

A84-25635
ENTEROSORPTION AS A METHOD OF PROLONGING THE LIFE OF OLD ANIMALS [ENTEROSORBTSIIA KAK METOD UVELICHENIIA PRODOLZHITEL'NOSTI ZHIZNI STARYKH ZHIVOTNYKH]
V. V. FROLKIS, V. G. NIKOLAEV, L. N. BOGATSKAIA, A. S. STUPINA, A. I. KOVTUN, E. V. SHCHERBITSKAIA, G. I. PARAMONOVA, V. E. SOBKO, V. M. SHAPOSHNIKOV, IU. E. RUSHKEVICH (Akademiia Meditsinskikh Nauk SSSR; Akademiia Nauk Ukrainskoi SSR, Institut Problem Onkologii, Kiev, Ukrainian SSR) et al. Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 30-39. In Russian. refs

Experiments carried out on 28-month-old Wistar rats determine the effect of repeated regimes of enterosorption on the mean and maximum life span and on certain functional and metabolic indicators. At certain regimes, there is an increase in the mean and maximum life span. In the experimental group, the changes that occur with age in the structure and ultrastructure of the liver, kidneys, myocardium, intestine, and pancreas are less pronounced than in the control group. Enterosorption acts to reduce the duration of pentobarbitol-induced sleep and to lower the quantity of cholesterol and triglycerides in the blood, triglycerides in the heart and brain, and cholesterol and triglycerides in the liver. Enterosorption also increases the biosynthesis of ribonucleic acid and protein in the liver, kidneys, and adrenal glands of old animals. C.R.

A84-25638
RUBNER'S CONSTANT AS A CRITERION OF SPECIFIC LIFE SPAN [KONSTANTA RUBNERA KAK KRITERII VIDOVOI PRODOLZHITEL'NOSTI ZHIZNI]
A. I. ZOTIN and T. A. ALEKSEEVA (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 59-64. In Russian. refs

The possibility of using Rubner's constant, equal to the product of the respiration intensity and the life span, as a criterion for specific life span is considered. It is shown that this constant gives a better characterization of life span than calendar time. This is because the constant takes into consideration such vital indicators as energy metabolism and is related to the thermodynamic characteristic of homeorhesis. C.R.

A84-25640
FEATURES OF THE UPTAKE OF NEUROTRANSMITTER AMINO ACIDS IN BRAIN PREPARATIONS OF ALBINO RATS WITH AGING [OSOBENNOSTI ZAKHVATA NEIROMEDIATORNYKH AMINOKISLOT V PREPARATAKH GOLOVNOGO MOZGA BELYKH KRYS PRI STARENII]
G. V. APRIKIAN, V. A. SHAGINIAN, G. A. MKRTCHIAN, ZH. A. PARONIAN, V. A. KNARIAN, and E. S. AKHVERDIAN (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 69-73. In Russian. refs

A84-25641
NEUROTROPHIC MECHANISMS OF AGING [NEIROTROFICHESKIE MEKHANIZMY STARENIIA]
V. V. FROLKIS (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 73-80. In Russian. refs

The change in the neurohumoral regulation of trophicity is seen as an important aging mechanism. Neural control over trophic processes becomes weaker with age. In senescent rats, the axoplasmic flow of substances slows down; this is related to changes in the energy processes in the neuron. Denervation induces less pronounced shifts in RNA and protein synthesis in the liver in senescent rats. It is shown that hypothalamic mechanisms regulating the synthesis of proteins becomes less reliable. With prolonged stimulation of the hypothalamus in senescent rats, weakening of protein synthesis occurs sooner. The relationship between protein synthesis and a membrane's energy properties is disturbed in old age. C.R.

A84-25643
THE EFFECT OF ADRENALINE, INSULIN, AND ESTRADIOL DIPROPIONATE ON THE ELECTRICAL ACTIVITY AND EXCITABILITY OF HYPOTHALAMIC NUCLEI IN ANIMALS OF VARIOUS AGES [VLIIANIE ADRENALINA, INSULINA I ESTRADIOL-DIPROPIONATA NA ELEKTRICHESKUIU AKTIVNOST' I VOZBUDIMOST' IADER GIPOTALAMUSA U ZHIVOTNYKH RAZNOGO VOZRASTA]
V. V. BEZRUKOV (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 85-91. In Russian. refs

A84-25644
FEATURES CHARACTERIZING THE EFFECT OF VASOPRESSIN ON VASCULAR SMOOTH MUSCLES IN ANIMALS OF VARIOUS AGES [OSOBENNOSTI VLIIANIIA VAZOPRESSINA NA GLADKIE MYSHTSY SOSUDOV ZHIVOTNYKH RAZNOGO VOZRASTA]
M. I. GUREVICH and I. V. FROLKIS (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 107-110. In Russian. refs

A84-25645
CHOLINERGIC REGULATION OF THE CARDIOVASCULAR SYSTEM IN OLD AGE [KHOLINERGICHESKAIA REGULIATSIIA SERDECHNO-SOSUDISTOI SISTEMY V STAROSTI]
V. G. SHEVCHUK (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 110-114. In Russian. refs

A84-25646
MORPHOFUNCTIONAL CHANGES IN THE HEART OF ADULT AND SENESCENT RABBITS WHEN THE HYPOTHALAMUS IS STIMULATED OVER SEVERAL DAYS [NEKOTORYE MORFO-FUNKTSIONAL'NYE IZMENENIIA SERDTSA VZROSLYKH I STARYKH KROLIKOV PRI MNOGODNEVNOM RAZDRAZHENII GIPOTALAMUSA]
IU. E. RUSHKEVICH (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 114-118. In Russian. refs

A84-25647
THE BONDING OF ALDOSTERONE BY KIDNEY CELL RECEPTORS IN ADULT AND SENESCENT RATS [SVIAZYVANIE AL'DOSTERONA RETSEPTORAMI KLETOK POCHEK VZROSLYKH I STARYKH KRYS]
L. V. MAGDICH and N. S. VERKHRATSKII (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 119-121. In Russian. refs

A84-25648
CIRCULATING IMMUNE COMPLEXES IN EXPERIMENTAL HYPERTENSION AND IN HYPERTENSION COMBINED WITH THE ADMINISTRATION OF CHOLESTEROL IN ANIMALS OF VARIOUS AGES [TSIRKULIRUIUSHCHIE IMMUNNYE KOMPLEKSY PRI EKSPERIMENTAL'NOI GIPERTONII I PRI SOCHETANII GIPERTONII S VVEDENIEM KHOLESTERINA U ZHIVOTNYKH RAZNOGO VOZRASTA]
O. P. NAUMOVA (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 121, 122. In Russian. refs

A84-25760#
FAST COMPONENTS OF THE ELECTRIC RESPONSE SIGNAL OF BACTERIORHODOPSIN PROTEIN
L. KESZTHELYI, P. ORMOS, and G. VARO (Magyar Tudomanyos Akademia, Biologiai Kozpont, Szeged, Hungary) Acta Physica (ISSN 0001-6705), vol. 53, no. 1-2, 1982, p. 143-157. refs

Fast electric signals corresponding to bR-K, K-L and L-M transitions in the bacteriorhodopsin photocycle were measured in cases of oriented purple membranes in solution and dried samples. In the latter case, the effect of external electric field was to increase (positive field) or decrease (negative field) the transition lifetimes. Based on the existing visible, UV, Raman spectroscopy and electric signal data a model of the bacteriorhodopsin proton pump was constructed. Author

A84-25762#
CONTRIBUTION OF COSMIC RAYS TO RADIATION EXPOSURE OF THE POPULATION
L. B. SZTANYIK and I. NIKL (Orszagos Sugarbiologiai es Sugaregeszsegugyi Kutato Intezet, Budapest, Hungary) Acta Physica (ISSN 0001-6705), vol. 53, no. 1-2, 1982, p. 189-200. refs

A84-25789
IMPACT THEORY OF MASS EXTINCTIONS AND THE INVERTEBRATE FOSSIL RECORD
W. ALVAREZ, L. W. ALVAREZ, F. ASARO, H. V. MICHEL (California, University, Berkeley, CA), E. G. KAUFFMAN (Colorado, University, Boulder, CO), and F. SURLYK (Gronlands Geologiske Undersogelse, Copenhagen, Denmark) Science (ISSN 0036-8075), vol. 223, March 16, 1984, p. 1135-1141. refs
(Contract NSF EAR-81-15858)

There is much evidence that the Cretaceous-Tertiary boundary was marked by a massive meteorite impact. Theoretical consideration of the consequences of such an impact predicts sharp extinctions in many groups of animals precisely at the boundary. Paleontological data clearly show gradual declines in diversity over the last 1 to 10 million years in various invertebrate groups. Reexamination of data from careful studies of the best sections shows that, in addition to undergoing the decline, four groups (ammonites, cheilostomate bryozoans, brachiopods, and bivalves) were affected by sudden truncations precisely at the iridium anomaly that marks the boundary. The paleontological record thus bears witness to terminal-Cretaceous extinctions on two time scales: a slow decline unrelated to the impact and a sharp truncation synchronous with and probably caused by the impact. Author

A84-25791
END-CRETACEOUS BRACHIOPOD EXTINCTIONS IN THE CHALK OF DENMARK
F. SURLYK (Gronlands Geologiske Underogelse, Copenhagen, Denmark) and M. B. JOHANSEN (Institute of Historical Geology and Palaeontology, Copenhagen, Denmark) Science (ISSN 0036-8075), vol. 223, March 16, 1984, p. 1174-1177. refs

A study of Nye Klov (Denmark) shows an extinction pattern (compatible with impact theory) for brachiopods that coincides with the Maastrichtian-Danian boundary. Brachiopods are practically nonexistent in the few basal meters of the Danian, and the Danian brachiopod fauna begins almost as abruptly as the Maastrichtian fauna disappears. At most, six species are common to both stages, similar in density and diversity. The northwest European Maastrichtian chalk is generally composed of coccoliths and pelagic foraminifera remains. Mass extinction of these groups prevented chalk production, which in conjunction with anoxia and clay deposition caused the extinction of chalk brachiopods and other specialized groups. The surviving species included forms that could survive in well-aerated shallow marine waters on substrates other than chalk. C.M.

A84-25792
TERMINAL CRETACEOUS EXTINCTIONS IN THE HELL CREEK AREA, MONTANA - COMPATIBLE WITH CATASTROPHIC EXTINCTION
J. SMIT (California, University, Los Angeles, CA; Amsterdam, Universiteit, Amsterdam, Netherlands) and S. VAN DER KAARS (Amsterdam, Universiteit, Amsterdam, Netherlands) Science (ISSN 0036-8075), vol. 223, March 16, 1984, p. 1177-1179. Research supported by the Aardwetenschappelijk Onderzoek Nederland. refs

Inaccurate stratigraphic correlations in the Hell Creek area, Montana, have led to the assumption that transitional vertebrate faunas (Bug Creek Anthills) exist in the latest Cretaceous, refuting

a catastrophic turnover at the Cretaceous-Tertiary boundary. Establishment of the transitional faunas in Paleocene channels that cut down through the Cretaceous-Tertiary boundary renders the terrestrial faunal record compatible with the marine record and with catastrophic extinction. Author

A84-25920
CONSTITUTIONAL IMMUNITY AND ITS MOLECULAR-ECOLOGICAL BASES [KONSTITUTSIONAL'NYI IMMUNITET I EGO MOLEKULIARNO-EKOLOGICHESKIE OSNOVY]
S. N. RUMIANTSEV Leningrad, Izdatel'stvo Nauka, 1983, 212 p. In Russian. refs

A discussion of the experimental and theoretical aspects of constitutional immunity includes the biotic interactions and molecular aspects of ecology and physiology of antimicrobial immunity. Ecological immune functions are investigated for the examples of stability of plants, and single-cell, lower, and higher animals with respect to molecular-ecological and physical factors. An analysis of the manifestations and mechanisms of immunity is conducted on the levels of genus, species, population, and individual, as well as for organs, tissues, cells, and subcellular and particularly molecular structures. The physiological aspects are reviewed on the basis of immune reactions to hormones, colyones, and other molecular-physical agents. Changes in constitutional immunity in the course of ontogenesis are considered, as well as the influence of physical and chemical effects. Several proposals are made regarding the essential nature of constitutional immunity and its significance in biomolecular evolutionary processes. J.N.

A84-26191
THERMOREGULATORY RESPONSES TO EXERCISE IN DEHYDRATED DOGS
M. A. BAKER (California, University, Riverside, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 635-640. refs
(Contract NSF PCM-82-00351)

The effects of dehydration on thermoregulation and circulation in seven exercising dogs were studied. Hydrated and subsequently dehydrated dogs were made to run for one hour at 25 C on a level treadmill at 7.5 km/h. Compared to hydrated dogs, dehydrated dogs exhibited higher rectal temperatures, lower rates of water loss by evaporation and drooling, decreased cardiac output, and decreased common corotid blood flow. For example, water loss by drooling in exercising dogs was 41.5 + or - 11 g/h when they were hydrated and 0.6 + or 0.4 g/h when they were dehydrated. It is concluded that mildly exercising dehydrated dogs conserves water by reducing water loss from evaporation and drooling, and by regulating body temperatures above hydrated levels. C.M.

A84-26192
EFFECTS OF EXERCISE ON COLLATERAL DEVELOPMENT IN MYOCARDIAL ISCHEMIA IN PIGS
C. M. BLOOR, F. C. WHITE, and T. M. SANDERS (California, University, La Jolla, CA) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 656-665. Research supported by the American Heart Association. refs
(Contract NIH-HL-17682)

Coronary arterial stenosis of the left circumflex coronary artery (LCCA) was induced in 18 pigs to study (in nine of the pigs) the effects of exercise on collateral development in myocardial ischemia. As compared to sedentary pigs, exercised pigs had a reduced infarct size of the left ventricle (5.9 + or - 1.0 vs. 11.7 + or - 1.0 percent) and a greater increase in collateral flow in the noninfarcted jeopardized zone of the LCCA (35.1 + or - 3.0 vs. 28.7 + or - 4.1 ml/min/100 g). Major findings are the following: chronic coronary arterial stenosis progressing to occlusion stimulated development of collateral circulation and salvaged tissue in the jeopardized myocardium of pigs with sparse collaterals; collateral circulation development and tissue salvage improvement by exercise; development of collaterals generally in or near the ischemic zone; and circumferential flow gradient development in all collateral beds after occlusion. C.M.

A84-26364
THE EFFECT OF X-RAYS ON CHROMATIN HISTONES AND ACIDIC PROTEINS IN RABBIT BRAINS [DEISTVIE RENTGENOVYKH LUCHEI NA KISLYE I OSNOVNYE BELKI KHROMATINA GOLOVNOGO MOZGA KROLIKOV]
M. E. KAKULIIA, M. A. MALATSIDZE, and V. SH. MAVARELISHVILI (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia (ISSN 0132-1447), vol. 112, Oct. 1983, p. 165-168. In Russian.

A84-26365
ALTERATIONS OF HYPERTROPHIED MYOCARDIUM AND ITS BLOOD VESSELS DURING EXPERIMENTAL INFARCTION [IZMENENIIA GIPERTROFIROVANNOI SERDECHNOI MYSHTSY I EE KROVENOSNYKH SOSUDOV PRI EKSPERIMENTAL'NOM INFARKTE]
T. A. GIBRADZE, L. A. METREVELI, and T. M. LORDKIPANIDZE (Akademiia Nauk Gruzinskoi SSR, Institut Eksperimental'noi Morfologii, Tbilisi, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia (ISSN 0132-1447), vol. 112, Oct. 1983, p. 185-188. In Russian. refs

A84-26366
DEVELOPMENT OF CHOLESTEROL ATHEROSCEROSIS IN THE SECONDARY IMMUNODEFICIENT CONDITION IN RABBITS [RAZVITIE KHOLESTERINOVOGO ATHEROSKEROZA PRI VTORICHNOM IMMUNODEFITSITNOM SOSTOIANII U KROLIKOV]
T. R. TEVZADZE and L. M. DZIDZIGURI (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Nauchno-Issledovatel'skii Institut Eksperimental'noi i Klinichnoi Terapii, Georgian SSR) Akademiia Nauk Gruzinskoi SSR, Soobshcheniia (ISSN 0132-1447), vol. 112, Oct. 1983, p. 189-192. In Russian. refs

N84-18254# Joint Publications Research Service, Arlington, Va.
BIOMEDICAL EXPERIMENTS ON SOVIET-FRENCH FLIGHT
Y. I. VOROBYEV and A. R. KROTOVSKAYA *In its* USSR Rept.: Space (JPRS-USP-84-001) p 47-55 26 Jan. 1984 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 2, Mar. - Apr. 1983 p 18-22
Avail: NTIS HC A06

Soviet-French space cooperation has permitted a large number of experiments dealing with virtually all fields of space research to be conducted. Working groups were organized in accordance with the main directions of scientific research (space physics, space communications, meteorology, and space biology and medicine). The first joint biological experiment, the Tsitos experiment, was conducted in real space flight conditions on the manned Salyut-6 station. The effect of space flight factors primarily weightlessness, on the growth and development of very simple biological objects were studied. The Bioblok-2 radiobiological experiment was conducted in order to gain an understanding of the effect of cosmic radiation on biological objects. Author

N84-18255# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SPACE BOTANY EXPERIMENTS
A. MASHINSKIY and G. NECHITAYLO *In its* USSR Rept.: Space (JPRS-USP-84-001) p 56-63 26 Jan. 1984 Transl. into ENGLISH from Tekhn.-Molodezhi (Moscow), no. 4, Apr. 1983 p 2-7
Avail: NTIS HC A06

An analysis on Earth showed that despite the external similarity with the controls, plants differed in terms of cell structure, biochemical makeup, and growth characteristics. Plants grew but failed to flower or produce seeds. In the absence of gravity, water and gas exchange in plants takes place differently, and the problem arises of removing metabolites and insuring the necessary heat conditions, since natural convection is also absent. Methods of growing plants is discussed, leading up to the successful cultivation and flowering of arabidopsis. B.C.

N84-18829*# National Aeronautics and Space Administration, Washington, D. C.
NASA SPACE BIOLOGY PROGRAM. EIGHTH ANNUAL SYMPOSIUM'S PROGRAM AND ABSTRACTS
T. W. HALSTEAD, ed. Feb. 1984 121 p refs Symp. held in Arlington, Va., 12-14 Oct. 1983
(NASA-CP-2299; EBT-3; NAS 1.55:2299) Avail: NTIS HC A06/MF A01 CSCL 06C

The activities included five half days of presentations by space biology principal investigators, an evening of poster session presentations by research associates, and an afternoon session devoted to the Flight Experiments Program. Areas of discussion included the following: gravity receptor mechanisms; physiological effects of gravity, structural mass; fluid dynamics and metabolism; mechanisms of plant response; and the role of gravity in development.

N84-18830*# Cornell Univ., Ithaca, N.Y. Inst. for Plant Research.
AMYLOPLAST MOVEMENT IN LIVING STATOCYTES Abstract Only
A. C. LEOPOLD and F. SACK *In* NASA. Washington NASA Space Biol. Program p 1 Feb. 1984
(Contract NAGW-3)
Avail: NTIS HC A06/MF A01 CSCL 06C

Much evidence implicates amyloplast movement in plant graviperception. How this signal is transduced into a differential growth response is not known. Studies using fixed tissue are useful for deriving mean sedimentation rates, but cannot yield data on: the movement of individual amyloplasts, the role of cytoplasmic streaming, and the initial dynamic events occurring during the presentation time. These limitations were overcome by examining living tissue sections with a horizontally mounted microscope connected to a video camera and recorder. The kinetics of the early response to reorientation are consistent with the hypothesis that amyloplasts act by contact with a sensitive surface near the lower wall and indicate that cytoplasmic streaming provides an important vector in amyloplast redistribution in response to gravity. Author

N84-18831*# Texas Univ., Austin. Dept. of Botany.
INHIBITION OF GRAVITROPISM IN OAT COLEOPTILES BY CALCIUM CHELATION Abstract only
S. J. ROUX *In* NASA. Washington NASA Space Biol. Program p 2-3 Feb. 1984
(Contract NSG-7480)
Avail: NTIS HC A06/MF A01 CSCL 06C

Some cellular event necessary for gravitropism is inhibited by EGTA without interferring with the overall growth. Calcium relieves this inhibition and demonstrates both that inhibition is reversible and was probably due to a reduction in the ability to free calcium required for one or more at the transduction steps of gravitropism. At the near neutral pH used, EGTA is charged and would not be expected to readily cross the membrane. One of its primary effects, then, is probably the bringing of free calcium in the apoplastic space exterior to the cell membranes. Author

N84-18832*# Michigan Univ., Ann Arbor.
PROTEIN CHANGES IN LEAF-SHEATH PULVINI OF BARLEY (HORDEUM) INDUCED BY GRAVISTIMULATION Abstract Only
P. B. KAUFMAN and I. SONG *In* NASA. Washington NASA Space Biol. Program p 4-5 Feb. 1984
(Contract NAGW-34)
Avail: NTIS HC A06/MF A01 CSCL 06C

Sodium dodecyl sulfate polyacrylamade gel electrophoresis (SDS-PAGE) pattern of salt soluble proteins elicite by gravistimulation were shown in the top and the bottom halves of the gravistimulated pulvini as follows: at least five proteins were increased in the tissues derived from the bottom halves of the pulvini in the approximate molecular weight range of 91, 57, 50, 22, 17 kilodatons. SDS densitometric scans indicated that the two of them are probably cellulase and invertase. B.G.

N84-18833*# Michigan State Univ., East Lansing. Dept. of Botany and Plant Pathology.
AN ATTEMPT TO LOCALIZE AND IDENTIFY THE GRAVITY SENSING MECHANISM OF PLANTS Abstract Only
R. S. BANDURSKI *In* NASA. Washington NASA Space Biol. Program p 6-7 Feb. 1984 refs
(Contract NAGW-97)
Avail: NTIS HC A06/MF A01 CSCL 06C

Gravistimulation causes an asymmetric distribution of the plant growth hormone, indole-3-acetic acid (IAA). In what tissue of the plant the IAA asymmetry arises will be determined so as to better localize the gravity sensing device. Author

N84-18834*# Ohio State Univ., Columbus.
THE ROLE OF CALCIUM IN THE GRAVITROPIC RESPONSE OF ROOTS Abstract Only
M. L. EVANS *In* NASA. Washington NASA Space Biol. Program p 8-9 Feb. 1984 refs
(Contract NAGW-297)
Avail: NTIS HC A06/MF A01 CSCL 06C

Previous research has indicated that gravity-induced calcium redistribution may play an important role in the gravitropic response of shoots. Calcium was shown to move toward the upper side of gravistimulated shoots (1), and inhibitors of the calcium-activated regulator protein, calmodulin, were shown to interfere with the gravitropic response of coleoptiles (2). The potential involvement of calcium redistribution in the gravitropic response of roots by testing was examined: (1) the effect on gravitropism of calcium chelators applied to the root cap, (2) the ability of calcium gradients applied across the root cap to induce gravitropic-like curvature, and (3) the influence of gravity on the movement of Ca(45)(2+) across the root cap. Author

N84-18835*# Kenyon Coll., Gambier, Ohio.
CALCIUM ELICITED ASYMMETRIC AUXIN TRANSPORT IN GRAVITY INFLUENCED ROOT SEGMENTS Abstract Only
K. L. EDWARDS *In* NASA. Washington NASA Space Biol. Program p 10-11 Feb. 1984
(Contract NAGW-368; PCM-8207147)
Avail: NTIS HC A06/MF A01 CSCL 06C

Auxin is a prime candidate for regulating and modulating the differential growth response of primary corn roots to gravity. Auxin, indole-3-acetic acid (IAA), both promotes and inhibits root elongation rapidly within a narrow concentration range. Thus growth regulation would require only small changes in the short lag period for initiation of gravitropism. Since auxin is transported to/through the zone of elongation toward the meristem, it may serve as a direct communication link between the zone of elongation, site of gravitropic response, and the root cap (RC), site of gravity perception. When auxin transport is inhibited, gravitropism is also inhibited. Napthylpthalamic acid (NPA) is one such inhibitor. It inhibits gravitropism only when applied to the apical growing and dividing region of the root. Application at the basal end of the root does not influence gravitropic NPA causes upward curvature when applied to the upper surface of horizontal, two day-old, intact corn roots. This effect is countered by application of IAA to the opposite side. Author

N84-18836*# San Diego State Univ., Calif.
MECHANISM OF SHOOT GRAVITROPISM Abstract Only
D. L. RAYLE *In* NASA. Washington NASA Space Biol. Program p 12 Feb. 1984
(Contract NAGW-230)
Avail: NTIS HC A06/MF A01 CSCL 06C

A better understanding of the cellular basis of plant shoot gravitropism was sought. A critical evaluation of the role of auxin gravitropism was provided. An alternative hypothesis which links Ca(42) fluxes to the asymmetric growth that leads to gravicurvature was evaluated. Author

N84-18837*# California Univ., Berkeley. Dept. of Botany.
PROTEIN AND CAROTENOID SYNTHESIS AND TURNOVER IN GRAVISTIMULATED ROOT CAPS Abstract Only
L. J. FELDMAN *In* NASA. Washington NASA Space Biol. Program p 13 Feb. 1984
(Contract NAGW-239)
Avail: NTIS HC A06/MF A01 CSCL 06C

In certain cultivars of corn gravitropic bending occurs only after the root cap, the site of gravity perception, is exposed to light. Light appears to trigger or to remove some block in the gravity translation process. Using light sensitive cultivars of corn, it was shown that light affects various processes in the cap. The roles of these light-induced processes in gravitropic bending in roots were studied. Author

N84-18838*# Washington Univ., St. Louis, Mo.
SMALL GRAVITATIONALLY ELICITED VOLTAGE TRANSIENTS IN PEA STEMS Abstract Only
B. G. PICKARD *In* NASA. Washington NASA Space Biol. Program p 14-15 Feb. 1984
(Contract NAGW-420)
Avail: NTIS HC A06/MF A01 CSCL 06C

Decapitated veritcal stem segments were observed for 45 min, noting the number of transients mu V for each 5-min interval. Results for two sets of stem segments are plotted. The average frequencies were 0.72 + or -0.05 and 0.66 + or - 0.04 per 5 min. One set of segments was swiveled gently to the horizontal position; then, recording continued for another 90 min. Transients continued in the vertical controls at a closely similar average rate 0.78 + or - 0.04 per 5 min. However, after the first 5-min interval the horizontally placed plants exhibited transients at an increased average rate of 1.08 + or - 0.04 per 5 min. The frequency of transients also increased following horizontal placement of intact shoots. However, it appears that this increase had two components: one due to gravity reception, and one due to the redistribution of indolacetic acid (IAA) believed to mediate gravitropic curvature (or, more specifically, to the increase of IAA in the lower tissue. Author

N84-18839*# Yale Univ., New Haven, Conn. Dept. of Biology.
MECHANISMS OF GRAVIPERCEPTION AND RESPONSE IN PEA SEEDLINGS Abstract Only
A. W. GALSTON *In* NASA. Washington NASA Space Biol. Program p 16 Feb. 1984 refs
(Contract NSG-7290)
Avail: NTIS HC A06/MF A01 CSCL 06C

A new method for the mass isolation and purification of multigranular amyloplasts from the bundle sheath parenchyma of etiolated pa epicotyls was presented. These bodies, which displace within 2+3 minutes of exposure to 1 x g, are probably the gravity receptors (statoliths) in this plant. These amyloplasts were characterized as having a doublemembrane with a surface-localized ATPase, a high calcium content, and their own genomic DNA. These amyloplasts are investigated as to (a) the reasons for their especially high density, probable related to their starch content, (b) the possible identity of their DNA with the DNA of chloroplasts and unigranular amyloplasts, and (c) possible importance of their high calcium content. Author

N84-18840*# Michigan Univ., Ann Arbor.
MAMMALIAN GRAVITY RECEPTORS: STRUCTURE AND METABOLISM Abstract Only
M. ROSS *In* NASA. Washington NASA Space Biol. Program p 17 Feb. 1984
(Contract NSG-9047)
Avail: NTIS HC A06/MF A01 CSCL 06C

High performance liquid chromatography (HPLC) instrumentation was used for amino acid analysis of rat otoconial complexes. The amino acids of otoconial complexes pooled by origin from only 10 rats were analyzed. It is indicated that it should be possible to analyze complexes from only three rats, and perhaps fewer, which means that the method should be applicable to material from space flow rats. It is suggested that the organic otoconial phase is comparable in its complement of acidic amino acids to other calcium carbonate containing materials such as fish otoliths and certain mollusk shells. The organic material is high in acidic amino acids; and the relative proportions of aspirate, glutamate, threonine and serine appear to be similar to those found in neogastropod shells. Its significance to the evolution of biomineralization processes occurring in the animal kingdom is emphasized. E.A.K.

N84-18841*# Temple Univ., Philadelphia, Pa.
AMPLITUDE DISTRIBUTIONS OF THE SPIDER HEARTPULSE IN RESPONSE TO GRAVITATIONAL STIMULI Abstract Only
A. FINCK *In* NASA. Washington NASA Space Biol. Program p 18-19 Feb. 1984
(Contract NAGW-242)
Avail: NTIS HC A06/MF A01 CSCL 06C

The arachnid Nuctenea sclopetaria (Clerck) which possesses a neurogenic heart, measuring the heartbeat is under efferent control through a dorsal nerve arising from a brain center is discussed. It was shown that the heartrate of this spider is also modulated by an afferent input associated with small increments of gravity. A compressive force on the order of 40 micron is sufficient to elicit a threshold change in heart rate for a typical (100mg) spider. This obtains in a hyper-Gz field less than 1.001. The functional relationship between gravity and heartrate is logarithmic between the absolute threshold and at least 1.5 Gz. A model was proposed in which equilibrium and movement are maintained by changes in blood pressure. It is concluded that the arachnid equilibrium system is like a weight detector which employs a hydraulic compensatory mechanism. E.A.K.

N84-18842*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STRUCTURAL DEVELOPMENT AND GRAVITY Abstract Only
E. R. MOREY-HOLTON *In* NASA. Washington NASA Space Biol. Program p 20-21 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Changes in contical bone formation found in rats on the model and wheather they are due to hind limb unloadng or involve a stress response was studied. Variables known to effect bone histomorphometry and physiology in that model are defined. The variables studied were: (1) changes in bone formation with age in two commonly used rat strains; (2) effects of cold stress on bone formation and apposition rates relative to changes in the same parameter in rats on the model. Body mass, growth rates, and tibial radographic and histomorphometric measurements were compared in Sprague-Dawley (S/D) and Fischer 344 (F) rats aged 6 to 68 weeks. Histomorphometric measurements of rat tibia from the juvenile to the adult period were studied, and tibial growth rates relative to both age and weight were compared. The physiological effects of unweighting the hind-limbs with those of cold stress in rats studied after 1 or 3 weeks of exposure. Adrenal weights, thymus weights, and corticosteroid levels were used as indictors of environmental stress. E.A.K.

N84-18843*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BONE LOSS IN TAIL-SUSPENDED RATS IN RESTRICTED TO THE UNWEIGHTED LIMBS Abstract Only
D. D. BIKLE, R. GLOBUS, and E. R. MOREY-HOLTON *In* NASA. Washington NASA Space Biol. Program p 22-24 Feb. 1984
(Contract NAGW-236)
Avail: NTIS HC A06/MF A01 CSCL 06C

Space flight which results in certain characteristic changes in the skeleton and it was hypothesized that these abnormalities are a direct result of the weightless state. To determine the role of PTH and 1,25(OH)2D in the bone changes associated with weightlessness, we studied bone metabolism under various dietary conditions using an Earth based rat model system which simulates weightlessness. In this model, rats are suspended by their tails such that their rear limbs are completely unloaded while their fore limbs are normally loaded. It is suggested that skeletal unloading induces a localized defect in the unloaded bone which results in

abnormal growth and mineralization. It is concluded that skeletal unloading may make the unloaded bone more or less sensitive to a systemic factor which in turn could account for a change in bone metabolism. E.A.K

N84-18844*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATING CERTAIN ASPECTS OF HYPOGRAVITY: EFFECTS ON THE MANDIBULAR INCISORS OF SUSPENDED RATS (PULEH MODEL) Abstract Only
D. J. SIMMONS (Washington Univ.), F. WINTER (Washington Univ.), and E. R. MOREY-HOLTON *In* NASA. Washington NASA Space Biol. Program p 25-26 Feb. 1984
(Contract NAGW-301)
Avail: NTIS HC A06/MF A01 CSCL 06C

The effect of a hypogravity simulating model on the rate of mandibular incisor formation, dentinogenesis and, amelogenesis in laboratory rats was studied. The model is the partial unloading by elevating the hindquarters. In this system, rat hindquarters are elevated 30 to 40 deg from the cage floors to completely unload the hindlimbs, but the animals are free to move about using their forelimbs. This model replicates the fluid sift changes which occur during the weightlessness of spaceflight and produces an osteopenia in the weight bearing skeletons. The histogenesis and/or mineralization rates of the mandibular incisor during the first 19d of PULEH in young growing rats are recorded. E.A.K

N84-18845*# Washington Univ., St. Louis, Mo. Dept. of Surgery/Orthopedics.
THE EFFECTS OF SPACEFLIGHT ON THE MINERALIZATION OF RAT INCISOR DENTIN Abstract Only
D. J. SIMMONS and G. D. ROSENBERG (Indiana Univ.) *In* NASA. Washington NASA Space Biol. Program p 27 Feb. 1984
(Contract NAGW-301)
Avail: NTIS HC A06/MF A01 CSCL 06C

Specific effects of space flight on dentin formation on the lower incisors of male rats were determined. Data were Fourier analyzed to determine the spectra of chemical growth rhythms. It was found that Calcium and P were more concentrated in the newly forming dentin of the Flight rats than in comparable regions of control tissues. There was no significant difference in the mean S-concentration between the two groups, but the pattern of S-distribution in the recently formed dentin from the Flight rats was different from that in the control group. Sulfur fluctuations in flight animals periodically peak above the irregular background fluctuations, but there are no comparable sulfur peaks across the dentin in the control. It is indicated that spaceflight has measurable effects on dentinogenesis, and may also bear on the problem of the regulatory role of proteoglycans in mineralization and the maturation of mineral and matrix moieties in skeletal tissue. E.A.K.

N84-18846*# University of the Pacific, Stockton, Calif. Dept. of Orthodontics.
INFLUENCE OF STRESS, WEIGHTLESSNESS, AND SIMULATED WEIGHTLESSNESS ON DIFFERENTIATION OF PREOSTEOBLASTS Abstract Only
W. E. ROBERTS *In* NASA. Washington NASA Space Biol. Program p 28 Feb. 1984
(Contract NAGW-356)
Avail: NTIS HC A06/MF A01 CSCL 06C

The effects of 18.5 days of weightlessness aboard a satellite, stress of restricted feeding, stress of noise and vibration to simulate space flight and 21 days of head down suspension via the Morey-Holton model for simulated weightlessness was studied. Nuclear size of fibroblastlike cells in PDL on the anterior surface of maxillary first molars was classified as: (1) A-cells, self perpetuating precursors with a nuclear volume 80 micron B-cells, nonosteogenic fibroblasts with a nuclear volume of 80-119 micron 3, C-cells, preosteoblasts that are in G1 stage of the cell cycle with a nuclear size of 120-170 micro, and D-cells, preosteoblasts that are in G2 stage of the cell cycle with a nuclear size 170 micro. E.A.K.

N84-18847*# Columbia Univ., New York. Dept. of Anatomy/Cell Biology.
MORPHOLOGICAL AND HISTOCHEMICAL STUDIES OF BONE AND CARTILAGE DURING PERIODS OF STIMULATED WEIGHTLESSNESS Abstract Only
S. B. DOTY *In* NASA. Washington NASA Space Biol. Program p 29-30 Feb. 1984 refs
(Contract NAGW-238)
Avail: NTIS HC A06/MF A01 CSCL 06C

Rats which were subjected to spaceflight for 2-4 weeks showed considerable loss in ability to form new bone. Animals which are placed into nonweight bearing positions, as a model to simulate the absence of gravity here on the Earth's surface. Show a similar decline in new bone formation. It is suggested that the mechanisms underlying these changes may be the result of reduced transmission of gravitational force to the skeletal cells. E.A.K

N84-18848*# Arizona Univ., Tucson.
METABOLIC ALTERATIONS CAUSED BY SUSPENSION HYPOKINESIA IN LEG MUSCLES OF RATS Abstract Only
M. E. TISCHLER *In* NASA. Washington NASA Space Biol. Program p 31-32 Feb. 1984
(Contract NAGW-277)
Avail: NTIS HC A06/MF A01 CSCL 06C

Metabolic changes on hypokinetic rats were measured. Two groups of animals were studied: (1) weight bearing control which were tail casted but allowed to walk on all four limbs, and (2) hypokinetic with no load bearing of the hindlimbs. The control and hypokinetic rats gained weight at a steady and similar rate over 6 days. Hypokinesia for 6 days led to significantly lower relative weights of the soleus, gastrocnemius and plantaris muscles. Hypokinesia did not effect the relative mass of the anterior tibialis or extensor digitorum longus (EDL) muscles. E.A.K.

N84-18849*# Texas Univ. Health Science Center, Dallas.
BIOCHEMICAL AND HISTOCHEMICAL ADAPTATIONS OF SKELETAL MUSCLE TO RAT SUSPENSION Abstract Only
G. H. TEMPLETON *In* NASA. Washington NASA Space Biol. Program p 33-34 Feb. 1984 refs
(Contract NAGW-140)
Avail: NTIS HC A06/MF A01 CSCL 06C

The influence of rat suspension on soleus disuse and atrophy was investigated to measure changes in fiber area and number and to determine if suspension elicited changes in lysosomal protease activity and rate of calcium uptake by the sarcoplasmic reticulum. The infuence of rat suspension on myosin light chain phosphorylation and succinate dehydrogenase activity are determined. E.A.K.

N84-18850*# Vanderbilt Univ., Nashville, Tenn.
PHYSIOLOGICAL CHANGES IN FAST AND SLOW MUSCLE WITH SIMULATED WEIGHTLESSNESS Abstract Only
W. D. DETTBARN and K. E. MISULIS *In* NASA. Washington NASA Space Biol. Program p 35-36 Feb. 1984
(Contract NAGW-469)
Avail: NTIS HC A06/MF A01 CSCL 06C

A rat hindlimb suspension model of simulated weightlessness was used to examine the physiological characteristics of skeletal muscle. The physiological sequelae of hindlimb suspension were compared to those of spinal cord section, denervation by sciatic nerve crush, and control. Muscle examined were the predominantly slow (Type 1) soleus (SOL) and the predominantly fast (Type 2) extensor digitorum longus (EDL). Two procedures which alter motor unit activity, hindlimb suspension and spinal cord section, produce changes in characteristics of skeletal muscles that are dependent upon fiber type. The SOL develops characteristics more representative of a fast muscle, including smaller Type 1 fiber proportion and higher AChE activity. The EDL, which is already predominantly fast, loses most of its few Type 1 fibers, thus also

becoming faster. These data are in agreement with the studies in which rats experienced actual weightlessness. M.G.

N84-18851*# Arizona Univ., Tucson.
APPROPRIATENESS OF THE SMALL-CAGE-REARED RAT AS A MODEL FOR THE STUDY OF ALTERED-ACTIVITY EFFECTS Abstract Only
R. M. ENOKA and D. G. STUART *In* NASA. Washington NASA Space Biol. Program p 37-38 Feb. 1984 refs
(Contract NAGW-338)
Avail: NTIS HC A06/MF A01 CSCL 06C

Within genetically imposed limits, the fatigue-resistance capability of muscle varies according to the chronic demands of usage imposed on the muscle. Given the fiber-type distribution within a muscle, its fatigue-resistance can be utilized as an indicant of its physiological status. It is suggested that the hindlimb musculature of rats raised in cages constructed to minimum DFA specifications are physiologically inappropriate for the study of altered-activity effects. This proposition is based upon two observations from the medial gastrocnemius muscle (n = 7) of Sprague-Dawley rats (500 g, 100 d); first, a substantial disparity in the peak forces (twitch and tetanic) elicited by neural and direct-muscle stimulation, and second, a reduction in force during the fatigue test (2 min of 1 Hz trains with each train lasting 330 ms and including 13 stimuli) that was greater (79%) than theoretically expected (62%). Both of these observations are critically assessed. M.G.

N84-18852*# California Univ., Riverside. Div. of Biomedical Sciences.
HOMEOSTASIS IN PRIMATES IN HYPERACCELERATION FIELDS Abstract Only
C. A. FULLER *In* NASA. Washington NASA Space Biol. Program p 39-40 Feb. 1984
(Contract NAGW-309)
Avail: NTIS HC A06/MF A01 CSCL 06C

Various homeostatic responses of a nonhuman primate, the squirrel monkey (Saimiri sciureus) to acute changes in the acceleration environment were examined. When these animals were exposed to a hyperdynamic field the body temperature was consistently depressed and the animals showed behavioral indications of increased drowsiness. Further, time of day played a significant role in influencing these responses. M.G.

N84-18853*# California Univ., Davis. Dept. of Animal Physiology.
SET-POINT CHANGES IN HIERARCHICALLY-ARRANGED THERMOGENIC SYSTEMS Abstract Only
J. M. HOROWITZ *In* NASA. Washington NASA Space Biol. Program p 41-42 Feb. 1984 refs
(Contract NSG-2234)
Avail: NTIS HC A06/MF A01 CSCL 06C

Rats acclimated to either 23 or 5 C were concurrently exposed to cold and hypergravic fields to test the proposal that mammals have parallel controllers for thermoregulation. The two groups of rats were used to evaluate the different relative contributions of shivering and nonshivering thermogenesis to the increased oxygen consumption of the cold-exposed rats in hypergravic fields. The lower magnitude of the cold-induced oxygen consumption observed when cold-exposed rats are moved from 1 G to hypergravic fields is probably due to an inactivation of shivering rather than nonshivering thermogenesis. The observation that shivering, but not nonshivering thermogenesis, appears to be impaired by hypergravic fields is consistent with the representation of central thermoregulation by multiple controllers. M.G.

N84-18854*# California Univ., Berkeley.
GRAVITY, BODY MASS AND COMPOSITION, AND METABOLIC RATE Abstract Only
N. PACE and A. H. SMITH *In* NASA. Washington NASA Space Biol. Program p 43-44 Feb. 1984
(Contract NSG-7336)
Avail: NTIS HC A06/MF A01 CSCL 06C

The scale effects of increased gravitational loading by chronic centrifugation on metabolic rate and body composition in metabolically mature mammals were investigated. Individual oxygen consumption rates in groups of 12 each, 8-month-old, hamster, rats, guinea pigs, and rabbits were measured at weekly intervals at 1.0 g, then 2.0 g for 6 weeks. Metabolic rate was increased significantly in all species, and stabilized after 2 weeks at 2.0 g. Statistical analysis of the data revealed that the larger the animal the greater was the increase in mass-specific metabolic rate, or metabolic intensity, over the 1.0 g value for the same animal, with the result that the interspecies allometric scaling relationship between metabolic rate and total body mass is different at 2.0 g compared 10 1.0 g. Analysis of covariance shows that the postioning constant at 2.0 g is increased by 17% at 2.0 g at the P .001 level, and the exponent is increased by 8% at the P = 0.008 level. Thus, the hypothesis that augmented gravitational loading should shift the allometric relationship between metabolic rate and body size by an increase in both parameters is supported. M.G.

N84-18855*# Louisville Univ., Ky. Dept. of Physiology and Biophysics.
EXTENSIONS OF SUSPENSION SYSTEMS TO MEASURE EFFECTS OF HYPOKINESIA/HYPODYNAMIA AND ANTIORTHOSTASIS IN RATS Abstract Only
X. J. MUSACCHIA and J. M. STEFFEN *In* NASA. Washington NASA Space Biol. Program p 45-47 Feb. 1984
(Contract NSG-2325)
Avail: NTIS HC A06/MF A01 CSCL 06C

Suspension systems are used to simulate hypokinetic/hypodynamic (H/H) and anitorthostatic (AO) responses seen under conditions of weightlessness. Growing rats in H/H suspension with unloaded hindlimbs for one and two weeks respond with muscle atrophy and increased excretion of nitrogenous end products such as urea, NH3 and 3 methyl histidine. Since muscle is in a dynamic state of synthesis and breakdown of protein, relationships between protein, RNA and DNA contents in the four muscles which reflect weight bearing and non-weight bearing functions were assessed. Protein and RNA progressively decreased over a one and two week period of H/H suspension: soleus gastrocnemius=plantaris EDL. Concommitant analysis of DNA contents showed there were no changes. The interpretation was that protein synthesis was slowed during H/H. As with muscle mass, protein and RNA levels recovered rapidly after removal from H/H. The AO rats (which are also H/H) respond with diuresis, natriuresis and kaliuresis in a manner comparable to responses seen when thoracic blood vessels are volume loaded. M.G.

N84-18856*# Baylor Coll. of Medicine, Houston, Tex.
REGULATION OF HEMATOPOIESIS IN THE SUSPENDED RAT AS A MODEL FOR SPACE FLIGHT Abstract Only
C. D. R. DUNN and P. C. JOHNSON *In* NASA. Washington NASA Space Biol. Program p 48-49 Feb. 1984
(Contract NAGW-308)
Avail: NTIS HC A06/MF A01 CSCL 06C

A series of studies was completed in which a variety of routine hematological and other parameters were obtained from sequential sampling of control and suspended rats. These data showed that, during suspension, the rats failed to gain weight at the same rate as the controls, ate and drank significantly less, demonstrated a transient increase in peripheral hematocrit and RBC count, a transient decrease in MCH, suppressed reticulocyte counts and a progressive decrease in MCV but no change in RBC shape. Leukocyte counts were variably decreased but no significant changes in platelet numbers were noted. Post-suspension, evidence of anemia was present from a reduced RBC count,

hemoglobin, hematocrit, and MCV. A leukocytosis was also noted. Efforts directed to the collection of data aimed at understanding changes in blood volume during suspension are also discussed. As part of these studies the following parameters were investigated; RBC survival, in vitro leukocyte reactivity to PHA, bone marrow and spleen cellularity and morphology, ferrokinetics, and the hematopoietic inductive microenvironment. M.G.

N84-18857*# Utah State Univ., Logan.
GRAVITROPISM IN LEAFY DICOT STEMS Abstract Only
F. B. SALISBURY *In* NASA. Washington NASA Space Biol. Program p 50-51 Feb. 1984
(Contract NSG-7567)
Avail: NTIS HC A06/MF A01 CSCL 06C

In an attempt to separate plant responses to mechanical stresses from responses to gravity compensation, six treatments were automated: (1) upright stationary controls; (2) horizontal clinostat; (3) intermittent clinostat (plants upright 3.3 minutes out of every 4 minutes, horizontal and rotated once in the remaining time); (4) inversion every ten minutes (plants upside down half the time); (5) inversion and immediate return to the vertical; and (6) vertical rotation. Epinasty appeared only on clinostated and on inverted plants, both subjected to gravity compensation. The mechanics of gravitropic stem bending and the effects of a unilateral application of ethephon of gravitropic bending were also investigated. M.G.

N84-18858*# Purdue Univ., Lafayette, Ind. Dept. of Horticulture.
MECHANICAL REGULATION OF PLANT GROWTH AND DEVELOPMENT Abstract Only
C. A. MITCHELL *In* NASA. Washington NASA Space Biol. Program p 52-53 Feb. 1984
(Contract NSG-7278)
Avail: NTIS HC A06/MF A01 CSCL 06C

Soybean and eggplant grown and shaken in a greenhouse exhibited decreased internode length, internode diameter, leaf area, and fresh and dry weight of roots and shoots in much the same way as outdoor-exposed plants. Perhaps more important than decreased dimensions of plant parts resulting from periodic seismic treatment is the inhibition of photosynthetic productivity that accompanies this stress. Soybeam plants briefly shaken or rubbed twice daily experienced a decrease in relative as well as absolute growth rate compared to that of undisturbed controls. Growth dynamics analysis revealed that virtually all of the decline in relative growth rate (RGR) was due to a decline in net assimilation rate (NAR), but not in leaf area ratio (LAR). Lower NAR suggests that the stress-induced decrease in dry weight gain is due to a decline in photosynthetic efficiency. Possible effects on stomatal aperture was investigated by measuring rates of whole plant transpiration as a function of seismo-stress, and a transitory decrease followed by a gradual, partial recovery was detected. M.G.

N84-18859*# Wake Forest Univ., Winston-Salem, N.C.
MEASUREMENT OF THIGMOMORPHOGENESIS AND GRAVITROPISM BY NON-INTRUSIVE COMPUTERIZED VIDEO IMAGE PROCESSING Abstract Only
M. J. JAFFE *In* NASA. Washington NASA Space Biol. Program p 54-54a Feb. 1984
(Contract NAGW-96)
Avail: NTIS HC A06/MF A01 CSCL 06C

A video image processing instrument, DARWIN (Digital Analyser of Resolvable Whole-pictures by Image Numeration), was developed. It was programmed to measure stem or root growth and bending, and coupled to a specially mounted video camera to be able to automatically generate growth and bending curves during gravitropism. The growth of the plant is recorded on a video casette recorder with a specially modified time lapse function. At the end of the experiment, DARWIN analyses the growth or movement and prints out bending and growth curves. This system was used to measure thigmomorphagenesis in light grown corn plants. If the plant is rubbed with an applied force load of 0.38 N., it grows faster than the unrubbed control, whereas 1.14 N. retards its growth. Image analysis shows that most of the change in the rate of growth is caused in the first hour after rubbing. When DARWIN was used to measure gravitropism in dark grown oat seedlings, it was found that the top side of the shoot contracts during the first hour of gravitational stimulus, whereas the bottom side begins to elongate after 10 to 15 minutes. M.G.

N84-18860*# Wake Forest Univ., Winston-Salem, N.C.
THE ROLES OF CALLOSE, ELICITORS AND ETHYLENE IN THIGMOMORPHOGENESIS AND GRAVITROPISM Abstract Only
M. J. JAFFE *In* NASA. Washington NASA Space Biol. Program p 54b-54c Feb. 1984
(Contract NAGW-96)
Avail: NTIS HC A06/MF A01 CSCL 06C

A correlation (both temporal and through the inhibitor, 2-deoxy-D-glucose) of callose deposition and ethylene evolution in mechanically perturbed (MP) bean or pine stems or in gravitationally stimulated corn shoots was demonstrated. It was suggested that the callose, which is deposited on the inside of the cell wall, and adjacent to the plasma membrane causes, in some way, the ethylene production. A hypothesis explaining the mechanism is discussed which states that there is a chemical activation of the enzyme system by the callose which is being deposited in apposition with it. Experimental data supporting the hypothesis are presented. M.G.

N84-18861*# Pennsylvania State Univ., University Park.
BIOPHYSICAL MECHANISM OF DIFFERENTIAL GROWTH DURING GRAVITROPISM Abstract Only
D. COSGROVE *In* NASA. Washington NASA Space Biol. Program p 55-56 Feb. 1984
(Contract NAGW-480)
Avail: NTIS HC A06/MF A01 CSCL 06C

A research project is described the goal of which is to determine the mechanism of gravitropic curvature in plant stems at the biophysical and the cellular level. The reorientation of plant organs under the influence of gravity is due to differential growth of the upper and lower sides of the organ. The rate of plant cell enlargement is governed by four biophysical parameters: (1) the extensibility of the cell wall; (2) the minimum stress in the cell wall required for wall expansion (the 'yield threshold'); (3) the osmotic pressure difference between the cell contents and the water source; and (4) the hydraulic conductivity of the pathway for water uptake. Gravitropic response must involve differential alteration of one or more of these four parameters on the two sides of the growing organ. Each of these factors will be examined to assess the role it plays in gravitropism. M.G.

N84-18862*# State Univ. of New York, Stony Brook. Dept. of Biochemistry.
CELLS, EMBRYOS AND DEVELOPMENT IN SPACE Abstract Only
A. D. KRIKORIAN *In* NASA. Washington NASA Space Biol. Program p 57-58 Feb. 1984 refs
(Contract NSG-7270)
Avail: NTIS HC A06/MF A01 CSCL 06C

Work continues to focus on the demonstrable totipotency of cultured somatic cells of various higher plants and has examined the conditions which regulate this propensity to be controllably released. This was done with special reference to cells obtained from cultured explants of daylily and carrot. For purposes of identifying the variables in question, work was carried out almost exclusively in liquid media. The events that intervene between the aseptic isolation of tissue explants, the culture of small derived units and free cells and the propagation in large numbers of adventive or somatic embryos to plantlets were traced and certain definitive stages at which control is exercised were identified. In daylily, morphologically competent units are now propagated with a high degree of precision in rotated liquid cultures in bulk, and under the conditions of continuous neutralized gravity, the development progresses so that embryo-plantlets are obtained.
Author

N84-18863*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
IN VITRO SEED TO SEED GROWTH ON CLINOSTATS Abstract Only
T. HOSHIZAKI *In* NASA. Washington NASA Space Biol. Program p 59-60 Feb. 1984
(Contract NAS7-918)
Avail: NTIS HC A06/MF A01 CSCL 06C

The effect of a long term micro-gravity environment on the life cycle of plants is unknown. Whether higher plants have evolved to a stage where removal or reduction of gravity is detrimental to plant life cycle and thus fatal to the plant species, is an unanswered question in space plants which were successfully grown through the various stages of their life cycle. Attempts to grow plants as a continuous integral process from seed to seed through one generation were successful until recently. Culture of plants through multiple generations was not accomplished in space nor in ground based studies. The effect of long term simulated weightlessness by growing consecutive generations of plants continuously on clinostats using the cruciferous plants, Arabidopsis thaliana (L.) Heyn. and Cardamine oligosperma Nutt. is being investigated. Author

N84-18864*# Pennsylvania Univ., Philadelphia.
IMPORTANCE OF GRAVITY FOR PLANT GROWTH AND BEHAVIOR Abstract Only
A. H. BROWN *In* NASA. Washington NASA Space Biol. Program p 61-61a Feb. 1984 refs
(Contract NGR-39-010-149; NGR-39-030-010)
Avail: NTIS HC A06/MF A01 CSCL 06C

Accomplishments during the past fiscal year consisted of (1) completion of research on a study of the kinetics of damping out of circummutation when the axially directed g-force was abruptly eliminated (Research Task NULYRL). (2) Further experiments were accomplished on a comprehensive study, underway for several years, to validate (or invalidate) the use of clinostat rotation as a hypogravity simulation device. (3) Some of our earlier (unpublished) observations on plant seedlings resistance to g-loading were evaluated, interpreted, and a paper was submitted for publication (Research Task HYGEFF). (4) In what has been called "Shuttle middeck locker ecology' an attempt to acquire reliable empirical information on the thermal profile experienced by test packages housed in middeck lockers (MDDL) during shuttle flights at long last seems to be yielding some results. Author

N84-18865*# Loyola Univ., Chicago, Ill.
THE ROLE OF GRAVITY IN LEAF BLADE CURVATURES Abstract Only
A. B. HAYES *In* NASA. Washington NASA Space Biol. Program p 62-63 Feb. 1984
(Contract NAGW-131)
Avail: NTIS HC A06/MF A01 CSCL 06C

In the past year we have gained useful information on several aspects of leaf blade growth. The most important observations are as follows: The C(14)-1AA moves preferentially in a gravipositive dorsiventral direction through the blade. This movement is inhibited by inversion of the blade. The responding cells in leaf blade hyponasty are in the lower epidermis and bundle sheath cells. Two additional responses in the leaf were characterized. In addition to blade curvature, the leaf shows petiole curvature and changes in the liminal angle subtended by the pulvinus. Ethylene production was studied under a number of conditions. The blade, rather than the petiole or pulvinus, is the principal site of auxin-promoted ethylene synthesis. The effects of a variety of agents on the blade, including gibberellic acid, abscisic acid, vanadate, low pH buffers, and blue light were reviewed. Author

N84-18866*# Houston Univ., Tex.
AROMATIC BIOSYNTHESIS IN PINE TISSUES Abstract Only
J. R. COWLES *In* NASA. Washington NASA Space Biol. Program p 64 Feb. 1984
(Contract NSG-9042)
Avail: NTIS HC A06/MF A01 CSCL 06C

Pinus elliotti is a woody plant species responsive to gravity and capable of synthesizing large quantities of lignin. Lignification begins very quickly after germination; lignin is detected in the vascular region within 4 days after germination and rapidly progresses up the hypocotyl. Young pine seedlings bend in response to geostimulation for about 10 days after germination, with the most rapid response time occurring in 4- to 5-day-old seedlings. Various chemicals were used to establish their effects on the geotropic response in this gymnosperm species. IAA completely arrests the geotropic response for 18 to 24 hr. Afterward the seedlings respond geostimulation as if they were not treated. The same pattern of response will occur with a second IAA treatment. If the synthetic auxin, 2-4,D, is used, the georesponse is permanently blocked. The method of application does not appear to be critical; addition of auxin to only one side of the seedling gave results similar to those obtained by treating the entire seedling. Author

N84-18867*# Indiana Univ., Bloomington. Dept. of Biology.
CYTOPLASMIC REARRANGEMENTS ASSOCIATED WITH AMPHIBIAN EGG SYMMETRIZATION Abstract Only
G. M. MALACINSKI *In* NASA. Washington NASA Space Biol. Program p 65-66 Feb. 1984
(Contract NAGW-60)
Avail: NTIS HC A06/MF A01 CSCL 06C

Cytoplasmic rearrangements which follow fertilization were mentioned in normal and inverted eggs. A set of yolk compartments was resolved by cytological analyses of both normally oriented and inverted eggs. Those compartments were characterized by their yolk platelet compositions and movement during egg inversion. It is found that during egg inversion the yolk compartments shift minor cytoplasmic compartments which line the egg cortex. Those yolk mass shifts occurred only after the inverted egg was activated. The direction of shift of the major yolk components, rather than the sperm entrance site, determines the dorsal/ventral polarity of the inverted egg. Among different spawnings the rate of shift varied. Eggs that displayed the fastest rate of shift exhibited the highest frequency of developmental abnormalities during organogenesis. Interpretation of novel observations on cytoplasmic organization provide criticism of some earlier models. A new density compartment model is presented as a coherent way to view the organization of the egg cytoplasm and the development of bilateral symmetry. Author

N84-18868*# Columbia Univ., New York. Dept. of Human Genetics and Development.
EFFECTS OF SIMULATED WEIGHTLESSNESS ON MAMMALIAN DEVELOPMENT. PART 1: DEVELOPMENT OF CLINOSTAT FOR MAMMALIAN TISSUE CULTURE AND USE IN STUDIES ON MEIOTIC MATURATION OF MOUSE OOCYTES Abstract Only
D. J. WOLEGEMUTH and G. S. GRILLS *In* NASA. Washington NASA Space Biol. Program p 67-68 Feb. 1984
(Contract NAGW-346)
Avail: NTIS HC A06/MF A01 CSCL 06C

The effects of weightlessness on three aspects of mammalian reproduction: oocyte development, fertilization, and early embryogenesis was studied. Zero-gravity conditions within the laboratory by construction of a clinostat designed to support in vitro tissue culture were simulated and the effects of simulated weightlessness on meiotic maturation in mammalian oocytes using mouse as the model system were studied. The timing and frequency of germinal vesicule breakdown and polar body extrusion, and the structural and numerical properties of meiotic chromosomes at Metaphase and Metaphase of meiosis are assessed. E.A.K.

N84-18869*# Texas Univ. Health Science Center, Houston. Inst. of Dental Science.
GROWTH AND DIFFERENTIATION OF MAMMALIAN EMBRYONIC TISSUES EXPOSED TO HYPERGRAVITY IN VIVO AND IN VITRO Abstract Only
P. J. DUKE *In* NASA. Washington NASA Space Biol. Program p 69-70 Feb. 1984
(Contract NAGW-438)
Avail: NTIS HC A06/MF A01 CSCL 06C

In about 10 years or so, men and women from Earth will be long-term inhabitants of a space station aboard which plants and animals will be growing and developing in gravities other than that of Earth. The effect of gravitational changes on development was examined. It is indicated that differentiation is speeded up under excess G and slowed in low or null G. The effects of exposure to excess gravity on fusion of the embryonic mouse secondary palate were studied. During fusion, the palatal shelves first adhere by means of glycoproteins appearing along the medial epithelial edge (MEE). The contacting epithelia then reorganize and undergo programmed cell death, allowing the underlying mesenchymes to come in contact. The process of cell death occurs in vitro at about the same rate that it occurs in vivo. E.A.K.

N84-18870*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Development Genetics and Anatomy.
RODENT CNS NEURON DEVELOPMENT: TIMING OF CELL BIRTH AND DEATH Abstract Only
J. R. KEEFE *In* NASA. Washington NASA Space Biol. Program p 71-71a Feb. 1984
(Contract NAGW-83)
Avail: NTIS HC A06/MF A01 CSCL 06C

Data obtained from a staged series of single paired injections of tritiated thymidine to pregnant Wistar rats or C57B16/j mice on selected embryonic days and several postnatal times are reported. All injected specimens were allowed to come to term, each litter culled to six pups and specimens were sacrificed on PN28, with fixation and embedding for paraffin and plastic embedding. The results are derived from serial paraffin sections of PN28 animals exposed to autoradiographic processing and plotted with respect to heavily labelled cell nuclei present in the selected brain stem nuclei and sensory ganglia. Counts from each time sample/structure are totalled and the percentage of cells in the total labelled population/structure represented by each injection time interval plotted. E.A.K.

N84-18871*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HYPER-GRAVITATIONAL EFFECTS ON METABOLISM AND THERMOREGULATION Abstract Only
J. OYAMA *In* NASA. Washington NASA Space Biol. Program p 72 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Animal hypergravitational effects on metabolism and thermoregulation was studied. The two major problem areas investigated are: initial and short-term exposure effects, and chronic, long-term exposure effects involving developmental and adaptational effects. Investigations focused on: (1) quantifying changes in thermoregulation with graded G-intensities in rats; (2) further delineating the effects of duration on gluconeogenesis, gluconeogenic hormones and substrates, and glucose homeostasis; and (3) reproduction and neonatal survival rates under different G-intensities. E.A.K.

N84-18872*# Dartmouth Coll., Hanover, N.H. Dept. of Anatomy.
FAILURE OF VINCRISTINE INDUCE TWINNING Abstract Only
M. BINDER *In* NASA. Washington NASA Space Biol. Program p 73 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Mammalian ova do not contain axes of symmetry from which are derived embryonic axes of symmetry. Mammalian axis determination is an early embryologic event occurring at about the time that monozygous twinning in mice. (Kaufma MH & O'Shea KS, 1978, Nature 276:707) and an attempt was made to reproduce their work in several strains of mice. Over 3200 embryos were examined without any twins being found. To rule out the possibility that vincristine caused twinning plus some lethal malformation (with subsequent resorption of the embryo) the embryos were examined 36-60 hours after vincristine treatment. R.J.F.

N84-18873*# California Univ., Berkeley. Dept. of Zoology.
TWINNING OF AMPHIBIAN EMBRYOS BY CENTRIFUGATION Abstract Only
S. D. BLACK *In* NASA. Washington NASA Space Biol. Program p 74 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

In the frog Xenopus laevis, the dorsal structures of the embryonic body axis normally derive from the side of the egg opposite the side of sperm entry. However, if the uncleaved egg is inclined at 1g or centrifuged in an inclined position, this topographic relationship is overridden: the egg makes its dorsal axial structures according to its orientation in the gravitational/centrifugal field, irrespective of the position of sperm entry. Certain conditions of centrifugation cause eggs to develop into conjoined twins with two sets of axial structures. A detailed analysis of twinning provided some insight into experimental axis orientation. First, as with single-axis embryos, both axes in twins are oriented according to the direction of centrifugation. One axis forms at the centripetal side of the egg and the other forms at the centrifugal side, even when the side of sperm entry is normal to the centrifugal force vector. Second, if eggs are centrifuged to give twins, but are inclined at 1g to prevent post-centrifugation endoplasmic redistributions, only single-axis embryos develop. Thus, a second redistribution is required for high-frequency secondary axis formation. This can be accomplished by 1g (as in the single centrifugations) or by a second centrifugation directed along the egg's animal-vegetal axis. R.J.F.

N84-18874*# Texas Univ. Health Science Center, Dallas. Div. of Cardiology.
CARDIAC CHAMBER VOLUMES BY ECHOCARDIOGRAPHY USING A NEW MATHEMATICAL METHOD: A PROMISING TECHNIQUE FOR ZERO-G USE Abstract Only
J. C. BUCKEY, J. M. BEATTIE, F. A. GAFFNEY, J. V. NIXON, and C. G. BLOMQVIST *In* NASA. Washington NASA Space Biol. Program p 75 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Accurate, reproducible, and non-invasive means for ventricular volume determination are needed for evaluating cardiovascular function zero-gravity. Current echocardiographic methods, particularly for the right ventricle, suffer from a large standard error. A new mathematical approach, recently described by Watanabe et al., was tested on 1 normal formalin-fixed human hearts suspended in a mineral oil bath. Volumes are estimated from multiple two-dimensional echocardiographic views recorded from a single point at sequential angles. The product of sectional cavity area and center of mass for each view summed over the range of angles (using a trapezoidal rule) gives volume. Multiple (8-14) short axis right ventricle and left ventricle views at 5.0 deg intervals were videotaped. The images were digitized by two independent observers (leading-edge to leading-edge technique) and analyzed using a graphics tablet and microcomputer. Actual volumes were determined by filling the chambers with water. These data were compared to the mean of the two echo measurements. R.J.F.

N84-18875*# National Inst. of Mental Health, Bethesda, Md. Heart, Lung and Blood Inst.
PRESYNAPTIC ELEMENTS INVOLVED IN THE MAINTENANCE OF THE NEUROMUSCULAR JUNCTION Abstract Only
G. H. BURROWS *In* NASA. Washington NASA Space Biol. Program p 76 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Alterations in the neuromuscular junction were observed in rats preceding loss of muscle mass. In view of the possibility that these alterations involve changes in the secretion of myotrophic

agents by presynaptic motor neurons, an investigation was undertaken to characterize a neuronall factor which is thought to be involved in the initiation and maintenance of cholinergic synapses. This factor, which is secreted into the incubation medium by NG108-15 neuroblastoma x glioma hybrid cells, induces the aggregation of nicotinic acetylcholine receptors on primary cultures of rat hindlimb myotubes. Previous attempts to purify this factor failed. Extensive washing of the NG108-15 cells with hepes-buffered salt solution followed by short (4 hour) collection times resulted in the collection of incubation medium containing maximal aggregation activity with as little as 5 ug secreted protein per ml of fresh medium. A three-fold increase in specific activity was obtained after anion exchange chromatography. R.J.F.

N84-18876*# Texas A&M Univ., College Station. Dept. of Plant Sciences.

IDENTIFICATION OF A VOLATILE PHYTOTOXIN FROM ALGAE Abstract Only

J. S. GARAVELLI, F. FONG, and E. A. FUNKHOUSER *In* NASA. Washington NASA Space Biol. Program p 77 Feb. 1984

(Contract NAGW-70; NCC-2-102)

Avail: NTIS HC A06/MF A01 CSCL 06C

The objectives were to develop a trap system for isolating fractions of volatile algal phytotoxin and to characterize the major components of the isolated phytotoxin fractions. A bioassay using Phaseolus vulgaris seedlings was developed to aid in investigating the properties of the phytotoxin produced by cultures of Euglena gracilis var. bacillaris and Chlorella vulgaris. Two traps were found, 1.0 M hydrochloric acid and 0 C, which removed the phytotoxin from the algal effluent and which could be treated to release that phytotoxin as judged with the bioassay procedure. It was also determined that pretraps of 1.0 M sodium hydroxide and 1.0 M potassium biocarbonate could be used without lowering the phytotoxin effect. Ammonia was identified in trap solutions by ninhydrin reaction, indophenol reaction and derivatization with dansyl chloride and phenylisothiocyanate. Ammonia at the gaseous concentrations detected was found to have the same effects in the bioassay system as the volatile phytotoxin. It is possible that other basic, nitrogen containing compounds which augment the effects of ammonia were present at lower concentrations in the algal effluent. R.J.F.

N84-18877*# Rockefeller Univ., New York. Lab. of Plant Molecular Biology.

PEA AMYLOPLAST DNA IS QUALITATIVELY SIMILAR TO PEA CHLOROPLAST DNA Abstract Only

J. J. GAYNOR *In* NASA. Washington NASA Space Biol. Program p 78 Feb. 1984

Avail: NTIS HC A06/MF A01 CSCL 06C

Amyloplast DNA (apDNA), when subjected to digestion with restriction endonucleases, yields patterns nearly identical to that of DNA from mature pea chloroplasts (ctDNA). Southern transfers of apDNA and ctDNA, probed with the large subunit (LS) gene of ribulose-1,5-bisphosphate carboxylase (Rubisco), shows hybridization to the expected restriction fragments for both apDNA and ctDNA. However, Northern transfers of total RNA from chloroplasts and amyloplasts, probed again with the LS gene of Rubisco, shows that no detectable LS meggage is found in amyloplasts although LS expression in mature chloroplasts is high. Likewise, two dimensional polyacrylamide gel electrophoresis of etiolated gravisensitive pea tissue shows that both large and small subunits of Rubisco are conspicuously absent; however, in greening tissue these two constitute the major soluble proteins. These findings suggest that although the informational content of these two organelle types is equivalent, gene expression is quite different and is presumably under nuclear control. R.J.F.

N84-18878*# Washington Univ., St. Louis, Mo. Dept. of Biology.

PARTICIPATION OF ETHYLENE IN GRAVITROPISM Abstract Only

M. HARRISON and B. G. PICKARD *In* NASA. Washington NASA Space Biol. Program p 79 Feb. 1984

Avail: NTIS HC A06/MF A01 CSCL 06C

In shoots of many plants, of which tomato (Lycopersicon esculentum Mill.) is an example, ethylene production is substantially increased during gravitropism. As a first step toward elucidating the role of ethylene in gravitropism, detailed time courses of ethylene production in isolated hypocotyl segments and whole plants were measured for gravistimulated and upright tomato seedlings. In the first experiment, seedlings were set upright or laid horizontal and then, at 15 min intervals, sets of hypocotyls were excised and sealed into gas tight vials. A steady long term rise in ethylene production begins after 15 min gravistimulation. It is possible that this increase is a consequence of the accumulation of indoleacetic acid (IAA) in the lower tissue of the hypocotyle. In a second kind of experiment, whole seedlings were enclosed in sealed chambers and air samples were withdrawn at 5 min intervals. Stimulated seedlings produced more ethylene than controls during the first 5 min interval, but not appreciably more during the second. This suggests the possibility that the ethylene production induced during the first 5 min occurs immediately rather than after a lag, and thus much too soon to be controlled by redistribution of IAA. R.J.F.

N84-18879*# Houston Univ., Tex. Dept. of Biology.

INTERACTIONS OF LIGHT AND GRAVITY ON GROWTH, ORIENTATION, AND LIGNIN BIOSYNTHESIS IN MUNG BEANS Abstract Only

G. C. JAHNS *In* NASA. Washington NASA Space Biol. Program p 80 Feb. 1984

Avail: NTIS HC A06/MF A01 CSCL 06C

Mung beans (Vigna radiata L.) seedlings grown on the third Space Transport Mission (STS-3) showed marked orientation problems (some of the stems elongated horizontally and many of the roots were growing upward) and had a lower lignin content than the ground based controls. This research was initiated to determine if the atypical growth characteristics of mung beans grown in microgravity could be simulated using horizontal clinostats. Most of the effort focused on the design, construction and testing of the clinostats. In order to closely approximate the growth conditions of the plants grown in the plant growth unit on STS-3, cylindrical lexan minichambers were constructed. Results showed that plants grown using these clinostats in the horizontal position exhibit similar growth characteristics to the plants grown on STS-3 (disorientation of both stems and roots), while the vertical stationary and vertical rotating controls exhibit normal growth. R.J.F.

N84-18880*# Michigan Univ., Ann Arbor. Dept. of Anatomy and Cell Biology.

CELLULAR LOCALIZATION OF NA(+), K(+)-ATPASE IN THE MAMMALIAN VESTIBULAR SYSTEM Abstract Only

T. P. KERR *In* NASA. Washington NASA Space Biol. Program p 81-82 Feb. 1984

Avail: NTIS HC A06/MF A01 CSCL 06C

Two different, but complementary, procedures for cellular localization of Na+, K+-ATPase in the guinea pig vestibular system were employed. One of these techniques, devised by Stirling, depends upon the well documented ability of the specific inhibitor ouabain to bind selectively to Na+,K+-ATPase, blocking catalytic activity. Microdisected vestibular tissues are incubated with tritium-labelled (3H-) ouabain, and regions with a high concentration of Na+,K+-ATPase are subsequently identified by light microscope autoradiography. A second method, originated by Ernst, detects inorganic phosphate released from an artificial substrate (nitrophenyl phosphate) by catalytic activity of the enzyme. In the presence of strontium ion, phosphate is precipitated near regions of high activity, then converted to a product which may finally be visualized in the electron microscope. This cytochemical enzymatic reaction is inhibited by ouabain. R.J.F.

N84-18881*# National Inst. of Mental Health, Bethesda, Md. Lab. of Clinical Science.
BIOASSAY, ISOLATION AND STUDIES ON THE MECHANISM OF ACTION OF NEURITE EXTENSION FACTOR Abstract Only
D. KLIGMAN *In* NASA. Washington NASA Space Biol. Program p 83 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

The identification and purification of molecules active in promoting neurite outgrowth requires a sensitive reproducible bioassay. A quantitative bioassay was utilized to purify a neurite extension factor (NEF) based on counting the number of phase bright neurons with processes at least equal to one cell body diameter after 20 hrs. in culture is defined, serum free medium. Using a combination of heat treatment DEAE cellulose chromatography and gel filtration, an acidic protein of M sub r = 75,000 was highly purified. Upon reduction, it yields subunits of M sub r = 37,000. Purified fractions are active half maximally at 100 ng/ml in inducing neurite outgrowth in this bioassay. Currently, monoclonal antibodies to NEF are being produced. Female Balb C mice were immunized with the antigen and fusions with mouse myeloma cells will be performed to yield hybridoma cells. R.J.F.

N84-18882*# Stanford Univ., Calif. Dept. of Biological Sciences.
ISOLATION AND CHARACTERIZATION OF BETA-GLUCAN SYNTHASE: A POTENTIAL BIOCHEMICAL REGULATOR OF GRAVISTIMULATED DIFFERENTIAL CELL WALL LOOSENING Abstract Only
K. M. KUZMANOFF *In* NASA. Washington NASA Space Biol. Program p 84 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

In plants, gravity stimulates differential growth in the upper and lower halves of horizontally oriented organs. Auxin regulation of cell wall loosening and elongation is the basis for most models of this phenomenon. Auxin treatment of pea stem tissue rapidly increases the activity of Golgi-localized Beta-1,4-glucan synthase, an enzyme involved in biosynthesis of wall xyloglucan which apparently constitutes the substrate for the wall loosening process. The primary objective is to determine if auxin induces de novo formation of Golgi glucan synthase and increases the level of this glucan synthase mRNA. This shall be accomplished by (a) preparation of a monoclonal antibody to the synthase, (b) isolation, and characterization of the glucan synthase, and (c) examination for cross reactivity between the antibody and translation products of auxin induced mRNAs in pea tissue. The antibody will also be used to localize the glucan synthase in upper and lower halves of pea stem tissue before, during and after the response to gravity. Author

N84-18883*# Millsaps Coll., Jackson, Miss. Dept. of Biology.
RHEOCEPTIVE MEDIATORS OF GRAVIPERCEPTION IN A WATER FLEA: MORPHOLOGICAL IMPLICATIONS OF ANTENNAL-SOCKET SETAE IN DAPHNIA MAGNA Abstract Only
D. G. MEYERS *In* NASA. Washington NASA Space Biol. Program p 85 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Aquatic microcrustaceans of the genus Daphnia are known to orient to light during the day. At night, in the absence of visual cues, daphnids were suspected of maintaining equilibrium by monitoring the direction of gravity through their swimming antennae. Recent investigations using simulated, weightlessness conditions coupled with absence of illumination revealed hair like structures or setae on the basal, articulating socket of the antennae that, when surgically removed, resulted in disorientation. Given the simulated weightlessness or neutrally buoyant condition that eliminated sinking of the normally negatively buoyant Daphnia, it was proposed that the antennal socket setae function as rheoceptors stimulated by the upward rush of water currents during gravity induced, sinking phase of daphnid swimming movements. This rheoceptively mediated, gravity perception hypothesis is further supported by morphological investigations. Scanning electron micrographs indicate that antennal socket setae are anatomically similar to proprioceptors used by higher crustaceans to monitor gravitational direction. R.J.F.

N84-18884*# Louisville Univ., Ky. Dept. of Physiology and Biophysics.
EFFECTS OF SUSPENSION ON TISSUE LEVELS OF GLUCOCORTICOID RECEPTORS Abstract Only
J. M. STEFFEN *In* NASA. Washington NASA Space Biol. Program p 86 Feb. 1984
Avail: NTIS HC A06/MF A01 CSCL 06C

Differential muscle responses can be simulated by hypokinetic/hypodynamic (H/H) suspension of rats with complete unloading of the hindlimb muscles. Since mechanism(s) underlying these atrophic effects were not clearly elucidated, experiments were initiated to investigate a possible role for glucocorticoids in the physiological and biochemical responses to H/H. The principal objective was to assess the potential for alterations in peripheral responsiveness to glucocorticoids in response to H/H. Studies have initially focused on the determination of tissue levels of glucocorticoid receptors as one index of hormonal sensitivity at the cellular level. Four hindlimb muscles (soleus, gastrocnemius, plantaris and EDL), previously demonstrated to exhibit differential responses to H/H, were investigated. Receptor levels in other glucocorticoid sensitive tissues (heart, liver, and kidney) were determined. Male rats (180-200g) were suspended for 7 or 14 days, sacrificed by cervical dislocation, and the tissues excised. R.J.F.

N84-18885*# California Univ., Davis.
AVIAN EMBRYONIC DEVELOPMENT IN HYPERDYNAMIC ENVIRONMENTS Final Report, 1 Oct. 1978 - 31 Mar. 1982
U. K. ABBOTT and A. H. SMITH 1983 13 p refs
(Contract NSG-7493)
(NASA-CR-173339; NAS 1.26:173339) Avail: NTIS HC A02/MF A01 CSCL 06C

Embryos which developed for 24 hours in the oviduct of hens maintained at 2 G and which were subsequently incubated at Earth gravity had a 14% reduction in hatchability. Increased mortality during the first 4 days, and an increase in embryonic abnormalities were of the types usually found during the first mortality peak (2-3 days). Embryos in eggs that were produced at Earth gravity and continued their development on the centrifuge at fields of 2 G or less did not appear to be greatly affected by the treatment. At 4 G, 91% of the embryos died, mostly on the first and second days of incubation. Abnormalities prominent in the centrifuged eggs include: (a) a failure of the primitive streak to develop; (b) interference with the development of the axial skeleton; (c) multiple hemorrhages, mostly petechial which is consistent with capillary fragility; and (d) retardation of embryo growth, possibly caused by an interference with gaseous diffusion, the result of an acceleration-induced increase in gas density in the centrifuging incubator. Author

N84-18886*# Rice Univ., Houston, Tex.
FLUID MECHANICAL ASPECTS OF CELL CULTURE Final Report
J. D. HELLUMS 29 Oct. 1982 5 p
(Contract NAS9-16433)
(NASA-CR-171749; NAS 1.26:171749) Avail: NTIS HC A02/MF A01 CSCL 06C

The influence of shear rate on cell cultures was determined. Cells were cultured on a flat substrate in a specially designed flow chamber in which shear rate is known and controlled. Author

N84-18887*# Tufts Univ., Boston, Mass. Musculo-Skeletal Research Group.
STATIC VERSUS DYNAMIC LOADS AS AN INFLUENCE ON BONE REMODELLING
L. E. LANYON and C. T. RUBIN 1983 24 p refs Sponsored in part by MRC, England
(Contract NAG9-25)
(NASA-CR-173365; NAS 1.26:173365) Avail: NTIS HC A02/MF A01 CSCL 06C

Bone remodelling activity in the avian ulna was assessed under conditions of disuse alone, disuse with a superimposed continuous compressive load, and disuse interrupted by a short daily period of intermittent loading. The ulna preparation is made by two submetaphyseal osteotomies, the cut ends of the bone being covered with stainless steel caps which, together with the bone they enclosed, are pierced by pins emerging transcutaneously on the dorsal and ventral surfaces of the wing. The 110 mm long undisturbed section of the bone shaft can be protected from functional loading, loaded continuously in compression by joining the pins with springs, or loaded intermittently in compression by engaging the pins in an Instron machine. Similar loads (525 n) were used in both static and dynamic cases engendering similar peak strains at the bone's midshaft (-2000 x 10-6). The intermitent load was applied at a frequency of 1 Hz during a single 100 second period per day as a ramped square wave, with a rate of change of strain during the ramp of 0.01 per second. Author

N84-18888*# Tufts Univ., Boston, Mass. Dept. of Anatomy and Cellular Biology.
REGULATION OF BONE MASS BY MECHANICAL STRAIN
C. T. RUBIN and L. E. LANYON 14 Mar. 1984 12 p refs Sponsored in part by MRC, England
(Contract NAG9-25)
(NASA-CR-173363; NAS 1.26:173363) Avail: NTIS HC A02/MF A01 CSCL 06C

By applying controlled intermittent loads in vivo to a bone protected from alternative sources of loading, it was possible to demonstrate a graded dose:response relationship between peak load and change in tissue mass. Only 100, 10.0 Hz cycles per day of loads producing physiological strain magnitudes and rates were necessary to elicit this adaptive response. Both increases and decreases in bone mass were achieved by increased cellular activity. The osteogenic response was practically unaccompanied by concurrent resorption, whereas reduction in bone mass was achieved by a response in which resorption predominated over formation. Author

N84-18889*# Tufts Univ., Medford, Mass. Dept. of Anatomy and Cellular Biology.
CONTROL OF BONE REMODELLING BY APPLIED DYNAMIC LOADS Final Report
L. E. LANYON and C. T. RUBIN 1984 3 p refs
(Contract NAG9-25)
(NASA-CR-173287; NAS 1.26:173287) Avail: NTIS HC A02/MF A01 CSCL 06C

The data showing the relationship between bone mass and peak strain magnitude prepared and submitted for publication. The data from experiments relating remodelling activity with static or dynamic loads were prepared and submitted for publication. Development of programs to relate the location of remodelling activity with he natural and artificial dynamic strain distributions continued. Experiments on the effect of different strain rates on the remodelling response continued. Author

N84-18890# Washington Univ., Seattle. Lab. for Bioelectromagnetics Research.
EFFECTS OF LONG-TERM LOW-LEVEL RADIOFREQUENCY RADIATION EXPOSURE ON RATS. VOLUME 3: SAR (SPECIFIC ABSORPTION RATE) IN RATS EXPOSED IN 2450-MHZ CIRCULARLY POLARIZED WAVEGUIDE Final Report, Jun. 1980 - Dec. 1982
C. K. CHOU, A. W. GUY, and R. B. JOHNSON Oct. 1983 29 p 3 Vol.
(Contract F33615-80-C-0612; AF PROJ. 7757)
(AD-A135376; SAM-TR-83-19) Avail: NTIS HC A03/MF A01 CSCL 06R

The average SARs for live rats exposed in 2450-MHz circularly polarized waveguides were estimated from the total system loss measured by five power meters and by the use of a correction factor representing the ratio between actual SAR (measured by twin-well calorimetry) and apparent SAR (measured by power meters) for various body masses and five orientations. In the waveguides, the average SAR changed less than threefold when the rats grew from 200 to 700 g and when they moved around in the cage. The ratio of peak of average SAR in the body of the rats was less than 3. These results indicate uniform energy disposition in rats exposed in the circular waveguide.
Author (GRA)

N84-18891# Washington Univ., Seattle. Lab. for Bioelectromagnetics Research.
EFFECTS OF LONG-TERM LOW-LEVEL RADIOFREQUENCY RADIATION EXPOSURE ON RATS. VOLUME 2: AVERAGE SAR AND SAR DISTRIBUTION IN MAN EXPOSED TO 450-MHZ RFR Final Report, Jun. 1980 - Dec. 1982
A. W. GUY, C. K. CHOU, and B. NEUHAUS Sep. 1983 110 p 2 Vol.
(Contract F33615-80-C-0612; AF PROJ. 7757)
(AD-A135455; SR-19; SAM-TR-83-18) Avail: NTIS HC A06/MF A01 CSCL 06R

This volume presents the methodology for and results of estimating values for the average SAR and the SAR distribution in man exposed to 1-mW/sq cm 450-MHz radiofrequency radiation for various polarizations and body positions. The results were obtained by calorimetry and thermography from 1/5 scaled models of man and were analyzed by an interactive computer system. The mean SAR as averaged over the body remained relatively constant at 0.050 W/kg, with a standard deviation of + or - .007 W/kg for all exposure polarization conditions and body postures. Peak SAR values were as high as 0.650 W/kg, occurring typically in the wrist. GRA

N84-19430# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
BIOLOGICAL LIFE SUPPORT SYSTEM
H. P. LEISEIFER, A. I. SKOOG, and A. O. BROUILLET (Hamilton Standard, Windsor Locks, Conn.) *In* ESA Environ. and Thermal Control Systems for Space Vehicles p 289-298 Dec. 1983 refs Previously announced in IAA as A84-11755
Avail: NTIS HC A25/MF A01

The feasibility and requirements of biological life support systems (BLSS) for permanently manned large space stations were analyzed. Functional requirements include atmosphere maintenance, and waste water reclamation. The BLSS components are humans, animals, plants and microorganisms integrated with other supporting physicochemical components. With regenerable physicochemical subsystems in the life support system, the water and oxygen loops can be closed. The benefits in weight, volume and resupply cost are generally achieved by mission durations on the order of 30 to 60 days for a 4 to 8 man crew. The carbon loop can be closed if metabolic waste products are regenerated and food is produced. Author (ESA)

N84-20113*# Scripps Institution of Oceanography, La Jolla, Calif.
PROCHLORON RESEARCH Final Report
R. A. LEWIN and L. C. CHENG 1983 2 p
(Contract NAGW-181)
(NASA-CR-173264; NAS 1.26:173264) Avail: NTIS HC A05/MF A01 CSCL 06C

The purpose was to prepare Prochloron photosynthetic membranes for the isolation of the two major chlorophyll-proteins, the P700-chlorophyll a-protein and the light-harvesting chlorophyll a/b-protein, using SDS-polyacrylamide gel electrophoresis. The prepared proteins (purified) were examined for their cross-reactivity to polyclonal antibodies prepared from higher plant proteins. In addition, material was prepared for electron microscopy, and isolation of the DNA for determination of its general complexity (COT analysis) and similarity to barley chloroplast DNA and Anabaena DNA by using restriction-endonuclease analysis. Kleinschmidt spreads of the DNA were in the electron microscope to identify and measure the extent and size of the circlar DNA.

N84-20114*# Scripps Institution of Oceanography, La Jolla, Calif.
PROCHLORON ON SYNAPTULA
L. CHENG and R. A. LEWIN *In its* Prochloron Res. 8 p 1983 refs
Avail: NTIS HC A05/MF A01 CSCL 06C

It is reported that, for the first time, Prochloron cells were found associated with an animal other than a colonial ascidian-namely, a synaptid holothurian, Snaptula lamperti. This occurance brings into question the supposedly obligate nature of the association of this problematic algae with didemnids and their allies. R.J.F.

N84-20115*# Commonwealth Scientific and Industrial Research Organization, Sydney (Australia). Plant Physiology Unit.
A COMPARATIVE STUDY OF THE FATTY ACID COMPOSITION OF PROCHLORON LIPIDS
J. R. KENRICK, E. M. DEANE, and D. G. BISHOP *In* Scripps Institution of Oceanography Prochloron Res. 10 p 1983 refs Prepared in cooperation with Macquarie Univ., North Ryde, Australia
Avail: NTIS HC A05/MF A01 CSCL 06C

The chemical analysis of lipids of Prochloron isolated from several hosts is discussed. The object was to determine whether differences in lipid composition could be used to characterize organisms from different sources. Major lipid components are given. An analysis of fatty acid composition of individual lipids slowed a distinctive disstribution of fatty acids. While present results do not justify the use of fatty acid content in the taxonomy of Prochlon, the variations found in the lipids of cells from the same host harvested from different areas, or at different times in the same area, suggest that a study of the effects of temperature and light intensity on lipid composition would be rewarding. R.J.F.

N84-20116*# Scripps Institution of Oceanography, La Jolla, Calif.
PROCHLORON Status Report
R. A. LEWIN *In its* Prochloron Res. 17 p 1983 refs
Avail: NTIS HC A05/MF A01 CSCL 06C

A review is given of the research problems associated with Prochloron. Two questions are discussed in detail. Did prochlorophytes arise in independently off cyanophytes, or did one of these classes arise from the other? If eukaryotic chlorophytes originated by symbiogenesis, might their plastids have arisen from symbiotic, endophytic prochlorophyte-like ancestors? R.J.F.

N84-20117*# Scripps Institution of Oceanography, La Jolla, Calif.
PROCHLORON-ASCIDIAN SYMBIOSES: PHOTOSYNTHETIC POTENTIAL AND PRODUCTIVITY
R. A. LEWIN, L. CHENG, and R. S. ALBERTE (Chicago Univ.) *In its* Prochloron Res. 11 p 1983 refs
Avail: NTIS HC A05/MF A01 CSCL 06C

The chlorophyll content of didemnid asidians with symbiotic algae (Prochloron) from oligotropic tropical marine waters around Palau, Western Carolin Islands is discussed. Several species contain as much chlorophyll per unit dry weight as many herbaceous crop plants and more than do other symbiotic associations such as lichens, green Hydra, etc. Their chlorphyllA/B ratios (3-9) were generally much lighter than those of angiosperms (2-4). Where they abound, Prochloron - ascidian symbiosis could make a major contribution to the productivity, especially in localized areas of tropical marine waters characterized by low nutrient levels and high irradiance. R.J.F.

N84-20118*# Scripps Institution of Oceanography, La Jolla, Calif.
DIURNAL RHYTHM IN THE CELL-DIVISION FREQUENCY OF PROCHLORON (PROCHLOROPHYTA) IN NATURE
R. A. LEWIN, L. CHENG, and J. MATTA *In its* Prochloron Res. 13 p 1983 refs
Avail: NTIS HC A05/MF A01 CSCL 07C

Frequencies of cell division stages in suspensions of Prochloron cells, expressed at regular intervals throughout a natural day-night cycle from several colonies of four species of host didemnid, are given. The proportion of dividing cells of Prochloron living symbiotically in colonies of a didemnid, Diplosoma virens, rises from about 4% during the night (20.00-04.00 hrs.) to about 13% in the morning (0,.00-12.00 hrs.), and then falls again in the afternoon. Similiar, though less pronounced, changes were observed among Prochloron cells in two other symbiotic didemnids, Lissoclinum patella and L. voeltzkowi. R.J.F.

N84-20119*# Scripps Institution of Oceanography, La Jolla, Calif.
CHLOROPHYLL AND CAROTENOID PIGMENTS OF PROCHLORON (PROCHLOROPHYTA)
H. W. PAERL (North Carolina Univ., Morehead City), R. A. LEWIN, and L. CHENG *In its* Prochloron Res. 17 p 1983 refs
Avail: NTIS HC A05/MF A01 CSCL 06C

High-performance liquid chromatography (HPLC) with a gradient-elution technique was utilized to separate and quantify chlorophylls a and b as well as major carotenoid pigments present in freeze-dried preprations of prochloron-didemnid associations and in Prochloron cells separated from host colonies. Results confirm earlier spectrophotometric evidence for both chlorophylls a and b in this prokaryote. Chlorophyll a:b ratios range from 4.14 to 19.71; generally good agreement was found between ratios determined in isolated cell preprations and in symbiotic colonies (in hospite). These values are 1.5 to 5-fold higher than ratios determined in a variety of eukaryotic green plants. The carotenoids in Prochloron are quantitatively and qualitatively similar to those found in various freshwater and marine blue-green algae (cyanopbytes) from high-light environments. However, Prochloron differs from cyanophytes by the absence of myxoxanthophyll and related glycosidic carotenoids. It pigment characteristics are considered sufficiently different from those of cyanophytes to justify its assignment to a separate algal division. Authr

N84-20120*# Chicago Univ., Ill.
PROCHLORON EXPEDITION Status Report
R. S. ALBERTE *In* Scripps Institution of Oceanography Prochloron Res. 3 p 1983
Avail: NTIS HC A05/MF A01 CSCL 06C

The purpose was to prepare Prochloron phototsynthetic membranes for the isolation of the two major chlorophyll-proteins, the p700-chlorophyll a protein and the light harvesting chlorophyll a/b-protein, using SDS-polyacrylamide get electrophoreses. The prepared proteins (purified) were examined for their cross-reactivity

to polyclonal antibodies prepared from higher plant proteins. In addition, material was prepared for electron microscopy, and isolation of the DNA for determination of its general complexity (COT analysis) and similarity to barley chloroplast DNA and Anabaena DNA by using restriction-endonuclease analysis Kleinschmidt spreads of the DNA were in the electron microscope to identify and measure the extent and size of the circular DNA. RTF.

N84-20121*# Colorado Univ., Boulder.
REPORT OF PROCHLORON RESEARCH
R. FALL and L. FALL *In* Scipps Institution of Oceanography Prochloron Res. 3 p 1983
Avail: NTIS HC A05/MF A01 CSCL 06C

The goal was to assay enzynes in situ in Prochloron, and to prepare active enzyme preparations for future use. In addition, photosynthesis as an indicator of whole cell viability was measured. This indicator was used to monitor extended survival of Prochloron cells after their removal from the host animal. R.J.F.

N84-20122*# Scripps Institution of Oceanography, La Jolla, Calif.
REPORT OF PROCHLORON RESEARCH, IPE-7 (PALAU, FEBRUARY 1982)
R. A. LEWIN and L. CHENG *In its* Prochloron Res. 4 p 1983
Avail: NTIS HC A05/MF A01 CSCL 06C

Various aspects of Prochloron research are discussed. At suitable low-tide periods about 5-6 new sites were surveyed as possible convenient sources of symbiotic didemnids. The Kanori Channel site peviously surveyed during IPE-VI remains by far the best, in terms of species, quantities and accessibility. Prochloron from the six major species of symbiotic didemnids was compared serum, cell size and vacuolation, etc. Tadpoles from Lissoclinum patella colonies were observed emerging from cloacal apertures; about 400 were collected. All but 4 carried a girdle of symbiotic Prochloron cells (about 40,000 per larva). Observations were made on cell viability indicated that a marked increase in protoplasm viscosity of the cell contents was associated with cell death. Living cells, in 5 microlitres of buffered sea water under a coverslip, when pressed with a 2 kg weight for 10 seconds, attempts made to culture Prochloron in sea-water media. R.J.F.

N84-20123*# Scripps Institution of Oceanography, La Jolla, Calif.
IPE 7
In its Prochloron Res. 2 p 1983
Avail: NTIS HC A05/MF A01 CSCL 06C

A description is given of the collection and treatment of samples of Prochloron cells. The cells of Prochloron were obtained and prepared in the following way. Colonies of the symbiotic host, the giant didemnid ascidian Lissoclinum patella, were collected at low-tide level on reef-flat sand between Kamori Island and Koror, Palau, Western Caroline Islands. The animal colonies were taken, immersed in sea water, to an 8,000-litre holding tank and kept with constantly running sea water at 30 deg. Individual colonies were picked clean of contaminants, rinsed in sea water buffered with 40 nM or 100 mM Tris buffer at pH 8.4, and squeezed by hand to express the algal cells from the cloacal atria. The algae were received in about an equal volume of the same buffered sea water; this neutralized the acids liberated by the bruised ascidians and thereby maintained the Ph high enough to keep the algal cells green. The Prochloron cells were washed twice with buffered sea water and concentrated by centrifugation at about 50 g for 90 seconds. Microscopic examination revealed that contamination by animal host cells or bacteria was negligible (much less than 1%). R.J.F.

N84-20124*# California Univ., Irvine.
PROCHLORON EXPEDITION
G. C. STEPHENS *In its* Prochloron Res. 2 p 1983
Avail: NTIS HC A05/MF A01 CSCL 06C

Prochloron requires a source of N. It can obtain this from its didemnid symbiont as NH (sub4) or amino acids or both. It may obtain it from sea water as do free-living algae (FAA), but this is not likely to be the major source due to diomass consideration. R.J.F.

N84-20125*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NITRITE REDUCTION IN PARACOCCUS HALODENITRIFICANS: EVIDENCE FOR THE ROLE OF A CD-TYPE CYTOCHROME IN AMMONIA FORMATION
L. I. HOCHSTEIN and S. E. CRONIN Jan. 1984 26 p refs
(NASA-TM-85883; A-9562; NAS 1.15:85883) Avail: NTIS HC A03/MF A01 CSCL 06C

Cell-free extracts prepared from Paracoccus halodenitrificans catalyzed the reduction of nitrate to ammonia in the presence of dithionite and methyl viologen. Enzyme activity was located in the soluble fraction and was associated with a cytochrome whose spectral properties resembled those of a cd-type cytochrome. Unlike the sissimilatory cd-cytochrome nitrate reductase associated with the membrane fraction of P. halodenitrificans, this soluble cd-cytochrome did not reduce nitrite to nitrous oxide. Author

N84-20126*# Virginia Univ., Charlottesville. Dept. of Physiology.
RAT BODY SIZE, COMPOSITION AND GROWTH AT HYPO- AND HYPERGRAVITY Final Report
G. C. PITTS 15 Jul. 1983 8 p
(Contract NSG-2225)
(NASA-CR-175393; NAS 1.26:175393) Avail: NTIS HC A02/MF A01 CSCL 06C

The effects of hypergravity (centrifugation) on body composition were investigated. Hypogravitational and hypergravitational aspects were reflected in the research effort. A list of publications is provided. N.W.

N84-20127*# National Aeronautics and Space Administration, Washington, D. C.
STUDIES ON PROTEINOGRAMS IN DERMATORPHYTES BY DISC ELECTROPHORESIS. PART 2: PROTEIN BANDS OF KERATINOPHILIC FUNGI
P. DANEV, V. BALABANOV, and E. FRIEDRICH Jul. 1983 8 p refs Transl. into ENGLISH from Dermatol. Venerol. (USSR), v. 19, no. 2, 1980 p 86-89 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASW-3542)
(NASA-TM-77096; NAS 1.15:77096) Avail: NTIS HC A02/MF A01 CSCL 06C

Disc electrophoresis studies on keratinophili fungi demonstrated corresponding proteinograms in morphologically homogeneous strains of the same species, but different in different species of one and the same genus. Author

N84-20128*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIOMEDICAL RESEARCH DIVISION SIGNIFICANT ACCOMPLISHMENTS FOR FY 1983
N. V. MARTELLO (Nelson and Johnson Engineering, Inc.) Feb. 1984 171 p refs
(NASA-TM-85929; A-9681; NAS 1.15:85929) Avail: NTIS HC A08/MF A01 CSCL 06C

Various research and technology activities of Ames Research Center's Biomedical Research Division are described. Contributions to the Space Administration's goals in the life sciences include research in operational medicine, cardiovascular deconditioning, motion sickness, bone alterations, muscle atrophy, fluid and electrolyte changes, radiation effects and protection, human behavior and performance, general biomedical research, and gravitational biology. Author

N84-20129# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
US ARMY MEDICAL BIOENGINEERING RESEARCH AND DEVELOPMENT LABORATORY, FISCAL YEAR 1983 Annual Progress Report, 1 Oct. 1982 - 30 Sep. 1983
T. L. TRUDEAU 1 Oct. 1983 177 p
(Contract DA PROJ. 3A1-61101-A-91-C; DA PROJ. 3E1-61102-BS-04)
(AD-A136926) Avail: NTIS HC A09/MF A01 CSCL 06E

The Annual Progress Report, Fiscal Year 1983, summarizes research performed by the US Army Medical Bioengineering Research and Development Laboratory in projects authorized by the Surgeon General, the US Army, and the Commander, US Army Medical Research and Development Command and supported by RDTE funds from the US Army Medical Research and Development Command. Author (GRA)

N84-20130# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
CRYOMICROTOME APPLICATIONS: TECHNIQUES FOR THE STUDY OF SKELETAL MATERIALS
K. C. SMITH, C. M. OLOFF, and L. E. KAZARIAN Sep. 1983 20 p
(Contract AF PROJ. 7231)
(AD-A137010; AFAMRL-TR-83-074) Avail: NTIS HC A02/MF A01 CSCL 14B

The LKB 2250 PMV Cryomicrotome is a large sledge-type microtome designed for sectioning both undecalcified bone and specimens of large size. The maximum specimen size is 150 x 450 mm, sufficient for an entire rabbit or small monkey. GRA

N84-20131# Argonne National Lab., Ill. Div. of Biological and Medical Research.
ULTRASTRUCTURAL EFFECTS OF RADIATION ON CELLS AND TISSUES: CONCLUDING REMARKS
T. M. SEED and K. E. CARR (Glasgow Univ.) 1982 3 p Presented at the Scanning Electron Microscopy Ann. Meeting, Anaheim, Calif., 25 Apr. 1982
(Contract W-31-109-ENG-38)
(DE84-003454; CONF-820409-6) Avail: NTIS HC A02/MF A01

The complex nature of the biological response to ionizing radiation and the inherent difficulties associated with developing unifying concepts and definitions was indicated. The multiplicity of the major response variables, i.e., specimen type, radiation parameters, analytical approach and endpoints measured, is undoubtedly a major problem. The specimens which ranged from eucaryotic algae grown in vitro in suspension cultures to brain tissue of cancer patients were analyzed. Specimens were irradiated with now fewer than seven types of ionizing radiation, which varied both in quality and quantity. Exposure regimens included single, fractionated, and chronic exposures. There are major differences in the analytical approach employed and end points measured. DOE

N84-20132# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
EFFECTIVENESS OF A DEVICE FOR DETECTION OF BACTERIOLOGICAL AEROSOLS; IMPROVEMENTS IN STANDARDIZATION AND SENSITIVITY IN THE LABORATORY
P. HALLIN, G. LINFORS, and G. SANDSTROEM Aug. 1983 20 p refs In SWEDISH; ENGLISH summary
(FOA-C-40175-B2; ISSN-0347-2124) Avail: NTIS HC A02/MF A01

A device for detecting bacteriological aerosols, based upon the alkaline luminolperborate reaction with ironporphyrins (e.g., hematin) in microbes, and especially bacteria, was developed. Standard calibration curves for different bacteria were produced, and a mean value curve from these curves is used for the determination of the amount of bacteria in an unknown air sample. The sensitivity limit for the system is 10,000 cells/cum of air. Author (ESA)

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AEROSPACE MEDICINE

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

A84-23472
ON THE PRINCIPLES UNDERLYING THE CHOICE AND EVALUATION OF PHYSIOLOGICAL INDICATORS OF THE FUNCTIONAL CONDITION OF THE ORGANISM [K VOPROSU O PRINTSIPAKH VYBORA I OTSENKI FIZIOLOGICHESKIKH POKAZATELEI FUNKTSIONAL'NOGO SOSTOIANIIA ORGANIZMA]
V. V. ROMANOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Dec. 1983, p. 44-46. In Russian. refs

A84-23473
THE COMBINED EFFECT OF ENVIRONMENTAL FACTORS ON THE ACID-BASE BALANCE OF THE BLOOD [VLIIANIE KOMBINIROVANNOGO DEISTVIIA FAKTOROV VNESHNEI SREDY NA KISLOTNO-OSNOVNOE SOSTOIANIE KROVI]
I. D. KUDRIN and N. A. STOLIAROVA Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Dec. 1983, p. 47-49. In Russian. refs

An experimental study was conducted to investigate the combined effect of carbon monoxide, physical exercise, and elevated ambient temperature on the acid-base balance of the blood in humans. Tests were performed at an ambient temperature of 35 C on healthy males 25-30 years in age; exercise consisted in a step test; and different combinations of the environmental factors were utilized with varying concentrations of CO in the inspired air (0.1 and 0.5 mg/l). A general trend in changes of the acid-base balance was observed, which manifested itself in changes in blood pH and gas composition characteristic for respiratory alkalosis. B.J.

A84-23475
CIRCADIAN RHYTHMS OF BODY RESISTANCE AND WORK CAPACITY IN SEAMEN [SUTOCHNYE BIORITMY REZISTENTNOSTI ORGANIZMA I RABOTOSPOSOBNOSTI MORIAKOV]
V. S. NOVIKOV and A. A. ARZUMANOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Dec. 1983, p. 52-54. In Russian. refs

Experimental data concerning circadian rhythms of body resistance (e.g., variations of automicroflora and cellular factors of nonspecific protection) and work capacity in seamen are examined. It is shown that the parameters of resistance and work capacity fluctuate in the course of the day. In the activity of the central nervous system, this fluctuation is manifested in rhythmically arising excitation and inhibition processes; while in the nonspecific-protection system, it is manifested in an increase or decrease of body resistance to the action of adverse factors. The highest levels of work capacity and resistance were recorded in the morning and during the day (to 2 AM), while the lowest levels were recorded at the end of the work day and in the evening. B.J.

A84-23709
SYSTEMS ANALYSIS OF HUMAN INDUSTRIAL ACTIVITY AS A BASIS FOR HYGIENIC EVALUATION [SISTEMNYI ANALIZ PROIZVODSTVENNOI DEIATEL'NOSTI CHELOVEKA KAK OSNOVA DIAGNOSTIKI ZDOROV'IA]
K. V. SUDAKOV, IU. D. MASHIN, R. V. SKALKIN, V. S. GRIGOREV, V. G. ZILOV, S. V. VELICHKINA, IU. A. FADEEV, IU. E. VAGIN, and A. V. BYCHKOV (Akademiia Meditsinskikh Nauk SSSR; I Moskovskii Meditsinskii Institut, Moscow, USSR) Sovetskaia Meditsina, no. 7, 1983, p. 8-14. In Russian. refs

A84-23710
IMPROVEMENT OF THE TREATMENT OF FURUNCULOSIS USING DATA OF IMMUNOLOGICAL INDICATORS [SOVERSHENSTVOVANIE LECHENIIA FURUNKULEZA PO DANNYM IMMUNOLOGICHESKIKH POKAZATELEI]
S. IU. ZAITSEVA (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Sovetskaia Meditsina, no. 7, 1983, p. 34-37. In Russian. refs

A84-23711
THE COMBINED EFFECT OF WORK FACTORS AND THE STRESS OF EVERYDAY LIFE ON MORBIDITY WITH A TEMPORARY LOSS OF WORK CAPACITY [SOCHETANNOE VLIIANIE TRUDOVOGO PROTSESSA I NAGRUZKI V BYTU NA UROVEN' ZABOLEVAEMOSTI S VREMENNOI UTRATOI TRUDOSPOSOBNOSTI]
V. I. OSHCHEPKOV (Izhevskii Meditsinskii Institut, Izhevsk, USSR) Sovetskaia Meditsina, no. 7, 1983, p. 74-76. In Russian. refs

A84-23714
BALANCE OF IRON, COPPER, AND MANGANESE IN THE BODIES OF YOUNG ATHLETES [BALANS ZHELEZA MEDI I MARGANTSA V ORGANIZME IUNYKH SPORTSMENOV]
V. V. NASOLODIN, V. IA. RUSIN, and I. P. GLADKIKH (Iaroslavskii Gosudarstvennyi Universitet, Yaroslave, USSR) *Gigiena i Sanitariia* (ISSN 0016-9900), July 1983, p. 25-29. In Russian. refs

Studies performed on young athletes (13-16 years in age) and their untrained coevals show that the content of iron, copper, and manganese in the blood in the autumn-winter months is higher than in the spring-summer months. A negative balance of trace elements was observed in the summer period. A complex of vitamins added to the diet was not found to produce any positive effect on the trace-element metabolism. The addition of iron, copper, and manganese to the complex of vitamins leads to a significant deposition of iron in the body, and to an increase in the trace-element (mainly iron content), the hemoglobin and erythrocyte levels, and the physical work capacity. B.J.

A84-23716
HYGIENIC EVALUATION OF MICROCLIMATE AND THE THERMAL CONDITION OF HUMANS DURING THE PERFORMANCE OF EASY WORK IN SIBERIAN ENTERPRISES [GIGIENICHESKAIA OTSENKA MIKROKLIMATA I TEPLOVOGO SOSTOIANIIA CHELOVEKA PRI VYPOLNENII LEGKIKH RABOT NA PREDPRIIATIIAKH SIBIRI]
G. N. REPIN (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), July 1983, p. 77-79. In Russian. refs

A84-23717
CRITERIA FOR EVALUATING THE THERMAL CONDITION OF HUMANS WHEN SUBSTANTIATING STANDARD REQUIREMENTS ON INDUSTRIAL MICROCLIMATE [KRITERII OTSENKI TEPLOVOGO SOSTOIANIIA CHELOVEKA DLIA OBOSNOVANIIA NORMATIVNYKH TREBOVANII K PROIZVODSTVENNOMU MIKROKLIMATU]
R. F. AFANASEVA, G. N. REPIN, L. V. PAVLUKHIN, F. M. SHLEIFMAN, and L. A. BASARGINA (Akademiia Meditsinskikh Nauk SSSR, Moscow; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Okhrany Truda, Leningrad, USSR; Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiewv, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), July 1983, p. 79-81. In Russian. refs

A84-23725
THE KIMBAROVSKII REACTION (THE KIMBAROVSKII COLOR PRECIPITATION REACTION) AS A NONSPECIFIC INDICATOR OF FATIGUE IN HIGH-ALTITUDE WORKERS [REAKTSIIA KIMBAROVSKOGO /TSORK/ KAK NESPETSIFICHESKII POKAZATEL' UTOMLENIIA U RABOTAIUSHCHIKH V USLOVIIAKH VYSOKOGOR'IA]
O. T. KASYMOV and B. S. MAMBETALIEV (Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR) Zdravookhranenie Kirgizii (ISSN 0490-1177), July-Aug. 1983, p. 9-11. In Russian.

A84-23726
CHARACTERISTICS OF THE WORK CAPACITY AND STATE OF HEALTH OF YOUNG WORKERS EXPOSED TO INDUSTRIAL NOISE AND VIBRATION [OSOBENNOSTI RABOTOSPOSOBNOSTI I SOSTOIANIIA ZDOROV'IA MOLODYKH RABOCHIKH, PODVERGAIUSHCHIKHSIA VOZDEISTVIIU PROIZVODSTVENNOGO SHUMA I VIBRATSII]
N. F. BORISENKO, IU. A. LITVINOVA, A. G. GLUSHCHENKO, A. P. IVAKHNO, M. N. BARANOVA, and V. V. DOBRIANSKII (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) *Gigiena Truda i* Professional'nye Zabolevaniia, Aug. 1983, p. 5-7. In Russian. refs

A84-23727
INTENSITY OF THERMAL AND PHYSICAL LOAD IN WORKERS OF HOT SHOPS IN PRESENT-DAY METALLURGICAL PRODUCTION [INTENSIVNOST' TEPLOVOI I FIZICHESKOI NAGRUZKI U RABOCHIKH GORIACHIKH TSEKHOV V SOVREMENNOM METALLURGICHESKOM PROIZVODSTVE]
N. G. KARNAUKH (Institut Gigieny Truda i Profzabolevanii, Krivoi Rog, Ukrainian SSR) Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1983, p. 24-27. In Russian. refs

A84-23729
BIOLOGICAL EFFECT OF NOISE OF IDENTICAL LEVELS WITH DIFFERENT SPECTRAL CHARACTERISTICS [BIOLOGICHESKOE DEISTVIE SHUMOV IDENTICHNYKH UROVNEI S RAZLICHNYMI SPEKTRAL'NYMI KHARAKTERISTIKAMI]
A. G. ARAKELIAN (Armianskii Institut Obshchei Gigieny i Profzabolevanii, Yerevan, Armenian SSR) *Gigiena Truda i* Professional'nye Zabolevaniia, Aug. 1983, p. 31-34. In Russian. refs

The effect of identical levels of noise with ascending and descending spectrum envelopes with a 5 dB/oct slope of the curves was studied in an anechoic chamber on 50 volunteers. Data indicate the noncoincidence of biological effects due to the underestimation of the energy of low-frequency components during exposure to average and high levels of noise. A correction method, approximating the identical-loudness curve, is proposed for assessing the sum level of noise. B.J.

A84-23731
THE PROFESSIONAL WORK CAPACITY OF FEMALE SEWING-MACHINE OPERATORS DEPENDING ON HEALTH AND FUNCTIONAL CONDITION [PROFESSIONAL'NAIA RABOTOSPOSOBNOST' SHVEI-MOTORISTOK V ZAVISIMOSTI OT SOSTOIANIIA ZDOROV'IA I FUNKTSIONAL'NYKH VOZMOZHNOSTEI]
V. N. BUGAEV (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1983, p. 47-49. In Russian.

A84-23732
HYPERTENSION AND THE PROFESSIONAL WORK CAPACITY OF BUS DRIVERS [GIPERTONICHESKAIA BOLEZN' I PROFESSIONAL'NAIA RABOTOSPOSOBNOST' VODITELEI AVTOBUSOV]
I. A. DUBININA (Institut Ekspertizy Trudosposobnosti i Organizatsii Truda Invalidov, Leningrad, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1983, p. 49, 50. In Russian. refs

A84-23733
THE EFFECT OF RAILROAD WORK ON THE CONDITION OF PERIPHERAL COLOR FIELDS OF VISION IN WORKERS IN LOCOMOTIVE BRIGADES [VLIIANIE POEZDNOI RABOTY NA SOSTOIANIE PERIFERICHESKIKH TSVETOVYKH POLEI ZRENIIA RABOTNIKOV LOKOMOTIVNYKH BRIGAD]
T. L. SOSNOVA (Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1983, p. 51, 52. In Russian. refs

A84-23743
HUMAN SENSITIVITY TO CHANGES IN SOLAR ACTIVITY [CHUVSTVITEL'NOST' CHELOVEKA K IZMENENIIU SOLNECHNOI AKTIVNOSTI]
V. G. SIDIAKIN, N. A. TEMURIANTS, V. B. MAKEEV, and O. G. TISHKIN (Simferopol'skii Gosudarstvennyi Universitet, Simferopol, Ukrainian SSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 96, July-Aug. 1983, p. 151-160. In Russian. refs

Changes that occur in the functional state of various bodily systems in response to increases in solar activity are analyzed. It is found that in healthy persons, an increse in solar activity will cause changes in the nervous system. In persons with a diminished ability to adapt, existing illnesses can be aggravated by an increase in solar activity. C.R.

A84-23927
ISOMETRIC OR DYNAMIC TRAINING - DIFFERENTIAL EFFECTS ON MECHANICAL PROPERTIES OF A HUMAN MUSCLE
J. DUCHATEAU and K. HAINAUT (Bruxelles, UniversiteLibre, Brussels, Belgium) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 296-301. Research supported by the Fonds National de la Recherche Scientifique and Fonds de la Recherche Scientifique Medicale. refs

The effects of three months, (ten minutes daily), of moderate, isometric or dynamic voluntary exercise on the contractile properties of the human adductor pollicis muscle in males and females (17-30 years old) are examined. Maximal muscle strength increased by 20 percent in subjects performing isometric contractions, and by 11 percent in subjects performing dynamic contractions. Isometric training, possibly by effecting greater contractile myofibrillar protein synthesis, increases the speed of movement against high mechanical resistance, while dynamic training increases the speed of movement against light loads. Isometric and dynamic exercises also differ in their effects on twitch force, twitch tension and relaxation development, contraction time, half relaxation time, and maximal shortening velocity. Since human muscle contraction kinetics adapts specifically to the type of contraction exercise, training programs should be especially designed for the type of effort required of the athlete. C.M.

A84-23928
AVAILABILITY OF GLUCOSE GIVEN ORALLY DURING EXERCISE
G. KRZENTOWSKI, B. JANDRAIN, F. PIRNAY, F. MOSORA, M. LACROIX, A. S. LUYCKX, and P. J. LEFEBVRE (Liege, Universite, Liege, Belgium) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 315-320. Research supported by the Fonds National de la Recherche Scientifique, Fonds de la Recherche Scientifique Medicale and Fonds de la Recherche Fondamentale Collective. refs

To explain the controversy over the effects of orally-given glucose during prolonged muscular exercise, oxidation rates of 100 g oral glucose loads in nine males are compared. The subjects, between 18 and 29 years old, were given naturally labeled glucose 15 minutes (group A) or 120 minutes (group B) after the beginning of a four hour moderate exercise period. Blood and urine tests were conducted at specific times as was respiratory measurement and analysis. Two hours after ingestion, total carbohydrate oxidation as well as lipid oxidation was the same for both groups; C-peptide concentration decreased more in group B, possibly because of higher sympathetic tone. Results discordant with other studies may be explained by differences in the intensity of work load, quantity of glucose ingested and ingestion time. It is concluded that glucose is utilized in a similar manner after both 15 and 120 minutes of exercise, and that 55 percent of the load is recovered as expired carbon dioxide within two hours. C.M.

A84-23932
EFFECTS OF NALOXONE ON MAXIMAL STRESS TESTING IN FEMALES
R. G. MCMURRAY, D. S. SHEPS, and D. M. GUINAN (North Carolina, University, Chapel Hill, NC) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 436-440. refs

The effects of naloxone on exercise performance were studied in six normal females (20-28 yr) as they walked until exhaustion on a treadmill (93.8 m/min) with an increasing grade (2.5 percent every 4 min). Three randomized and double blind trials were conducted: naloxone infusion (0.4 mg/ml saline), saline infusion (1 ml) and infusion control. Submaximal stage responses were the same for all subjects; maximal stage responses differed. During naloxone treatment, maximal ventilation was decreased by 7.9 l/min by a 4-breath reduction in respiratory frequency, maximal end-tidal carbon dioxide partial pressure was increased approximately 4 torr, and maximal heart rate was significantly lowered. Though cardiorespiratory differences were significant, maximum oxygen uptake and exercise duration were not affected by naloxone, indirectly suggesting that beta-endorphins are physiologically insignificant during acute maximal exertion. C.M.

A84-23935
VENTILATORY MUSCLES DURING EXERCISE IN AIR AND OXYGEN IN NORMAL MEN
P. T. P. BYE, S. A. ESAU, K. R. WALLEY, P. T. MACKLEM, and R. L. PARDY (Montreal Chest Hospital Center; McGill University; Royal Victoria Hospital, Montreal, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 464-471. Research supported by the Medical Research Council, Royal Edward Laurentian Foundation and Parker B. Francis Foundation. refs

Diaphragmatic fatigue is studied in seven physically untrained men (26-36 years old) during and after short-term high-intensity constant-work-load exercise to exhaustion on a cycle ergometer. Findings of this study include the ability of all physically untrained participants to achieve high oxygen consumption; the first report of decline in maximum transdiaphragmatic pressure after high-intensity exercise; and the benefit of oxygen breathing that reduced expiratory ventilation and consequently delayed diaphragmatic fatigue and/or altered the ventilatory muscle recruitment pattern. Other oxygen effects include increased exercise time, less leg pain, decreased minute ventilation (at oxygen isotime), delayed decrease during exercise of the high-frequency

to low-frequency ratio of the diaphragmatic electromyogram, better recovery of postexercise maximum transdiaphragmatic pressure, and no fall in postexercise end-inspiratory transdiaphragmatic pressure. C.M.

A84-23936
ADRENOCORTICAL RESPONSES TO MAXIMAL EXERCISE IN MODERATE-ALTITUDE NATIVES AT 447 TORR
C. M. MARESH, B. J. NOBLE, K. L. ROBERTSON, and R. L. SEIP (Wyoming, University, Laramie, WY; St. Luke's Hospital, Kansas City, MO) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, Feb. 1984, p. 482-488. Research supported by the University of Wyoming. refs

The effects of maximal exercise on serum aldosterone (Aldo) concentration in six low-altitude natives (LAN) and eight moderate-altitude natives (MAN) at a simulated altitude of 4270 m (447 torr) after two days of exposure to that altitude are compared. LAN and MAN groups were comprised of 19-25 year olds, the former living at 373 m or less and the latter living between 1830-2200 m. Generally, LAN's values for maximum exercise cardiorespiratory variable changes were double MAN's values. Though postexercise serum hydrocortisone and Aldo concentrations increased in both groups at residence and at 447 torr (lower increase at 447 torr), LAN's drop in Aldo concentration at 447 torr was more dramatic: a result correlated to higher acute motion sickness and reduced exercise capacity. C.M.

A84-23955
INVESTIGATION OF THE NEURON FIRING RATE IN THE HUMAN BRAIN [ISSLEDOVANIE CHASTOTY RAZRIADOV NEIRONOV MOZGA CHELOVEKA]
IU. L. GOGOLITSYN and IU. D. KROPOTOV Leningrad, Izdatel'stvo Nauka, 1983, 120 p. In Russian. refs

A system of statistical methods for the analysis of the current firing rate in neuron populations of the human brain during psychological testing is reviewed, and the results of testing with electrodes implanted in different structures of the brain are used to study recognition of visual stimuli, simple thought processes, and word memory. An analysis of the dynamics of the current neuron-firing rate demonstrated both short-term and long-term variations of this parameter. The participation of neuron populations in the action of mechanisms organized at various stages of information processing may be appraised by viewing the pattern of current firing-rate as a multicomponent structure, each element of which is a mode associated with a determined wave form. J.N.

A84-23957
PROBLEM OF ADAPTATION AND HEALTH SPA THERAPY [PROBLEMA ADAPTATSII I KURORTNOE LECHENIE]
V. G. BOKSHA Leningrad, Izdatel'stvo Meditsina, 1983, 128 p. In Russian. refs

The health spa is viewed as an important element in a hygiene system designed to maintain normal functioning, development, and work efficiency in the human organism, as well as to assure maximum active lifespan. But the spas, which are used to cure and prevent disadaptation to extreme environments, present an adaptation problem in themselves. The trip to the health spas in the south and southwest Soviet Union represents a large degree of acclimatization for many patients from distant parts of the country. The mechanisms and particular features of physiological acclimatization due to various environmental factors and to the condition of the organism are described. The disruption of adaptation in the form of meteoropathic reaction is reviewed, and a clinical evaluation and preventive measures are given. Adaptation reactions and the character of adaptation in climatotherapy are discussed. J.N.

A84-23959
REMOTE OBSERVATION AND DIAGNOSTIC EVALUATION: CONTACT AND COMMUNICATION IN MEDICAL-CONTROL PROBLEMS [DISTANTSIONNOE NABLIUDENIE I EKSPERTNAIA OTSENKA: OBSHCHENIE I KOMMUNIKATSIIA ZADACHAKH MEDITSINSKOGO KONTROLIA]
F. N. USKOV, O. V. KUSHNEREVA, B. A. POPOV, E. F. BAZHIN, IA. A. VALSINER, A. T. DURANDINA, N. S. ZAPRISA, T. B. KOLINICHENKO, T. V. KORNEVA, M. MORAVEK et al. Moscow, Izdatel'stvo Nauka, 1982, 112 p. In Russian. refs

The monitoring of professional and psychological adaptation of cosmonauts to flight stress factors is described. A series of external signs (including speech, gesture, body movements, and posture), which are insignificant in the usual diagnostic situation, become the major source of significant flight stress information. The problem of limited doctor-patient communication is considered and a solution is offered in the form of automatic recording and analysis of dialogue time parameters, which are important in studying the details of doctor-patient rapport. The involvement level of the diagnostician is discussed; his role as observer is stressed. It is proposed that specific verbal and nonverbal behaviors are indicative of psychosomatic manifestations in conditions of weightlessness. J.N.

A84-23987
TEMPORARY THRESHOLD SHIFTS AFTER ONSET AND OFFSET OF MODERATELY LOUD LOW-FREQUENCY MASKERS
E. ZWICKER and A. HESSE (Muenchen, Technische Universitaet, Munich, West Germany) Acoustical Society of America, Journal (ISSN 0001-4966), vol. 75, Feb. 1984, p. 545-549. Research supported by the Deutsche Forschungsgemeinschaft. refs

The temporary threshold shifts produced by moderately loud low-frequency maskers oscillate for a few minutes in reproducible patterns not only after their offset but also after their onset. The temporal variations in threshold exhibit 'bounces' which are similar to those found by Hirsh and Ward (1952) after the offset of very loud maskers. Threshold shifts of up to 30 dB are reported here for pauses of 3-min duration in continuous maskers. It is pointed out that these effects could originate in the internal cochlear metabolism, whose steady-state condition is seen to be influenced by the moderately loud low-frequency tones. C.R.

A84-24098
HUMAN PHYSIOLOGY AT EXTREME ALTITUDES ON MOUNT EVEREST
J. B. WEST (California, University, La Jolla, CA) Science (ISSN 0036-8075), vol. 223, Feb. 24, 1984, p. 784-788. Research supported by the National Geographic Society, U.S. Army, NSF, et al. refs
(Contract PHS-R01-HL-24335; PHS-N01-HR-2915)

The American Medical Research Expedition to Everest constructed three laboratory camps at various altitudes on Mount Everest and even obtained physiological data on the summit itself. Results show that only an enormous increase in ventilation will compensate for extreme hypoxia. Latitude-dependent barometric pressure (caused by a large cold air mass in the stratosphere above the equator) results in higher than predicted pressures. Barometric pressure was measured to be 400.4 + or - 2.7 torr at 5400 m, 283.6 + or 1.5 torr at 8050 m and 253.0 torr (one measurement taken) at 8848 m. Physiological measurements at various altitudes were taken of alveolar carbon dioxide pressure (summit mean 7.5 torr), inspired oxygen pressure in relation to maximum oxygen uptake (summit value less than 30 torr to one liter per minute), and arterial blood pH (summit value over 7.7. Other measurements discussed include ventilation, blood physiology, and metabolic and psychometric changes. C.M.

A84-24326
INTERNATIONAL UNION OF PHYSIOLOGICAL SCIENCES, COMMISSION ON GRAVITATIONAL PHYSIOLOGY, ANNUAL MEETING, 5TH, MOSCOW, USSR, JULY 26-29, 1983, AND SYMPOSIUM ON GRAVITATIONAL PHYSIOLOGY, SYDNEY, AUSTRALIA, AUGUST 28-SEPTEMBER 3, 1983, PROCEEDINGS
Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, 183 p.

Among the topics discussed are metabolic and hormonal responses to simulated weightlessness, weightlessness-induced changes in the human cardiorespiratory system, physiological methods for protection against high and sustained g(z) acceleration, interserosal forces, space flight-induced changes in the hormonal control of fluid and electrolyte metabolism, visual-vesticular interactions in roll, the role of chronic acceleration in gravitational physiology, evolutionary and physiological adaptation to gravity, and cardiovascular responses to space flight. Also considered are the mechanisms of posture maintenance in the weightless state, the reversible effects of an altered gravity field on myofibrillar skeletal muscle proteins, the specific regulation of Ca-P metabolism during hypokinesia and weightlessness by vitamin D(3), motion sickness susceptibility related to ACTH, ADH, and TSH, demographic considerations in gravitational biology, the effects of hypergravity on the rate of antibody formation and on the prenatal development of mammals, the biological effects of weightlessness at cellular and subcellular levels, the effect of emotional stress prior to the onset of centrifugation on acceleration tolerance in pilots, and hemodynamics under changed gravity. O.C.

A84-24328#
HORMONAL AND METABOLIC RESPONSES TO SIMULATED WEIGHTLESSNESS
A. GUELL, CL. GHARIB, J. L. BASCANDS, and A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-9 to S-11. refs

An attempt is made to synthesize the hormonal and metabolic responses to simulated weightlessness, with attention to such parameters participating in blood volume regulation as diuresis, hematocrit, Na(+), plasma renin activity, aldosterone, and antidiuretic hormone. After studying approximately 2000 subjects in horizontal or antiorthostatic bedrests, or immersed in swimming pools, it is noted that several problems in this field of inquiry remain to be resolved. It is suggested that further study of the beta-endorphine system, the kinine-kallicrein system, and the natriuretic factor, if conducted under standardized protocols, should benefit research efforts. O.C.

A84-24329#
WEIGHTLESSNESS INDUCED CHANGES IN HUMAN CARDIO-RESPIRATORY SYSTEM
A. M. GENIN, V. G. SHABELNIKOV, and N. M. ASIAMOLOVA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-12, S-13.

A diagrammatic characterization is developed for the main genetic relations in the human cardiorespiratory system which determine fainting reaction upon orthostatic exposure. The diagram takes into account the results of orthostatic tests conducted after zero-g simulation experiments and space flights. A qualitative consideration is undertaken of the diagram's representation of feedback loop stability. O.C.

A84-24330#
PHYSIOLOGICAL METHODS FOR PROTECTION AGAINST HIGH SUSTAINED GZ ACCELERATION
U. I. BALLDIN (Karolinska Institutet, Stockholm, Sweden) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-14 to S-17. refs

The g-load tolerance of pilots flying high performance aircraft is important, and may at times be a limiting factor in such operations. Increasing the blood pressure during g-exposure by means of Valsalva and muscle straining maneuvers, the further technological development of anti-g suit systems, extreme assisted positive pressure breathing, and muscle strength training programs, are the methods which appear to be of greatest value in increasing g-tolerance and protection against high, sustained g(z) acceleration. O.C.

A84-24331#
HEART RATE RESPONSE DURING +GZ OVERLOAD ON THE HUMAN CENTRIFUGE AND DURING MAXIMUM BICYCLE ERGOMETER LOAD
D. WIRTH and W. PAPENFUSS (Institute of Aviation Medicine, Koenigsbrueck, East Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-18, S-19.

The heart rates observed during ergometrical vita maxima tests are generally higher than the maximum heart rates during +g(z) overload of human centrifuge subjects, and these rates in turn exhibit differences reflecting centrifuge acceleration profiles. With identical profiles, great interindividual variability is noted in absolute heart rate value, its growth under increasing overload, and its regulative characteristics. These results substantiate the use of the heart rate as an indicator of strain, for those cases where individual response patterns for given load types are known. O.C.

A84-24333*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CURRENT CONCEPTS OF SPACE FLIGHT INDUCED CHANGES IN HORMONAL CONTROL OF FLUID AND ELECTROLYTE METABOLISM
C. S. LEACH, P. C. JOHNSON (NASA, Johnson Space Center, Houston, TX), and W. N. SUKI (Baylor University, Houston, TX) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-24 to S-27. refs

A systematic analysis of body fluid and renal dynamics during simulated space flight (head-down bedrest) was undertaken to increase understanding of the physiologic effects of acute cephalad fluid shifts. The earliest effects were increases in central venous pressure and decreases in plasma aldosterone, epinephrine and norepinephrine and glomerular filtration rate, 2 h after the beginning of bedrest. Decreases in plasma angiotensin I at 6 h may have resulted from the increased effective pressure and decreased sympathetic activity seen earlier in bedrest. The early decrease in aldosterone and ADH is thought to contribute to an increase, by 6 h, in urinary excretion of salt and water. Fluid and electrolyte losses occur during space flight, and analysis of body fluids from Space Shuttle crewmembers has indicated that conservation of these substances is begun almost immediately upon cessation of weightlessness. Operational medicine measures to counteract dehydration and electrolyte loss resulted in a less extreme physiologic response to the flight. Author

A84-24334#
REGULATION OF MAN'S HYDRATION STATUS DURING GRAVITY-INDUCED BLOOD REDISTRIBUTION
A. I. GRIGOREV, B. L. LICHARDUS, V. I. LOBACHIK, N. MIHAILOWSKY, V. V. ZHIDKOV, and IU. V. SUKHANOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR; Slovenska Akademia Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-28, S-29.

A number of studies involving 20 test subjects have been conducted in order to ascertain the influence of adiuretine on the hydration status of the body, the influence of water supplements on the background of adiuretine uptake, and the combined effect of adiuretine and water-salt supplements. An analysis of the data obtained has shown that the adiuretine/water-salt supplement combination, in particular, has a long term effect with advantages for the correction of hydration status. O.C.

A84-24335#
VISUAL-VESTIBULAR INTERACTION IN ROLL - PSYCHOPHYSICS AND PHYSIOLOGY
J. DICHGANS (Tuebingen, Universitaet, Tuebingen, West Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-32 to S-34. refs

An assessment is presented of current knowledge concerning the visual-vestibular interaction in roll motion about the x-axis of a subject's head. The sensation of continuous roll motion may be elicited in a stationary observer durng the viewing of a large disk or hemispheric dome as it rotates around his line of sight. Subjects report the paradoxical perception of limited displacement despite a continuous sensation of motion. The apparent position may be conceptualized as the result of a compromise, weighing the different and in part contradictory sensory inputs for gravitational orientation. O.C.

A84-24336#
VESTIBULAR DYSFUNCTION IN COSMONAUTS DURING ADAPTATION TO ZERO-G AND READAPTATION TO 1 G
L. N. KORNILOVA, I. IA. IAKOVLEVA, I. K. TARASOV, and G. I. GORGILADZE (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-35, S-36.

Symptoms of illusionary reactions and motion sickness in 36 cosmonauts, members of long-term and short-term flights, are analyzed. Otolith asymmetry was observed in every cosmonaut who showed overt symptoms of motion sickness after long-term space flights. It is demonstrated that the vestibular function may be modified in space flight, that these changes are transient, and that the vestibular system may adapt to prolonged space flights. J.N.

A84-24345#
SKIN AND MUSCLE VASCULAR RESISTANCE DURING TILT AND NECK SUCTION
F. BONDE-PETERSEN, K. SKAGEN, O. HENRIKSEN, and M. SUZUKI (Copenhagen, University, Copenhagen; Kommunehospitalet; University Hospital, Hvidovre, Denmark) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-64, S-65. Research supported by the Danish Space Board and Statens Laegevidenskabelige Forskningsrad. refs

To determine the arterial baroreceptor regulation of skin and muscle vascular resistances, arterial pressure, heart rate, and skin and muscle blood flows were measured during neck suction in four young healthy males. Isotope clearance technique with xenon-133 and external counting was used to measure skin and muscle blood flows in both underarms, kept at heart level to achieve constant relative hydrostatic pressure similar to the horizontal position. Results suggest that muscle vascular beds are regulated by general sympathetic vasoconstrictor tone and high pressure baroreceptors but not skin vascular resistance. Skin vascular resistance itself may be controlled by low pressure baroreceptors. C.M.

A84-24346#
RESULTS OF ECHOCARDIOGRAPHIC EXAMINATION DURING 7 DAYS FLIGHT ONBOARD SALIUT VII, JUNE 1982
L. POURCELOT, F. PATAT, J. M. POTTIER (Tours, Universite, Tours, France), A. A. SAVILOV, V. V. BYSTROV, L. I. KAKURIN, A. R. KOTOVSKAIA, and A. F. ZHERNAKOV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-66 to S-69. refs

The effects of weightlessness on the cardiovascular system of Salyut-7 crewmembers were studied using echocardiography; principal objectives included studying the cardiovascular regulation mechanism that operates after body fluid redistribution during weightlessness, and evaluating the consequences of regulation on cerebral blood flow and ejection fraction. The ultrasound equipment was able to visualize the heart and vessels, record the movement of cardiac structures, and measure blood flow in superficial vessels. Cardiac exploration results are examined: cardiac output, heart rate, stroke volume, left end systolic and end diastolic ventricle volumes, and myocardial contractility all increased. Since results correspond to one subject only, similar studies must be conducted in future spaceflights before generalizations can be made. C.M.

A84-24347#
CHANGES IN INFORMATION PROCESSING ABILITY (IPA), EEG, EOG USING PASSIVE ORTHOSTATIC AND ANTIORTHOSTATIC TEST
P. REMES, J. HIDEG, L. BOGNAR, A. POZSGAI, L. LEHOCZKY, Z. SIDO, GY. G. KISS, and S. KALMAR (Hungarian Academy of Sciences, Intercosmos Council, Budapest, Hungary) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-70, S-71.

Cardiovascular and respiratory parameters, are measured, EEGs and EOGs are obtained, and information-processing ability (IPA) is evaluated in 21 healthy pilots in horizontal, orthostatic, and antiorthostatic positions. Sensory-motor reaction time, four-choice reaction and selection times, processed information quantity, and bit speed under normal and time-force or sound-disturbance double-loading conditions are measured with the hand-held device described by Hideg et al. (1980, 1982) and used to calculate IPA. Hemodynamic changes which have been shown to cause vestibular disorders in weightlessness (Remes et al.; 1979, 1981) are found to excite the central nervous system but to have no adverse effects on IPA or psychophysiological reserves. T.K.

A84-24348#
CARDIOVASCULAR RESPONSES TO BICYCLE EXERCISE DURING LOWER BODY NEGATIVE PRESSURE
M. SUZUKI (Nippon College of Physical Education, Tokyo, Japan) and F. BONDE-PETERSEN (Copenhagen, University, Copenhagen, Denmark) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-72, S-73. Research supported by the Danish Space Board. refs

The combined effects of lower-body negative pressure (LBNP) and bicycle exercise on the cardiovascular system are investigated experimentally in 6 healthy male subjects. Measurements of cardiac

output (by a rebreathing technique), heart rate (by EKG), blood pressure, and leg-muscle blood flow (by local Xe-133 clearance) are obtained during rest and 100 and 200-W exercise in a 65-cm-diameter 130-cm-high LBNP chamber at normal pressure and -15, -30, and -40 mm Hg. Decreasing lower-body pressure is accompanied by parallel heart-rate increases and cardiac-output decreases in both rest and exercise, while the exercise-related increase in mean arterial pressure becomes greater. Total peripheral resistance and muscle vascular resistance are lower in exercise than at rest, but increase and decrease (respectively) by significant amounts during rest as lower-body pressure is lowered. These findings are attributed to the action of independent mechanisms regulating heart rate and blood pressure under LBNP and to unregulated mechanical distension of the leg-muscle vessels. T.K.

A84-24351*# National Aeronautics and Space Administration, Washington, D. C.
CARDIOVASCULAR RESPONSES TO SPACEFLIGHT
A. NICOGOSSIAN, S. L. POOL, and P. C. RAMBAUT (NASA, Washington, DC) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-78 to S-80. refs

The cardiovascular system's adaptive changes during and after spaceflight are discussed. Cephalic fluid shifts are demonstrated by photographs along with calf girth and leg volume changes. Inflight measurements show an increase in average resting heart rate and systolic blood pressure, and a sympathetic-parasympathetic neural imbalance. Postflight findings include a small but reversible decrease in the left ventricular muscle mass. Since 1980, NASA's research has emphasized cardiovascular deconditioning and countermeasures: hemodynamic changes, endocrine and neurohumoral aspects, etiologic factors, and lower body negative pressure devices. Though human beings acclimate to the space environment, questions concerning the immediate and long-term aspects of spaceflight need to be answered for adequate planning of extended space missions. C.M.

A84-24352#
CARDIOVASCULAR RESPONSES TO HEAD-DOWN TILT IN YOUNG AND MIDDLE-AGED MEN
C. G. BLOMQVIST, F. A. GAFFNEY, and J. V. NIXON (Texas, University, Dallas, TX) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-81, S-82. refs

The overall pattern of adaptation to head-down tilt over a 24-hour period is noted to be similar in young and middle-aged men, involving a central fluid shift, a transient increase in ventricular filling, diuresis, and a blood volume decrease which returns to supine baseline levels with 24 hours. The principal differences included a larger and more prolonged increase in central venous pressure for the older group. These findings are consistent with a decreased ventricular compliance in the older men. Arterial pressure was maintained constant in both groups, but by different mechanisms, suggesting an age-related difference in baroceptor function. O.C.

A84-24353#
INFLUENCE OF OPTOKINETIC STIMULATION AND IMMERSION ON EYE-HEAD COORDINATION IN MAN
V. A. BARMIN, IU. V. KREIDICH, and I. B. KOZLOVSKAIA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-83-S85. refs

The effects of optokinetic stimulation (OKS) from dark and light 3-cm-wide strips rotating at 48-50 deg/sec and/or 7-day immersion hypokinesia (IHK) on the performance of a horizontal gaze-direction task are investigated experimentally in human subjects. The results are presented graphically and discussed. Eye-head coordination was adversely affected by both OKS and IHK, and the effects were additive when subjects exposed to IHK were asked to perform the task with OKS. These results are shown to be in agreement with the findings of Meiry (1971) and Susuki (1972) on the relationship of vestibular, visual, and proprioreceptive afferent systems. T.K.

A84-24354#
A STUDY OF MECHANISMS OF POSTURE MAINTENANCE IN THE WEIGHTLESS STATE
G. CLEMENT, F. LESTIENNE (CNRS, Laboratoire de Physiologie Neurosensorielle, Paris, France), V. S. GURFINKEL, M. I. LIPSHITS, and K. E. POPOV (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-86 to S-89. refs

Posture maintenance in a weightless state was tested in Salyut-7 crewmembers by studying the following movements: (1) voluntary raising of the right hand, (2) voluntary tiptoeing, and (3) involuntary body movement produced by a support platform's forward displacement. Results show that subjects could maintain posture in weightlessness, primarily because of leg anterior surface muscle contraction. Posture regulation includes fast adaptation involving the redistribution of motor commands between ankle flexors and extensors, and slow adaptation involving less anticipatory activation of the biceps femoris and quantitative changes in EMG postural components. It is concluded that the control system underlying posture stability is very conservative and that weightlessness adaptation strategies should be based on a terrestrial body scheme. C.M.

A84-24360#
PLASMA LEVELS OF NOREPINEPHRINE, EPINEPHRINE AND DOPAMINE DURING A 4-DAY HEAD-DOWN TILT WITH AND WITHOUT EXERCISE
J. M. PEQUIGNOT, L. PEYRIN (CNRS, Laboratoire de Physiologie, Lyon, France), G. GAUQUELIN, G. ANNAT, C. GHARIB (Lyon I, Universite, Lyon, France), A. GUELL, and A. BES (Centre Hospitalier Universitaire Rangueil, Toulouse, France) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-100; S-101. Research supported by the Centre National d'Etudes Spatiales and Universitede Lyon I. refs

The changes in sympathoadrenal activity during a -6-deg head-down tilt were assessed in eight healthy men by measuring plasma norepinephrine, epinephrine, and dopamine by a radioenzymatic method. Plasma catecholamine levels were unaltered after short-term (from 30 min to 10 h) or long-term (from 1 to 4 days) head-down tilt, and the association of regular exercise (50 percent VO2 max during 2 hrs/d) with the tilt did not affect the results. These findings suggest that sympathoadrenal activity is not significantly modified by head-down tilt at -6 deg. Author

A84-24364#
THE NATURE AND CHARACTERISTICS OF A GRAVITATIONAL ATAXIA
I. B. KOZLOVSKAIA, I. F. ASLANOVA, V. A. BARMIN, L. S. GRIGOREVA, G. I. GEVLICH, A. V. KIRENSKAIA, and M. G. SIROTA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-108, S-109. refs

The present experimental analysis of disturbances in the control accuracy of voluntary movements as a consequence of spaceflight and of hypokinesia experiments has concentrated on

weightlessness effects in different parts of the motor system, such as proprioreceptors, spinal synergies, etc. The quantitative spectrum of accuracy control disorders in movements of different types has been determined, and it has been possible to characterize them as atactic disorders. Afferent input activity changes appear to be responsible for this type of ataxia. O.C.

A84-24368*# Technology, Inc., Houston, Tex.
MOTION SICKNESS SUSCEPTIBILITY RELATED TO ACTH, ADH AND TSH
R. L. KOHL (Technology, Inc., Houston, TX), C. LEACH, J. L. HOMICK (NASA, Johnson Space Center, Houston TX), and F. T. LAROCHELLE (Northrop Services, Inc., Houston, TX) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-117, S-118. refs

The hypothesis that endogenous levels of certain hormones might be indicative of an individual's susceptibility to stressful motion is tested in a comparison of subjects classified as less prone to motion sickness with those of higher susceptibility. The levels of ACTH and vasopressin measured before exposure to stressful motion were twice as high in the less-suceptible group. No significant differences were noted in the levels of angiotensin, aldosterone, or TSH. The differences between the two groups were greater for a given hormone than for any of the changes induced by exposure to stressful motion. J.N.

A84-24395#
HAEMODYNAMICS UNDER CHANGED GRAVITY
E. B. SHULZHENKO and S. M. BELIAEV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Symposium on Gravitational Physiology, Sydney, Australia, Aug. 28-Sept. 3, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-176, S-177. refs

Microgravity was simulated by 'dry' immersion of 1, 3 or 7 days. Before and after immersion hemodynamic parameters were measured during ergometry tests. The major goal of this study was to investigate cardiovascular changes during exercise performed after a short-term exposure to simulated weightlessness. Another purpose was to identify a relationship between renal fluid losses during immersion and cardiovascular changes after the exposure. Author

A84-24951
THE SICKLE CELL TRAIT IN RELATION TO THE TRAINING AND ASSIGNMENT OF DUTIES IN THE ARMED FORCES. I - POLICIES, OBSERVATIONS, AND STUDIES
L. W. DIGGS Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 180-185. refs

A84-24952
THE EFFECTS OF ACCELERATION FORCES ON NIGHT VISION
D. A. TIPTON, A. R. MARKO, and D. A. RATINO (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB; Wright State University, Dayton, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 186-190. refs

The effects of Gy and Gz acceleration forces on cone-type mesopic vision threshold values were examined in ten male flight members (25-39 years) of the United State Air Force. A three-axis human centrifuge simulated a night-flight combat environment, and the following acceleration levels were studied: +1 Gz, +1 Gy, +1.4 Gz, +2 Gz, +3 Gz, and a combination of +2 Gy and +1 Gz. The physiological parameters recorded were arterial oxygen saturation by ear oximetry, heart rate, and visual acuity threshold values. Results of luminance threshold values demonstrated no shift at +1 Gy or +1.4 Gz, but showed increases at the 0.01 level for +2 Gz, +3 Gz, and +2 Gy combined with +1 Gz. Since in a combat situation a pilot is likely to be exposed to a G load in which his mesopic luminescence treshold shifts, and since low G levels affect the subject at a visual acuity level of 20/50, it is concluded that higher G levels or more stringent acuity requirements will have an even greater affect. C.M.

A84-24953
EFFECTS OF EXTENDED HYPOXIA ON NIGHT VISION
J. L. KOBRICK, H. ZWICK, C. E. WITT, and J. A. DEVINE (U.S. Army, Army Research Institute of Environmental Medicine, Natick, MA; U.S. Army, Letterman Army Institute of Research, San Francisco, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 191-195. refs

The effects of 16 days of sustained hypoxia (4300 m equivalent) on the dark adaptation threshold function were studied in 12 male subjects measured periodically (days 2, 4, 6, 9, 11, 13, 16 of exposure) over a 20-min test period for both red and green stimuli using a new computerized dark adaptometer. Comparison with sea level performance showed negligible elevations of thresholds for red response, but highly significant impairment of green response (p less than 0.00001) over almost the entire dark adaptation function. These losses peaked between the sixth and ninth day followed by little recovery, except at the eleventh day when the subjects descended briefly to 3200 m elevation. Impairments developed rapidly again upon return to the original higher altitude. The results differ from previous findings after shorter exposure periods, which showed only slight impairments of the early segment of dark adaptation. Implications of the results are discussed. Author

A84-24955
HORMONAL DISTURBANCES OF FLUID-ELECTROLYTE METABOLISM UNDER ALTITUDE EXPOSURE IN MAN
S. OKAZAKI, Y. TAMURA, T. HATANO, and N. MATSUI (Nagoya University, Nagoya, Japan) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 200-205. refs

Changes in fluid-electrolyte, aldosterone, and antidiuretic hormone (ADH) shortly after exposure to a simulated altitude of 6000 m (354 mm Hg) are examined in 18 males and 2 females (23-48 years old) to determine the hormonal effects on water and electrolyte metabolism. Since upon arrival at 6000 m, hematocrit and serum protein increase with elevated serum osmolality and urine flow decreases, a hypotonic fluid shift to intracelular space is proposed as the cause for decreased plasma volume. Interpretation of the results suggests that ADH is elevated by hypoxic stress, elevated serum osmolality, and decreased plasma volume. It is also proposed that increased aldosterone is caused by increased adrenocorticotropin secretion (plasma renin activity not excluded). Increased secretions of water and electrolyte regulating hormones may provoke body fluid retention, resulting in oliguria, and increased aldosterone may accelerate alkalosis at the beginning of high altitude exposure. It is therefore suggested that these hormonal changes are associated with acute mountain sickness. C.M.

A84-24956
PHYSIOLOGICAL RESPONSES AND SURVIVAL TIME PREDICTION FOR HUMANS IN ICE-WATER
J. S. HAYWARD and J. D. ECKERSON (Victoria, University, Victoria, British Columbia, Canada) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 206-211. Research supported by the Natural Sciences and Engineering Research Council of Canada. refs

To test the potential survivability of inactive humans in ice-water, 10 females and 11 males (lightly-clothed and nonexercising) were immersed in 0 C water for 25-40 minutes until their core temperatures dropped to 35 C. During the first one to two minutes of immersion, ventilation rate increased 434 percent with a respiratory exchange ratio rise of 0.8 to 1.4. After 10 minutes of immersion, average skin temperature had dropped to 5 C and average rectal and tympanic cooling rates were 6.02 and 5.40 C/hour. Maximum shivering metabolism (almost four times the preimmersion metabolic rate) was reached 15-20 minutes after

immersion; during this time heart rates were in the range of 90-110 beats/minute and respiration minute volume increased by 250-300 percent. It is concluded that the average person's survival time in 0 C water (based on hypothermia rather than drowning) is 1-1.5 hours. C.M.

A84-24958
A STUDY OF MAXIMAL OXYGEN CONSUMPTION IN CHINESE MALES
B.-L. HO (Institute of Aviation Medicine, Taipei, Republic of China) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 222-225. refs

A84-25101
MAIN FINDINGS AND PROSPECTS RELATING TO THE ECOLOGICAL PHYSIOLOGY OF HUMANS [OSNOVNYE ITOGI I PERSPEKTIVY EKOLOGICHESKOI FIZIOLOGII CHELOVEKA]
A. D. SLONIM (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 3-10. In Russian. refs

Research on the ecological physiology of humans is surveyed in connection with the general ecology of living organisms and applied physiology (e.g., the physiology of work and sport, and clinical physiology). Adaptive behavior and its interaction with homeostasis reactions are examined, and various types of physiological adaptations are discussed, including 'nervous', cyclic, and migrational. Related questions of trophology are examined, and the main objectives of an ecological physiology of work are formulated, with reference to studies of human activity at the population level, the prediction of work capacity, and the assessment of work load in various geographical zones. Problems in ecological pathology are also considered. B.J.

A84-25102
THE PHYSIOLOGY OF WORK IN THE MOUNTAINS - PROBLEMS AND PROSPECTS [FIZIOLOGIIA TRUDA V GORAKH: PROBLEMY I PERSPEKTIVY]
A. A. AIDARALIEV (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Frunze, Kirgiz SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 11-15. In Russian. refs

The adaptation of workers to mountain environments is examined with reference to biomedical studies performed in the mountain regions of Kirghizia. It is recommended that the following measures be instituted: the improvement of worker-selection methods for mountain conditions; worker preparation; the development of a rational work-rest regime; the proper equipping of medical facilities; the development of mountain medicine therapies; and the determination of the necessary level of hospitalization for mountain deadaptation. B.J.

A84-25105
ASSESSMENT OF THE FUNCTIONAL CAPABILITIES OF THE HUMAN BODY IN DOING PHYSICAL WORK [OTSENKI FUNKTSIONAL'NYKH VOZMOZHNOSTEI ORGANIZMA PRI VYPOLNENII FIZICHESKOI RABOTY]
V. P. GREBNIAK (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Donetskii Nauchno-Issledovatel'skii Institut Gigieny Trudai Profzabolevanii, Donetsk, Ukrainian SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 31-40. In Russian. refs

It is noted that the specific capacity of humans to do mechanical work can be most efficiently predicted by measuring the dynamics of such cardiorespiratory indicators as heart rate, lung ventilation volume, and oxygen consumption. A method for assessing the specific functional capabilities of the human body according to the integral criterion A is established. It is shown that the physiological determinacy of the criterion A can be expressed most fully when it is used to calculate relative values, registered during a feature test, as the least dependent on the effect of the set of random factors. B.J.

A84-25106
THE INFORMATION CONTENT OF EEG DATA IN PREDICTING OPERATOR WORK-CAPACITY [INFORMATIVNOST' EEG-DANNYKH V PROGNOZIROVANII RABOTOSPOSOBNOSTI OPERATOROV]
N. D. BAGROVA, R. N. KOROBOV, and IU. M. GROMOV (Voenno-Meditsinskaia Akademiia, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 41-46. In Russian. refs

An experimental study was performed to assess the possibility of evaluating and predicting the mental work capacity of operators on the basis of EEG data with the application of various psychophysiological tests. It is shown that the EEG spectral power density (SPD) in the 1-32 Hz frequency range can be used as an informative index. A linear relationship exists between the complexity of the mental tests and the markedness of SPD variations, which indicates that the degree of test complexity is directly proportional to the level of bioelectric activity accompanying the test. The increase or decrease of the SPD of slow rhythms (2-8 Hz) and rhythms at 15 Hz and above, following physical loads, is shown to be a valuable index characterizing operator work-capacity. B.J.

A84-25108
COLD VASODILATION IN PERSONS SUBJECTED TO THE CHRONIC EFFECT OF LOW POSITIVE TEMPERATURES [KHOLODOVAIA VAZODILIATATSIIA U LITS, PODVERGSHIKHSIA KHRONICHESKOMU VOZDEISTVIIU NIZKIKH POLOZHITEL'NYKH TEMPERATUR]
M. IU. GEDYMIN, M. N. EVLAMPIEVA, I. S. KANDROR, and A. G. LEKSIN (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 52-58. In Russian. refs

A84-25109
GENERAL FEATURES OF ADAPTATION OF MINERS OF THE DONETS COAL BASIN [OBSHCHIE ZAKONOMERNOSTI ADAPTATSII SHAKHTEROV DONBASSA]
A. L. RESHETIUK (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Donetskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 59-65. In Russian. refs

Different phases of Selye adaptation and their combinations are observed in Donets miners depending on the work stress intensity, exposure to this stress, and the level of factually admissible risk to health. The main occupationally significant effects of adaptation are investigated and described schematically. Productivity is found to be inversely proportional to stress intensity. Various manifestations of behavioral adaptation to work are examined, including the avoidance reaction. B.J.

A84-25110
FUNCTIONAL CONDITION DURING WORK ACTIVITY, WORK CAPACITY, AND HEALTH IN HUMANS [FUNKTSIONAL'NOE SOSTOIANIE PRI TRUDOVOI DEIATEL'NOSTI, RABOTOSPOSOBNOST' I ZDOROV'E CHELOVEKA]
IU. G. SOLONIN, S. B. MASLENTSEVA, Z. M. KUZNETSOVA, V. A. KOZLOVSKII, and S. L. USTIANTSEV (Ministerstvo Zdravookhraneniia RSFSR, Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 66-71. In Russian. refs

Physiological tests were performed on 334 males 20-49 years in age in order to study the effects of physical work using different muscle components; physical work capacity was evaluated in 250 of the subjects according to PWC170 and maximum oxygen consumption. In addition, morbidity with temporary loss of work capacity was studied in 4186 year-round laborers. It is shown that the functional condition during work activity, expressed in strain on the body, determines the level of physical work capacity and morbidity, as well as their dynamics during the working period of

life. High strain in physical work in the course of many years causes an accelerated decline of work capacity and a deterioration in health. B.J.

A84-25111
CORRELATION OF OBJECTIVE AND SUBJECTIVE INDICATORS IN THE EVALUATION OF THE FUNCTIONAL CONDITIONS OF HUMANS IN CONDITIONS OF WORK [SOOTNOSHENIE OB'EKTIVNYKH I SUB'EKTIVNYKH POKAZATELEI PRI OTSENKE FUNKTSIONAL'NOGO SOSTOIANIIA CHELOVEKA V PROIZVODSTVENNYKH USLOVIIAKH]
B. N. PETUKHOV, N. S. UDAROVA, O. A. LIKHACHEVA, V. K. KHUKHLAEV, I. A. KALUPINA, and L. D. EVDOKIMOVA (Nauchno-Issledovatel'skii Institut Truda, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 72-80. In Russian. refs

Fatigue, the subjective sensation of tiredness, and work-related indicators were investigated in representatives of 61 occupations, and the correlation of these indicators was examined. It is shown that, within the limits of one occupation, the quantified subjective sensation of tiredness and its symptoms toward the end of the work shift are closely correlated with the work load and objective changes of the functional condition (the fatigue indicators). B.J.

A84-25112
PHYSIOLOGICAL REACTIONS DURING WORK IN OPERATORS IN CONDITIONS OF DISTURBED HOMEOSTASIS [FIZIOLOGICHESKIE REAKTSII V PROTSESSE TRUDA U OPERATOROV V USLOVIIAKH NARUSHENNOGO GOMEOSTAZA]
L. V. DONSKAIA, V. V. BADKHEN, and I. A. DUBININA (Leningradskii Nauchno-Issledovatel'skii Institut Ekspertizy Trudosposobnosti i Organizatsii Truda Invalidov, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 81-85. In Russian. refs

The condition of central and cerebral hemodynamics was studied in bus drivers and operators of printing machinery with disturbed regulation of the vascular tonus, as well as in a healthy control group; the operators, both male and female, suffer from stage I hypertension. The hemodynamic indicators of the healthy control group were found to differ considerably from those of persons with disturbed homeostasis; and a significant deterioration of these indicators was noted in the latter group in the course of the work day. B.J.

A84-25113
BLOOD-CIRCULATION DYNAMICS IN CONDITIONS OF CONTINUOUS WORK ON AN EXPEDITION [DINAMIKA KROVOOBRASHCHENIIA V USLOVIIAKH EKSPEDITSIONNO-VAKHTOVOGO TRUDA]
S. G. KRIVOSHCHEKOV and IU. A. TATAUROV (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 86-93. In Russian. refs

Results are presented concerning the response of the circulation system in Soviet oil drillers working continuously for 14 days (an eight-hour shift with an eight-hour rest period between shifts), then resting for 14 days. The aerobic (physical) work capacity of the workers was found to decrease during the continuous work period; the decrease amounts to 20-25 percent at the beginning and end of the period. In the middle of this period the adaptive reactions of the body are directed toward the conservation of body reserve capacities, which is achieved primarily on the basis of cholinergic regulation mechanisms. The 14-day rest period is shown to be sufficient to restore the body functions studied. B.J.

A84-25114
EFFICIENCY OF THE OCCUPATIONAL ACTIVITY OF PERSONS DEPENDING ON THEIR PSYCHOPHYSIOLOGICAL CHARACTERISTICS [EFFEKTIVNOST' PROFESSIONAL'NOI DEIATEL'NOSTI CHELOVEKA V ZAVISIMOSTI OT EGO FIZIOLOGO-PSIKHOLOGICHESKIKH OSOBENNOSTEI]
V. G. IUROVSKIKH (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Okhrany Truda, Sverdlovsk, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 94-103. In Russian. refs

An investigation is made of the most significant psychophysiological qualities which directly or indirectly participate in the formation of occupational success; and methods for the objective assessment of this efficiency as well as for its enhancement are examined. It is shown that the human factor in work safety plays a greater role than is usually thought. A comparative analysis of the physiological and psychic qualities of workers with alternative indicators of traumatism discloses the main factors affecting work safety. Among the social-psychological causes of occupational traumas are certain negative qualities of managers, who, forming an unfavorable style of management, hamper work safety. B.J.

A84-25115
INDIVIDUAL FEATURES OF RESPONSES OF THE BODY TO COMBINED THERMAL AND PHYSICAL LOAD [INDIVIDUAL'NYE OSOBENNOSTI REAKTSII ORGANIZMA NA SOCHETANNUIU TEPLOVUIU I FIZICHESKUIU NAGRUZKU]
A. T. MARIANOVICH, V. S. BALANDIN, A. K. BEKUZAROV, and G. M. LAPIKOV (Voenno-Meditsinskaia Akademiia, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 104-111. In Russian. refs

Eight healthy males 29-34 years of age were exposed to an environment with an air temperature of 49 C, a relative humidity of 20 percent, and an air velocity of 0.5 m/s; the exposure consisted of two-hour periods for five consecutive days and was accompanied by repeated bicycle exercise. In conditions of this combined thermal and physical load, an inverse relationship was found between the degree of disturbance of the thermal balance of the body and the strain level of the homeostatizing systems, manifested in a sensation of discomfort. In these conditions the character of the response of the individual (a smaller disturbance of the thermal balance of the body under high strain or vice versa) is determined by individual features, not associated with the level of physical work capacity or perspiration level. B.J.

A84-25116
ANTHROPOMETRIC INDICES AND PHYSICAL WORK CAPACITY [ANTROPOMETRICHESKIE POKATATELI I FIZICHESKAIA RABOTOSPOSOBNOST']
A. T. KETKIN, N. G. VARLAMOVA, and V. G. EVDOKIMOV (Akademiia Nauk SSSR, Institut Biologii, Syktyvkar, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 112-116. In Russian. refs

The present study investigates the influence of anthropometric indices on work capacity and their use to calculate aerobic productivity in workers engaged in moderate and heavy physical labor and in 'white-collar' workers. Ninety-one males were subjected to step tests of increasing intensity. Only low correlation was found between body weight, height, and other anthropometric indices and work capacity. B.J.

A84-25117
THE EFFECT OF ADAPTATION TO A HOT CLIMATE ON THE CONDITION OF HEAT RECEPTION [VLIIANIE ADAPTATSII K ZHARKOMU KLIMATU NA SOSTOIANIE TERMORETSEPTSII]
T. V. KOZYREVA and M. A. IAKIMENKO (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 117-119. In Russian. refs

Tests were performed on persons living at least three years in a hot climate (Ashkhabad) and in various Siberian cities (the control group) but spending most of their time in heated buildings. The tests, performed on 106 persons 20-35 years of age (65 living in

Siberia, the rest in Ashkhabad), involved the evaluation on multiple temperature-sensitive spots on both arms, hot on one arm and cold on the other. It is found that heat adaptation leads to changes in the functioning of the temperature analyzer. The number of skin receptors sensitive to high temperatures is significantly reduced in persons living in a hot climate. During heat adaptation, the character of the skin-temperature dependence of the number of functioning cold receptors does not change. B.J.

A84-25118
FEATURES OF ENERGETIC AND HEMODYNAMIC PROVISION OF SUBMAXIMAL PHYSICAL LOAD IN MALES OF A MATURE AGE [OSOBENNOSTI ENERGETICHESKOGO I GEMODINAMICHESKOGO OBESPECHENIIA SUBMAKSIMAL'NOI FIZICHESKOI NAGRUZKI U MUZHCHIN POZHILOGO VOZRASTA]
O. V. KORKUSHKO and IU. T. IAROSHENKO (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 120-125. In Russian. refs

A84-25119
THE EFFECT OF THE NATURAL-LIGHT REGIME ON BIORHYTHMS IN POLAR WORKERS [VLIIANIE ESTESTVENNOGO SVETOVOGO REZHIMA NA BIORITMY U POLIARNIKOV]
M. P. MOSHKIN (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 126-129. In Russian. refs

The paper presents a comparative analysis of the circadian rhythms of a number of physiological indicators recorded in workers at the Antarctic station of Molodezhnaia in 1974 in winter during the polar night and in autumn under various levels of solar radiation. It is shown that changes in the circadian rhythms of body temperature, myocardial contractility, diastolic pressure, and urinary steroid excretion on cloudy days with reduced illumination have the same trend as in the polar-night period. The synchronizing effect of light on physiological rhythms relies on the participation of such neuroendocrine structures as the retina, the suprachiasmatic nucleus of the hypothalamus, the upper cervical sympathic ganglia, and the epiphysis. B.J.

A84-25120
EEG VARIANTS DURING CHANGES IN THE FUNCTIONAL CONDITION OF THE BRAIN [VARIANTY EEG PRI IZMENENIIAKH FUNKTSIONAL'NOGO SOSTOIANIIA MOZGA]
E. A. ZHIRMUNSKAIA and N. A. ANOKHINA (Ministerstvo Zdravookhraneniia RSFSR, Bol'nitsa 1, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 130-138. In Russian. refs

A classification of background EEG patterns, consisting of 20 distinct groups within the five basic EEG types, is developed for describing diffuse EEG changes. The classification makes possible a sufficiently rigorous evaluation of the degree and possible mechanisms of disturbances of brain electrical activity. Changes in integral EEG patterns can be caused not only by the affection of the cerebral cortex at the microstructural level but also by disturbances of cortex activity from nonspecific systems of the limbic-reticular complex. The classification may therefore be used to evaluate the functional condition of the brain not only in sick persons without gross disturbances of the nervous system but also in healthy persons in extreme environments. B.J.

A84-25121
VOLUNTARY CONTROL OF CURRENT LUNG VENTILATION BY INSTRUMENTED FEEDBACK [PROIZVOL'NOE UPRAVLENIE TEKUSHCHE I LEGOCHNOI VENTILIATSIEI POSREDSTVOM INSTRUMENTAL'NOI OBRATNOI SVIAZI]
I. S. BRESLAV, A. M. SHMELEVA, A. T. NORMATOV, and V. P. FROLOVA (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 139-143. In Russian. refs

Experiments were performed on three males 40-43 years of age, two with tachypnea and one with bradypnea. It is shown that a breathing pattern chosen voluntarily which increases lung ventilation to a specified level through instrumented feedback is structurally different from the pattern formed during hyperpnea induced by hypercapnia, hypoxia, and muscular work. Voluntary control is characterized by a relatively large increase in breathing depth; the increase in breathing rate is not pronounced in this case, and is completely absent in subjects with tachypnea. These features, as well as a relatively small increase in inspiratory activity, indicate that the voluntary control of the breathing muscles is achieved, at least partly, without recourse to the bulbopontine mechanism of respiratory rhythmogenesis. B.J.

A84-25123
THE EFFECT OF SHORT-TERM HEAT ADAPTATION ON CERTAIN INDICATORS OF PHYSICAL WORK CAPACITY [VLIIANIE KRATKOVREMENNOI TEPLOVOI ADAPTATSII NA NEKOTORYE POKAZATELI FIZICHESKOI RABOTOSPOSOBNOSTI]
K. N. KACHANOVSKII (Pedagogicheskii Institut, Chardzhou, Turkmen SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 163-165. In Russian. refs

The effect of short-term adaptation to high ambient temperature (48 C) on such indicators of physical work capacity as heart rate, respiratory rate, and arterial pressure was investigated in eight healthy males 28-30 years of age. The subjects were tested in a heat chamber two hours per day for five days, the physical load involving bicycle pedaling. The data confirm the hypothesis that heat stimulation is not only connected with physical regularities but is also determined by the organization of the systemic response to physical load. The test technique validated in the experiment makes it possible to evaluate various types of individual strategies of adaptation to physical loads in a hot environment. B.J.

A84-25125
CHARACTERISTICS OF DEPTH PERCEPTION WITH REGARD TO THE RELATIVE MOTION OF OBJECTS [KHARAKTERISTIKA GLUBINNOGO ZRENIIA PRI VOSPRIIATII OTNOSITEL'NOGO DVIZHENIIA OB'EKTOV]
I. P. ZHUCHENKO (Ministerstvo Ugol'noi Promyshlennosti Ukrainskoi SSR, Bazovaia Laboratoriia, Profotbora i Adaptatsii Gornorabochikh, Makeevka, Ukrainian SSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 168, 169. In Russian. refs

A84-25148
INFLUENCE OF PHYSICAL TRAINING ON NONSPECIFIC ADAPTATION MECHANISMS [VLIIANIE FIZICHESKOI TRENIROVKI NA NESPETSIFICHESKIE MEKHANIZMY ADAPTATSII]
I. V. SAPOV and V. S. NOVIKOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Jan. 1984, p. 41-43. In Russian. refs

The directionality of changes in nonspecific resistance indicators in fluntionally healthy individuals and athletes who partake of systematic exercise of varying intensities at high latitudes is determined. Results of examinations of individuals, including mid- and short-distance runners and highly ranked cross-country skiers, demonstrate that among the natural defense mechanisms mobilized by physical exercise, the change in the cellular factors of nonspecific immunity is the most pronounced. The physico-chemical stability of leukocytes and the phagocytosis intensity in the athletes were respectively 32.1 and 29.1 percent higher than in nonathletes. The absorptive leukocyte function in

athletes was 39.9 percent higher than in nonathletes and 28.2 percent higher than in those who regularly exercised. J.N.

A84-25149
METHODS FOR EVALUATING HEART RHYTHM AS AN INDICATOR OF THE FUNCTIONAL STATE OF A PILOT IN FLIGHT [METODY OTSENKI SERDECHNOGO RITMA KAK POKAZATELIA FUNKTSIONAL'NOGO SOSTOIANIIA LETCHIKA V POLETE]
V. G. DOROSHEV, G. N. GRECHIKHIN, V. A. SAPOZHNIKOV, L. M. RAK, A. A. BAKUTIS, and I. E. LEBEDEVA Veonno-Meditsinskii Zhurnal (ISSN 0026-9050), Jan. 1984, p. 46-48. In Russian.

To select the simplest and most reliable method of rapid diagnostics of the in-flight functional state of a pilot, a comparative evaluation of three techniques for heart rhythm analysis is presented. Electrocardiograms of 25 flighter pilots performing similar flight exercises were taken in the D-S lead before, during, and after flight. Then the R-R interval duration per each 100 cardiac cycles was measured. The influence of specific features of the performed flights on the structure of heart rhythm is seen in two reactions, the first of which is characterized by a smooth transition from a slow to a faster pulse. The second reaction is marked by a pronounced increase in the frequency of heart contractions. The method of correlational rhythmography is preferred over the stress index method and the variational pulsogram method. J.N.

A84-25150
DIAGNOSIS OF CRITICAL CRANIOCEREBRAL TRAUMA IN EXTENDED CRUISE CONDITIONS [DIAGNOSTIKA TIAZHELOI CHEREPNO-MOZGOVOI TRAVMY V USLOVIIAKH DLITEL'NOGO PLAVANIIA]
V. D. DEMENKO Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Jan. 1984, p. 48-50. In Russian. refs

The particular significance for ships' surgeons of the two fundamental diagnostic questions regarding intracranial and interacerebral hematomas, defining the character of the traum and determining the possible location of a brain compression, is studied. A discussion of general and focal critical brain trauma symptoms is presented. A list of clinical symptoms associated with rapid development of the comatose state with areflexia and diffuse muscular hypotony for determining the side of the injury is given. The diagnosis of critical craniocerebral trauma in extended cruise conditions should also include craniography and spinal tap techniques. J.N.

A84-25183#
NOISE CHARACTERISTICS ON THE GROUND RUN-UP TEST BY CURRENT COMBAT AIRCRAFT AND PROTECTION PROGRAM FOR HEARING LOSS
O. FUJIWARA, N. UTSUKI, and Y. TAKEUCHI (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports (ISSN 0023-2858), vol. 24, Sept. 1983, p. 141-152. In Japanese, with abstract in English. refs

The ground run-up noise characteristics of the F-15J jet aircraft are compared with those of the F-4EJ, F-104J, and T-2 in JASDF. The measured noise level of the F-15J of 127 dB (A) at a point 10 m ahead of the landing gear is much greater than that of the others. Also, maximum sound energy of 123 dB (SPL) was observed in the octave-band of 4 KHz center frequency. Ear plugs and ear muffs are suggested for personnel working within a 10 m radius of or operating the F-15J, and a safety distance of 600 m was estimated for continuous exposure without any ear protectors. Safety distances for the F-4EJ were estimated at 200 m and for the F-104J and T-2 at 150 m. J.N.

A84-25352
THE THERAPEUTIC EFFECT OF THE BETA-ADRENERGIC BLOCKER CORGARD (NADOLOL) AND ITS INFLUENCE ON HEMODYNAMICS IN PATIENTS WITH HYPERTENSION [LECHEBNYI EFFEKT BLOKATORA BETA-ADRENERGICHESKIKH RETSEPTOROV KORGARDA /NADOLOLA/ I EGO VLIIANIE NA GEMODINAMIKU U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU]
KH. E. CHARYEV and E. V. ERINA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 17-21. In Russian. refs

A84-25353
CHANGES IN THE RENAL-ALDOSTERONE SYSTEM ASSOCIATED WITH UNILATERAL PORTALIZATION OF ADRENAL AND RENAL BLOOD IN PATIENTS WITH ARTERIAL HYPERTENSION [IZMENENIIA V RENIN-AL'DOSTERONOVOI SISTEME PRI ODNOSTORONNEI PORTALIZATSII NADPOCHECHNIKOVOI I POCHECHNOI KROVI U BOL'NYKH S ARTERIAL'NOI GIPERTENZIEI]
A. V. POKROVSKII, A. P. TORGUNAKOV, P. O. KAZANCHIAN, A. I. MATVEEVA, L. A. MIGALINA, B. A. ASHUROV, and G. V. BABLOIAN (Akademiia Meditsinskikh Nauk SSSR, Moscow; Kemerovskii Meditsinskii Institut, Kemerovo, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 21-24. In Russian. refs

A84-25354
DIFFERENCES IN THE RATE OF NA/LI COUNTERTRANSPORT IN ERYTHROCYTE MEMBRANES IN PATIENTS WITH ESSENTIAL AND RENAL HYPERTENSION [RAZLICHIIA V VELICHINE NA/LI-PROTIVOTRANSPORTA V MEMBRANE ERITROTSITOV U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU I POCHECHNOI GIPERTENZIEI]
V. A. LIUSOV, I. IU. POSTNOV, S. N. ORLOV, and G. G. RIAZHSKII (II Moskovskii Gosudarstvennyi Meditsinskii Institut; Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 24-26. In Russian. refs

A84-25355
ADRENOCORTICAL ACTIVITY IN PATIENTS WITH HYPERTENSION IN RESPONSE TO EMOTIONAL STRESS [ADRENOKORTIKAL'NAIA AKTIVNOST' U BOL'NYKH GIPERTONICHESKOI BOLEZN'IU V OTVET NA EMOTSIONAL'NUIU NAGRUZKU]
T. A. POLOSOVA, E. V. BELOVA, I. E. SOFIEVA, G. B. GOLOVANOVA, and N. M. PLOTNIKOVA (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 27-30. In Russian. refs

A84-25356
APPLICATION OF MYOCARDIAL SCINTIGRAPHY WITH TL-201 FOR THE DIFFERENTIAL DIAGNOSIS OF ISCHEMIC HEART DISEASE AND HYPERTROPHIC CARDIOMYOPATHIES IN WOMEN [PRIMENENIE STSINTIGRAFII MIOKARDA C201TL DLIA DIFFERENTSIAL'NOI DIAGNOSTIKI ISHEMICHESKOI BOLEZNI SERDTSA I GIPERTROFICHESKIKH KARDIOMIOPATII U ZHENSHCHIN]
V. N. SPIZHOVYI, A. A. KRAMER, V. S. GASILIN, A. A. LIAKISHEV, L. E. SAMOILENKO, and N. M. AKHMEDZHANOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 51-55. In Russian. refs

A84-25358
HETEROGENEITY OF AORTAL AND ARTERIAL ENDOTHELIUM IN HUMANS - A QUANTITATIVE INVESTIGATION USING SCANNING ELECTRON MICROSCOPY [GETEROGENNOST' ENDOTELIIA AORTY I ARTERII CHELOVEKA KOLICHESTVENNOE IZUCHENIE S POMOSHCH'IU RASTROVOI ELEKTRONNOI MIKROSKOPII]
V. V. DOLGOV, O. E. ZAIKINA, M. F. BONDARENKO, and V. S. REPIN (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 23, Aug. 1983, p. 92-95. In Russian. refs

A84-25361
HEPATIC HEMODYNAMICS IN ATHLETES WITH MYOCARDIAL DYSTROPHY [GEMODINAMIKA PECHENI U SPORTSMENOV S DISTROFIEI MIOKARDA]
E. F. IAKOVLEV and R. D. DIBNER (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 13, 14. In Russian. refs

A84-25362
THE EFFECT OF AN ANTIOXIDANT ON THE ENDURANCE OF PERSONS TRAINED AND UNTRAINED WITH REGARD TO PHYSICAL EXERCISE [VLIIANIE ANTIOKSIDANTA NA VYNOSLIVOST' TRENIROVANNYKH I NETRENIROVANNYKH K FIZICHESKOI NAGRUZKE LIUDEI]
F. Z. MEERSON, V. E. KAGAN, Z. V. BERESNEVA, L. P. MATVEEV, V. M. BOEV, L. L. PRILIPKO, and L. IU. GOLUBEVA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 14-17. In Russian. refs

A84-25363
THE EFFECT OF SWIMMING IN A THERAPEUTIC POOL ON THERMOREGULATORY REACTIONS [VLIIANIE ZANIATII V OZDOROVITEL'NOM PLAVATEL'NOM BASSEINE NA TERMOREGULIATORNYE REAKTSII]
A. IA. TIKHONOVA, T. G. SIMONOVA, and M. A. IAKIMENKO (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 17, 18. In Russian. refs

A84-25364
INDIVIDUAL FEATURES OF THE VEGETATIVE TONUS AND ITS INTERRELATIONSHIP WITH THE FUNCTIONAL CONDITION OF THE CENTRAL NERVOUS SYSTEM [INDIVIDUAL'NYE OSOBENNOSTI VEGETATIVNOGO TONUSA I EGO VZAIMOSVIAZ' S FUNKTSIONAL'NYM SOSTOIANIEM TSENTRAL'NOI NERVNOI SISTEMY]
O. Z. BOMSHTEIN and V. A. SHESTAKOV (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 18-20. In Russian. refs

The individual characteristics of the vegetative tonus in young athletes (rowers) was evaluated on the basis of skin resistance and the interrelationship of the tonus with the condition of the central nervous system as indicated by critical flicker fusion. It is shown that the character of the relationship between the skin resistance and the critical flicker fusion differs among the different athletes. The pattern of changes of these two parameters under step loading is investigated. B.J.

A84-25365
INTERRELATIONSHIP OF THE LEVEL OF PHYSICAL WORK CAPACITY, MOTOR REGIME, AND PRODUCTIVE ACTIVITY [VZAIMOSVIAZ' UROVNIA FIZICHESKOI RABOTOSPOSOBNOSTI, DVIGATEL'NOGO REZHIMA I PROIZVODSTVENNOI DEIATEL'NOSTI]
L. N. NIFONTOVA (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 28-30. In Russian. refs

A84-25367
DEPENDENCE OF THE FUNCTIONAL CONDITION OF WORKERS ON AGE AND OCCUPATIONAL FACTORS [ZAVISIMOST' FUNKTSIONAL'NOGO SOSTOIANIIA ORGANIZMA RABOTAIUSHCHIKH OT VOZRASTA I PROIZVODSTVENNYKH FAKTOROV]
V. A. BUZUNOV (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1983, p. 20-22. In Russian. refs

Multiple correlation analysis is used to establish a quantitative relation between the degree of work load and intensity, occupational conditions (i.e., noise level and air temperature in the work zone), age, and the duration of work service. Multiple regression equations are obtained for predicting the degree of fatigue in workers in relation to their age and work conditions. Work load is assessed according to the level of resistance produced by static effects. B.J.

A84-25368
THRESHOLD SENSITIVITY OF ANALYZERS IN ADULT ELECTRO-GAS WELDERS AND STUDENTS OF VOCATIONAL SCHOOLS WITH DIFFERENT DEGREES OF OCCUPATIONAL SKILL [POROGOVAIA CHUVSTVITEL'NOST' ANALIZATOROV U VZROSLYKH RABOCHIKH ELEKTROGAZOSVARSHCHIKOV I UCHASHCHIKHSIA PTU S RAZNOI STEPEN'IU OSVOENIIA PROFESSII]
T. A. KISPAEV (Ministerstvo Zdravookhraneniia SSSR, Institut Gigieny Detei i Podrastkov, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1983, p. 23-25. In Russian. refs

A84-25370
THE EFFECT OF WORK CONDITIONS IN HOTHOUSES ON THE CONDITION OF THE UPPER RESPIRATORY PATHWAYS [VLIIANIE USLOVII TRUDA V TEPLITSAKH NA SOSTOIANIE VERKHNIKH DYKHATEL'NYKH PUTEI]
S. M. PUKHLIK and D. M. BABOV (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1983, p. 85, 86. In Russian. refs

A84-25399
EFFECTS OF SPACED AND REPEATED TOTAL SLEEP DEPRIVATION
W. B. WEBB and C. M. LEVY (Florida, University, Gainesville, FL) Ergonomics (ISSN 0014-0139), vol. 27, Jan. 1984, p. 45-58. refs (Contract DAMD17-80-C-0058)

Six young adult males were sleep deprived for 2 nights on five successive occasions at 3 week intervals. During the deprivation period they completed subjective ratings and performed on an extensive battery of tasks. Subjective measures and vigilance tasks showed substantial deprivation effects; the cognitively-demanding tasks were less affected. Where repetition of sessions resulted in changes, relative to sleep deprivation the effects with those of 'sensitization' rather than 'immunization'. Author

A84-25599
CALORIC TEST, ITS MODERN VERSIONS, MERITS AND SHORTCOMINGS [KALORICHESKAIA PROBA, SOVREMENNYE VARIANTY EE PROVEDENIIA, DOSTOINSTVA I NEDOSTATKI]
N. C. BLAGOVESHCHENSKAIA (Akademiia Meditsinskikh Nauk, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Jan.-Feb. 1984, p. 6-13. In Russian. refs

The Fitzgerald and Hallpike (1942) caloric test and several recent modifications are reviewed. The rotative test and the air caloric test, which is especially valuable for calorization with dry perforations of the tympanic membrane, are described. The caloric test is much more informative than the rotative test, and has many advantages, primarily that it may be used for almost all patients, including comatose, and that only one labyrinth is stimulated. The decompensating stage of very different diseases can be characterized by the hyperreflex of caloric nystagmus, its asymmetry, arrhythmia, tonicity, and increased amplitude. A change in the culmination phase of the caloric nystagmus represented as isolated explosions of the 'flickering' nystagmus, and heightened sensory and vegetative responses may also characterize the decompensating stage. It is not so much the length of the nystagmus that has particular significance in central vestibular disturbances, but the change in its character. J.N.

A84-25600
INFLUENCE OF VESTIBULAR-ANALYZER HYPERSTIMULATION ON THE ADRENOCORTICOTROPHIC FUNCTION OF THE PITUITARY BODY AND THE ADRENAL CORTEX [VLIIANIE GIPERSTIMULIATSII VESTIBULIARNOGO ANALIZATORA NA ADRENOKORTIKOTROPNUIU FUNKTSIIU GIPOFIZA I KORY NADPOCHECHNIKOV]
IU REVSKOI, K., A. SH. ZAICHIK, and A. V. SOLOVEV (Leningradskii Pediatricheskii Meditsinskii Institut, Leningrad, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Jan.-Feb. 1984, p. 29-32. In Russian. refs

To explain the effect of alternating acceleration on the adrenocorticotrophic function of the pituitary body and the adrenal cortex, 105 healthy males between 18 and 20 years of age were subjected to testing in which stimulation of the vestibular apparatus, which causes motion sickness, was induced by continuous cumulation of Coriolis accelerations. By comparison with the control group not subjected to the accelerations, the accelerated individuals were characterized by lower resulting levels of ACTH, corticosterone, and 11-deoxycortisol in the blood plasma. Also, the levels of aldosterone measured 5, 30, and 120 after the end of the acceleration were higher than in the control group. The connection between the constitutional deficiency of the limbicoreticular complex and low vestibular stability is confirmed to a certain degree. J.N.

A84-25636
AGING AND THE HUMAN DIGESTIVE SYSTEM [PISHCHEVARITEL'NAIA SISTEMA CHELOVEKA PRI STARENII]
L. N. VALENKEVICH (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and A. M. UGOLEV (Leningradskii Pediatricheskii Meditsinskii Institut, Leningrad, USSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 45-53. In Russian. refs

The results obtained from an investigation of the effects of aging on the digestive system are discussed in relation to data in the literature. Changes that occur in regulatory systems are considered, as are adaptive processes. It is shown that along with changes in membrane hydrolysis and absorption, there is also an intensification of alteration processes and a disturbance of endoecology, motility, and other functional indicators of the digestive organs. C.R.

A84-25637
FEATURES OF ANAEROBIC ENERGY SUPPLY IN PHYSICAL LOADS IN INDIVIDUALS OF VARIOUS AGES [OSOBENNOSTI ANAEROBNOGO ENERGOOBESPECHENIIA FIZICHESKOI NAGRUZKI V RAZLICHNYE VOZRASTNYE PERIODY]
D. F. CHEBOTAREV, O. V. KORKUSHKO, and IU. T. IAROSHENKO (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 53-59. In Russian. refs

Gas analysis and spirometry are used in determining the threshold of anaerobic metabolism in healthy individuals ranging in age from 20 to 89. It is shown that in both men and women this threshold decreases with age in a systematic way. The size of the threshold is found to be closely related to the magnitude of the submaximal load and to the oxygen demand at the height of the load. In middle-aged individuals, anaerobic sources are tapped earlier, and the maximum anaerobic capacity is limited. In individuals ranging in age from 60 to 89 who exercise regularly and who have done so for a long time, the threshold is higher than for individuals of the same age who do not exercise. C.R.

A84-25639
MECHANISMS FOR THE INCREASE IN ARTERIAL PRESSURE IN OLD AGE [MEKHANIZMY POVYSHENIIA ARTERIAL'NOGO DAVLENIIA V STAROSTI]
A. V. TOKAR (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 64-69. In Russian. refs

The study is carried out on 168 individuals in good health ranging in age from 30 to 105. It is noted that a moderate increase in arterial pressure with age has a physiological basis. Hemodynamically, it is caused by an increase in the overall peripheral and elastic resistance of the arterial system. The decrease in cardiac output with age and the increase in the volume of the aortic hydroelastic reservoir serve to keep the arterial pressure within the limits of a relative physiological norm. Disturbances in the neurohumoral regulation of the arterial pressure level derive from a change in the sensitivity of the mechanical and chemical receptors of the vessels. They are also caused by a disruption of the relationship between renin activity and the concentration of aldosterone in the plasma and by an increase in the amount of intracellular sodium. It is noted that these reactions are physiologically expedient. C.R.

A84-25642
AGING AND THE HUMAN ORIENTING RESPONSE [ORIENTIROVOCHNYI REFLEKS PRI STARENII CHELOVEKA]
N. B. MANKOVSKII, I. N. KARABAN, and R. P. BELONOG (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Jan.-Feb. 1984, p. 81-85. In Russian. refs

The response is seen as a reflection of the functional activity of various structures in the corticosubcortical level; for this reason, it is investigated as an indicator of the brain's integrative activity. Polygraph studies are made of an orienting response that has several components in 147 healthy subjects ranging in age from 20 to 102. It is found that a hyporeactive response becomes more pronounced with age; there are intensive manifestations of the orienting response in the oldest subjects. A frequency-integrative analysis of the EEG component of the reaction and of the theta rhythm reveals pronounced differences with age in the role that the hippocampus plays in the motivation mechanisms of the orienting response. The analysis also shows a rearrangement with age in the activating systems of the reticulo-hypothalamo-hippocampal level which provide the external manifestations of reactions conforming to the situation and to the age of the individual. C.R.

A84-25761#
INVESTIGATION OF CHANGE OF MINERAL METABOLISM OF COSMONAUTS BY X-RAY FLUORESCENCE METHOD
J. BACSO, M. KIS-VARGA, P. KOVACS, J. PALVOLGYI, D. BERENYI (Magyar Tudomanyos Akademia, Atommag Kutato Intezet, Debrecen, Hungary), J. HIDEG (Hungarian People's Army, Medical Service, Budapest, Hungary), R. A. TIGRANIAN, and T. A. VITING (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Acta Physica (ISSN 0001-6705), vol. 53, no. 1-2, 1982, p. 159-164. refs

Micro-element determination was carried out in the blood serum and in the hair samples of the first Soviet-Hungarian space team, by using the techniques of X-ray fluorescence analysis. The concentration of Cl, K, Ca, Br, Cu and Zn was determined before and after the space flight. Author

A84-25775
MEDICATION AND FLYING: A PILOT'S GUIDE
S. R. MOHLER (Wright State University, Dayton, OH) Boston, Boston Publishing Co., 1982, 222 p. 60.

A comprehensive guide to the effects of medication on flying for all pilots is presented. Medications discussed include prescription and nonprescription drugs with their generic and trade names. Consideration is given to alcohol and nicotine, as well as illicit and disapproved drugs. Six categories of drugs in conjucntion with flying are presented: (1) permissible drugs, (2) permissible

drugs with approval, (3) drugs approved in individual cases, (4) drugs not permissible until treatment is discontinued, (5) drugs indicating a health condition that precludes safe flying, and (6) drugs with adverse effects that preclude safe flying. Finally a list is provided of the 200 most frequently used drugs and the number of mentions given to each drug. C.M.

A84-25918
ARTERIAL HYPERTENSION (A CLINICAL AND EXPERIMENTAL ANALYSIS) [ARTERIAL'NYE GIPERTONII /KLINIKO-EKSPERIMENTAL'NYI ANALIZ/]
I. I. ISAKOV Leningrad, Izdatel'stvo Meditsina, 1983, 200 p. In Russian. refs

The etiology and pathogenesis of the major forms of hypertension are described. Particular attention is given to the view shared by many clinicians that essential hypertension develops from a heightened level of blood output into the conducting arteries. It is noted that this view runs counter to that of Lang, who saw the disorder as developing from a heightened tonicity of the arterioles. In discussing these positions, an analysis is made of clinical and experimental data from a number of investigators who have studied regulatory mechanisms and the role played by smooth-muscle vascular cells in the formation of various forms of hypertension. C.R.

A84-25924
BIOLOGICAL RHYTHMS AND THE ORGANIZATION OF HUMAN LIFE IN SPACE [BIOLOGICHESKIE RITMY I ORGANIZATSIIA ZHIZNI CHELOVEKA V KOSMOSE]
B. S. ALIAKRINSKII Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii, Volume 46), 1983, 248 p. In Russian. refs

The organization of human activity in space is considered in relation to biorhythms. Evidence is presented in support of the contention that a disruption of circadian rhythms is a necessary part of the stress syndrome. Practical recommendations are made for organizing life in space in a way that prevents this disruption and ensures good health. C.R.

A84-25925
FUNCTION OF AUDITORY AND VESTIBULAR ANALYZERS UNDER THE EFFECT OF SPACE FLIGHT FACTORS [FUNKTSIIA SLUKHOVOGO I VESTIBULIARNOGO ANALIZATOROV PRI DEISTVII FAKTOROV AVIAKOSMICHESKOGO POLETA]
E. V. LAPAEV, IU. V. KRYLOV, and V. S. KUZNETSOV Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 47), 1983, 241 p. In Russian. refs

An investigation of the physiology of the auditory analyzer and of its reactions to the effects of various space flight factors is seen as an initial or intermediate step in establishing a basis for allowable noise levels in space flight. Auditory masking and auditory thresholds by pitch and intensity are studied and experimental methods for assessing acoustic effects on the human organism are described. The effect of high-intensity noise during active work in space flight and the effect of medium-intensity noise during the orbital phase of space flight on the auditory analyzer and the human body is studied. One of the most harmful results of noise effects is identified as the prevention of sleep. The function of the vestibular analyzer in a high-temperature environment is investigated, and the influences of weightlessness and hypodynamia are considered. An analysis of experimental data on the vestibular analyzer demonstrates that in the stimulation mechanisms of the cupulo-endolymphatic system in rotation, it is not the absolute value of the angular acceleration that has essential significance, but the difference of the tangential accelerations at various points in the semicircular canals. J.N.

A84-26188
STRENGTH AND CYCLE TIME OF HIGH-ALTITUDE VENTILATORY PATTERNS IN UNACCLIMATIZED HUMANS
T. B. WAGGENER, P. J. BRUSIL, R. E. KRONAUER, R. A. GABEL, and G. F. INBAR (Harvard University, Cambridge; Harvard University, Boston; U.S. Army, Research Institute of Environmental Medicine, Natick, MA; Technion - Israel Institute of Technology, Haifa, Israel) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 576-581. refs
(Contract NIH-2-R01-HL-1635-02; NIH-5-R23-HD-15732-02)

Breathing patterns at sea level and simulated altitudes of 8000, 9000, 11,000, and 14,000 feet were examined with magnetometers in 12 healthy supine young adults to determine how breathing pattern characteristics change with altitude. Periodic breathing, whose cycle time was 12 to 34 seconds, was strong enough to include apnea at minimum ventilation time for all subjects. The incidence of periodic breathing generally increased with greater altitude, and the periodic pattern's cycle time increased as the pattern became stronger. After normalizing to a standard pattern strength, cycle time decreased as altitude increased. During the second part of the study conducted three weeks later and involving seven of the original subjects, the standard cycle time at 14,000 feet for each subject was the same as the initial experimental recording within on average six percent. At 11,000 feet, subjects reproduced their cycle times within on average nine percent. It is suggested that under less stressful conditions, ventilation response is more flexible and consequently produces more variability in the cycle time of breathing patterns. C.M.

A84-26189
HYPOCAPNIA AND SUSTAINED HYPOXIA BLUNT VENTILATION ON ARRIVAL AT HIGH ALTITUDE
J. K. ALEXANDER, R. F. GROVER, R. E. MCCULLOUGH, R. G. MCCULLOUGH, L. G. MOORE, J. B. SAMPSON, J. V. WEIL, J. T. REEVES (Colorado, University, Denver, CO; U.S. Army, Research Institute of Environmental Medicine, Natick, MA; Baylor University, Houston, TX), S. Y. HUANG, and J. T. MAHER Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 602-606. refs
(Contract NIH-HL-14985; DAMD-81-C-1057)

The hypoxic ventilatory responses of 12 subjects at low altitudes were compared with ventilation at high altitude to determine the inhibitory responses that initially affect ventilatory response after arrival at high altitude. Experimental conditions consisted of isocapnic hypoxia and poikilocapnic hypoxia during acute and sustained hypoxia in Denver (1600 m) with ventilations also measured for five days on Pikes Peak (4300 m). On the first day at Pikes Peak, ventilation was less than predicted by acute isocapnic and poikilocapnic tests. However, similar results for the first day were obtained in Denver for sustained poikilocapnic hypoxia. During the fourth and fifth day on Pikes Peak, endtidal PCO2, pHa, and Sa O2 leveled out, and ventilation response (12.4 1/min, BTPS) concurred with isocapnic test predictions. It is suggested that the combination of hypocapnia and sustained hypoxia limited the ventilatory increase on the first day at Pikes Peak but did not interfere after four or five days of acclimatization. C.M.

A84-26190
EFFECTS OF ENDURANCE EXERCISE ON METABOLIC WATER PRODUCTION AND PLASMA VOLUME
J. M. PIVARNIK, E. M. LEEDS, and J. E. WILKERSON (Indiana University, Bloomington, IN) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 613-618. refs

Six endurance-trained and heat-acclimatized adult males ran for 1 h (or until exhaustion) at room temperature (23.8 C) on three occasions. The work loads approximated 37, 56, and 74 percent of the subjects' aerobic capacities. Venous blood samples were drawn, and urine was collected before and immediately after each exercise bout. Metabolic cost was partitioned by energy substrate, and metabolic water production was quantified from

urinary nitrogen, oxygen, and carbon dioxide production. Total body water loss was recorded as the decrease in body weight during the exercise. All subjects completed 1 h of exercise at the two lower exercise intensities but, due to exhaustion, averaged only 35.5 min at the highest work intensity. There were no significant changes in plasma volume after the exercise bouts. Metabolic water production increased with increasing work intensity as did the fraction of total caloric expenditure derived from carbohydrate metabolism. Plasma protein content significantly increased at all levels of exercise intensity. Metabolic water production alone would be of minimal help in plasma volume maintenance and thermoregulation during endurance exercise. Author

A84-26193
HYPOXIA ALTERS BLOOD COAGULATION DURING ACUTE DECOMPRESSION IN HUMANS
H. M. OBRODOVICH, M. ANDREW, G. W. GRAY, and G. COATES (McMaster University; Chedoke-McMaster Hospitals, Hamilton; Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 666-670. Research supported by the Ontario Heart Foundation; Medical Research Council of Canada. refs
(Contract MRC-MA-7486)

A study was conducted to determine if shortening of the activated partial thromboplastin time (APTT) associated with acute decompression is caused by hypoxia or hypobaria. Three male and three female adults (27-42 years old) were exposed on three different occasions to two hours of hypoxic hypobaria (410 torr, n = 5), hypoxic normobaria (fractional inspired O2 tension = 0.11, n = 4), or normoxic hypobaria (410 torr breathing supplemental O2, n = 5). The APTT was stable during normoxic hypobaria but shortened during hypoxic hypobaria and hypoxic normobaria. Results show shortened APTT accompanied by a 50 percent increase in factor VIII:C without an increase in VIII-related antigen level (VIII:Ag). It is concluded that hypoxia shortens APTT and that an increase in plasma VIII:C-like activity is the probable effector. C.M.

A84-26194
HEAT PRODUCTION DURING SLEEP
C. M. SHAPIRO, C. C. GOLL, G. R. COHEN, and I. OSWALD (Edinburgh, University; Glasgow University, Glasgow, Scotland) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 671-677. refs

Heat production during sleep was studied by continuous indirect calorimetry with simultaneous electroencephalographic monitoring. Controlling for gross influences on heat production, comparisons of heat production during different sleep stages showed heat production in stage 4 sleep to be significantly lower than in other sleep stages. There appeared to be a gradation in heat production in non-rapid-eye-movement stages of sleep with stage 2 higher and stage 4 lower than stage 3. Heat production in stage 4 was less variable than in any other sleep stage. Both the level and variability of heat production was similar in stage 2 and rapid-eye-movement sleep. Heat production during the night was 9 percent lower than during resting wakefulness. The average heat production in stage 4 sleep was 14.4 percent lower than resting wakeful values. Author

A84-26195
HEMODYNAMIC AND METABOLIC RESPONSES TO EXERCISE AFTER ADRENOCEPTOR BLOCKADE IN HUMANS
A. A. MCLEOD, J. E. BROWN, B. B. KITCHELL, F. A. SEDOR, C. KUHN, D. G. SHAND, and R. S. WILLIAMS (Duke University, Medical Center, Durham, NC) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 716-722. Research supported by the Pepsico Foundation. refs
(Contract NIH-HL-25146)

The effects of acute alpha1-adrenoceptor blockade with prazosin, beta1-adrenoceptor blockade with atenolol, and nonselective beta-adrenoceptor blockade with propanol on hemodynamic and metabolic responses were compared in six male subjects (25-35 years old) after two hours of prior intensive exercise to produce skeletal muscle glycogen depletion and to increase dependence on hepatic glucose output and circulating free fatty acids (FFA). Parameters measured were plasma catecholamines, glycogen, glucose, and FFA levels, and systolic and diastolic blood pressures. Results showed a difference in the hemodynamic effects of beta1-selective vs. nonselective beta-blockade during exercise after skeletal muscle glycogen depletion, and the importance of beta2-mediated hepatic glucose production for the maintenance of glucose levels during exercise. In the absence of beta2-receptors, after acute alpha2-blockade with prazosin increased catecholamines, the plasma glucose level rose. It is suggested that alpha1-mediated hepatic glucose production is not significant during exercise in humans. C.M.

A84-26196
HORMONAL FACTORS IN REDUCED POSTPRANDIAL HEAT PRODUCTION OF EXERCISE-TRAINED SUBJECTS
J. LEBLANC, P. DIAMOND, J. COTE, and A. LABRIE (Universite, Laval, Quebec, Canada) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 772-776. Research supported by the Department of National Defence of Canada. refs

The influence of exercise training on postprandial heat production was investigated in human subjects. Whereas resting metabolic rate was comparable for trained and nontrained subjects, the heat increment of feeding (HIF) after subjects consumed a meal containing 755 kcal was approximately 50 percent smaller in the trained subjects. Measurements of respiratory quotient also indicated a reduction of about 50 percent in glucose oxidation associated with exercise training. The levels of plasma norepinephrine increased significantly (P less than 0.01) from 200 to 300 pg/ml in the sedentary subjects, but the changes observed in trained subjects were not significant. The postprandial heat production was diminished in exercise-trained subjects, and it is suggested that this could be related to a reduced activity of the sympathetic nervous system. Another possibility is that this reduction in HIF is related to a facilitation of glucose disposal in the form of glycogen rather than in the form of lipids. Author

A84-26197
BREATHING PATTERN IN HUMANS - ELEVATED CO2 OR LOW O2 ON POSITIVE AIRWAY PRESSURE
J. A. HIRSCH and B. BISHOP (New York, State University, Buffalo, NY) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 777-784. refs
(Contract NIH-P01-HL-14414; F41609-75-C-003)

The effects on breathing patterns of pressure breathing alone and combined with chemical stimulation were studied in eleven women and seven men (19-52 years old). Ventilatory responses to positive pressure breathing (PPB) in subjects breathing air, 12 percent O2, or elevated CO2 were measured. PPB in subjects breathing air increased minute ventilation (VI), tidal volume (VT), breathing frequency (F), mean inspiratory (VT/TI) and expiratory (VT/TE) flows, and decreased expiratory duration, and end-tidal CO2. When responses to either stimulus alone were summed, the predicted values were less than the actual observed results for VT, F, VT/TI, VT/TE during three and five percent CO2, and for VT, F, and VT/TE during isocapnic hypoxia. It is suggested that the integration of sensory information initiated by the combination of PPB and chemical stimuli is a process that involves multiple sites within the brain. C.M.

A84-26198
LASER-DOPPLER MEASUREMENT OF SKIN BLOOD FLOW - COMPARISON WITH PLETHYSMOGRAPHY
J. M. JOHNSON, W. F. TAYLOR, A. P. SHEPHERD, and M. K. PARK (Texas, University, San Antonio, TX) Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology (ISSN 0161-7567), vol. 56, March 1984, p. 798-803. Research supported by the American Heart Association. refs
(Contract NIH-HL-20663)

Plethysmographic and laser-Doppler velocimetric measurements of skin blood flow (SBF) changes were compared in five studies on four men. Laser-Doppler blood flow (LDF) correlated well with total forearm blood flow (FBF) within each study ($r = 0.94$-0.98), but the relationship differed among the studies. The slopes for LDF vs. FBF ranged from 40 to 122 mV/ml 100 ml min. When LDF was measured at six sites on the forearms of each subject, regional variation had 1.8- to 5.7-fold ranges. However, during occlusion, LDF values of the forearm were more consistent within and between subjects. It is concluded that LDF provides a good indicator of SBF response from the illuminated skin region, but that the variable relationship to total SKB, and the uncertain LDF values at zero SBF prevent the technique's quantitative use. C.M.

A84-26376#
RECENT ADVANCES IN DIAGNOSTIC TECHNIQUES IN CARDIOLOGY
M. L. BHATIA (All India Institute of Medical Sciences, New Delhi, India) Aviation Medicine, vol. 27, Dec. 1983, p. 76-84.

Cardiology diagnostic techniques reviewed include exercise stress testing, ambulatory ECG monitoring, echocardiography, and radionuclide studies. The value of exercise stress testing for diagnosing ischemic heart disease is maintained, and the test features that indicate severity of the heart's condition (e.g., ST segment elevation and R wave amplitude) are discussed. Applications of ambulatory ECG monitoring are examined and include diagnosing myocardial ischemia and detecting PVCs. The cardiac disease abnormalities that are evaluated by echocardiography, and the advantages of radionuclide ventrilography (RNV) are listed (e.g., noninvasiveness and nonproduction of ventricular ectopic activity). Two methods of RNV, first pass method and equilibrium gated RNV, are compared. Also discussed are myocardial perfusion imaging with thallium-201, myocardial infarct scintigraphy with radiopharmaceuticals, and digital subtraction angiobraphy. C.M.

A84-26377#
A STUDY OF PRE-EXCITATION SYNDROME IN HEALTHY AIRCREW
S. M. OSAMA (Air Force Central Medical Establishment, New Delhi, India) and S. K. PRASHAR (Army Hospital, Delhi, India) Aviation Medicine, vol. 27, Dec. 1983, p. 85-92. refs

The preexcitation syndrome (PES) was studied in 14 aircrew members at the Indian Air Force Central Medical Establishment, New Delhi, between 1973 and 1982. The group was comprised of 12 asymptomatic cases, one case with a single palpitation episode, and one case that had developed giddiness. Initially, ischemic heart disease had been diagnosed in 50 percent of the cases, and abnormal stress test responses had been reported in 50 percent of the group. Final diagnosis was three cases of Lown-Ganong-Levine Syndrome and eleven cases of Wolf-Parkinson-White Syndrome. It is suggested that asymptomatic personnel showing PES on routine ECG for the first time be subjected to detailed clinical examination. In other instances ECG should be recorded at rest and after exercise, and 24 hour ambulatory monitoring should be conducted. In conclusion stress tests are considered not to give additional information concerning PES. C.M.

A84-26378#
PROBLEMS IN AERO-MEDICAL EVALUATION - SICK SINUS SYNDROME
K. V. S. MANI, P. M. SUNDARAM, M. RAJ (Directorate of Medical Services, New Delhi, India), and A. S. KASTHURI (Directorate General of Armed Forces, Medical Services, New Delhi, India) Aviation Medicine, vol. 27, Dec. 1983, p. 93-98. refs

Sick sinus syndrome (SSS) is examined in three case reports, and developments in electrocardiology are briefly reviewed. Though SSS is more frequent in the elderly, the pilots in the case reports are between 25 and 30 years old. The first SSS case was asymptomatic and otherwise clinically normal. The second case was related to a tuberculosis infection, and the third case illustrated the flight safety hazards caused by aircrew reticence to disclose symptoms. A high degree of suspicion and a systematic approach are deemed essential for diagnosing SSS. In addition, scalar electrocardiography (ECG), electrophysiological studies, and dynamic ECG with a Holter monitor and telemetry are recommended as evaluation methods. C.M.

A84-26379#
MITRAL VALVE PROLAPSE - AN AERO MEDICAL PROBLEM
M. M. SINGH (Air Force Central Medical Establishment, New Delhi, India), S. SINGH (Air Force Hospital 5, Jorhat, India), J. S. KULKARNI (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), V. M. ALURKAR, and J. VASUDEVAN (Indian Air Force, Command Hospital, Bangalore, India) Aviation Medicine, vol. 27, Dec. 1983, p. 99-104. refs

Mitral valve prolapse (MVP) was studied in twelve Indian Air Force personnel at the Institute of Aviation Medicine, Bangalore. Eight subjects with a mean age of 24 years were from the flying branch, and four subjects with a mean age of 39 years were from the ground duty branch. All subjects except one exhibited mid to late systolic murmur in the apical region and/or along the left sternal region. Click was heard in 75 percent of the experimental group and ECG abnormality (i.e., T wave changes in inferolated leads or cardiac arrhythmias) was detected in 58 percent. Twenty-five percent of MVP was attributed to papillary dysfunction due to coronary heart disease. Echocardiography detected MVP in 83 percent of the experimental group, and left ventricular angiogram confirmed the MVP diagnosis in 50 percent. The importance of MVP diagnosis in flying air force personnel is stressed, since the effects of +G on the ventricle can compromise the performance of normally asymptomatic individuals. C.M.

A84-26380#
EXERCISE UNDER HYPOXIA - A STRESS TEST FOR EVALUATION OF CASES WITH ISCHAEMIC HEART DISEASE FOR REHABILITATION
M. AKHTAR (Air Force Hospital, Kanpur, India) and P. C. CHATTERJEE (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 27, Dec. 1983, p. 105-110. refs

A hypoxic stress test at the Institute of Aviation Medicine, Bangalore, is used to successfully evaluate the working capability of individuals rehabilitated from ischemic heart disease and myocardial infarction. Drugs, dietetic restriction, normal response to maximal treadmill exercise, and risk factor correction preceded the Double Master Two Step exercise at a simulated altitude of 15,000 feet. Positive results occurred in 22.99 percent of the 187 air force servicemen tested. The individuals that passed the test and were consequently assigned to strenuous duties, including duties in mountainous regions, have not exhibited any clinical or electrocardiographic deterioration for periods up to and exceeding five years. C.M.

A84-26382#
HIGH SUSTAINED POSITIVE G - FUTURE PROBLEMS AND SOLUTIONS
K. RAI (Indian Air Force, Central Air Command, New Delhi, India) Aviation Medicine, vol. 27, Dec. 1983, p. 115-122. refs

Research at the Institute of Aviation Medicine, Bangalore, on positive pressure breathing (PPB) illustrates the benefits of using

20 mm Hg PPB as a protective technique during sustained high G with ten experienced fighter pilots (21-35 years old) exposed to +Gz on a human centrifuge. While 10 mm Hg PPB does not provide additional protection with the partial pressure (PP) suit, 20 mm Hg PPb does increase protection by 0.44 G. Compared to 20 mm Hg, 30 mm Hg PPB supplies an additional protection of .36 G, a valuable gain for aircraft missions requiring long periods of high G protection. Though nine out of the ten pilots prefer 20 mm Hg over 30 mm Hg PPB because of transmitting problems with the latter, both types of PPB are preferred over PP suits, which increase fatigue and cause discomfort. C.M.

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EYE SPECTRAL SENSITIVITY AND ITS VARIATION WITH LUMINANCE LEVEL

P. W. TREZONA and J. LAYCOCK Farnborough, England RAE 16 May 1983 39 p refs

(RAE-TR-83043; RAE-FS(F)-205; BR88788) Avail: Issuing Activity

The variance of the human eyes' luminous efficiency, V (lambda) over the luminance range of emissive display devices was tested. Experiments on a 2 deg field, with a dark surround, were performed on 4 normal observers to determine the spectral sensitivity curve at each of 5 luminance levels ranging from 1 to 2000 fL. Spectral sensitivity curves used the flicker photometry method, and at 1 fL yield a curve similar to V (lambda) but higher for blues and greens. At 10 fL there is a marked decrease in red sensitivity and at 100 fL a much smaller decrease in green sensitivity. Curves at the higher levels are much narrower and more pointed than V (lambda) and show much lower precision and greater observer variability. Observer variation is greatest for blue wavelengths.

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ERGO-OPHTHALMOLOGICAL ASPECTS OF THE VDU: VISUAL STRAIN AND THE BLUE LIGHT LESION

L. BARCA and F. PASSANI Oct. 1983 13 p refs Transl. into ENGLISH from Atti della Fond. Giorgio Ronchi (Italy), Vol. 31, No. 1, 1982 p 107-115

(DRIC-T-6921; BR89834) Avail: Issuing Activity

Factors responsible for the sensation of weariness, visual fatigue and discomfort claimed by operators of visual display units after prolonged periods of watching the screen are discussed. The spectral emissions of the phosphors used are examined. Their potential risk, and the so-called blue light lesion, are considered.

Author (ESA)

N84-18894# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

AIRBORNE PENETRATION OF RADIOACTIVE CLOUDS M.S. Thesis

T. R. KLING Mar. 1983 93 p

(AD-A135848; AFIT/GNE/PH/83M-7) Avail: NTIS HC A05/MF A01 CSCL 18H

This report evaluates the threat to aircrew members when their aircraft approaches and subsequently penetrates a descending radioactive cloud generated by a nuclear weapon surface burst. The re-development of Hickman's program consists of a remodeling of the computational methods for sky-shine dose and cloud model. The code also computes the ionizing dose rate an air crew member receives when flying through the radioactive cloud as a function of time. The code computes the doses by considering the cloud size, the aircraft's transit time, the ingestion rate of radioactive particles, the aircraft's distance to the burst, and the aircraft's altitude. A simple extension of the computer code computes the dose received from multiple bursts. The results show that at 9500 meters (about 31,000 feet), the total dose to each aircrew member is about 5 rem after flying through the cloud 1 hour after cloud stabilization. The multiple burst dose is approximately 204 rem under the same conditions as the single burst case. Both the single and multiple burst case use a mission completion time of 8 hours after entering the cloud. GRA

N84-18895# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.

ANALYSIS OF THE KINEMATIC PROPERTIES DATA OF THE SHOULDER COMPLEX DURING FORCED MOTION Final Report, 1 Jan. - 31 Jul. 1982

A. E. ENGIN Wright-Patterson AFB, Ohio AMRL Aug. 1983 59 p

(Contract F33615-81-C-0500; AF PROJ. 7231)

(AD-A135913; AFAMRL-TR-83-067) Avail: NTIS HC A04/MF A01 CSCL 06B

This report, first, presents a brief introduction dealing with kinematics measured by means of sonic emitters and a special application of this technique to the shoulder complex. This is followed by a presentation of a new data collection methodology and analysis of the sonic emitters data by utilization of the three most accurate sonic emitters out of six located on the arm cuff of the test subject. Numerical results are provided for three male subjects in the form of plots showing passive resistance of the shoulder complex as functions of drawer displacements of the upper arm for its several orientations with respect to the torso.

Author (GRA)

N84-18896# California Univ., Irvine, Dayton, Ohio.

TOXIC HAZARDS RESEARCH UNIT REPORT, 1983 Annual Technical Report, Jun. 1982 - Jun. 1983

J. D. MACEWEN and E. H. VERNOT Wright-Patterson AFB, Ohio Aerospace Medical Research Lab. Oct. 1983 224 p

(Contract F33615-80-C-0512; AF PROJ. 6302)

(AD-A136170; AFAMRL-TR-83-64; ATR-20) Avail: NTIS HC A10/MF A01 CSCL 06T

The research program of the Toxic Hazards Research Unit (THRU) for the period of June 1982 through May 1983 is reviewed in this report. Chronic toxicity and oncogenic studies were carried out with hydrazine, Otto Fuel 2, JP-7, JP-8, and JP-TS. A series of acute toxicity studies was conducted on a variety of chemicals and chemical agents used by the Army, Air Force, and Navy. Neurotoxicity and subchronic inhalation studies were conducted on several hydraulic fluids. GRA

N84-18897# SRI International Corp., Menlo Park, Calif. Life Sciences Div.

NEUROPHYSIOLOGICAL BASES OF EVENT-RELATED POTENTIALS Annual Report, 1 May 1982 - 30 Apr. 1983

C. S. REBERT, W. J. DONOVAN, K. H. PRIBRAM, and J. E. EVANS Jun. 1983 81 p Prepared in cooperation with Stanford Univ.

(Contract F49620-82-K-0016; AF PROJ. 2313)

(AD-A135263; AFOSR-83-0902TR; AR-1) Avail: NTIS HC A05/MF A01 CSCL 06P

In order to more fully understand the physiological and psychological significance of event-related potentials, cortical and subcortical recordings are being obtained form monkeys performing in operant-conditioning tasks, Six animals were trained on initial phases of the cued reaction-time task at SRI International and were subsequently implanted with electrodes capable of recording transient and sustained evoked potentials and massed-unit activity. Two monkeys were trained on initial phases of an oddball task at Stanford University, and electrodes are being prepared so that the subcortical generators of the P300 wave can be assessed in these animals. An LSI-11/23 computer system was installed at SRI to implement the cued reaction-time task and to collect event-related potentials. Preliminary recordings of slow potentials and massed-unit activity were collected from the lateral geniculate nucleus of one cat to evaluate the performance of modified amplifiers, and transient (P300) and sustained (contingent negative variation) evoked potentials were recorded from the scalps of human subjects to confirm appropriate performance of the laboratory system. : Author (GRA)

N84-18898# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
ANTHROPOMETRIC AND MASS DISTRIBUTION CHARACTERISTICS OF THE ADULT FEMALE
J. W. YOUNG, R. F. CHANDLER, C. C. SNOW, K. M. ROBINETTE (AFAMRL), G. F. ZEHNER (Anthropology Research Project, Inc.), and M. S. LOFBERG (USAF Hospital George) 1983 109 p Sponsored in part by National Highway Traffic Safety Administration
(AD-A135316; FAA-AM-83-16) Avail: NTIS HC A06/MF A01 CSCL 06N

This study of 46 living adult females is part of a long-range research program designed to establish valid analytical relationships between readily measured body dimensions and mass distribution characteristics of living populations. Presented in this report are data describing the mass distribution characteristics of primary and composite body segments. The report also contains sets of regression equations which can be used to predict segmental volumes and moments of inertia from anthropometric data. The data base is derived from both classical anthropometric measurements and from stereophotogrammetric techniques. Subjects were representative of a general United States population as defined by the 1971-74 Public Health Service, Health and Nutrition Examination Survey (HANES). The data obtained described segment and segment composite volumes, centers of volume, intersegment cut centroids, principal inertial axes, and surface anatomical landmarks with respect to anatomical axes developed for each segment. Experiments designed to test the validity of research techniques and controls, and to measure the differences between stereophotometrically derived values and values obtained by direct measurement techniques are also described here. GRA

N84-18899# EEG Systems Lab., San Francisco, Calif.
SINGLE TRIAL BRAIN ELECTRICAL PATTERNS OF AN AUDITORY AND VISUAL PERCEPTUOMOTOR TASK Interim Progress Report, 22 Feb. 1982 - 1 Jun. 1983
A. S. GEVINS, S. L. BRESSLER, B. A. CUTILLO, J. C. DOYLE, R. S. TANNEHILL, and G. M. ZEITLIN Jun. 1983 91 p
(Contract F49620-82-K-0006; AF PROJ. 2313)
(AD-A135545; AFOSR-83-1014TR) Avail: NTIS HC A05/MF A01 CSCL 06P

This past year the proposed auditory-visual preceptuomotor paradigm was designed and implemented, and 12 twenty-one channel pilot recordings were conducted. The objective was to compare spatiotemporal brain-potential patterns associated with: (1) the preparation to receive auditory or visual numeric stimuli, and (2) the processing of auditory and visual numeric stimuli. A bimodal paradigm sufficiently controlled for the application of a 49 channel Neurocognitive Pattern (NCP) Analysis has been finalized and participant screening sessions have begun. Sections 3 and 4 of this Interim Progress Report are comprised of publihsed (Science, 220:97-99, 1983) and in preparation papers describing our recent visuospatial move/no-move study. The results of further signal processing studies on that data are described in Sections 5 and 6. GRA

N84-18900# European Space Agency, Paris (France).
MICROGRAVITY AS AN ADDITIONAL TOOL FOR RESEARCH IN HUMAN PHYSIOLOGY WITH EMPHASIS ON SENSORIMOTOR SYSTEMS
G. CLEMENT (CNRS, Paris) and J. DROULEZ (CNRS, Paris) Sep. 1983 54 p refs
(Contract ESA-82/17; ESA-82/18)
(ESA-BR-15; ISSN-0250-1589) Avail: NTIS HC A04/MF A01; ESA, Paris FF6 Member States, AU, CN and NO (+20% others)

Research in sensory systems (visual, vestibular, auditory and perception systems) and sensorimotor functions (sensorimotor coordination, balance, orientation, fatigue, motion sickness) as well as equipment to be deployed in the Spacelab Anthrorack are described. Past investigations on human sensorimotor system and the status of ground based microgravity simulation studies and techniques are reviewed. Measurements to be carried out during spaceflights, and stimuli to be applied to the human test subject are listed. Author (ESA)

N84-20133* National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: 1983 CUMULATIVE INDEX
Jan. 1984 428 p
(NASA-SP-7037(170); NAS 1.21:7037(170)) Avail: NTIS HC $10.00 CSCL 06E

This bibliography is a cumulative index to the abstracts contained in NASA SP-7037 (158) through NASA SP-7037 (169) of Aeronautical Engineering: A Continuing Bibliography. NASA SP-7037 and its supplements have been compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA) and the National Aeronautics and Space Administration (NASA). This cumulative index includes subject, personal author, corporate source, contract, report number, and accession number indexes. Author

N84-20134* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 255)
Feb. 1984 86 p
(NASA-SP-7011(255); NAS 1.21:7011(255)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 278 reports, articles and other documents introduced into the NASA scientific and technical information system in January 1984. Author

N84-20135*# Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.
RESEARCH OPPORTUNITIES IN MUSCLE ATROPHY Final Report
G. J. HERBISON and J. M. TALBOT Jan. 1984 89 p refs
(Contract NASW-3728)
(NASA-CR-175422; NAS 1.26:175422) Avail: NTIS HC A05/MF A01 CSCL 06P

A trophy of skeletal muscle; muscle a trophy associated with manned space flight; the nature, causes, and mechanisms of muscle atrophy associated with space flight, selected physiological factors, biochemical aspects, and countermeasures are addressed. N.W.

N84-20136# Norwegian Defence Research Establishment, Kjeller. Toxicology Div.
A STUDY ON THE GASTROINTESTINAL HORMONES AND THE GASTRIC ACID SECRETION DURING PHYSICAL STRESS IN MAN
O. OKTEDALEN 15 Dec. 1983 61 p refs
(NDRE/PUBL-83/1001; ISSN-0085-4301) Avail: NTIS HC A04/MF A01

The influence of physical stressors on the secretion of gastric acid and on the blood levels of gastrointestinal peptides that control the functions of the digestive process were investigated. Since peptic ulcer disease in many ways was linked to an increase in the gastric acid, the peptide levels that are know to regulate the gastric acid secretion (gastrin) were measured, and the influence of gastric acid produced (secretin, group I pepsinogins) was studied. The blood levels of gastrointestinal peptides that have possible metabolic influence (vasoactive intestinal polypeptide and human pancreatic polypeptide) were measured.

N84-20137# Norwegian Defence Research Establishment, Kjeller. Toxicology Div.

GENERAL INTRODUCTION TO THE STUDY ON THE GASTROINTESTINAL HORMONES AND THE GASTRIC ACID SECRETION DURING PHYSICAL STRESS IN MAN

O. OKTEDALEN *In its* A Study on the Gastrointestinal Hormones and the Gastric Acid Secretion During Phys. Stress in Man p 9-41 15 Dec. 1983 refs

Avail: NTIS HC A04/MF A01

The effect of prolonged physical stress and absolute fasting on the blood levels of gastrointestinal peptides and the secretion of gastric acid were studied. Especial attention was paid to peptide levels that influence, or are influenced by, the secretion of gastric acid (gastrin, secretin, pepsinogens I), or that probably have metabolic function (vasoactive intestinal polypeptide, pancreatic polypeptide). The hyperchlorhydria was not caused by the gastrin hormone, but the hypersecretion of gastric acid could account for approximately fifty per cent of the hypersecretinemia found during the stress. High plasma levels of secretin were also found during a 4 to 5 day period of absolute fasting. The high plasma levels of vasoactive intestinal polypeptide (VIP) were not influenced by the gastric acid secretion. Instead, the results indicated the VIP is a peptide of substrate need. The high fasting serum levels of human pancreatic polypeptide were modified by nutrient ingestion both during physical stress and absolute fasting. Author

N84-20138# Norwegian Defence Research Establishment, Kjeller. Toxicology Div.

THE EFFECT OF PHYSICAL STRESS ON GASTRIC SECRETION AND PANCREATIC POLYPEPTIDE LEVELS IN MAN

O. OKTEDALEN, I. GULDVOG (National Hospital, Oslo), P. K. OPSTAD, A. BERSTAD (Lovisenberg Hospital, Oslo), D. GEDDE-DAHL (Diakonhjemmet Hospital, Oslo), and R. JORDE (Trome Univ. Hospital) *In its* A Study on the Gastrointestinal Hormones and the Gastric Acid Secretion During Phys. Stress in Man p 91-113 15 Dec. 1983 refs Sponsored in cooperation with the Norwegian Military Academy and the Norwegian Joint Medical Service

Avail: NTIS HC A04/MF A01

Twelve healthy subjects were exposed to a 4-day period of hard physical exercise, calorie supply deficiency, and severe sleep deprivation. The basal acid output (BAO), the sham-feeding induced acid output MAO (sub Sh) and the pentagastrin stimulated acid output MAO (sub Pg) were measured immediately after this stress period and in a control experiment performed several weeks later. The stress induced a 3-fold increase in the median BAO, an increase (p 0.05) in the MAO (sub Sh), which, however, was not significantly elevated when basal-subtracted. MAO (sub Pg) was unchanged. In contrast to acid, pepsin output was not influenced by stress. The human pancreatic polypeptide (hPP) level in serum increased 2-fold after the stress. The integrated hPP response induced by modified sham-feeding was higher ($p=0.02$) after the stress than in the control experiment. The results show that physical stress has separate influence on the gastric secretion of acid and pepsin. Author

N84-20139# Naval Postgraduate School, Monterey, Calif.

A MATHEMATICAL MODEL FOR OXYGEN TOXICITY IN MAN M.S. Thesis

L. W. SIMMONS Sep. 1983 68 p

(AD-A137379) Avail: NTIS HC A04/MF A01 CSCL 12A

In this thesis, mathematical models are established for the development of oxygen toxicity in divers. The study endeavors to derive the shape of the oxygen tolerance curve in terms of depth-time limitations by statistical analysis of existing data. By assuming a known distribution for the time-to-serious-symptom, mathematically predictive models are developed which allow a greater degree of predictability in mission profiles and allow the associated risk to divers to be evaluated. GRA

N84-20140# Army Research Inst. of Environmental Medicine, Natick, Mass.

PHYSIOLOGICAL, BIOMECHANICAL, AND MEDICAL ASPECTS OF LIFTING AND REPETITIVE LIFTING: A REVIEW

J. KNAPIK Nov. 1983 53 p

(Contract DA PROJ. 3E1-62777-A-845)

(AD-A136689; USARIEM-T-7/83) Avail: NTIS HC A04/MF A01 CSCL 06S

The literature relating to physiological and medical aspects of lifting and repetitive lifting is reviewed. Studies on maximal lifting capacity and maximal acceptable lift (MAL, the amount of weight that can be lifted repetitively over an 8h period) show that as the height to which the load is lifted increases, the amount of weight lifted decreases. As lifting frequency increases, MAL decreases but power output increases. MAL of females is 50 - 70% of male values. Cardiorespiratory and metabolic studies demonstrates that VO2, HR, VE, and ratings of perceived exertion increase in a linear manner with increases in the load or frequency of lifting. The mechanical efficiency of repetitive lifting is 6-7%. MAL does not change with changes in the length or height of the load but as the load width increases, MAL decreases. VO2 and HR increase with increasing load length or width. A biomechanical model for estimation of forces and torques at various joints is presented. Compressive forces on the L5/51 spinal segment are less for the squat lift (straight back, bent knees) than the stoop lift (straight back, bent knees). The free style and stoop techniques result in lower energy expenditures and higher power outputs than the squat. GRA

N84-20141# Technology, Inc., San Antonio, Tex. Life Sciences Div.

N1 AND P1 COMPONENTS OF THE VISUAL EVOKED RESPONSE IN HUMANS. A TOPOGRAPHICAL AND FUNCTIONAL COMPARISON Final Report, 1 Jan. - 1 May 1983

F. H. PREVIC, D. L. SCHAFER, C. A. SPENCER, and J. A. CHAMBERS Nov. 1983 15 p

(Contract F33615-80-C-0610; AF PROJ. 7757)

(AD-A137030; TR-118B-6183; SAM-TR-83-44) Avail: NTIS HC A02/MF A01 CSCL 06P

The N1 and P1 components of the visual evoked response (VER) in humans were compared along several dimensions. To elicit the VER, square-wave gratings were presented in pattern-appearance/disappearance and phase-reversal stimulation modes. The gratings varied in terms of contrast, spatial and temporal frequency, and the region of the visual field in which they were presented. The results of these experiments indicated that the N1 and P1 components of the human VER possess similar functional and topographical characteristics, and may reflect a common neural origin. GRA

N84-20142# Catholic Univ. of America, Washington, D.C. Human Performance Lab.

PATTERN-DIRECTED ATTENTION IN UNCERTAIN FREQUENCY DETECTION

J. H. HOWARD, JR., A. J. OTOOLE, R. PARASURAMAN, and K. B. BENNETT 14 Oct. 1983 41 p

(Contract N00014-79-C-0550; NR PROJ. RR0-4209)

(AD-A135905; TR-83-22-ONR) Avail: NTIS HC A03/MF A01 CSCL 05J

The role of early pattern components as cues in uncertain frequency detection was investigated in four probe-signal experiments. Listeners heard consecutive presentations of a 12-tone pattern in a noise background. One presentation of the pattern was complete whereas the other was missing the eleventh(primary) tone. Listeners were required to indicate which presentation was complete. On 20% of the test trails, the eleventh component of the complete pattern was replaced with one of four probe tones. The results indicated that listeners were more sensitive to the primary tone than to probe tones but this selective sensitivity changed on a trail-by-trail basis as a function of the attentional cues provided by early pattern components. The data suggested two cue functions: (1) an informational function in providing

information regarding which primary tone is likely to occur on a given trail, and (2) a frequency function that automatically directs listening to an appropriate frequency range and narrows or fine tunes the listening band. GRA

N84-20143# Naval Aerospace Medical Research Lab., Pensacola, Fla.

ULTRASTRUCTURAL EVALUATION OF THE RETINA IN RETINOPATHY OF PREMATURITY AND CORRELATIONS WITH VITAMIN E THERAPY Interim Report

W. A. MONACO 3 Aug. 1982 21 p

(AD-A135929; NAMRL-1294) Avail: NTIS HC A02/MF A01 CSCL 06E

Histological evidence of retinal damage associated with the clinical observation of Retinopathy of Prematurity (ROP) grade III was documented in preterm infants receiving the minimum dosage of vitamin E recommended by the American Academy of Pediatrics (5 mg/kg/day), and exposed to high concentration/duration of oxygen at birth. Matched infants that were provided a higher oral dosage of vitamin E (100 mg/kg/day) did not develop the serious grade of retinopathy (grade III) (1,2). In this paper cytological correlates are described which substantiate pre-existing theories concerning the pathological changes associated with the development of the disease at a light microscopic level. Moreover, observations made at the electromicroscopic level permit distinctions to be made concerning the newly formed retinal vessels, in treated versus non-treated infants, that have not been noted in the history of this disease. These retinal distinctions suggest that vitamin E may be efficacious in reducing the severity of ROP. Lastly, a mechanism is suggested for the action of vitamin E in reducing the severity of ROP. GRA

N84-20144# Naval Aerospace Medical Research Lab., Pensacola, Fla.

DISTRIBUTION OF VISUAL CHARACTERISTICS OF NAVAL AVIATION PERSONNEL Final Report

A. G. BAISDEN and W. A. MONACO 5 Aug. 1983 27 p

(Contract NR PROJ. F58-524)

(AD-A135930; NAMRL-1301) Avail: NTIS HC A03/MF A01 CSCL 06E

Failure to meet required visual standards provides a significant source of rejections to naval aviation training and of disqualifications of designated aviators for Service Group I. It is important to assure these standards represent the visual abilities which are critical to mission performance, and to assure their proper application throughout the aviator's career. The purpose of this report is to assess the visual characteristics of stratified samples (active duty/retired) within the naval aviation community through the examination of health records, to determine the distribution of those characteristics, and to identify those characteristics that have been noted to change during the course of the naval aviator's career. The findings, based on an examination of 72 health records, show that with increasing age there are decreases in visual acuity and accommodative amplitude, increases in against-the-rule astigmatism and myopia, and stability in fusion-related variables and intraocular pressure. GRA

N84-20145# Colorado Univ., Denver. Health Sciences Center.

VENTILATION AND VENTILATORY CONTROL IN HIGH ALTITUDE PULMONARY EDEMA AND ACUTE MOUNTAIN SICKNESS Final Report, Jul. 1981 - Oct. 1982

J. T. REEVES Apr. 1983 15 p

(Contract DAMD17-81-C-1057; DA PROJ. 3E1-62777-A-879)

(AD-A135941) Avail: NTIS HC A02/MF A01 CSCL 06E

When the 12 subjects were taken from low altitude (1600M in Denver, CO) to high altitude (4300M on Pike's Peak) they underwent acclimatization over 5 days. The surprising finding was that on day 4 and day 5 their ventilations were predicted by the acute isocapnic hypoxic response at low altitude. It was as though, after acclimatization, the relatively pure response to acute hypoxia was a major determinant of ventilation. On arrival at high altitude (Pike's Peak day 1) the ventilation showed only a small increase above the Denver value, as though the response to hypoxia were inhibited. Total ventilaltion, however, was not the most sensitive measure of acclimatization because we found it was influenced by metabolic increases at rest and dead space increases during exercise.. A more sensitive measure and one that provided useful inter-individual comparisons involved the use of an SaO2-PCO2 stimulus response curve, similar to that proposed by Rahn and Otis. Examination of these curves in relation to high altitude values suggested that it was hypoxic depression at high altitude that was responsible for the poor ventilatory response and the development of symptoms in some individuals at high altitude. GRA

N84-20146# Army Research Inst. of Environmental Medicine, Natick, Mass.

HEAT EXCHANGE DURING UPPER AND LOWER BODY EXERCISE

M. N. SAWKA, R. R. GONZALEZ, L. L. DROLET, and K. B. PANDOLF Nov. 1983 24 p

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A136015; USARIEM-M-6/84) Avail: NTIS HC A02/MF A01 CSCL 06S

This study examined evaporative and dry heat exchange during upper and lower body exercise. Four male subjects performed arm crank (AC) or cycle (CY) exercise at the same oxygen uptake (approx 1.6 1/min) in an environment facilitating dry (R + C) heat exchange (18 C, rh = 78%), and an environment facilitating evaporate (Esk) heat loss (35 C, rh = 28%), both having a equal dew point temperature (14 C). R + C was determined from the torso with a net radiometer and from the limbs with heat flow discs; whereas, Esk was determined from the torso and limbs by dew-point hygrometry. In both environments, neither esophgeal temperature nor mean skin temperature were different between exercise types ($P>0.05$). Torso R + C was significantly ($P<0.05$) greater during AC than CY exercise in both environments. Torso Esk, as well as arm R + C and arm Esk were not different ($p>0.05$) between exercise type in each environment. Leg R + C was greater ($P>0.05$) during CY and AC exercise in the 18 C environment, whereas, leg Esk was greater ($p<0.05$) during CY and AC exercise in the 35 C environment. These data indicate that to compensate for greater torso sensible heat loss during upper body exercise, lower body exercise elicits additional R + C or Esk from the legs. The avenue for this compensatory sensible and insensible heat loss depends upon the differential heat transfer coefficients. GRA

N84-20147# New York Univ., New York.

NEUROMAGNETIC INVESTIGATION OF WORKLOAD AND ATTENTION Interim Technical Report, 1 Jan. - 31 Dec. 1982

L. KAUFMAN and S. J. WILLIAMSON 23 Apr. 1983 5 p

(Contract F49620-82-K-0014; AF PROJ. 2313)

(AD-A136172; AFOSR-83-0901TR) Avail: NTIS HC A02/MF A01 CSCL 05J

Progress was made in the areas of instrumention and techniques, and experiment on the auditory and visual neuromagnetic counterpart to the P300 complex, and in formulating new approaches to the study of brain activity related to workload and attention. A new system (MAGSCAN), used to hold a multisensor array of SCUID's and gradiometers was designed and is under construction. MAGSCAN will make possible the rapid measurement of the field normal to the scalp, and thereby allow an efficient and cost-effective construction of field maps that are needed for locating sources of neuromagnetic fields. This system will minimize effects of long-term changes in the state of a subject in the course of an experiment. Also, several computer programs were developed to implement experiments and provide a more sophisticated level of data analysis. R.J.F.

N84-20148# Professional Staff Association of the Rancho Los Amigos Hospital, Inc., Downey, Calif.
SHORT-TERM HUMAN RESPIRATORY EFFECTS OF NITROGEN DIOXIDE: DETERMINATION OF QUANTITATIVE DOSE-RESPONSE PROFILES. PHASE 1: EXPOSURE OF HEALTHY VOLUNTEERS TO 4 PPM NO/SUB 2 Final Report
W. S. LINN and J. D. HACKNEY 10 Jun. 1983 35 p refs (PB84-132299; CRC-APRAC-CAPM-48-83) Avail: NTIS HC A03/MF A01 CSCL 06T

Twenty-five healthy volunteers were exposed twice to purified air (control) and to 4 ppm NO2 (exposure) for periods of one hour, fifteen minutes, including light and heavy bicycle exercise (fifteen minutes each). No statistically significant effects of NO2 on airway resistance, symptoms, heart rate, skin conductance, or self-reported emotional states were found. Systolic blood pressure showed a statistically significant difference between NO2 exposure and control: a decrease with NO2 of about 2 mm Hg. the lack of effect on airway resistance contrasts with published results from other laboratories. The health significance of the blood-pressure effect, if any, is unknown. Author (GRA)

N84-20149 University of Northern Colorado, Greeley.
THE EFFECT OF AEROBIC CAPACITY ON VO2 MAX VALUES MEASURED DURING LEG ERGOMETRY AND COMBINED ARM AND LEG ERGOMETRY Ph.D. Thesis
R. J. SABATH, III 1983 121 p
Avail: Univ. Microfilms Order No. DA8328509

The effect of aerobic capacity on VO2 max values measured during leg ergometry and combined arm-leg ergometry was examined. Thirty-six males, ages 18 to 31 years were divided into two groups on the basis of their VO2 max values. Each subject performed three VO2 max tests, two leg tests on a cycle ergometer and one combined test of arm cranking and leg pedaling. A two way ANOVA, corrected for repeated measures suggests a significant relationship between the level of aerobic capacity, the amount of muscle mass activated, and the VO2 max values recorded. Less fit subjects demonstrated a significantly VO2 max in tests of arm-leg ergometry as compared to leg only ergometry. Subjects with higher aerobic capacities failed to demonstrate similar differences. Dissert. Abstr.

N84-20150 Miami Univ., Coral Gables, Fla.
EFFECT OF INSPIRATORY MUSCLE FATIGUE ON PERCEPTION OF ADDED LOADS IN HUMANS Ph.D. Thesis
W. R. REVELETTE 1983 62 p
Avail: Univ. Microfilms Order No. DA8328440

Studies have indicated that muscle fatigue alters the perception of added loads, and suggest that the primary source of load magnitude information is supplied by motor command signals. The effect that both adaptation to an extreme load and muscle fatigue had on the perception of inspiratory resistive loads was investigated. Effects on either threshold detection (TD) or magnitude estimation (ME) of added resistive loads were assessed following a two minute exposure to a very high resistive load and after inspiratory muscle fatigue. A third study, designed to parallel the resistive load ME experiment, involved estimation of weights lifted in the hand. Perceptual performance was assessed for the TD study using the Weber fraction based on mouth pressure. The exponent for Stevens' power law was used in the ME studies as a measure of performance. There was no significant difference in the Weber fractions for any condition. Dissert. Abstr.

N84-20151 Louisiana State Univ., New Orleans.
THE EFFECTS OF HIGH FREQUENCY POSITIVE PRESSURE VENTILATION ON HYPOXIC PULMONARY VASOCONSTRICTION Ph.D. Thesis
S. M. HALL 1983 96 p
Avail: Univ. Microfilms Order No. DA8324424

The effects of two modes of ventilation on the distribution of blood flow in the lung were compared. High frequency positive pressure ventilation is compared to a method of ventilation more commonly used clinically, intermittent positive pressure ventilation. Eighteen dogs had electromagnetic flow probes chronically implanted on their main (QT) and left (QL) pulmonary arteries. Catheters were placed in their left atria, and temoral and pulmonary arteries. They were ventilated via Cartens dual lumen endotracheal tubes inserted through tracheostomies, separating ventilation of the left and right lungs. Experiments were performed on three groups of these closed chest animals. (1) in the first group of experiments (N = 7), the fraction of the cardiac output perfusing the left lung (QL/QT) was determined during bilateral ventilation and during ventilation of the right lung while the left lung was collapsed. Ventilation was maintained with eithe a Harvard respirator or an Emerson airway vibrator. Dissert. Abstr.

N84-20152 South Dakota State Univ., Brookings.
METABOLIC CHARACTERISTICS OF POST-EXERCISE KETOSIS: THE PROTECTIVE EFFECTS OF TRAINING Ph.D. Thesis
M. A. BEATTIE 1983 182 p
Avail: Univ. Microfilms Order No. DA8325021

The metabolic characteristics of post-exercise ketosis was determined. Experiments dealing with both the trained and nontrained states in order to determine the trained induced adaptations which account for the differences seen in the two conditions are included. Trained and untrained rats were fasted overnight and then exercised for 90 minutes. Both groups began exercise with severly depleted liver glycogen stores, but only the untrained rats showed high levels of blood 3-oxybutyrates in the post-exercise period. Hepatic maionyl CoA levels were similar in the two groups at all points. Plasma free fatty acid and hepatic carnitine concentrations indicated that ketogenesis was proceeding at higher rates in untrained animals. Trained and untrained rats were also restricted to 18 g of food on the night before a 90 minute exercise bout. Rats fed ad lib were also exercised. Dissert. Abstr.

N84-20153 Ball State Univ., Muncie, Ind.
EFFECTS OF DIETARY SODIUM INTAKE ON BODY AND MUSCLE POTASSIUM CONTENT IN UNACCLIMATIZED MEN DURING SUCCESSIVE DAYS OF WORK IN THE HEAT Ph.D. Thesis
L. E. ARMSTRONG 1983 113 p
Avail: Univ. Microfilms Order No. DA8327870

The influence of two levels of dietary sodium (Na+) intake on intramuscular and extracellular potassium (K-) content was examined. Nine unacclimatized college males exercised (90 minutes of treadmill walking, 5.6km/hr, 6% grade) in an environmental chamber maintained at 40.1 + or - .05 C and 23.5 + or - .4%RH, during two 8 day dietary acclimation regimens. The first regimen employed a high Na+ diet (399mEq/day), the second a low Na+diet (98mEq/day); both diets contained 80mEq K-/day. Total body K+ stores increased during the high Na+ diet (+138mEq, 4.1%) and the low Na+diet (+114mEq, 3.4%). By day 8 (D8) of both treatments, subjects exhibited a significantly lower (p.05) mean heart rate and rectal temperature. Oxygen consumption and sweat rate were unaltered but sweat responsiveness (mi/hr/C) progressively increased during the acclimation trials. Dissert. Abstr.

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BEHAVIORAL SCIENCES

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

A84-23322
THE EFFECT OF HYPERBARIC OXYGENATION ON THE BEHAVIOR OF ANIMALS WHICH ARE PERFORMING AN EXTRAPOLATION TASK [VLIIANIE GIPERBARICHESKOI OKSIGENATSII NA POVEDENIE ZHIVOTNYKH PRI RESHENII IMI EKSTRAPOLIATSIONNOI ZADACHI]
L. V. KRUSHINSKII, S. N. EFUNI, A. F. SEMIOKHINA, M. G. PLESKACHEVA, V. IU. TSAPIN, and E. A. DEMUROV (Akademiia Meditsinskikh Nauk SSSR; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 274, no. 1, 1984, p. 237-240. In Russian. refs

A84-23621
RAPID DISCRIMINATION OF VISUAL PATTERNS
J. R. BERGEN (RCA David Sarnoff Research Center, Princeton, NJ) and B. JULESZ (Bell Telephone Laboratories, Inc., Murray Hill, NJ) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Sept.-Oct. 1983, p. 857-863. refs

Experiments involving the rapid discrimination of visual patterns are used to infer the spatial information available to an observer within the first few hundred ms of inspection. Eye movements are prevented by a very brief presentation of the stimulus, and the inspection interval is terminated by a presentation of a masking pattern. It is shown that detection of a simple vertical target line segment, embedded in an array of differently oriented background segments, improves with the increase of mask delay. This improvement is rapid if the difference in angular orientation between the target and background segments is large, but it becomes much slower as this difference is reduced. For a 90 deg orientation difference, reliable detection of the target is obtained in about 60 ms, while for a 20 deg difference, over 200 ms is required. The reduction of the area in which the target may lie reduces the inspection time that is required to determine the target's presence or absence. The phenomena are invariant under changes of the spatial scale within the fovea and parafovea. Author

A84-23623
SIX FORMAL PROPERTIES OF TWO-DIMENSIONAL ANISOTROPIC VISUAL FILTERS - STRUCTURAL PRINCIPLES AND FREQUENCY/ORIENTATION SELECTIVITY
J. G. DAUGMAN (Harvard University, Cambridge, MA) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Sept.-Oct. 1983, p. 882-887. refs
(Contract F49620-81-K-0016)

Six formal properties of anisotropic linear two-dimensional filters are noted which are relevant for modeling the mechanisms of spatial visual information extraction. These properties concern the relationship between the organizational principle of a two-dimensional anisotropic spatial filter or neural receptive field (such as elongation, or concatenation of subunits, or differential operators mediated by lateral inhibition in neural laminae) and the resulting general consequences for spatial frequency and orientation selectivity. These properties are demonstrated without assuming particular two-dimensional filter functional forms; rather, they are shown as general principles associated with certain broad categories of two-dimensional filters. Such an analysis enhances the theoretical understanding of the two-dimensional receptive field organization of neurons in the visual cortex and permits the rejection of some candidate organizational principles on two-dimensional spectral grounds. Author

A84-23624
THE STRUCTURE OF THE HUMAN MOTION DETECTION SYSTEM
A. J. VAN DOORN and J. J. KOENDERINK (Utrecht, Rijksuniversiteit, Utrecht, Netherlands) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Sept.-Oct. 1983, p. 916-922. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek. refs

In contradistinction with technical pattern recognizers, humans are very apt at the detection of regions of coherent movements in changing images. They detect coherent patches in spatiotemporal white noise at threshold signal-to-noise ratios of one hundredth. Possible physiological mechanisms that sustain this ability are discussed in terms of simple mechanistic models, and the results of psychophysical experiments are presented. These results are compatible with two different mechanistic interpretations. The main result is that the human movement detectors are completely unlike the speedometer in an automobile: they are tuned, and a whole ensemble of mechanisms, tuned to different velocities, reside at any location in the visual field. Thus you may easily see two velocity vectors simultaneously at a given place. Segregation occurs when different detectors are stimulated at each side of a border. The spatiotemporal parameters that characterize these units are found: these limit the resolution in time and space, whereas the sensitivity depends on the number of units that participate in a detection. This number may range between a few (perhaps one) to a thousand or more. Apparently, resolution can be traded against noise immunity. It is argued that technical systems, developed on a similar basis, might be useful as preprocessors of sequences of images in order to detect features of interest (coherent regions) and to suggest a first rough segmentation. Author

A84-23701
CERTAIN PSYCHOLOGICAL PROBLEMS IN A SYSTEMS APPROACH TO THE ANALYSIS OF HUMAN ACTIVITY [NEKOTORYE PSIKHOLOGICHESKIE PROBLEMY SISTEMNOGO PODKHODA PRI ANALIZE DEIATEL'NOSTI CHELOVEKA]
B. A. DUSHKOV (Universitet Druzhby Narodov, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 23-32. In Russian. refs

A84-23702
CERTAIN ASPECTS OF THE INTERRELATIONSHIP BETWEEN GENERAL PSYCHOLOGY AND THE PSYCHOLOGY OF WORK [O NEKOTORYKH ASPEKTAKH VZAIMOOTNOSHENIIA MEZHDU OBSHCHEI PSIKHOLOGIEI I PSIKHOLOGIEI TRUDA]
W. HACKER (Dresden, Technische Universitaet, Dresden, East Germany) Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 33-39. In Russian. refs

A84-23703
AN OBSERVER'S USE OF ACOUSTIC AND MODALITY-NONSPECIFIC FEATURES OF SOUNDING FOR THE DIFFERENTIATION OF AUDITORY SIGNALS [ISPOL'ZOVANIE NABLIUDATELEM AKUSTICHESKIKH I MODAL'NO-NESPETSIFICHESKIKH PRIZNAKOV ZVUCHANIIA DLIA RAZLICHENIIA SLUKHOVYKH SIGNALOV]
K. V. BARDIN and T. P. GORBACHEVA (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 48-57. In Russian. refs

A84-23704
COMPLEX EVALUATION OF OPERATOR-TRAINING LEVEL [KOMPLEKSNAIA OTSENKA TRENIROVANNOSTI OPERATORA]
V. A. BODROV, IU. A. KUKUSHKIN, and A. S. KUZMIN Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 58-63. In Russian.

A method for evaluating an operator's training level is described which is based on a set of indices characterizing the performance

quality, the structure of controlling motions, and the operator's nervous-emotional stress state. A pattern-recognition approach makes it possible to synthesize a complex index of training level, its normative value, and the information content of individual indices. The proposed method should make it possible: (1) to predict the number of training sessions needed to achieve a prescribed level of preparedness; (2) to compare various training methods; and (3) to more precisely determine the parameters and structure of the apparatus used in the training. B.J.

A84-23705
PSYCHOLOGICAL SAFETY FACTORS RELATING TO THE DRIVING OF AUTOMOBILES AND PROBLEMS OF COMMUNICATION BETWEEN DRIVERS [PSIKHOLOGICHESKIE FAKTORY NADEZHNOSTI UPRAVLENIIA AVTOMOBILIAMI I PROBLEMA OBSHCHENIIA MEZHDU VODITELIAMI]
V. F. VENDA, G. S. ULIKHANIAN (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR), and R. V. ROTENBERG (Moskovskii Avtodorozhnyi Institut, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 75-86. In Russian. refs

A84-23706
SOCIAL-PSYCHOLOGICAL PROBLEMS IN THE EVALUATION OF ENGINEERING PERSONNEL IN AUTOMATED SYSTEMS FOR THE CONTROL OF DEVELOPING ENTERPRISES [SOTSIAL'NO-PSIKHOLOGICHESKIE PROBLEMY DIAGNOSTIKI INZHENERNYKH KADROV V AVTOMATIZIROVANNYKH SISTEMAKH UPRAVLENIIA RAZRABATYVAIUSHCHIKH PREDPRIIATII]
E. S. CHUGUNOVA (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) and N. A. VIKTOROV Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 87-95. In Russian. refs

A84-23707
THE RELATIONSHIP BETWEEN COMPLEX MENTAL PROCESSES WITH THE FUNCTIONAL ORGANIZATION OF THE BRAIN'S WORKINGS [SVIAZ' SLOZHNYKH PSIKHICHESKIKH PROTSESSOV S FUNKTSIONAL'NOI ORGANIZATSIEI RABOTY MOZGA]
T. N. USHAKOVA, L. A. SHUSTOVA (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR), and N. E. SVIDERSKAIA (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 119-133. In Russian. refs

Morphofunctional relationships in the brain during the performance of complex mental acts are examined. The Livanov EEG technique was used to investigate the role of different brain structures in the organization of ongoing mental activity. Three specific patterns of the activation of brain regions associated with the performance of three types of mental activity (verbal-productive, verbal-reproductive, and visual thinking) are identified. It is observed that virtually the entire brain is involved in the ongoing activity. A pronounced specificity of interhemispheric relations with different kinds of mental processes is remarked, and specific EEG manifestations are identified which are connected with differences in task difficulty. B.J.

A84-23708
A RESPONSE TO PROFESSOR B. I. DODONOV (A FURTHER CONSIDERATION OF A NEED- INFORMATIONAL APPROACH TO THE STUDY OF EMOTIONS) [OTVET PROFESSORU B. I. DODONOVU /ESHCHE RAZ O POTREBNOSTNO-INFORMATSIONNOM PODKHODE K IZUCHENIIU EMOTSII/]
P. V. SIMONOV (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 4, July-Aug. 1983, p. 134-145. In Russian. refs

A84-23715
THE EFFECT OF MENTAL STRAIN ON THE CONDITION OF HIGHER NERVOUS ACTIVITY AND WORK CAPACITY OF TECHNICUM STUDENTS [VLIIANIE UMSTVENNOI NAGRUZKI NA SOSTOIANIE VYSSHEI NERVNOI DEIATEL'NOSTI I RABOTOSPOSOBNOSTI UCHASHCHIKHSIA TEKHNIKUMA]
L. G. VATCHENKO (Zhovtnevaia Sanepidstantsiia, Dnepropetrovsk, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), July 1983, p. 64-68. In Russian. refs

A84-23962
MATHEMATICAL METHODS IN SOCIAL PSYCHOLOGY [MATEMATICHESKIE METODY V SOTSIAL'NOI PSIKHOLOGII]
S. S. PAPOVIAN Moscow, Izdatel'stvo Nauka, 1983, 344 p. In Russian. refs

This monograph opens with a review of methodological problems in the use of mathematical methods in social psychology. Attention is then given to measurement methods and models in social psychology with particular emphasis on scaling methods. The quantitative and qualitative mathematical analysis of group social-psychological characteristics is considered, and structural and dynamic models of social-psychological processes are discussed. The use of multivariate statistical methods in the analysis of social-psychological data is described; and aspects of strategy and tactics in the development of mathematical methods in social psychology are examined. B.J.

A84-23984
EFFECTS OF TRAFFIC NOISE ON QUALITY OF SLEEP - ASSESSMENT BY EEG, SUBJECTIVE REPORT, OR PERFORMANCE THE NEXT DAY
R. T. WILKINSON and K. B. CAMPBELL (Medical Research Council, Psychophysiology Section, Cambridge, England) Acoustical Society of America, Journal (ISSN 0001-4966), vol. 75, Feb. 1984, p. 468-475. Research supported by the Commission of the European Communities and Medical Research Council of England. refs

A84-24731* University of Southern California, Los Angeles.
RESTRICTION OF PURSUIT EYE MOVEMENT RANGE DURING A CONCURRENT AUDITORY TASK
F. V. MALMSTROM (Southern California, University, Los Angeles, CA), L. E. REED (USAF, Human Resources Laboratory, Wright-Patterson AFB, OH), and R. J. RANDLE (NASA, Ames Research Center, Moffett Field, CA) Journal of Applied Psychology (ISSN 0021-9010), vol. 68, no. 4, 1983, p. 565-571. NASA-USAF-supported research. refs

A two-part experiment was performed using 10 naive adult male subjects to determine the effects of a concurrent auditory dot/dash identification task on pursuit eye movements. Results indicated there was a significant (20 percent) but transitory task-induced restriction of the range of both an 18 deg horizontal and a 14 deg vertical pursuit eye movement visual angle. Furthermore, doubling the presentation rate of the concurrent task accounted for an additional 5 percent restriction of pursuit eye movement range. Results also indicated that the eye movement range is unaffected by both prior knowledge of the task and four consecutive practice trials. It is suggested that both the rapidity of target movement and the presence of concurrent mental tasks could significantly shrink an operator's pursuit eye movement ranges during viewing of dynamic visual displays such as airborne low-level television and forward-looking infrared. Author

A84-24949* Illinois Univ., Champaign.
AN ANALYSIS OF THE PROCESSING REQUIREMENTS OF A COMPLEX PERCEPTUAL-MOTOR TASK
A. F. KRAMER, C. D. WICKENS, and E. DONCHIN (Illinois, University, Champaign, IL) Human Factors (ISSN 0018-7208), vol. 25, Dec. 1983, p. 597-621. refs
(Contract F49620-79-C-0233; JPL-955610)

Current concerns in the assessment of mental workload are discussed, and the event-related brain potential (ERP) is introduced as a promising mental-workload index. Subjects participated in a

series of studies in which they were required to perform a target acquisition task while also covertly counting either auditory or visual probes. The effects of several task-difficulty manipulations on the P300 component of the ERP elicited by the counted stimulus probes were investigated. With sufficiently practiced subjects the amplitude of the P300 was found to decrease with increases in task difficulty. The second experiment also provided evidence that the P300 is selectively sensitive to task-relevant attributes. A third experiment demonstrated a convergence in the amplitude of the P300s elicited in the simple and difficult versions of the tracking task. The amplitude of the P300 was also found to covary with the measures of tracking performance. The results of the series of three experiments illustrate the sensitivity of the P300 to the processing requirements of a complex target acquisition task. The findings are discussed in terms of the multidimensional nature of processing resources. Author

A84-24950* Virginia Polytechnic Inst. and State Univ., Blacksburg.

A COMPARISON OF RATING SCALE, SECONDARY-TASK, PHYSIOLOGICAL, AND PRIMARY-TASK WORKLOAD ESTIMATION TECHNIQUES IN A SIMULATED FLIGHT TASK EMPHASIZING COMMUNICATIONS LOAD

J. G. CASALI and W. W. WIERWILLE (Virginia Polytechnic Institute and State University, Blacksburg, VA) Human Factors (ISSN 0018-7208), vol. 25, Dec. 1983, p. 623-641. refs
(Contract NAG2-17)

Sixteen potential metrics of pilot mental workload were investigated regarding their sensitivity to communication load and their intrusion on primary-task performance. A moving-base flight simulator was used to present three cross-country flights. The flights varied only in the difficulty of the communications requirements. Rating scale measures were obtained immediately postflight; all others were taken over a 7-min segment of the flight task. The results indicated that both the Modified Cooper-Harper Scale and the workload Multi-descriptor Scale were sensitive to changes in communications load. The secondary-task measure of time estimation and the physiological measure of pupil diameter were also sensitive. As expected, those primary-task measures that were direct measures of communicative performance were also sensitive to load, whereas aicraft control primary-task measures were not, attesting to the task specificity of such measures. Finally, the intrusion analysis revealed no differential interference between workload measures. Author

A84-24954

THE USE OF RELAXATION/DESENSITIZATION IN TREATING ANXIETY ASSOCIATED WITH FLYING

J. R. AITKEN (U.S. Navy, Naval Regional Medical Center, LeJeune, NC) and J. W. BENSON (U.S. Navy, Naval Aerospace Medical Institute, Pensacola, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 196-199. refs

The use of relaxation/desensitization therapy in treating anxiety associated with flying is described. Treated were 46 male and 1 female flight students who attended 3-6 sessions lasting 1 hour each. This therapy uses a behavioral approach in treating anxiety associated with flying. Relaxation/desensitization incorporates the use of relaxation exercises and in-depth mental imagery. Six months after completion of therapy, all subjects were followed up to determine the therapy's effectiveness. There was a high success rate (79 percent) of subjects successfully completing training. Author

A84-24960

PILOT DISORIENTATION AND THE USE OF A PERIPHERAL VISION DISPLAY

R. MALCOLM (Maltech Research Corp., Oakville, Ontario, Canada) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 231-238.

A new method of presenting cockpit information, called peripheral vision display (PVD), that reduces disorientation and pilot overload is described. Stabilization of the eyes in space during head movement by the semicircular canals is explained and it is maintained that 90 percent of orientation is provided by visual information, of which 90 percent is peripheral. The PVD involves a laser that shines a bar of light across the cockpit's instrument panel. The bar of light is kept steady in relation to the horizon outside the aircraft even when the pilot cannot see the horizon himself. Various tests are being conducted that demonstrate the benefits of PVD. A test flight under a cloudy sky during which pilots are required to fly toward a stationary ship's light with all instrument lights off is not possible for more than two minutes unless the PVD is functioning. With the PVD, pilots are able to fly within 2 deg of heading, 2 deg of pitch and roll, and 5 kn of airspeed for five to ten minutes. C.M.

A84-25103

STRATEGY OF PSYCHIC ADAPTATION IN ANTARCTIC CONDITIONS [STRATEGIIA PSIKHICHESKOI ADAPTATSII V USLOVIIAKH ANTARKTIDY]

A. A. ALDASHEVA (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 16-22. In Russian. refs

A strategy of behavioral adaptation for Antarctic workers is considered. It is shown that the individual structure of psychic adaptation is determined by the initial personality profile, and a definite correlation dynamics is observed during the adaptation process. Different components of the initial personality structure are found to be activated at different stages of the winter stay: the emotional and communication components at the beginning; mainly the emotional component in the middle stage; and the intellectual component at the end. At the end of the winter stay, the psychic adaptation is achieved through the totality of the personality-structure variables, the dominant role of individual characteristics being reduced. B.J.

A84-25104

FUNCTIONAL CONDITION OF OPERATORS AND ITS SYSTEMS-ENGINEERING DETERMINANTS [FUNKTSIONAL'NOE SOSTOIANIE OPERATOROV I EGO SISTEMOTEKHNICHESKIE DETERMINANTY]

V. S. AVERIANOV, O. V. VINOGRADOV, K. G. KAPUSTIN, V. A. LEONOVA, N. S. MALAKHOV, A. S. ILVES, V. I. CHERNYSHEV, and R. M. IAROVAIA (Nauchno-Proizvodstvennoe Ob'edinenie Neftekhimicheskikh Protsessov, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 23-30. In Russian. refs

An experimental study of the functional condition of operators at automated oil-processing plants is presented. It is shown that the scale of quantitative criteria of neural-psychic strain needs to take into account the specific characteristics of the operator activity, and it is found that the level of neural-psychic work strain can be determined more precisely by taking account of subjective assessment by the operator of time expended on the main types of work. The relationship between the psychophysiological indicators and the characteristics of the hardware and operational complexity of the plants is analyzed, and a regression formula is proposed which can be used to predict the functional condition of operators. B.J.

A84-25107

ELECTROSLEEP AS A METHOD FOR THE PROPHYLAXIS OF NERVOUS-PSYCHIC OVERSTRAIN AND THE RESTORATION OF MENTAL WORK CAPACITY IN OPERATORS [ELEKTROSON KAK METOD PROFILAKTIKI NERVNO-PSIKHICHESKOI PRENAPRIAZHENIIA I VOSSTANOVLENIIA UMSTVENNOI RABOTOSPOSOBNOSTI U OPERATOROV]

A. M. GONCHARENKO, I. S. KANDROR, I. I. POPOVA, V. M. SHAKHNAROVICH (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR), and S. R. ROITENBURD Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 47-51. In Russian. refs

A84-25122
SPATIAL-TEMPORAL STRUCTURE OF A 'QUANTUM' OF INDUSTRIAL ACTIVITY AND ITS PHYSIOLOGICAL BASIS [PROSTRANSTVENNO-VREMENNAIA STRUKTURA 'KVANTA' PROIZVODSTVENNOI DEIATEL'NOSTI I EGO FIZIOLOGICHESKOE OBESPECHENIE]
G. V. RYZHIKOV and S. IA. KLASSINA (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 144-152. In Russian. refs

The 'quantized' structure of industrial activity was investigated on the example of the activity of quality controllers of electrooptical systems. The activity of the controllers (women 20-24 years of age) involved a series of periodically repeated manipulations, each of which was characterized by an electromyogram of the hands. Systemic 'quantization' was achieved by isolation of the moments when the control operation was concluded. The systemic 'quantum' was shown to be represented as a sequence of discrete control phases, each of which has its vegetative basis. The spatial structure of the systemic 'quantum' is determined by the number and order of succession of these control phases; while the temporal structure is characterized by the relationship between the durations of the control phases. B.J.

A84-25124
CHANGES OF OCCUPATIONALLY IMPORTANT QUALITIES IN OPERATORS AT OIL-PROCESSING PLANTS DURING ADAPTATION TO WORK [OB IZMENENII PROFESSIONAL'NO VAZHNYKH KACHESTV U OPERATOROV NEFTEPERERABATYVAIUSHCHIKH USTANOVOK V PROTSESSE ADAPTATSII K TRUDU]
E. P. KORABLINA (Leningradskoe Nauchno-Proizvodstvennoe Ob'edinenie Neftekhimicheskikh Protsessov, Leningrad, USSR) Fiziologiia Cheloveka (ISSN 0131-1646), vol. 10, Jan.-Feb. 1984, p. 166-168. In Russian. refs

A84-25184#
AN ANALYSIS OF JASDF AIRCRAFT ACCIDENTS DATA FROM HUMAN FACTORS ASPECT. II - AN ANALYSIS OF PILOT ERRORS AND PSYCHO-PHYSIOLOGICAL FACTORS
Y. KAKIMOTO, Z. KATOH, T. NAKABAYASHI, and H. IWAMOTO (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Tokyo, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports (ISSN 0023-2858), vol. 24, Sept. 1983, p. 153-175. In Japanese, with abstract in English. refs

Pilot errors in aircraft accident reports and their underlying psychophysiological factors are reported. The overall pilot error analysis covers the period from April 1955 to March 1981 and eighty-two cases among them from April 1970 to March 1980 were used for the psychophysiological analysis. The pilot error rate in aircraft accident causes was found to be a nearly constant 53 percent over the entire period under consideration. Decision errors constituted about 40 percent of pilot errors per 100,000 flying hours, the balance being due to operation and procedure errors. While decision errors have been showing the same rate, the operation and procedure rate has steadily decreased. Attention and emotional items were seen as important factors in pilot error. J.N.

A84-25359
EVALUATION OF THE PSYCHIC STATES OF ATHLETES [K OTSENKE PSIKHICHESKIKH SOSTOIANII SPORTSMENOV]
M. N. NILOPETS and V. P. PANIUSHKIN (Vsesoiuznyi Nauchno-Issledovatd'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 5, 6. In Russian. refs

Miasishchev's triad approach for investigating the psychic states of athletes is described. This approach comprises the evaluation of vegetative shifts, subjective experiences, and quantitative and qualitative indicators of activity. B.J.

A84-25360
THE USE OF PSYCHOPHYSIOLOGICAL INDICATORS TO PREDICT THE SUCCESSFULNESS OF COMPETITIVE ACTIVITY [ISPOL'ZOVANIE PSIKHOFIZIOLOGICHESKIKH POKAZATELEI DLIA PROGNOZA USPESHNOSTI SOREVNOVATEL'NOI DEIATEL'NOSTI]
V. P. NEKRASOV and IU. B. NIKIFOROV (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1983, p. 7-9. In Russian. refs

A84-25372
CONSTANCY AND FUNCTIONAL LABILITY OF PERCEPTION [KONSTANTNOST' I FUNKTSIONAL'NAIA GIBKOST' VOSPRIIATIIA]
A. I. MIRAKIAN (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR) Voprosy Psikhologii (ISSN 0042-8841), July-Aug. 1983, p. 104-111. In Russian. refs

The constant/nonconstant perception of magnitudes is considered as an immediate-sensory perceptual process consisting of successive microacts, generating opposite anisotropic relations between compared magnitudes. Further transformations of these relations result either in constant perception or nonconstant perception, as well as in depth perception and the perception of distance between objects, i.e., in the functional lability of the perception of spatial relations between objects. B.J.

A84-25373
***NEUROPSYCHOLOGICAL INVESTIGATION OF* VISUAL-PICTORIAL THINKING [NEIROPSIKHOLOGICHESKOE ISSLEDOVANIE NAGLIADNO-OBRAZNOGO MYSHLENIIA]**
T. SH. GAGOSHIDZE and E. D. KHOMSKAIA (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Voprosy Psikhologii (ISSN 0042-8841), July-Aug. 1983, p. 119-127. In Russian. refs

Brain mechanisms for visual-pictorial thinking associated with the performance of tasks requiring the mental manipulation of three-dimensional geometric shapes are examined with particular emphasis on the role of the right and left hemispheres in the organization of the corresponding thinking operations. The dominance of the right hemisphere has been established, which is probably connected with the fact that the simultaneous synthesis of incoming information occurs there. Performance errors are correlated with different neuropsychological symptoms of disturbed visual-spatial functions. B.J.

A84-25374
THE GROUP - PSYCHOLOGY AND ETYMOLOGY [GRUPPA - PSIKHOLOGIIA I ETIMOLOGIIA]
A. I. DONTSOV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Voprosy Psikhologii (ISSN 0042-8841), July-Aug. 1983, p. 132-137. In Russian. refs

The specific characteristics of the psychological approach to the study of small social groups are defined. The etymology and transformations of the meaning of the term 'group' in the main European languages during the 18th and 19th centuries is examined, with particular emphasis on the works of Pushkin and Lenin. It is concluded that the primary goal of psychological analyses of social communities should be the study of mechanisms of the generation, reproduction, and development of the psychological integrity of groups. B.J.

A84-25375
THE SPEED OF FORGETTING [O SKOROSTI ZABYVANIIA]
V. N. LANGE Voprosy Psikhologii (ISSN 0042-8841), July-Aug. 1983, p. 142-145. In Russian. refs

A conceptual model of forgetting based on a probabilistic approach is proposed. A parameter interpreted as the relative speed of information loss or the speed of forgetting is discussed, and values of this parameter for 'neutral' information and for emotionally charged information (a meaningful text) are determined. The speed of forgetting is found to be approximately 10 times less for emotionally charged information. B.J.

A84-25400
HELICOPTER WARNING SIGNALS - COMPARATIVE STUDY OF INDIVIDUAL AND GROUP INTERVIEWS [LA SIGNALISATION DES ALARMES SUR HELICOPTERE - ETUDE COMPARATIVE DE L'ENTRETIEN INDIVIDUEL ET DE L'ENTRETIEN DE GROUPE]
B. GANGLOFF and J. P. PAPIN (Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris, France) Ergonomics (ISSN 0014-0139), vol. 27, Jan. 1984, p. 81-87. In French. refs

The effectiveness of group and individual interviewing techniques in the ergonomic evaluation of helicopter VDU warning systems is investigated. Six commanders, seven pilots, and seven flight engineers were interviewed individually for about 45 min; one three-member crew and one group comprising three commanders, three pilots, and two flight engineers were interviewed for about 2 h. Subjects discussed included the detection of the warning display (by whom and with what priorities), the presentation of the warning (location, lighting, size, audio signal, indication of procedure to be followed), and missing or defective warnings. Individual interviews are found to produce more complete information on VDU problems, while group interviews are more effective in identifying solutions. The use of complementary group and individual interviews is recommended. T.K.

A84-25910
SYSTEMS PROBLEMS IN THE DEVELOPMENT OF MATHEMATICAL PSYCHOLOGY [SISTEMNYE PROBLEMY RAZVITIIA MATEMATICHESKOI PSIKHOLOGII]
G. E. ZHURAVLEV Moscow, Izdatel'stvo Nauka, 1983, 288 p. In Russian. refs

The foundations of mathematical psychology are examined, and it is noted that the systems principle should serve as the basis of this psychology. Particular consideration is given to the problem of the synthesis of mathematics and psychology; the relation to artificial intelligence; systems problems in the interaction of psychology, semiotics, and information theory; choice reaction as an information process; and the adaptive transmission of messages as a model of human behavior. A complex approach based on mathematical modeling is elaborated which makes it possible to effectively describe information processing by humans and to construct adequate models of human adaptation to the environment. B.J.

A84-26381#
'PILOT ERROR' ACCIDENT: A CASE REPORT - NEED FOR INFLIGHT PHYSIOLOGICAL MONITORING
R. R. KAPUR (Air India, Bombay, India) Aviation Medicine, vol. 27, Dec. 1983, p. 111-114.

'Pilot error' accidents are on the increase in the Indian Air Force, and accident-prone pilots are frequently the cause. Such pilots usually have a past history of 'pilot error' incidents and/or accidents. Many of them keep flying because policy regarding their disposal is not well defined. Invariably their routine medical examinations do not show any mental, physical or behavioral abnormality. A case report is discussed. Inflight physiological monitoring of EEG for such cases is recommended to detect pilot limitations under actual flying stresses. Author

A84-26384#
PERSONALITY PROFILE OF AN IAF PILOT - ITS USEFULNESS IN PILOT SELECTION
N. RAMACHANDRAN, J. M. WADHAWAN, V. CHANDRAMOHAN, P. L. N. RAO (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), and V. KUMAR (Air Force Hospital 5, Jorhat, India) Aviation Medicine, vol. 27, Dec. 1983, p. 131-139. refs

A84-26385#
ISOLATION STRESS-INDIVIDUAL SUSCEPTIBILITY IN TERMS OF PSYCHOPHYSIOLOGICAL MANIFESTATIONS
J. M. WADHAWAN, N. RAMACHANDRAN, V. CHANDRAMOHAN, D. T. SHAKUNTHALA, P. L. N. RAO (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), and E. M. IYER Aviation Medicine, vol. 27, Dec. 1983, p. 140-150. refs

Personality type and response to isolation stress is studied in 22 male volunteers (20-40 years old) from the Indian Air Force. The volunteers were subjected to 72 hours of isolation at the isolation stress laboratory, Institute of Aviation Medicine, Bangalore. The experimental group was divided into extroverts and introverts and psychological, physiological and biochemical tests were employed to correlate personality type and response to isolation stress. Compared to introverts extroverts showed higher levels of urinary 17 OHCS during isolation as well as better performance on the NRC stresslyser. During isolation all subjects demonstrated stimulus searching behavior and improved performance on the vigilance task. In addition, isolation effects included a mean weight loss of 1.35 kg and a transient impairment of cognitive processes. C.M.

A84-26386#
MEDICAL PROBLEMS OF AIR TRAFFIC CONTROL - A PRELIMINARY STUDY
S. P. DESHMUKH (Indian Air Force, Bangalore, India) and N. RAMACHANDRAN (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 27, Dec. 1983, p. 151-157. refs

A study on air traffic control officers at HAL Airport, Bangalore, India, was conducted to identify job related problems for the purpose of establishing a methodology for future, more detailed studies. Sixteen air traffic control officers, 43-57 years old, with approximately fifteen and one-half years experience, were asked to answer a biographical and work-related questionnaire as well as a personality test. It is maintained that future questionnaires should be designed to elicit more specific responses. A problem encountered was the noncommittal answers from air traffic control officers approaching retirement and consequently unconcerned about work improvements. Two major stresses, were identified: the variety of aircraft landing at the same time, and the rise in fuel prices which provokes argument from pilots asked to hover. C.M.

N84-18250# Joint Publications Research Service, Arlington, Va.
COSMONAUT TRAINING
A. G. NIKOLAYEV *In its* USSR Rept.: Space (JPRS-USP-84-001) p 15-19 26 Jan. 1984 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 2, Mar. - Apr. 1983 p 2-7
Avail: NTIS HC A06

Training cosmonauts for their professional activities is now accomplished along the following main avenues: training for control of space vehicles and orbital stations, together with operation of onboard systems; training to conduct planned scientific and technical research and experiments; training the cosmonaut's body for the effects of spaceflight factors; the formation of the cosmonaut's personality and his psychological preparation for flight. Training for multiple expedition space flights entails a number of special features and difficulties. This is associated primarily with the need to train a large number of crews simultaneously (including the backup crews). Second, consideration must be given to the differences in the training programs for each expedition in terms both of volume and of tasks. Third, it is necessary to coordinate in time those training tasks connected with the interaction of the crews on the main expedition and those of the visiting expeditions. Author

N84-18251# Joint Publications Research Service, Arlington, Va.
BEREGOVOY ON COSMONAUT TRAINING
A. G. BEREGOVOY *In its* USSR Rept.: Space (JPRS-USP-84-001) p 20-24 26 Jan. 1984 Transl. into ENGLISH from Aviatsiya i Kosmonavtika (Moscow), no. 4, Apr. 1983 p 1-2
Avail: NTIS HC A06

With the growth of our knowledge about space and its effect on man, the methods for training cosmonauts were refined and new facilities created. For example, after it was discovered that a cosmonaut's blood rushes to his head during the period of adaptation to weightlessness, new training methods utilizing special devices were developed. And after the first extended flight it turned out that it is difficult for the body to get used to Earth's gravity. The specialists then found methods to ease the cosmonaut's re-encounter with Earth. Cosmonauts stay in orbit for months. This does not mean simple flying, but also performing extremely diversified and complicated research. In order to do this they must have extensive knowledge in the most variegated fields of science and technology. This knowledge is acquired during the stage of general space training, which is conducted in groups according to an overall program. During this period the cosmonauts' individual special features are studied; this is necessary for the selection of future crews, since mutual psychological compatibility must also be taken into consideration. Author

N84-18901# Air Force Human Resources Lab., Brooks AFB, Tex. Operationns Training Div.
VELOCITY CONTROL DECISION-MAKING ABILITY: RELATIONSHIP TO FLYING CAPABILITY AND EXPERIENCE Interim Report, 1 Jun. 1981 - 1 Dec. 1982
J. C. DEMAIO Dec. 1983 19 p
(Contract AF PROJ. 2313)
(AD-A136546; AFHRL-TP-83-32) Avail: NTIS HC A02/MF A01 CSCL 05I

Research investigated the ability of pilots of differing experience and capability to make vehicle control decisions. Three groups of pilots and three groups of pilot trainees performed the flight decision making assessment task (FDAT). The FDAT is a microcomputer based, discretetime vehicle control task. Differences in FDAT performance were found as a function of pilot capability. Results are discussed in terms of pilot capability and of decision factors involved in vehicle control. Author (GRA)

N84-18902*# Johns Hopkins Univ., Baltimore, Md. Dept. of Psychiatry.
POSITIVE AND NEGATIVE REINFORCEMENT EFFECTS ON BEHAVIOR IN A THREE-PERSON MICROSOCIETY
H. H. EMURIAN, J. V. BRADY, J. L. MEYERHOFF, and E. H. MOUGEY 1 Dec. 1983 62 p Submitted for publication
(Contract NGR-21-001-111; N00014-80-C-0467; NR PROJ. 170-910)
(NASA-CR-173164; NAS 1.26:173164; AD-A135262; TR-ONR-9)
Avail: NTIS HC A04/MF A01 CSCL 05J

Three-person groups of males (G1, G2, and G4) and females (G3) resided for 6 to 12 days in a continuously programmed environment. Subjects followed a behavioral program that determined the sequential and contingent relationships within an inventory of activities. During a positive reinforcement day, each work unit completed by a subject incremented a group account that was divided evenly among the 3 participants at the study's conclusion. During a negative reinforcement day, no money was earned, and the group was assigned a work unit criterion to accomplish to avoid a reduction in accumulated earnings. During avoidance days, subjects exhibited aggressive responses, which differed in magnitude among the 4 groups, as determined from several distinct behavioral measures that reflected the overall status of the microsociety. These effects appear to fall within the conceptual and procedural framework that encompasses analyses of by-products of aversive control, and they suggest that similar variables are operative. GRA

N84-18903# Catholic Univ. of America, Washington, D.C. Lab. for Human Performance.
THE EFFECT OF STRUCTURED CONTEXTUAL TONES ON PSYCHOPHYSICAL FREQUENCY DISCRIMINATION
K. B. BENNETT, J. A. BALLAS, and J. H. HOWARD, JR. 14 Oct. 1983 39 p
(Contract N00014-79-C-0550; NR PROJ. 196-159; RR0420901)
(AD-A135433; TR-83-21-ONR) Avail: NTIS HC A03/MF A01 CSCL 05J

Six musically and six non-musically trained observers listened to patterns composed of 11 tones of short duration (40 ms). Using a same-different psychophysical procedure observers were asked to report frequency changes in the middle tone of the pattern. Three experimental conditions were formed: constant, random, and structured. In the constant condition observers listened to a single pattern. The observers in the structured and random conditions listened to 12 patterns, but the tonal patterns in the structured condition were arranged to reflect structural rules. Musical training made no difference, but magnitude of the frequency change was highly significant in discrimination performance. A non-parametric statistical analysis revealed a significant effect among the three conditions. It was demonstrated that a structured pattern of tones provided a knowledge source from which observers could effectively abstract information for frequency discrimination judgements. Author (GRA)

N84-20154*# Maryland Univ., College Park. Remote Sensing Systems Lab.
REMOTE SENSING TRAINING FOR CORPS OF ENGINEERING PERSONNEL: THE UNIVERSITY TRAINING MODULE CONCEPT Final Report, Jul. 1981 - Jul. 1982
Aug. 1982 34 p refs Sponsored in part by Corps of Engineers
(Contract NAS5-26650)
(NASA-CR-175204; NAS 1.26:175204) Avail: NTIS HC A03/MF A01 CSCL 05I

A concept to permit Corps of Engineers personnel to obtain and maintain an appropriate level of individual proficiency in the application of remote sensing to water resource management is described. Recommendations are made for specific training courses and include structure and staffing requirements, syllabi and methods of operation, supporting materials, and procedures for integrating information systems management into the University Training Modules. Author

N84-20155*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF RIDE QUALITY PREDICTION METHODS FOR HELICOPTER INTERIOR NOISE AND VIBRATION ENVIRONMENTS
J. D. LEATHERWOOD, S. A. CLEVENSON, and D. D. HOLLENBAUGH (USAAVSCOM Research and Technology Labs.) Mar. 1984 47 p refs
(Contract DA PROJ. 1L2-62209-AH-76)
(NASA-TP-2261; L-15661; NAS 1.60:2261; AVSCOM-TR-84-D-2)
Avail: NTIS HC A03/MF A01 CSCL 05H

The results of a simulator study conducted to compare and validate various ride quality prediction methods for use in assessing passenger/crew ride comfort within helicopters are presented. Included are results quantifying 35 helicopter pilots discomfort responses to helicopter interior noise and vibration typical of routine flights, assessment of various ride quality metrics including the NASA ride comfort model, and examination of possible criteria approaches. Results of the study indicated that crew discomfort results from a complex interaction between vibration and interior noise. Overall measures such as weighted or unweighted root-mean-square acceleration level and A-weighted noise level were not good predictors of discomfort. Accurate prediction required a metric incorporating the interactive effects of both noise and vibration. The best metric for predicting crew comfort to the combined noise and vibration environment was the NASA discomfort index. Author

N84-20156# Naval Training Equipment Center, Orlando, Fla.
PART-TASK TRAINING STRATEGIES IN SIMULATED CARRIER LANDING FINAL APPROACH TRAINING Final Report, 1 Mar. 1982 - 30 Apr. 1983
D. C. WIGHTMAN Nov. 1983 75 p
(AD-A136670; NAVTRAEQUIPC-IH-347) Avail: NTIS HC A04/MF A01 CSCL 05I

This experiment manipulated task simplification variables of lag and approach length in order to examine their influence on training of the perceptual motor skills of a simulated carrier landing in the transfer of a training experiment. In addition, the subject's level of motor skills was assessed as a means of controlling for individual differences and testing for any interactions that might exist between the training strategies and the subject's aptitude. Strong transfer effects were found for both motor-skill levels and the segmentation technique, while lag manipulation produced no main effects. Several interactions of the aptitude by treatment type between subject's motor-skill levels and training manipulation were discovered. The results suggest that low-motor-skill subjects are unable to adapt to changes presented during training and are unable to break bad habits acquired during the course of training. GRA

N84-20157# Michigan State Univ., East Lansing.
PERFORMANCE FEEDBACK EFFECTS UNDER VARYING CONDITIONS OF GOALS, FEEDBACK TYPE, AND CHOICE Interim Technical Report
D. R. ILGEN and C. F. MOORE Dec. 1983 47 p Prepared in cooperation with Purdue Univ., Lafayette, Ind.
(Contract N00014-83-K-0756)
(AD-A136703; TR-83-6; REPT-2002) Avail: NTIS HC A03/MF A01 CSCL 05J

Three studies were conducted to investigate the effects of goal setting and feedback on quality and quantity performance dimensions of a task. The purpose of the research was to: (1) demonstrate the interactive effect of goals and feedback on performance, (2) investigate the effects of different types of feedback on motivation and learning in the presence of goals, and (3) explore the effects on motivation, learning and performance variables on allowing individuals the freedom to choose to receive feedback. In all three experiments, subjects used a microcomputer to respond to a proofreading task. The results indicated that goal setting and feedback do interact to affect performance and that the cognitive processes involved in the interaction are more likely to be strategy-oriented rather than motivational. Author (GRA)

N84-20158# Naval Postgraduate School, Monterey, Calif.
THE EFFECT OF NOISE AND DISPLAY ORIENTATION ON COGNITIVE PERFORMANCE M.S. Thesis
S. H. CHOI Sep. 1983 57 p
(AD-A136808; AD-E301284) Avail: NTIS HC A04/MF A01 CSCL 05J

Military personnel encounter a variety of noise environments. During exercises, high intensity noise levels are often encountered. 24 subjects were required to respond to symbols presented under two levels of task difficulty, two levels of presentation rate, two levels of display orientation, and three levels of noise intensity. The purpose of the experiment was to determine whether noise intensity and display orientation had any effect on short-term memory task. Results showed that continuous white noise at intensity levels of 30, 85, and 105 dB had no effect on the short-term memory task. Presentation rate and task difficulty demonstrated a significant relationship with task performance as did their two-way interaction. This two-way interaction between presentation rate and task difficulty exhibited a different pattern for the two levels display orientation. GRA

N84-20159# Perceptronics, Inc., Woodland Hills, Calif.
MENTAL REPRESENTATION OF CIRCUIT DIAGRAMS: INDIVIDUAL DIFFERENCES IN PROCEDURAL KNOWLEDGE Annual Report
R. E. GEISELMAN, M. G. SAMET, and T. D. WICKENS Dec. 1983 60 p
(Contract N00014-81-C-0590)
(AD-A136876; PATR-1109-83-12) Avail: NTIS HC A04/MF A01 CSCL 05J

This work is concerned with the knowledge that electronics technicians possess of electronic equipment, and more generally, with how people operate in tasks that draw upon a complex spatial symbolic knowledge base. A technician's knowledge base is postulated to consist of three types of related knowledge: structural/functional knowledge, which pertains to the actual configuration of a circuit and the role that its components play in the operation of the device; prototypical knowledge, which pertains to the general properties common to circuits of a given type; and procedural knowledge, which pertains to the way that a circuit can be modified and to the interaction among knowledge elements of all three types of knowledge. The present report focuses on an experiment conducted to investigate individual differences in procedural knowledge. Novice and expert subjects performed tasks in which they had to either locate and correct an error in a circuit, change the function of a circuit, or complete a missing segment in a circuit. On all tasks, experts were found to be far more accurate than novices; but more important, experts were classified, on the basis of verbal protocols, to be considerably more systematic, orderly and directed in their problem solving strategies. The productive procedures used by experts were then translated into specific guidelines toward improving circuit troubleshooting, and the effectiveness of these guidelines will be evaluated in a subsequent experiment. The results of this research program should help in providing guidelines for training electronic technicians to better understand and troubleshoot complex equipment. GRA

N84-20160# Seville Training Systems Corp., Pensacola, Fla.
PROCESSES OF SKILL PERFORMANCE: A FOUNDATION FOR THE DESIGN AND USE OF TRAINING EQUIPMENT Final Report, Jun. 1978 - Jul. 1982
W. D. SPEARS Nov. 1983 172 p
(Contract N61339-78-C-0113)
(AD-A136879; SEVILLE-TR-82-06; NAVTRAEQUIPC-78-C-0113-4) Avail: NTIS HC A08/MF A01 CSCL 05I

The purpose was to lay a foundation for the design of low-cost training devices through an analysis of skill performance. Cognitive motor skills are analyzed in terms of the processing of information. Cognitive processes involved in both types of skills include task recognition; task comprehension; goal setting; planning performance; initiating, monitoring, and regulating performance; stimulus encoding and elaboration; attentional processes; retention and retrieval of information; hierarchical schemata for discrimination and generalization; motivation; and skill integration and automatization. For motor skills, special attention is given to structural characteristics of movements; temporal characteristics of movements; signal discrimination and generalization; roles of sensory modes and their interactions; and patterns of skill integration. Empirically based concepts are used throughout to provide an operational means of manipulating variables during training, and examples are given of methods for empirically assessing the roles of various processes. It is concluded that the analyses could be readily extrapolated to a training technology in general and to the design of training devices in particular. Selected research topics illustrate what could be involved in the extrapolation. Author (GRA)

N84-20161# Duke Univ., Durham, N. C.
EFFORT AND ACCURACY IN CHOICE
E. J. JOHNSON and J. W. PAYNE Jan. 1984 60 p
(Contract N00014-80-C-0114)
(AD-A136881; 84-1) Avail: NTIS HC A04/MF A01 CSCL 05A

Individuals often use several different strategies such as the expected value rule, conjunctive rule, and elimination-by-aspects,

to make decisions. It has been hypothesized that strategy selection is, in part, a function of the ability of a strategy to produce an accurate response and the strategy's demand for mental resources or effort. We examine effort and accuracy and their role in strategy selection. Several strategies that may be used to make choices under risk are simulated using a production system framework. This framework allows the estimation of the effort required to use the strategy in a choice environment, while simultaneously measuring its accuracy relative to a normative model. A series of Monte-Carlo studies varied several aspects of the choice environments, including the complexity of the task and the presence or absence of dominated alternatives. These simulations identify strategies which approximate the accuracy of normative procedures while requiring substantially less effort. These results, however, are highly contingent upon characteristics the task environment. Finally, we discuss the potential of production system models in understanding task effects in decisions and the learning of effort/accuracy tradeoffs. Author (GRA)

N84-20162# Chicago Univ., Ill. Center for Decision Research.
LEARNING IN A PROBABILISTIC ENVIRONMENT: A NEW APPROACH, AND SOME PRELIMINARY FINDINGS
J. KLAYMAN May 1983 29 p Presented at the Meeting of the Midwest. Psychol. Assoc., Chicago, May 1983
(Contract N00014-81-K-0314)
(AD-A137031; TR-7) Avail: NTIS HC A03/MF A01 CSCL 05J

Many studies of 'probability learning' have led to the conclusion that human learners cannot find the 'rule' amidst the 'noise' (Brehmer, 1980). It is hypothesized that under more natural conditions, learners do develop rules which are probabilistically predictive, and improve chiefly through the addition of new predictive variables. The present study represents natural learning situations by including: instructions and rewards that emphasize gradual development of understanding, rather than discovery of the right rule; and a large number of cues, which must be discovered, rather than a few cues explicitly given. Results with 12 college-student subjects indicate significant learning in a computer-displayed task, over approximately 10 hours of experience. Learning was incremental, and was accompanied by the addition of valid factors to existing rules. These results contrast with findings that people fail to utilize information effectively in probabilistic situations. Earlier studies do not, however, model situations in which learning requires the discovery and validation of predictive cues, processes critical for the development of real-world expertise. GRA

N84-20163# Chicago Univ., Ill. Center for Decision Research.
A THEORY OF DIAGNOSTIC INFERENCE Final Report
H. J. EINHORN and R. M. HOGARTH Nov. 1983 36 p
(Contract N00014-81-K-0314)
(AD-A137032; TR-8) Avail: NTIS HC A03/MF A01 CSCL 05J

The essential aspects of diagnostic inference are that they are causal rather than correlational, backward rather than forward (one goes from effects to prior causes), concerned with a specific rather than the general case, and constructive (one can synthesize, enlarge, or otherwise develop new hypotheses). We have developed and tested models of two aspects of diagnostic inference: judgments of the causal strength of a hypothesis/explanation, and how probabilistic assessments concerning the occurrence of a past event are made on the basis of (often conflicting) evidence received from less than perfectly reliable sources. The psychological rationales, quantitative formulations, and implications of these models are presented in this report together with a description of various experiments designed to test the models. We also discuss several commonalities between the two lines of research: the use of cognitive anchoring-and-adjustment strategies to cope with complex inference tasks; the constructive nature of diagnosis; the importance of surprise in inference; and the relation of the present work to normative standards of judgment and choice. GRA

N84-20164# Washington Univ., Seattle. Dept. of Psychology.
SELF-MONITORING. COGNITIVE PROCESSES AND PERFORMANCE
I. G. SARASON and E. H. POTTER, III 12 Dec. 1983 30 p
(Contract N00014-80-C-0522)
(AD-A137043; CO-ONR-009) Avail: NTIS HC A03/MF A01 CSCL 05J

The findings of two laboratory experiments and three field studies conducted at the U.S. Coast Guard Academy dealing with the effects of self-monitoring are reported. The laboratory studies showed a significant relationship between self-monitoring, task persistence, and cognitive interference. The field studies showed significant differences between positive and negative self-monitoring with regard to how new Coast Guard Academy cadets respond to entry into a complex, stress-arousing organizational setting. The five studies reveal that positive self-monitoring has a salutary effect on performance, cognitive interference, and self evaluation. The research suggests that both psychological theory and organizational effectiveness might be significantly advanced with an increase in knowledge about how people deal with self-related attentional cues. Author (GRA)

N84-20165# Yale Univ., New Haven, Conn. School of Organization and Management.
A NORMATIVE MODEL OF WORK TEAM EFFECTIVENESS Interim Report
J. R. HACKMAN Nov. 1983 74 p
(Contract N00014-80-C-0555)
(AD-A136398; AD-E000556; SOM-TR-2) Avail: NTIS HC A04/MF A01 CSCL 05A

Descriptive research on group performance has produced neither a set of empirical generalizations sturdy enough to guide the design and management of work teams, nor interventions that reliably improve team effectiveness. As an alternative, a normative model of group effectiveness is proposed and discussed. The model identifies potentially manipulable aspects of the group and its context that are particularly potent in promoting team effectiveness, and organizes those factors to make them useful in diagnosing the strengths and weaknesses of task-performing teams. The final section of the paper explores the implications of the normative model, and outlines the beginnings of an action model for creating and maintaining effective work groups in organizations. Author (GRA)

N84-20166# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
TOWARD AN INTERPERSONAL PARADIGM FOR SUPERIOR-SUBORDINATE COMMUNICATION Ph.D. Thesis
T. L. BANGS Nov. 1983 205 p
(AD-A135863; AFIT/CI/NR-83-77D) Avail: NTIS HC A10/MF A01 CSCL 05J

The purpose of this dissertation is to report formulative research on an interpersonal paradigm for superior-subordinate communication. The suggested paradigm goes beyond traditional structural approaches to leadership and rests on the interpersonal perception theory of Laing, Phillipson, and Lee. The following theoretical propositions were tested: (1) Highly confirming behavior by a superior, as perceived by an immediate subordinate, is related to a high degree of subordinate feedback. (2) Highly confirming behavior by a superior, as that behavior is perceived by a subordinate, is related to greater communication of creativity from the subordinate to the superior. (3) High superior disclosure, as perceived by a subordinate, is related to a high degree of subordinate feedback. (4) A high degree of superior accessibility, as perceived by a subordinate, is related to greater communication of creativity from the subordinate to the superior. (5) A high degree of superior accessibility, as perceived by a subordinate, is related to a high degree of subordinate feedback. GRA

N84-20167# Yale Univ., New Haven, Conn. School of Organization and Management.
AN INTERGROUP PERSPECTIVE ON GROUP DYNAMICS Interim Report
C. P. ALDERFER Oct. 1983 94 p
(Contract N00014-82-K-0715)
(AD-A135582; SOM-WP-57) Avail: NTIS HC A05/MF A01 CSCL 05J

Intergroup perspectives began to shape the understanding of human behavior from the beginning of the twentieth century. Intergroup theory provides interpretations for individual, interpersonal, group, intergroup, and organizational relations. The version of intergroup theory given here uses a definition of group that is concerned with both internal and external properties. It explains intergroup dynamics in terms of group boundaries, power, affect, cognition, and leadership behavior. It examines the nature of identity and organization groups. It relates the state of intergroup relations to the suprasystem in which they are embedded. It presents an understanding of the changing relations among interdependent groups and their representatives through the operation of parallel and unconscious processes. The theory relates to a wide array of social and organizational problems, including the development of effective work teams, the definition and management of organizational culture, and the teaching of organizational behavior in Management schools. GRA

N84-20168# Instructional Science and Development, Inc., San Diego, Calif.
AUTOMATED INSTRUCTIONAL MEDIA SELECTION (AIMS)
H. D. KRIBS, A. C. SIMPSON, and L. J. MARK Oct. 1983 110 p
(Contract N61339-79-C-0104; NR PROJ. 871-1)
(AD-A135749; NAVTRAEQUIPC-79-C-0104-1) Avail: NTIS HC A06/MF A01 CSCL 05I

As part of an overall automated aids to instructional systems development project, the Automated Instructional Media Selection (AIMS) model was developed. The model was designed to be flexible and widely applicable. It allows the user to define the media pool of up to 90 potential media, and 90 instructional characteristics. All aspects of the media pool are updatable. A user's guide is included for using the system. Author (GRA)

N84-20169# Mathetics, Inc., San Diego, Calif.
PILOT BEHAVIOR MODELS FOR LSO (LANDING SIGNAL OFFICER) TRAINING SYSTEMS Final Report, 30 Jun. 1980 - 30 Oct. 1981
J. T. HOOKS and W. S. MCMURRY Oct. 1983 235 p
(Contract N61339-80-C-0063)
(AD-A135823; NAVTRAEQUIPC-80-C-0063-2) Avail: NTIS HC A11/MF A01 CSCL 05I

This report promulgates results of a project to develop pilot/aircraft behavior models for an automated LSO training system. Data supporting the identification of critical LSO task conditions were collected through literature search, accident report review and survey of the LSO community. Results of data collection and their implications to model development are presented. Pilot/aircraft models, a listing of key LSO learning concepts and a functional design for the models are included. An extensive bibliography is also included. Author (GRA)

N84-20170# Naval Aerospace Medical Research Lab., Pensacola, Fla.
PERFORMANCE CONSISTENCY ON A PERCEPTUAL-MOTOR TASK AS A CORRELATE OF ACHIEVEMENT MOTIVATION
G. B. THOMAS and R. W. CLIPPER 17 Jun. 1983 29 p
(Contract NR PROJ. F58-528)
(AD-A135933; NAMRL-1299) Avail: NTIS HC A03/MF A01 CSCL 05J

A series of studies involving Student Naval Aviators, Navel Flight Officers and Aviation Officer Candidates was conducted to determine whether consistency of performance on a perceptual-motor task was related in any way to scores on traditional pencil-and-paper tests of achievement motivation. The results indicated that a particular choice RT paradigm repeatedly resulted in correlations of 0.43 to 0.69 ($p < 0.05$) between performance consistency and TAT-based measures of achievement motivation and that the test-retest reliability of the consistency measure was on the order of 0.70. No other relationships appeared repeatedly throughout the five studies. A very limited validation study relating relevant measures with the ultimate performance consistency measure might be a useful supplement to existing selection tests in predicting success in flight training. It is recommended that additional research be conducted to replicate and refine the RT consistency measure with the ultimate goal being an objective measure of achievement motivation. GRA

N84-20171# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ACCURACY OF VISUALLY PERCEIVED ROLL ANGLE AND ROLL RATE USING AN ARTIFICIAL HORIZON AND PERIPHERAL DISPLAYS
R. J. A. W. HOSMAN and J. C. VANDERVAART Mar. 1983 24 p refs Presented at 2nd European Ann. Conf. on Human Decision Making and Manual Control, Bonn, 2-4 Jun. 1982
(VTH-LR-377) Avail: NTIS HC A02/MF A01

In computer controled ground tests, jet transport pilots were required to make accurate and fast estimates of roll attitude or roll rate presented at short intervals on a central cathode ray tube display (artificial horizon). The influence of exposure time and, in the case of the roll rate perception task, the influence of the presence of displays in the peripheral field of vision, were investigated. Results show that roll attitude perception is more accurate and can be accomplished at much shorter exposure times than roll rate perception. Reaction time for roll attitude perception is 0.1 sec shorter than for roll rate perception using the central display. Peripheral displays improve roll rate perception and decrease reaction time. Author (ESA)

N84-20172# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
PSYCHOLOGICAL RESEARCH IN USA WITHIN THE AREAS OF ANTI-TANK HELICOPTER OPERATIONS AND MAN-COMPUTER INTERACTIONS: STUDY TRIP TO USA, MAY-JUNE 1983
H. MARMOLIN and A. CARLSTROEM Nov. 1983 31 p refs In SWEDISH; ENGLISH summary
(FOA-C-53012-H2; ISSN-0347-7665) Avail: NTIS HC A03/MF A01

Selection and training of pilots, cooperation between pilot and gunner and the use of training simulators are discussed.
Author (ESA)

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

A84-23620
MODELING AND SIMULATION OF VERTEBRATE PRIMARY VISUAL SYSTEM BASIC NETWORK
M. N. OGUZTORELI (Alberta, University, Edmonton, Canada) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Sept.-Oct. 1983, p. 766-781. Sponsorship: Natural Sciences and Engineering Research Council of Canada. refs
(Contract NSERC-A-4345)

An attempt is made to study the neuronal activities in the primary visual system in vertebrates by mathematical modeling and simulations. The eight-cell model, called the basic network, is governed by eight coupled nonlinear integro-differential difference equations. Five of the cells in the basic network are from the

retina, and the remaining three are from the lateral geniculate nucleus and the visual cortex, forming a functional unit to process the visual information. This functional unit has two local circuitries, the retinal pathway and the thalamocortical pathway connected by the optic nerve. Each cell in the basic network is characterized by its structure and interaction with other cells. The modeling of the basic network is described. The system equations are derived from the more general neuronal network equations studied in earlier work by taking into account the main characteristics of the neurons, the form of the connections, and the manner of the interactions. The experimental determination of the system parameters is briefly discussed. The simulations are considered under different conditions, as well as the responses of the system to certain rectangular and periodic incoming light intensities. Author

A84-23625
PERTURBATION ANALYSIS APPLIED TO EYE, HEAD, AND ARM MOVEMENT MODELS
S. L. LEHMAN and L. W. STARK (California, University, Berkeley, CA) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Sept.-Oct. 1983, p. 972-979. refs

Four types of human movements are compared: eye saccades, horizontal head rotations, the twisting motion of the forearm about its long axis, and the horizontal rotation of the forearm about the axis of the elbow. Each is a rotation about a single axis of a load, driven by muscle-generated torques. In each case, investigators have modeled the load as a second-order linear system and have taken care in identifying the three parameters of the model. The aim of the present study is to develop a hierarchy of descriptions of each kind of movement. The strategy is to apply perturbation theory to the four second-order models. The amplitude, time, and maximum net torques to get a single-parameter equation for each movement system. Asymptotic series solutions are developed for the response of each system to a step input, in terms of the single (small or large) parameter. The low-order terms of the expansions give the simplest approximations to the behavior of each system. These low-order approximate trajectories are used to compare the systems and to understand control strategies for different movements. Author

A84-23712
THE INFLUENCE OF THE CHEMICAL COMPOSITION OF THE AIR ON THE OXIDIZING EFFECT OF OZONE IN BUILDINGS [VLIIANIE KHIMICHESKOGO SOSTAVA VOZDUKHA NA OKISLITEL'NYI EFFEKT OZONA V POMESHCHENIIAKH]
M. P. ZAKHARCHENKO (Voenno-Meditsinskaia Akademiia, Leningrad, USSR) and M. T. DMITRIEV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), July 1983, p. 4-6. In Russian. refs

Mass spectroscopy and chromatography were used to analyze the air in buildings with different densities of inhabitants and artificial ozonation of the air. It is shown that the oxidizing effect of ozone can be used to sanitize the air; the oxidizing effect is inversely proportional to the chemical composition of the air in the indoor environment; i.e., the better the composition, the less manifest the ozone effect. It is noted that artificial ozonation should be implemented with due regard to the maximum equilibrium concentration of ozone, as it can affect human health. B.J.

A84-23713
SUBSTANTIATION OF MICROCLIMATE NORMS FOR INDUSTRIAL BUILDINGS, TAKING INTO ACCOUNT THE CATEGORY OF OPERATOR-WORK LOAD [OBOSNOVANIE NORM MIKROKLIMATA PROIZVODSTVENNYKH POMESHCHENII S UCHETOM KATEGORII NAPRIAZHENNOSTI OPERATORSKOGO TRUDA]
F. M. SHLEIFMAN, M. I. ZAKHARENKO, and A. A. LASHCHUK (Kievskii Nauchno-Issledovatel'skii Institut, Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), July 1983, p. 9-11. In Russian. refs

A84-23719
INDIVIDUAL RADIATION DOSES FOR CERTAIN GROUPS OF PERSONNEL [INDIVIDUAL'NYE DOZY OBLUCHENIIA NEKOTORYKH GRUPP PERSONALA]
V. A. ALEKSEEVA, V. G. ERKIN, and O. V. LEBEDEV (Ministerstvo Zdravookhraneniia SSSR, Leningradskii Nauchno-Issledovatel'skii Institut Radiatsionnoi Gigieny, Leningrad, USSR) Gigiena i Sanitariia (ISSN 0016-9900), July 1983, p. 93, 94. In Russian.

A thermoluminescence dosimetry method and a unified method of data analysis and processing were used to evaluate individual doses for three groups of personnel working at tasks involving exposure to radiation: (1) workers with medical X-ray apparatus; (2) personnel involved with X-ray and gama-ray flaw inspection; and (3) workers engaged in the burial of radioactive wastes. Results indicate that the distribution of individual doses is log-normal in character. B.J.

A84-23728
RHEOSTAT TESTS OF DIESEL LOCOMOTIVES AND THE HYGIENIC EVALUATION OF THESE TESTS [REOSTATNYE ISPYTANIIA TEPLOVOZOV I IKH GIGIENICHESKAIA OTSENKA]
E. I. GOLDMAN, E. A. DMITRIEV, and A. B. SUKHACHEVA (Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, Aug. 1983, p. 27-31. In Russian.

Investigations of operating conditions during rheostat tests of diesel locomotives have shown that the workers are exposed to the adverse effects of hot microclimate, temperature drops, toxic chemicals, and noise and vibrations, the levels of which exceed permissible ones. Remote monitoring in the testing of diesel locomotives is shown to be hygienically preferable. The implementation of measures of environment protection during rheostat tests is considered. B.J.

A84-23737
BIOLOGICAL CRITERIA FOR THE USE OF NEW PROTEIN SOURCES IN MEAT PRODUCTS [BIOLOGICHESKIE KRITERII RATSIONALIZATSII ISPOL'ZOVANIIA NOVYKH ISTOCHNIKOV BELKA V MIASNYKH PRODUKTAKH]
A. M. SAFRONOVA, V. A. SHATERNIKOV, V. G. VYSOTSKII, A. CHOLAKOVA, and N. NESTOROV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Institut Miasnoi Promyshlennosti, Bulgaria) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1983, p. 38-44. In Russian. refs

A84-23800
EFFECTS OF LOCUS OF CONTROL AND TASK COMPLEXITY ON PROSPECTIVE REMEMBERING
H. WICHMAN and A. OYASATO (Claremont McKenna College, Claremont, CA) Human Factors (ISSN 0018-7208), vol. 25, Oct. 1983, p. 583-591. Research supported by the Claremont McKenna College. refs

A median split of scores on the personality dimension was used to divide seventy-nine high school students into two groups (internals and externals). Participants were required to perform a planned action at specified times while performing an intensive intervening activity. The difficulty of intervening task alternated between simple and complex, and the type of memory activity was either habitual or episodic. Internals performed less well with a simple task and habitual remembering than when they have a simple task and the more challening episodic memory condition. The results suggest that the locus of control might be an important personnel selection variable when dealing with intensive tasks that are at the extremes of simplicity and complexity. J.N.

A84-24388#
AUTOMATIC SLEEP STAGE ANALYZER TO DETERMINE THE PHYSIOLOGICAL SLEEP PROFILE IN MAN, MONKEY AND IN RATS
T. SCHLEGEL, K. HECHT, M. POPPEI, J. VESPER, and E. WACHTEL (Berlin Humboldt-Universitaet, Berlin, East Germany) (International Union of Physiological Sciences, Commission on Gravitational Physiology, Annual Meeting, 5th, Moscow, USSR, July 26-29, 1983) Physiologist, Supplement (ISSN 0031-9376), vol. 26, Dec. 1983, p. S-159, S-160.

A84-24637#
ENVIRONMENTAL CONTROL AND LIFE SUPPORT (ECLS) DESIGN OPTIMIZATION APPROACH
H. F. BROSE (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT) IN: Space station: Policy, planning and utilization; Proceedings of the Symposium, Arlington, VA, July 18-20, 1983 . New York, American Institute of Aeronautics and Astronautics, 1983, p. 189-194.

The design of environmental-control and life-support (ECLS) systems for the proposed space station is discussed. Design constraints imposed by the overall station concept include crew size and tour of duty, evolutionary vs. integral development, power concept, orbit-keeping and ACS concept, and EVA requirements. The design process involves selecting the station scenario or range of scenarios to be realized, setting the ECLS standards, reviewing concepts capable of meeting these standards, performing payback analysis, and selecting the technologies using specific criteria. Basic, intermediate, and growth versions of a station ECLS system are presented in block diagrams and characterized. A flexible design approach applicable to different scenarios is recommended. T.K.

A84-24957
THERMAL PROTECTION PERFORMANCE OF SURVIVAL SUITS IN ICE-WATER
J. S. HAYWARD (Victoria, University, Victoria, British Columbia, Canada) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, March 1984, p. 212-215. refs

A84-25010* Ohio State Univ., Columbus.
A COMPARISON OF VISUAL AND KINESTHETIC-TACTUAL DISPLAYS FOR COMPENSATORY TRACKING
R. J. JAGACINSKI, J. M. FLACH, and R. D. GILSON (Ohio State University, Columbus, OH) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-13, Nov.-Dec. 1983, p. 1103-1112. Army-sponsored research. refs
(Contract NSG-2179)

Recent research on manual tracking with a kinesthetic-tactual (KT) display suggests that under certain conditions it can be an effective alternative or supplement to visual displays. In order to understand better how KT tracking compares with visual tracking, both a critical tracking and stationary single-axis tracking tasks were conducted with and without velocity quickening. In the critical tracking task, the visual displays were superior, however, the quickened KT display was approximately equal to the unquickened visual display. In stationary tracking tasks, subjects adopted lag equalization with the quickened KT and visual displays, and mean-squared error scores were approximately equal. With the unquickened displays, subjects adopted lag-lead equalization, and the visual displays were superior. This superiority was partly due to the servomotor lag in the implementation of the KT display and partly due to modality differences. Author

A84-25182#
THE IMPACT PERFORMANCE EVALUATION OF JASDF NEW LIGHT WEIGHT HELMET
K. SHIMIZU, W. OGAWA, N. KAWABATA, K. TAGAMI, and F. TOMITA (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan) Japan Air Self Defence Force, Aeromedical Laboratory, Reports (ISSN 0023-2858), vol. 24, Sept. 1983, p. 133-140. In Japanese, with abstract in English. refs

The total impact energy attenuational characteristics of the FHG-1 protective helmet for aircrew of JASDF were evaluated using the Z90.1 impact test method of the American National Standard Institute. The experiment used two steel anvils (hemispherical and flat) and five free fall heights (1.0, 1.2, 1.4, 1.6, and 1.8 m). To measure the impact acceleration, the signal from an acceleration transducer placed in the headform was analyzed and recorded on the external memory of a personal computer. The helmet showed sufficient impact attenuation characteristics in the hemispherical anvil test from the drop height of 1.8 m, and also cleared six tests from 1.0 m to the same location of the helmet. J.N.

A84-25366
HYGIENIC EVALUATION OF FIRE-RESISTANT POLYESTER FIBER [GIGIENICHESKAIA OTSENKA OGNESTOIKOGO POLIEFIRNOGO VOLOKNA]
T. A. CHUDINSKAIA, K. A. RAPOPORT, and N. G. SHUBENKIN (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Sinteticheskikh Volokon, Kalinin; Akademiia Meditsinskikh Nauk, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1983, p. 18-20. In Russian. refs

A toxicological and hygienic evaluation of polyester fabric with low-level fire resistance was carried out, and various compounds added to the fabric to make it more fire-resistant were investigated. In particular, the hygienic characteristics of fire-resistant polyester fabric containing decabrom diphenyloxide were analyzed. The additive is shown to have an irritating, skin-resporptive effect, producing changes in the nervous system, cholinesterase activity, and blood serum total protein level. The fabric sample possesses high vapor permeability, and low hygroscopicity and water-retaining capacity. The use of the fabric in industry is recommended. B.J.

A84-25511
SMART STICK CONTROLLERS
D. W. REPPERGER (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH) IN: American Control Conference, San Francisco, CA, June 22-24, 1983, Proceedings. Volume 2 . New York, Institute of Electrical and Electronics Engineers, 1983, p. 807-812. refs

In an effort to apply computers to aid the control of aircraft, a study is being conducted on the use of a computer to change the dynamics of a hand controller as a function of several variables. Such a stick could be termed a 'Smart Stick', if its dynamic properties could change by computer control as a function of measured variables. The variables considered here are the G fields experienced and the pilot's biodynamic response characteristics. By varying the stick controller's dynamic properties, it is possible to obtain more than one definition of closed loop (man-machine) system optimality. Several designs are considered, using analog representations of mechanical systems and the use of methods from circuit theory. The main purpose here is to obtain insight on how to dynamically change the controller's characteristics, using computer control to improve the closed loop man-machine system response under acceleration field stress. Author

A84-26383#
BACKACHE IN CHETAK CREW AND SUGGESTED ERGONOMIC IMPROVEMENTS IN AIRCRAFT SEAT DESIGN
R. SINGH (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 27, Dec. 1983, p. 123-130. refs

A survey of helicopter seat comfort, conducted on the Indian Chetak crew, produced a modified seat design and recommendations for mainly minimizing backache. The seatback

inclination angle was reduced from 106 deg to 96 deg, the accompanying cushion's height was increased by approximately 15 cm, and an adjustable lumbar pad was provided to prevent lower back pain. The seatpan cushion was redesigned so that its inclination (from the horizontal) was 8 deg instead of 16 deg, and an adjustable headrest was provided that does not interfere with the pilot's visibility. Recommendations for future designs include a helmet oxygen mask connector, relocation of hot air feed pipes, and spinal exercises to reduce backache. C.M.

N84-18462# Centre National d'Etudes Spatiales, Toulouse (France).
ELECTROMAGNETIC DESIGN OF A REMOTE MANIPULATOR ARM FOR SPACE APPLICATIONS [CONCEPTION ELECTROMAGNETIQUE D'UN BRAS TELEMANIPULATEUR POUR APPLICATIONS SPATIALES]
L. PETITJEAN and J. C. BINDER (Crouzet, Valence, France) *In* ESA First European Space Mech. and Tribology Symp. p 63-71 Dec. 1983 *In FRENCH*
Avail: NTIS HC A10/MF A01

The electromagnetic design of a satellite remote manipulator arm for handling other satellites in orbit is discussed. A design in which the chaser satellite roughly positions the arm relative to the target, and then guides the arm using optical or extremely high frequency sensors is considered. A decentralized dc drive motor is proposed. Potentiometers are used for position detection, tachometric generators for velocity detection. A parallel fixed axes configuration is retained for the joints. Author (ESA)

N84-18904# Naval Submarine Medical Research Lab., Groton, Conn.
COLD WEATHER GOGGLES. 6: EFFECTIVENESS OF YELLOW FILTERS Interim Report
S. M. LURIA, J. WONG, and R. RODRIGUEZ 22 Nov. 1983 23 p
(Contract M00-95)
(AD-A136241; NSMRL-1011-6) Avail: NTIS HC A02/MF A01 CSCL 06Q

The visibility of bright and dark targets was compared when viewed through yellow filters whose excitation purity ranged from 0.06 to 0.98 as well as a neutral filter and whose total transmittances had been roughly equated. The visibility of large bright targets was enhanced by all the yellow filters but only to a very small degree. The visibility of the dark targets was also slightly enhanced, but these differences were not statistically significant. The color perception of both color normals and red green dichromats was not affected by yellow filters whose excitation purity was less than 0.20. GRA

N84-18905# Carnegie-Mellon Univ., Pittsburgh, Pa. Leg Lab.
DYNAMICALLY STABLE LEGGED LOCOMOTION Progress Report, Oct. 1982 - Oct. 1983
M. H. RAIBERT, H. B. BROWN, JR., M. CHEPPONIS, E. HASTINGS, J. KOECHLING, K. N. MURPHY, S. S. MURTHY, and A. J. STENTZ 13 Dec. 1983 142 p
(Contract MDA903-82-K-0153; ARPA ORDER 4148)
(AD-A136644; CMU-RI-TR-83-20) Avail: NTIS HC A07/MF A01 CSCL 05H

This report documents recent progress in exploring active balance for dynamic legged systems. Balance in 3D can be achieved with a very simple control system. The control system has three separate parts, one that controls forward running velocity, one that controls body attitude, and one that controls hopping height. Experiments with a physical 3D machine that hops on just one leg show that it can hop in place, travel at a specified rate, follow simple paths, and maintain balance when disturbed. Top recorded running speed was 2.2 m/sec (4.8 mph). The 3D control algorithms are direct generalizations of those used earlier in 2D, with surprisingly little additional complication. Computer simulations of a simple multi-legged system suggest that many of the concepts that are useful in understanding locomotion with one leg can be used to understand locomotion with several legs. A planar model with two legs trots and bounds with the same three part control decomposition used for the one-legged systems. We have designed a four-legged running machine in order to experiment with balance in systems with more than one leg. The machine is arranged like a large dog, with narrow hips, and a long body. We have begun to study gait in terms of coupled oscillations. We have found that changes in the ratio of leg stiffness to hip stiffness change the pattern of rocking and swaying motions. For legged systems to be maneuverable, they must be able to traverse arbitrary paths in the horizontal plane. GRA

N84-18906# Texas A&M Univ., College Station.
SCIENCE OF INTEGRATION Final Report, 29 Apr. 1982 - 1 Jul. 1983
W. A. HYMAN, R. D. HUTCHINGSON, C. LESSARD, and B. DAS Sep. 1983 25 p
(Contract F33615-78-D-0629; AF PROJ. 7930)
(AD-A135590; SAM-TR-83-32) Avail: NTIS HC A02/MF A01 CSCL 05H

This project identified under the term integration, rules, guidelines, and management processes which, when followed, would result in optimal system performance and the avoidance of certain types of problems which presently exist in aircrew life support equipment. The occurance of burdensome of otherwise problematical equipment is frequently a result of poorly defined design constraints rather than lack of integration. Therefore, lack of integration is not necessarily the cause of equipment problems, nor will integration necessarily alleviate them. Integration, the combining of tasks of system hardware so as to optimize a system design with respect to preselected parameters, requires a detailed specification of the critical parameters and sufficient design a alternatives such that the optimum design can be selected. Both technical and managerial research, development, and implementation control are necessary to (a) properly define subsystem design constraints, (b) identify existing subsystems that can or must be redesigned to accommodate other new subsystems, and (c) test any resultant system for overall compliance with total function and total constraints. GRA

N84-18907# California Univ., San Diego, La Jolla. Inst. for Cognitive Science.
USER CENTERED SYSTEM DESIGN
L. BANNON, E. CONWAY, A. CYPHER, S. DRAPER, J. GRAHAM, S. GREENSPAN, M. L. MONTY, D. A. NORMAN, C. OMALLEY, and R. W. ROOT Nov. 1983 35 p Presented at the 1983 CHI Conf. on Human Factors in Computer Systems, Boston, Dec. 1983
(Contract N00014-79-C-0323; NR PROJ. 667-437)
(AD-A136131; ICS-8305) Avail: NTIS HC A03/MF A01 CSCL 05E

This report includes four papers by the UCSD Project on Human-Computer Interfaces presented at the 1983 Conference on Human Factors in Computer Systems (Boston, December 1983). The first paper, Evaluation and Analyses of User's Activity Organization (Bannon, Cypher, Greenspan, and Monty), analyzes the activities performed by users of computer systems. The second paper, A Proposal for User Censered System Documentation (O'Malley, Smolensky, Bannon, Conway, Graham, Sokolov, and Monty), outlines a set of proposals for the development of system documentation based on an analysis of user needs. The third paper, Questionnaires as a Software Evaluation Tool (Root and Draper), reports on a study investigating the strengths and weaknesses of questionnaires as software evaluation tools. The fourth paper, Design Principles for Human-Computer Interfaces (Norman), discusses some of the properties that useful principles should have and presents examples of a tradeoff analysis. GRA

N84-18908# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
USN/USAF ANTI-G-SUIT CONSOLIDATION PROGRAM Final Report
J. Z. LEWYCKYJ 22 Aug. 1983 23 p
(AD-A136138; NADC-83076-60) Avail: NTIS HC A02/MF A01 CSCL 06Q

As a result of a Standardization meeting between the US Air Force and the US Navy, it was decided that a joint specification would be prepared for an Anti-G Suit. To this end, each service would evaluate the other Services Anti-G Suit and the best features would be combined. This report provides some of the background and a comparison of both suits. It provides a test program on the Air Force CSU-13/P Anti-G Suit to be conducted by NAVAIRDEVCEN. Author (GRA)

N84-19428# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SPACELAB/ORBITER ATMOSPHERE REVITALIZATION SUBSYSTEM COMMONALITY AND FLIGHT EXPERIENCE
P. LAUTENBACH, R. VAETH, and J. E. SWIDER (Hamilton Standard, Windsor Locks, Conn.) *In* ESA Environ. and Thermal Control Systems for Space Vehicles p 271-279 Dec. 1983
(Contract ERNO-CC-DS-000-100)
Avail: NTIS HC A25/MF A01

The Spacelab/orbiter atmosphere revitalization subsystem cabin and avionics air loops are described, and performance during STS flights is described. The cabin loop contains a fan, a CO2 control assembly, humidity and temperature controls, a water separator, condensate storage, an overboard dumping assembly, and an air distribution assembly. The avionics loop includes fans, heat exchangers, smoke sensors, a rack cooling assembly, and fire suppression system. Differences between orbiter and Spacelab requirements are indicated. Author (ESA)

N84-19429# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
THE COMPLEMENTARY ROLES OF EXISTING AND ADVANCED ENVIRONMENTAL, THERMAL CONTROL AND LIFE SUPPORT TECHNOLOGY FOR SPACE STATIONS
A. I. SKOOG and H. F. BROSE (Hamilton Standard, Windsor Locks, Conn.) *In* ESA Environ. and Thermal Control Systems for Space Vehicles p 281-288 Dec. 1983 refs
Avail: NTIS HC A25/MF A01

The role of existing technology, especially Shuttle and Spacelab equipment, and the evolution to incorporation of advanced hardware in a closed loop environmental thermal control and life support (ETCLS) system are discussed. Analyses of regenerative and closed loop systems performed during Space Operations Center, Manned Space Platform, Space Station and Spacelab programs are reviewed. Cabin atmosphere, hygiene, water management, and galley requirements are considered. It is concluded that a considerable amount of existing ETCLS equipment can be used for space stations. Author (ESA)

N84-19634*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OPERATOR WORKLOAD MEASUREMENT VALIDATION FOR THE MARK IV DSCC MONITOR AND CONTROL SUBSYSTEM
M. LEMAY (Montclair State Coll.), E. E. HIRD, and B. Y. RODRIQUEZ *In its* The Telecommun. and Data Acquisition Rept. p 132-140 15 Feb. 1984 refs
Avail: NTIS HC A10/MF A01 CSCL 05H

The validation of some proposed measures of operator workload in a large interactive computer system is described. The tests were conducted on MARK III deep space network (DSN) equipment using experienced operators as subjects. The significant operator workload measure are identified and useful guidelines are obtained on operator task scheduling. E.A.K.

N84-19894# Patras Univ. (Greece). Dept. of Mechanical and Electrical Engineering.
RESEARCHING THE MAN-MACHINE SYSTEM AS A FUNCTION OF SOIL-ENVIRONMENT SYSTEM
A. MASSINAS and P. DRAKATOS (MIT) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., part 3 p 1-8 May 1983 refs
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 05H

A stochastic model which describes the functional relationship between the man-machine system (MMS) and the soil environment system(SES) with respect to earth moving equipment is developed. The Vashy-Buchingham theorem was applied and nondimensional P sub i terms resulted. This model was approved by means of a series of experiments that are valid for a large range of values. Author

N84-19895# Patras Univ. (Greece). Dept. of Mechanical and Electrical Engineering.
A STOCHASTIC MODEL FOR THE MAN-MACHINE-SOIL-ENVIRONMENT SYSTEM (MMSES) AND THE INFLUENCE OF VIBRATIONS
A. MASSINAS and P. DRAKATOS (MIT) *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., part 3 p 9-18 May 1983 refs
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 05H

A stochastic model which describes the interaction of different parameters involved in the man-machine-soil-environment system (MMSES), with respect to the efficiency of the earth moving equipment is described. There is a large number of dependent and independent variables that effect the systems. However, only those which were thought to be influencial in the operation of the system were taken into consideration. The Vashy-Buckingham theorem was applied and nondimensional Pm terms were resulted. Employing the general form of curvilinear regression equation and the method of least squares through the use of a special computer program the functional relationships that govern the MMSE system were determined. Experiments using six operators, five types of soil and three different machines under different environmental conditions were carried out and various results obtained. The effects of vibrational acceleration were also taken into consideration. The validity of the model was justified by experimental results gathered from various sources during a five year period and also from the data obtained from various experiments made ad hoc. M.G.

N84-19896# Concordia Univ., Montreal (Quebec). Dept. of Mechanical Engineering.
AN OPTIMUM SEAT-SUSPENSION FOR OFF-ROAD VEHICLES
S. RAKHEJA and S. SANKAR *In* Shock and Vibration Inform. Center The Shock and Vibration Bull., part 3 p 19-34 May 1983 refs
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 05H

Low frequency terrain induced vibration transmitted to off-road vehicle operators are quite severe and exceed International Standards Organization (ISO) specified fatigue-decreased-proficiency limits. Design of an optimum seat-suspension to protect the drivers from incoming injurious vibrations in bounce, longitudinal, lateral, roll, and pitch modes, is presented. The existing bounce seat-suspension is modeled as a two-degree-of-freedom, nonlinear system. Configuration of a horizontal isolator attachable to the existing bounce isolator to attenuate longitudinal and lateral vibration is proposed and modeled including nonlinearities. The nonlinear models in the three translational modes are linearized, and design parameters are selected through parametric optimization. Optimization problem is formulated to maintain the acceleration power spectral densities within the ISO specified limits, corresponding to 4 hours exposure while constraining the relative displacements to a minimum possible. Isolation of roll and pitch vibrations is sought through a gimbal arrangement mounted to the bounce isolator. Parametric

optimization of the linear rotational model is carried out to maintain bounce acceleration response within 4 hours exposure limit (ISO), subject to constrained pitch and roll accelerations. M.G.

N84-20173# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
VIBRATION EXPOSURES CONCERNING THE DRIVERS OF TRUCKS AND VEHICLES OPERATED BY RODOTIGRE
L. X. NEPOMUCENO 11 Oct. 1983 31 p In PORTUGUESE; ENGLISH summary
Avail: NTIS HC A03/MF A01

The results of the vibration levels in third octave bands, related to the exposure the drivers of vehicles suffer are presented. The results comprise various types of pavements in different roads, from asphalt to totally untreated roads. The results indicate some limited time for driving, according to the type of pavement on the different roads, as the drivers are normally on the wheel during eight hours daily. Author

N84-20174*# Nelson and Johnson Engineering, Inc., Boulder, Colo.
THE HISTORICAL DEVELOPMENT AND BASIS OF HUMAN FACTORS GUIDELINES FOR AUTOMATED SYSTEMS IN AERONAUTICAL OPERATIONS
J. A. CICIORA, S. D. LEONARD, N. JOHNSON, and J. AMELL Feb. 1984 403 p
(Contract NAS2-11523)
(NASA-CR-166560; NAS 1.26:166560) Avail: NTIS HC A18/MF A01 CSCL 05H

In order to derive general design guidelines for automated systems a study was *conducted on the utilization and acceptance* of existing automated systems as currently employed in several commercial fields. Four principal study area were investigated by means of structured interviews, and in some cases questionnaires. The study areas were aviation, a both scheduled airline and general commercial aviation; process control and factory applications; office automation; and automation in the power industry. The results of over eighty structured interviews were analyzed and responses categoried as various human factors issues for use by both designers and users of automated equipment. These guidelines address such items as general physical features of automated equipment; personnel orientation, acceptance, and training; and both personnel and system reliability. Author

N84-20175*# Stanford Univ., Calif.
PRECISE CONTROL OF FLEXIBLE MANIPULATORS Semiannual Progress Report
R. H. CANNON, JR. Mar. 1984 36 p refs
(Contract NAG1-322)
(NASA-CR-175389; NAS 1.26:175389) Avail: NTIS HC A03/MF A01 CSCL 05H

Experimental apparatus were developed for physically testing control systems for pointing flexible structures, such as limber spacecraft, for the case that control actuators cannot be collocated with sensors. Structural damping ratios are less than 0.003, each basic configuration of sensor/actuator noncollocation is available, and inertias can be halved or doubled abruptly during control maneuvers, thereby imposing, in particular, a sudden reversal in the plant's pole-zero sequence. First experimental results are presented, including stable control with both collocation and noncollocation. Author

N84-20176*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN EXPERIMENTAL EVALUATION OF THE STERNBERG TASK AS A WORKLOAD METRIC FOR HELICOPTER FLIGHT HANDLING QUALITIES (FHQ) RESEARCH
J. C. HEMINGWAY Mar. 1984 39 p refs
(NASA-TM-85884; A-9634; NAS 1.15:85884) Avail: NTIS HC A03/MF A01 CSCL 05H

The objective was to determine whether the Sternberg item-recognition task, employed as a secondary task measure of spare mental capacity for flight handling qualities (FHQ) simulation research, could help to differentiate between different flight-control conditions. FHQ evaluations were conducted on the Vertical Motion Simulator at Ames Research Center to investigate different primary flight-control configurations, and selected stability and control augmentation levels for helicopters engaged in low-level flight regimes. The Sternberg task was superimposed upon the primary flight-control task in a balanced experimental design. The results of parametric statistical analysis of Sternberg secondary task data failed to support the continued use of this task as a measure of pilot workload. In addition to the secondary task, subjects provided Cooper-Harper pilot ratings (CHPR) and responded to workload questionnaire. The CHPR data also failed to provide reliable statistical discrimination between FHQ treatment conditions; some insight into the behavior of the secondary task was gained from the workload questionnaire data. Author

N84-20177*# Hamilton Standard, Windsor Locks, Conn.
PREPROTOTYPE SAWD SUBSYSTEM Final Report
T. A. NALETTE Feb. 1984 124 p
(Contract NAS9-13624)
(NASA-CR-171760; NAS 1.26:171760; SVHSER-8921) Avail: NTIS HC A06/MF A01 CSCL 06K

A regenerable, three man preprototype solid amine, water *desorbed (SAWD) CO2 removal and concentation subsystem was* designed, fabricated, and successfully acceptance tested by Hamilton Standard. The preprototype SAWD incorporates a single solid amine canister to perform the CO2 removal function, an accumulator to provide the CO2 storage and delivery function, and a microprocessor which automatically controls the subsystem sequential operation and performance. The SAWD subsystem was configured to have a CO2 removal and CO2 delivery capability at the rate of 0.12 kg/hr (0.264 lb/hr) over the relative humidity range of 35 to 70%. The controller was developed to provide fully automatic control over the relative humidity range via custom software that was generated specifically for the SAWD subsystem. The preprototype SAWD subsystem demonstrated a total of 281 hours (208) cycles of operation during ten acceptance tests that were conducted over the 3 to 70% relative humidity range. This operation was comprised of 178 hours (128 cycles) in the CO2 overboard mode and 103 hours (80 cycles) in the CO2 reduction mode. The average CO2 removal/delivery rate met or exceeded the design specification rate of 0.12 kg/hr (0.254 lb/hr) for all ten of the acceptance tests. Author

N84-20178# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
DEVELOPMENT OF A PRESSURIZED ANTI-EXPOSURE BARRIER SYSTEM Interim Report, Oct. 1981 - May 1983
J. Z. LEWYCKYJ 1 May 1983 77 p
(AD-A137130; NADC-83055-60) Avail: NTIS HC A05/MF A01 CSCL 06Q

A protective foam barrier was conceived to serve as a normal flight garment to enhance flame resistance, reduce adverse thermal conduction, and provide flotation during emergency conditions. *Preliminary studies investigated feasibility of utilizing pressurized* foam between two layers of cloth to envelop the wearer's torso and limbs. GRA

N84-20179# Naval Submarine Medical Center, Groton, Conn.
STANDARDS FOR PROTECTIVE GOGGLES FOR USE IN THE COLD Final Report
S. M. LURIA 21 Dec. 1983 12 p
(Contract DA PROJ. M00-95)
(AD-A137288; NSMRL-1014) Avail: NTIS HC A02/MF A01 CSCL 06Q

The characteristics of goggles needed to protect the eyes in *cold environments are specified, based on laboratory investigations,* field studies, and a survey of the literature. The transmittance of the filters, the magnitude of distortion, the degree of chromaticity, resistance to fogging, and the physical standards of the filters are considered. GRA

N84-20180# Human Engineering Labs., Aberdeen Proving Ground, Md.
MISSILE COMPONENT REPAIR WHILE WEARING NBC PROTECTIVE CLOTHING Final Report
J. D. WAUGH and P. W. KILDUFF Jan. 1984 50 p
(AD-A137315; AD-E500606; HEL-TM-1-84) Avail: NTIS HC A03/MF A01 CSCL 15B

The US Army Human Engineering Laboratory assessed possible degradation in the performance of missile repair persons while wearing NBC protective clothing. Nine male soldiers, just graduated from the Advanced Individual Training Course in Missile Repair, were required to perform repair tasks in three replications. Two repair tasks were chosen; one considered nondifficult whose activities concentrated on procedural diagnostics and fault isolation; the second considered difficult, required manipulating small machine parts and hand tools requiring fine eye-hand coordination. The experimental results and subsequent comparative statistical analysis showed no degradation in performance of the easier procedures and diagnostic task. The time to complete the more difficult task was degraded (increased) on the average of 45% in MOPP 4 with a definite contribution to degradation attributed to the mask/hood and the protective gloves by themselves. A significant improvement attributed to learning from the first to the second presentation was found, but not from the second to the third presentation. The participants' degree of learning was neither enhanced nor held back while in protective clothing as compared to working in the duty uniform. GRA

N84-20181# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering/Operations Research.
GENIE: A COMPUTER-BASED TASK FOR EXPERIMENTS IN HUMAN-COMPUTER INTERACTION
T. E. LINDQUIST, R. G. FAINTER, M. T. HAKKINEN, S. R. GUY, and J. F. MAYNARD Oct. 1983 52 p
(Contract N00014-81-K-0143; RR0-4209)
(AD-A137473; CSIE-83-10) Avail: NTIS HC A04/MF A01 CSCL 05H

The results of many human-computer interaction studies are often not generalizable because the task environment in which they are run does not posssess characteristics common to other interfaces. In this paper we describe a generalized task environment that is directly applicable to several interesting real-world tasks, and that contains elements appearing in almost every system having a human-computer interface. The environment is implemented through a software system called GENIE (Generic Environment for Interactive Experiments), and is based on controlling the motion of vehicle through three-dimensional space. Aside from providing a task with common characteristics, GENIE's implementation was designed to allow for adaptation to a variety of studies. The user's interface to the system has been constructed in such a way as to minimize the effort necessary for change. The paper first describes the development of the GENIE software system and then presents its structure. The user's view of the system is discussed followed by a presentation of the facilities available to the experimenter. Software components of the system are described from a functional level, and finally, three example experiments that use the system are described. Author (GRA)

N84-20182# Illinois Univ., Urbana. Lab. for Engineering-Psychology Research.
THE LIMITS OF MULTIPLE RESOURCE THEORY: THE ROLE OF TASK CORRELATION/INTEGRATION IN OPTIMAL DISPLAY FORMATTING
C. D. WICKENS and D. B. BOLES Dec. 1983 25 p
(Contract N00014-79-C-0658; NR PROJ. 196-158)
(AD-A136692; EPL-83-5/ONR-83-5) Avail: NTIS HC A02/MF A01 CSCL 05J

This report presents a theory of the optimal display format for tasks that have multiple stimulus elements. Our previous research indicates that these various elements should be presented to display channels that employ separate resources (e.g., be distributed between auditory and visual modalities). In this report we suggest that this distribution should not be done to the extent that (1) the values of the various display elements are correlated (e.g., temperature and pressure of gas in a pipe), (2) the separate elements must be integrated into a single mental model of the environment. Collectively, we define these two conditions as the degree of correlation/integration. As correction/integration increases, the relative advantages of separate resources decreases. The research in our own and other laboratories that supports this concept is reviewed. Author (GRA)

N84-20183# Illinois Univ., Urbana. Lab. for Engineering-Psychology Research.
A COMPARISON OF HOMOGENEOUS AND HETEROGENEOUS DISPLAY FORMATS IN INFORMATION INTEGRATION AND NONINTEGRATION TASKS
D. B. BOLES and C. D. WICKENS Dec. 1983 36 p
(Contract N00014-79-C-0658; NR PROJ. 196-158)
(AD-A136693; EPL-83-6/ONR-83-6) Avail: NTIS HC A03/MF A01 CSCL 05H

The multiple resources model states that dual-task performance improves if the component tasks are made minimally similar with respect to the mental resources the demand. The lesser the overlap between stimulus modality, central processing, and response modality resources, the lesser the predicted interference between concurrent tasks. Although the model has generally received support from dual-task experiments, it has not been known whether it generalizes to task environments requiring the combination or integration of information sources prior to response. Here two experiments made use of three tasks varying in terms of integration demands, and presented via four visual display formates for numeric information, presumably varying in the homogeneity of resource demands. These results conceptually replicate previous findings in showing that dual-task environments benefit from the use of nonoverlapping (heterogeneous) resources, presumably because they allow for greater noninterfering parallel processing. Yet when information integration is required, this is no longer true; under certain conditions, benefit is obtained when the information sources to be integrated use overlapping (homogeneous) resources. It appears that the design of optimal displays in applied settings must take into account the degree to which information is to be integrated or responded to separately. GRA

N84-20184# BioTechnology, Inc., Falls Church, Va.
A REVIEW OF MAJOR ISSUES RELATING TO HUMAN-MACHINE INTEGRATION IN THE DEVELOPMENT OF MILITARY SYSTEMS Final Research Note
H. E. PRICE, C. R. SAWYER, and J. S. KIDD Dec. 1983 46 p
(Contract MDA903-81-C-0541; DA PROJ. 2Q1-62722-A-791)
(AD-A136739; ARI-RN-83-51) Avail: NTIS HC A03/MF A01 CSCL 05H

This paper discusses recurrent problems and deficiencies related to the adequate consideration of human factors, manpower, personnel and training issues in the development of military systems. It provides a brief review and a discussion of these issues from a number of differing perspectives of the varied participants in the development and acquisition community. Author (GRA)

N84-20185# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
APPLIED COGNITIVE SCIENCE
E. E. SMITH and A. COLLINS Dec. 1983 41 p
(Contract N00014-81-C-0019; N00014-79-C-0338)
(AD-A136780; BBN-5499; TR-2-ONR) Avail: NTIS HC A03/MF A01 CSCL 05J

One focus of modern cognitive science is the interaction between people and complex systems, such as computer and electronic systems. American society is becoming inundated with more and more complex systems. The skills required to design, operate, and fix these systems have become necessary ones for anyone to function successfully in our society. Teaching people to deal with these systems, and designing the systems so that they are easy for people to use, are important goals for an applied cognitive psychology. In this paper we present a framework for

understanding the research in the cognitive sciences on human interaction with systems, and describe some of the best research carried out in this area. Author (GRA)

N84-20186# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
EXPLAINING COMPLEX ENGINEERED DEVICES
D. S. WELD Dec. 1983 50 p
(Contract N00014-79-C-0338)
(AD-A136790; BBN-5489; TR-ONR-7) Avail: NTIS HC A03/MF A01 CSCL 09B

This paper presents the outline of an algorithm which generates summary explanations of and answers questions about complex engineered devices. The algorithm uses two domain models: an expert model of the machine, and a model of the student's device understanding. Also required is an inference engine which can perform qualitative simulations of the device engine from the expert model. Given these prerequisites, the algorithm recursively describes the device in a series of ever more detailed passes. In each pass the device is depicted with a strict sequence of topics: the device's role, function, structure, and then its mechanism. The explanatory algorithm is interesting not only for its potential utility in computer aided instruction but also for the constraints it sets on the contents of an expert tutor's mental model of an engineered device. Author (GRA)

N84-20187# Navy Personnel Research and Development Center, San Diego, Calif.
GUIDE TO THE DEVELOPMENT OF A HUMAN FACTORS ENGINEERING DATA RETRIEVAL SYSTEM Interim Report, 1 Oct. 1981 - 30 Sep. 1982
D. MEISTER and R. E. BLANCHARD Nov. 1983 44 p
(Contract F57-526)
(AD-A136918; NPRDC-TR-84-4) Avail: NTIS HC A03/MF A01 CSCL 05E

This report describes the functional specifications for the development of a human factors engineering (HFE) data retrieval system to be used by system acquisition managers, designers, and HFE specialists. The system is organized around the following requirements: system must be responsive to the needs of a variety of users, include data of the type presently available in MIL STD 1472C plus quantitative estimates of human performance, maintenance and logistics data, specifications and standards, and analytical and evaluational techniques, include data from operational Navy sources not presently found in any HFE data base, be formatted in three tracks, with Track 1 consisting of abstracts of individual studies, Track 2 containing data from the same sources but in a highly synthesized form, and Track 3 containing all other ancillary information such as HFE specifications and standards. GRA

N84-20188# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering/Operations Research.
ISSUES IN INTERACTION LANGUAGE SPECIFICATION AND REPRESENTATION
D. H. JOHNSON and H. R. HARTSON Nov. 1983 75 p
(Contract N00014-81-K-0143; RR0-4209)
(AD-A136943; AD-E001638; CSIE-83-15) Avail: NTIS HC A04/MF A01 CSCL 05H

Interaction between a human and a computer necessarily involves the use of a language in which the two can communicate. For application systems which are created under the Dialogue Management System (DMS), this language is usually an interaction language. Issues in the implementation of interaction languages are discussed, including language design, language specification and representation schemes, and language recognition. Components of an interaction language are classified into categories which are analyzed in terms of their specification needs. A model for interaction language specification is presented which depicts several inter-related submodels as a communication path between a dialogue author and an end-user. Because the dialogue author who is creating the user interface for application systems is not expected to be a language specialist, an automated tool to facilitate interaction language design, specification, representation, and parsing is being incorporated into the Author's Interactive Dialogue Environment (AIDE). An interactive example-based interface for syntax specification, Language-By-Example (LBE), guides the dialogue author at design-time in specifying an interaction language for an application system. An example of the use of LBE for defining command strings is presented. Author (GRA)

N84-20189# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering/Operations Research.
THE BEHAVIORAL DEMONSTRATOR: A REQUIREMENTS SPECIFICATION EXECUTOR
J. E. CALLAN, III May 1983 62 p
(Contract N00014-81-K-0143; RR04209)
(AD-A136944; AD-E001638; CSIE-83-14) Avail: NTIS HC A04/MF A01 CSCL 09B

This report presents a design for tools which aid in the requirements verification of computer systems. These tools use a very high level graphical requirements specification language and a system development methodology for human-computer systems. The report moves from an abstract design to actual implementation and uses a sample application system throughout the illustration. Author (GRA)

N84-20190# Virginia Polytechnic Inst. and State Univ., Blacksburg. Computer Science Industrial Engineering/Operations Research.
DIALOGUE MANAGEMENT: NEW CONCEPTS IN HUMAN-COMPUTER INTERFACE DEVELOPMENT
H. R. HARTSON and D. H. JOHNSON Nov. 1983 56 p
(Contract N00014-81-K-0143; RR04209)
(AD-A136945; AD-E001638; CSIE-83-13) Avail: NTIS HC A04/MF A01 CSCL 05H

Dialogue Management is an emerging field which emphasizes a specialization in the development of quality human-computer interfaces. It encompasses the design, implementation, simulation, execution, maintenance, and metering of dialogues in an integrated environment. Several key concepts in dialogue management have been identified in response to the need for improved human-computer interfaces. These concepts are surveyed here, and their importance to dialogue design and management is discussed. Dialogue independence and internal and external dialogue are manifest in the separation of the dialogue components of a software system from the computational components. In a new system design role, a dialogue author is responsible for creating the dialogue which constitutes the human-computer interface of an application system. A holistic methodological approach to system development places emphasis on the development of both dialogue and computational components of an application system. Systems are now being built which incorporate many of these important concepts in the management of dialogues for human-computer systems. Several of these systems are mentioned as examples of concepts application, and one such system is described in some detail. Author (GRA)

N84-20191# Michigan Univ., Ann Arbor. Robot Systems Div.
COORDINATED RESEARCH IN ROBOTICS AND INTEGRATED MANUFACTURING Annual Report, 1 Aug. 1982 - 31 Jul. 1983
D. E. ATKINS and R. A. VOLZ 31 Jul. 1983 135 p
(Contract F49620-82-C-0089; AF PROJ. 2306)
(AD-A137042; RSD-TR-17-83; AFOSR-83-1340TR; AR-1) Avail: NTIS HC A07/MF A01 CSCL 13H

The research procured under this contract is oriented toward the understanding and development of the flexible robot based manufacturing cells or islands which will increasingly become a basic blocks for the building of modern parts production and assembly facilities. Present work spans a hierarchy of sub-systems oriented toward the development and integration of high performance manipulators into flexible manufacturing cells. These subsystems may be divided into several levels of abstraction: Level 1: The mechanical structure and low-level (small time-constant) control of high-performance manipulators; The sensor sub-systems (force, tactile, thermal, and vision); Computer architecture and

languages which form the basis of robot systems and manufacturing cells; Level 2: Integration of mechanical structure, computer system and sensor to form flexible robot systems; Level 3: The integration of systems with production and assembly machines and information contained in the manufacturer's computer-aided design database; and Level 4: Integration of the factory-wide distributed database which is central to the design, production and business functions of manufacturing. GRA

N84-20192# Air Force Human Resources Lab., Brooks AFB, Tex.
NONLINEAR PREDICTION OF HEAD MOVEMENTS FOR HELMET-MOUNTED DISPLAYS Final Technical Paper
U. H. LIST Dec. 1983 25 p
(Contract AF PROJ. 2743)
(AD-A136590; AFHRL-TP-83-45) Avail: NTIS HC A02/MF A01 CSCL 05I

In head-and eye-slaved visual systems, lag times in the visual feedback loop are more apparent than they are in conventional fixed display systems. The available technology of digital image generators does not permit lag times to be reduced to the required amount. Therefore, appropriate prediction algorithms have to be developed. Accelerometers were used to measure the step response of the head in three axes of rotation. It could be shown that linear prediction does not provide the necessary accuracy in the simulated position. A further analysis of the recorded data revealed that it is possible to take advantage of the head's latency to improve the prediction. A simple nonlinear prediction algorithm based on acceleration data was successfully implemented in the fiber optic helmet-mounted display. Author (GRA)

N84-20193# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
REPORT ON STUDY TRIP TO FRANCE, 28 JUNE-9 JULY 1983
B. C. R. STROEMBLAD and L. E. LARSSON Nov. 1983 38 p
Partly in ENGLISH, SWEDISH and FRENCH
(FOA-C-59007-H1; ISSN-0347-7665) Avail: NTIS HC A03/MF A01

High altitude clothing, acceleration protection, chemical warfare protection, anti-wind blast suits, oxygen masks and oxygen regulators are discussed. A lightweight pressure controlled oronasal mask-helmet system with an automatically operating device for keeping the mask against the face is described. Author (ESA)

N84-20194 California Univ., Berkeley.
MODEL REFERENCE ADAPTIVE CONTROL OF MECHANICAL MANIPULATORS Ph.D. Thesis
R. HOROWITZ 1983 259 p
Avail: Univ. Microfilms Order No. DA8328915

The use of techniques to the dynamic control of mechanical manipulators is demonstrated and evaluated. The mathematical modeling of mechanical manipulators is discussed and the dynamic equations of mechanical manipulators are derived. Making use of the fundamental properties of the manipulator equations, a simple continuous time adaptive algorithm is developed for compensating nonlinear terms in the dynamic equations and for decoupling the dynamic interactions. In addition, an alternate discrete time model reference adaptive control algorithm, based on the independent tracking and regulation design, is presented. A computer simulation study, using a three degree of freedom manipulator model, is conducted to evaluate the performance of both the continuous and discrete time manipulator control systems. Simulation results show that both adaptive control schemes are effective in reducing the sensitivity of the manipulator performance to configuration and payload variations. Dissert. Abstr.

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PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N84-19639*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SETI INVESTIGATIONS AT JODRELL BANK, ENGLAND: SEPTEMBER THROUGH NOVEMBER 1983
G. S. DOWNS and S. GULKIS *In its* The Telecommun. and Data Acquisition Rept. p 196-205 15 Feb. 1984 refs
Avail: NTIS HC A10/MF A01 CSCL 22A

The radiofrequency interference RFI environment was examined in the frequency band 1404 to 1444 MHz using the DSN Advanced Systems' Radio Frequency Interference Surveillance System. An uncooled FET amplifier was placed on the 12.8-m antenna, and unlimited observing time was made available to the SETI project. One night of observing at 1667 MHz was made available on the 76 m antenna. Preliminary results of four investigations are reported: (1) full scans of the horizon, cataloging RFI events between 1404 and 1444 MHz; (2) lunar reflections of terrestrial RFI signals between 1424 and 1444 MHz; (3) noise background distortions caused by galactic neutral hydrogen emission at 1420.4 MHz; and (4) low sensitivity search for spectral features of F, G, and K stars. E.A.K.

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Supplement 259)* JUNE 1984

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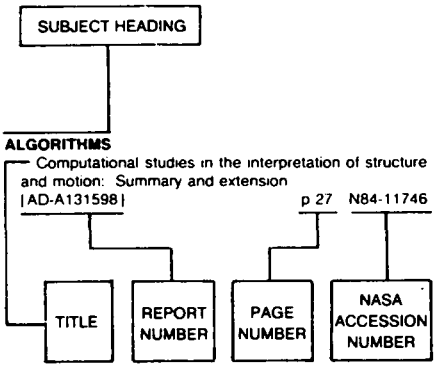

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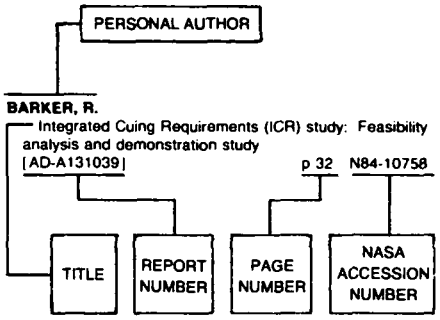

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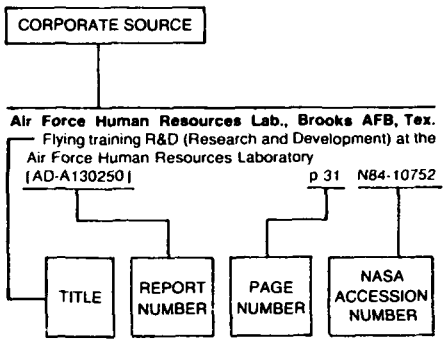

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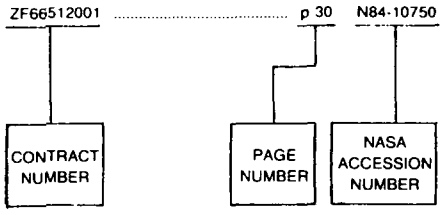

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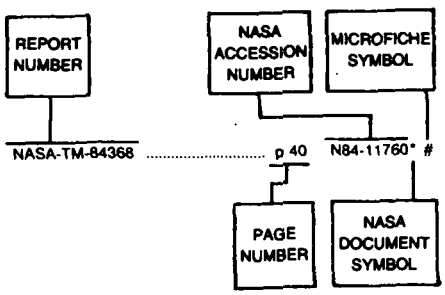

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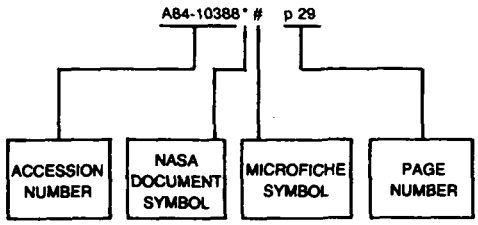

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