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A Continuing Bibliography with Indexes

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Aerospace Medicine & Biology

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NASA SP-7011(232)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 232)

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 April 1982 in

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

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 437 reports, articles and other documents announced during April 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA).* The first issue of the bibliography was published in July 1964.

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

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

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

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

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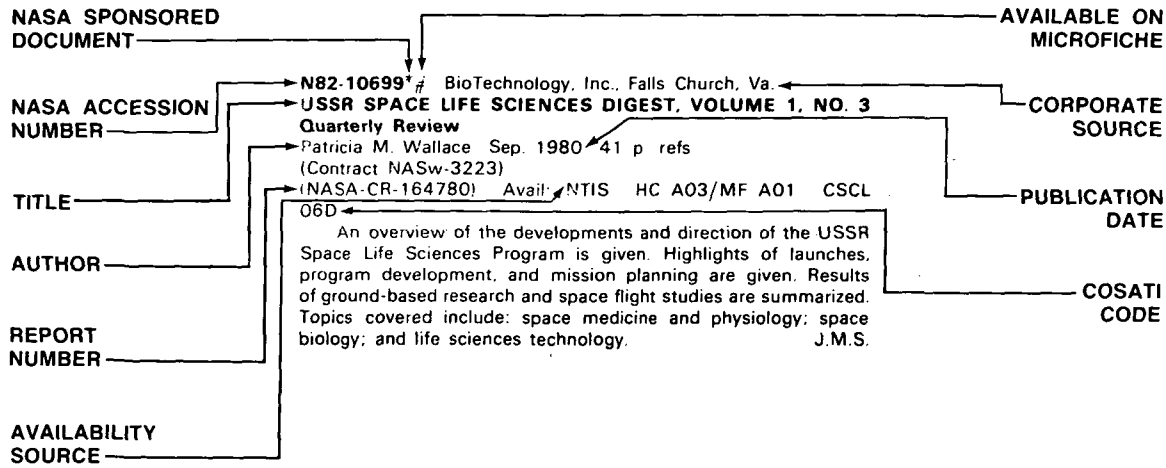

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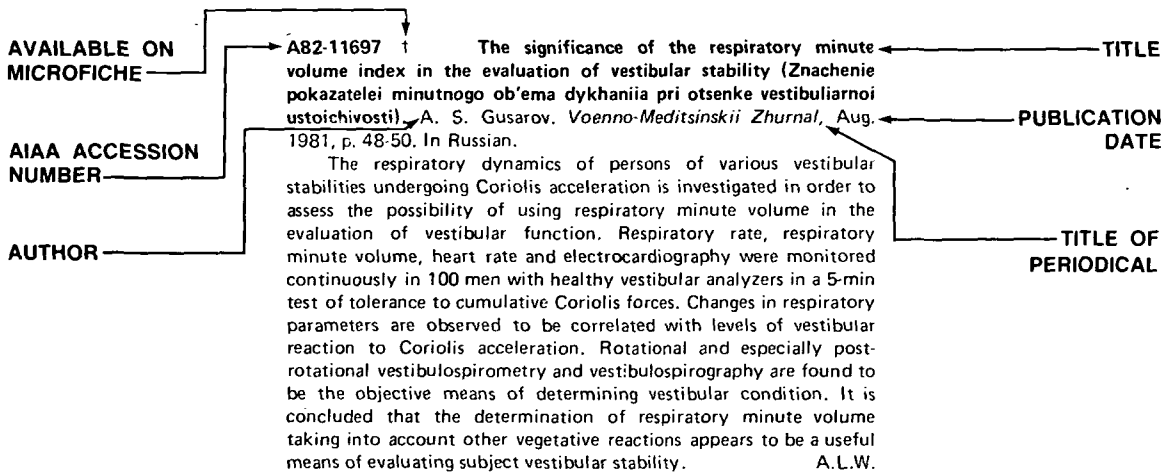

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 232)

MAY 1982

IAA ENTRIES

A82-18872 † **The healthy and the diseased human brain (Zdorovyi i bol'noi mozg cheloveka).** N. P. Bekhtereva. Leningrad, Izdatel'stvo Nauka, 1980. 208 p. 357 refs. In Russian.

Conceptions of the physiological characteristics and interactions of the human brain are discussed based on experimental and observational data obtained over nearly two decades. Current principles and capabilities in the study of the human brain are considered, including electroencephalography, electrical stimulation and pharmacological tests, and general principles of human brain organization are reviewed particularly as regards long-term memory and the maintenance of mental activity. The impact of illness on general brain mechanisms is considered, along with the relation of brain mechanisms to the neurophysiology of the psyche in areas such as phoneme and word handling and the thinking process. Attention is also given to the neurophysiology of human memory and its electrical stimulation, and to the present and past development of human neurophysiology. A.L.W.

A82-18977 † **Biped walking - Model problems of dynamics and control (Dvunogaia khod'ba - Model'nye zadachi dinamiki i upravleniia).** V. V. Beletskii. In: Motion stability. Analytical mechanics. Motion control. Moscow, Izdatel'stvo Nauka, 1981, p. 28-41. 16 refs. In Russian.

The literature on biped walking is reviewed with emphasis on the work of Beletskii and his colleagues. Particular consideration is given to the method of prescribed synergy, compensating oscillations, parametric optimization of the walking process, angular stabilization, stabilization algorithms, and the problem of underwater walking. B.J.

A82-18988 † **Development of an integrated walking robot (Razrabotka integral'nogo shagaiushchego robota).** D. E. Okhotsimskii, A. K. Platonov, V. S. Gurfinkel', and E. A. Devianin. In: Motion stability. Analytical mechanics. Motion control. Moscow, Izdatel'stvo Nauka, 1981, p. 223-238. 30 refs. In Russian.

The basic principles of the functional organization of an integrated walking robot are reviewed. Attention is given to problems of motion design, the mathematical modeling of robot motion, and the development of laboratory models. B.J.

A82-19000 **Psychological problems in the mutual adaptation of man and machine in control systems (Psikhologicheskie problemy vzaimnoi adaptatsii cheloveka i mashiny v sistemakh upravleniia).** Edited by B. F. Lomov, V. F. Venda, and Iu. M. Zabrodin. Moscow, Izdatel'stvo Nauka, 1980. 320 p. In Russian.

A systems theory and methodology is developed concerning the mutual, reciprocal adaptation of man and machine so as to optimize the informational interaction between them. Following a review of current psychological problems in the man-machine system, an approach to system optimization based on the mutual adaptation of man and machine is established. Attention is then given to the construction and modeling of processes of multilevel mutual adaptation of man and machine, and to psychological methods for the adaptation of specific man-machine systems. Methods for the modeling and optimization of adaptive man-machine systems, including autonomic-type systems and systems operating under critical conditions and based on idealized strategies for operative problems are examined, and the application of the concept of mutual adaptation between man and machine to operator training is considered. A.L.W.

A82-19012 **Physical and physiological features of long-range flight and its impact on patients (Physikalische und physiologische Besonderheiten des Langstrekkenfluges und seine Auswirkungen auf den Patienten).** K. Grossmann (Akademie des Sanitärs- und Gesundheitswesens der Bundeswehr, Munich, West Germany). In: Aeromedical evacuation: Results, analysis, developments; International Aeromedical Evacuation Congress, 1st, Munich, West Germany, September 16-19, 1980, Reports. Munich, Allgemeiner Deutscher Automobil-Club, 1981, p. 152-162. In German.

Adverse effects on patients caused by long-range flights in ambulance aircraft are presented. Various types of acceleration and deceleration at takeoff and landing are discussed in relation to the possible adverse effects on respiratory patients. The effects of noise, temperature and aircraft humidity on patients are presented, and the optimal temperature is found to be 20-24 C, with an optimal aircraft humidity of 35%. The effects of spin, ozone, cosmic rays and changes in time zone are also discussed. D.L.G.

A82-19014 **The reliability of flight personnel during the operation of the Mi-4 helicopter.** Y. G. Zorbas (European Institute of Environmental Cybernetics, Athens, Greece). In: Aeromedical evacuation: Results, analysis, developments; International Aeromedical Evacuation Congress, 1st, Munich, West Germany, September 16-19, 1980, Reports. Munich, Allgemeiner Deutscher Automobil-Club, 1981, p. 177-180.

The effect of vibration and noise of an Mi-4 helicopter on the reliability of the flight personnel was examined. A study group composed of 53 Mi-4 flight personnel was divided into work-related groups which were tested for simple motor reactions, reactions to a moving object, the critical frequency of flicker fusion, the capacity for fine coordination of movements, and the reproducibility of muscular exertion. The tests were applied before and after flights for one month, and the results were compared with results from similar tests carried out on a control group manning a helicopter which had low noise and vibration levels. Significant deterioration in the performance of the tests was observed in all crewmembers on the Mi-4, and were highest among the captains, while the control group exhibited few of the performance degradations. It is noted that some of the declines in performance were cumulative, i.e. grew greater with longer times. M.S.K.

A82-19016 **First aid for thorax traumas: Thorax drainage through suction - Report on 25 cases (Primärversorgung von Thoraxtraumen: Thoraxsaugdrainage - Bericht über 25 Fälle).** C. Biesing and A. David (Malteser-Hilfsdienst, Cologne, West Germany). In: Aeromedical evacuation: Results, analysis, developments; International Aeromedical Evacuation Congress, 1st, Munich, West Germany, September 16-19, 1980, Reports. Munich, Allgemeiner Deutscher Automobil-Club, 1981, p. 189-191. In German.

A82-19223 **Evaluation of maximal and submaximal static muscle exertions.** K. H. E. Kroemer (Virginia Polytechnic Institute and State University, Blacksburg, VA) and W. S. Marras (Wayne State University, Detroit, MI). *Human Factors,* vol. 23, Dec. 1981, p. 643-653. 21 refs. Contract No. F49670-79-C-0109.

A model of the regulation of muscle strength exertion is proposed. Based on the model, methods are discussed to assess whether a subject exerts maximal or submaximal efforts. Results with 40 subjects indicate that a simple technique may be developed to judge if a subject is following instructions to exert a maximal contraction in a routine test of voluntary muscle strength. (Author)

A82-19224 **Differences in eye movement data recorded by electro-oculography and corneal reflection techniques.** J. Lehtela (Institute of Occupational Health, Helsinki, Finland). *Human Factors,* vol. 23, Dec. 1981, p. 661-665.

The techniques of electro-oculography and corneal reflection are compared as to their abilities to monitor saccades, fixations and blinks during a visual task under simulated field conditions. Electro-oculograms and video recordings of eye mark motions were obtained simultaneously in unrestrained subjects asked to trace visually patterns of circles placed 1 m away. It is found that whereas the number of blinks given by the two methods coincide quite well, the number of saccades as recorded by the corneal reflection camera was greater than that by EOG, due to the classification of some shorter saccades as involuntary microsaccades in EOG recordings. Although the exact fixation point could not be determined in the present experiment, the fixation times calculated from EOG data appear longer than those by corneal reflection. It is concluded that while the corneal reflection camera with video monitor is suitable for monitoring the visual situation, including the fixation point, EOG is more suitable for providing quantitative data about blinks, saccades and fixations. A.L.W.

A82-19225 **Control and automatic processing during tasks requiring sustained attention - A new approach to vigilance.** A. D. Fisk and W. Schneider (Illinois, University, Champaign, IL). *Human Factors,* vol. 23, Dec. 1981, p. 737-750. 34 refs. Grant No. NIH-5-R01-MH-3125. NR Project 150-409.

Vigilance decrements are interpreted within a two-process (automatic/control) theory of human information processing, and the theoretical components of the normal vigilance curve are discussed in relation to type of processing and amount of practice. Two experiments were conducted showing significant vigilance decrements when subjects utilized effortful control processing; the normal decrement was not observed when effortless automatic processing was possible. Maximum vigilance decrements occur when subjects must continually and redundantly allocate control-processing resources. Results disconfirm the habituation hypothesis. It is concluded that structuring a task such that there is a consistent relationship between signals and noise will reduce vigilance problems. System design implications suggest that tasks should be structured to mimimize continuous and repetitive control processing. Methods for developing vigilance-decrement-resistant automatic processing are discussed. (Author)

A82-19248 **Computer simulation as a visual aid in a video course.** G. L. Bell (Mitre Corp., McLean, VA). In: Summer Computer Simulation Conference, Washington, DC, July 15-17, 1981, Proceedings. Arlington, VA, AFIPS Press, 1981, p. 496, 497. U.S. Department of Transportation Contracts No. FA80WA-4370; No. FA01-81-C-10001.

A study of the performance of controllers in the Air Traffic Control (ATC) system concluded that many controllers perform their ATC tasks in ways that leave them vulnerable to common human errors, misunderstandings, and confusions. The study team made, therefore, the recommendation that the controllers' training should include ways to compensate for basic human limitations. The Air Traffic Service has begun to follow the recommendation by adding videotape courses on ATC-operational remembering and listening. Three courses (for terminal radar, en route radar, and tower cab positions) are to be provided. Each course contains ten examples of aids used in simulated ATC situations which are often encountered by controllers. The workplace and equipment for the two courses for the radar positions is to be simulated. The radar displays in the scenarios require computer simulation. G.R.

A82-19258 **Advanced aviation concepts evaluation through computer driven simulation.** J. Fabry and E. S. Stein (FAA, Technical Center, Atlantic City, NJ). In: Summer Computer Simulation Conference, Washington, DC, July 15-17, 1981, Proceedings. Arlington, VA, AFIPS Press, 1981, p. 659-661.

The goals and operational characteristics of FAA programs for human interactions with advanced avionics systems and displays are discussed. Flight training simulators are noted to offer realistic aircraft handling experience in a cost-effective fashion. The necessity of employing human factors personnel before the actual engineering of a system is stressed, and is a guiding concept in the operations of the FAA Advanced Concepts Laboratory. The Technology, Concepts, and World divisions of the Laboratory are outlined, and the training simulators, the Digital Avionics Control System, and the Cockpit Display of Traffic hardware are described for use by pilots and air traffic controllers. M.S.K.

A82-19491 * **Effects of vasopressin administration on diuresis of water immersion in normal humans.** M. Epstein, A. G. DeNunzio, and R. D. Loutzenhiser (U.S. Veterans Administration Medical Center; Miami, University, Miami, FL). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1384-1387. Research supported by the U.S. Veterans Administration; Contract No. NAS9-15473.

The influence of vasopressin suppression on the diuresis encountered during water immersion is investigated in studies on normal humans immersed to the neck. Six hydrated male subjects were studied on two occasions while undergoing 6 h of immersion without or during the administration of aqueous vasopressin for the initial 4 h. Neck immersion is found to result in a significant increase in urinary flow rate beginning in the first hour and persisting throughout the immersion. The administration of vasopressin markedly attenuated the diuretic response throughout the period of infusion, while cessation of vasopressin administration during the final 2 h of immersion resulted in a marked offset of the antidiuresis. Results thus support the view that the suppression of antidiuretic hormone contributes to the immersion diuresis of hydrated subjects. A.L.W.

A82-19492 * **Orthostatic fluid-electrolyte and endocrine responses in fainters and nonfainters.** E. Shvartz, V. A. Convertino, L. C. Keil, and R. F. Haines (NASA, Ames Research Center, Moffett Field, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1404-1410. 39 refs.

The responses to orthostasis of fluid-electrolyte and endocrine indicators in persons subject and not subject to fainting during tilting are investigated, along with the effects of heat acclimatization and physical training on those responses. Plasma volume and electrolytes and plasma vasopressin and renin activity were determined in tilt-table tests conducted before and after an eight-day period of daily heat acclimation during exercise at 50% maximal oxygen uptake at 40 C, or a control period of exercise at 24 C. Half of the 10 subjects in the study, regardless of exercise regime, showed improved orthostatic reactions in the second tilting test, related to increases in post-tilt plasma volume and potassium concentration, particularly in the nonfainters. In the first test, plasma renin activity is observed to increase fivefold and plasma vasopressin 50 times after the transition from the supine to the orthostatic positions; the respective increases were reduced by 50 and 75% in the second test. The fainters also exhibit a greater increase in vasopressin and a lower increase in renin activity upon tilting than the nonfainters. Results indicate the orthostatic-induced vasopressin increase to be related to volume control independent of renin activity. A.L.W.

A82-19493 **Variability of oxygen affinity of blood - Human subjects native to high altutude.** R. M. Winslow, C. C. Monge, N. J. Statham, C. G. Gibson, S. Charache, J. Whittembury, O. Moran, and R. L. Berger (Centers for Disease Control, Atlanta, GA; Universidad Particular Peruana, Lima, Peru; National Institutes of Health, Bethesda; Johns Hopkins University, Baltimore, MD). *Journal of Applied Physiology: Respiratory, Environmental and Exercise*

Physiology, vol. 51, Dec. 1981, p. 1411-1416. 24 refs. NSF Grant No. INT-77-21795.

The oxygen equilibrium curves (OECs) of whole blood from high-altitude natives is measured in a study of the variability of oxygen affinity under in vivo conditions. An automated method was used to measure the entire OEC from 0 to 150 Torr under controlled pH and CO2 tension in 46 Peruvians native to high altitudes (4540 m) and 25 sea-level controls. Fits of the data with the Adair curve describing the successive oxygenation of hemoglobin reveal that at a pH of 7.4, the oxygen tension at which the hemoglobin is half saturated with O2 is significantly higher in the high-altitude population than in the controls. When the state of compensated alkalosis of the high-altitude subjects is taken into account, however, the values are found to be indistinguishable from the controls. It is concluded that the reduction in oxygen affinity of high-altitude natives is offset by the compensatory respiratory alkalosis so that the position of the OEC is close to that of sea-level humans. Considerable individual variability in oxygen affinities is noted in both groups.

A.L.W.

A82-19494 Glycogen and nonspecific adaptation to cold. J. LeBlanc and A. Labrie (Université Laval, Quebec, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1428-1432. 14 refs.

Exposure to moderate cold for a few weeks causes adaptation through the development of nonshivering thermogenesis primarily in the brown adipose tissue. Exposure to severe cold by repeated short exposures also causes adaptation but by mechanisms that seem to be different. It was also found that this type of adaptation is nonspecific because it can be produced by other stresses such as swimming or fasting. Simultaneous determinations of glycogen in the liver and soleus and tibialis muscles indicated a possible role for this substrate in cold resistance. Repeated cold exposure, swimming for 3 h, or fasting for 48 h all reduced the glycogen stores when measured immediately after the stress. However, the levels of glycogen were significantly increased above the initial values when the determinations were made 24 h later. Cold tolerance measured by resistance to hypothermia at -5 C was improved only when the test was done 24 h after the stress had taken place. Thus, cold resistance is nonspecific and results suggest that glycogen stores could serve as a rate-limiting substrate. (Author)

A82-19495 Effect of blood volume on sweating rate and body fluids in exercising humans. S. M. Fortney, E. R. Nadel, C. B. Wenger, and J. R. Bove (John B. Pierce Foundation Laboratory; Yale University, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1594-1600. 32 refs. Grant No. NIH-HL-20634.

A82-19496 Enhanced heat production in physically restrained rats in hypoxia. M. Hayashi and T. Nagasaka (Kanazawa University, Kanazawa, Japan). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1601-1606. 27 refs.

The combined influence of hypoxia and restraint on metabolic heat production in rats is investigated. Heat production, heat loss, colonic temperature and cardiovascular activity were monitored in rats placed in individual wire mesh cages in which they could move freely or in restraint cylinders, and exposed to mixtures of 9.5% O2 in N2 gas. Hypoxic exposure is found to lead to rapid decreases in heat production and heart rate and gradual decreases in heat loss and colonic temperature in the freely moving rats, while the restrained rats exhibited increased heat production, heat loss, colonic temperature and heart rate. The increases are reversed in restrained chemically sympathectomized rats treated with 6-hydroxydopamine hydrobromide, while norepinephrine is observed to lead to increases in heat production and heart rate in freely moving rats. Hypoxia is also found to decrease significantly blood flow to the brown adipose tissues in restrained rats while increasing blood flow to the heart, diaphragm and limb muscles. Results suggest that hypermetabolism in restrained rats during hypoxia is due to increased neurosympathetic activity, with increased muscle metabolism. A.L.W.

A82-19497 Alterations in responses to drugs of atria from white rats acclimated to hypobaric hypoxia. M. J. Hughes, M. T. Kopetzky, F. Messiha, K. Light, and C. D. Barnes (Texas Tech University, Lubbock, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1607-1611. 33 refs. Grant No. NIH-HL-16240.

Changes in ion responses and in drug sensitivities of cardiac muscles of animals adapted to simulated high altitude conditions are investigated. Atria isolated from young male Wistar rats acclimated to a simulated altitude of 6000 m and from control rats were observed under normoxic conditions. The spontaneous rate of atria isolated from altitude-acclimated rats is found to be significantly lower than that of atria from the control animals. While neither group of tissues responded to the administration of ouabain, the altitude-adapted atria showed a greater sensitivity to both pentobarbital sodium and to ethanol, which stopped spontaneous activity at lower doses than in the control animals. The acclimated atria are found to be less sensitive, however, to norepinephrine and to exhibit a smaller chronotropic response and a greater inotropic response to increased concentrations of calcium. The data obtained are thus indicative of changes in tissue metabolism similar to those found in newborn animals. A.L.W.

A82-19498 Breath-by-breath measurement of true alveolar gas exchange. W. L. Beaver, N. Lamarra, and K. Wasserman (California, University, Medical Center, Torrance, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 51, Dec. 1981, p. 1662-1675. 15 refs.

A method has been developed for the on-line estimation of breath-by-breath alveolar gas exchange from measurements of gas exchange at the mouth corrected for changes in functional residual capacity and alveolar gas concentration. The algorithms employed calculate alveolar O2 and CO2 gas exchanges from the alveolar O2, CO2 and N2 concentrations at end of expiration, the volume containing the lung gas stores at end of expiration and the breath-to-breath change in this volume. Error sensitivity analysis indicates the effects of inaccuracies due to measurement errors to be similar in magnitude to those found in the conventional open-circuit method. Direct comparisons between the alveolar gas exchange measured by the present method and according to the open-circuit assumption that inspired and expired N2 volumes are equal, in subjects exercising at various work rates reveals the presence of significant breath-to-breath differences in gas exchange, particularly during metabolic and respiratory transients, which may have a significant influence in the interpretation of the underlying physiology. A.L.W.

A82-19608 Psychophysical evidence for more than two kinds of cone in dichromatic color blindness. F. S. Frome, T. P. Piantanida, and D. H. Kelly (SRI International, Menlo Park, CA). *Science,* vol. 215, Jan. 22, 1982, p. 417-419. 11 refs. Grants No. NIH-EY-02357; No. NIH-EY-01128.

Psychophysical evidence shows that at least some classically diagnosed dichromats have three cone types rather than two. The anomalous cones, previously thought to be absent, are less sensitive than normal cones to both spectral and temporal variations, and have spectral sensitivities like those of the abnormal cones of anomalous trichromats. These results are not consistent with either loss or replacement models of X-linked recessive color-vision defects, since some dichromats apparently have the same three photopigments as anomalous trichromats. (Author)

A82-19743 # Staying sane in space. B. J. Bluth (California State University, Northridge, CA). *Mechanical Engineering,* vol. 104, Jan. 1982, p. 24-29. 35 refs.

With a view to the establishment of procedures and techniques that will help crews adapt to long missions aboard the projected NASA Space Operations Center, in which nine persons will live for between three and six months, a historical study is made of confined crew performance in isolated environments. Attention is also given to Soviet long-duration mission crew experience. Among the confined, isolated and stressful precedents surveyed are Antarctic research teams, submarine crews, the operators of oceanographic research vessels and undersea research laboratories, and trainees in specially designed simulators. It is generally found that personality screening prior to confinement did not accurately predict subsequent behavior, with irritability increasing as the mission progressed. NASA and

Soviet screening and training procedures are described, with recommendations for crew compartment design. O.C.

A82-19746 † Brain monoamine oxidase activity during cold adaptation and under the combined effects of cold and hyperbaric oxygenation (Aktivnost' monoaminoksidaz mozga pri kholodovoi adaptatsii i sovmestnom deistvii kholoda i giperbarooksigenatsii). I. A. Goroshinskaia, L. L. Grabovskova, Z. G. Bronovitskaia, and A. A. Krichevskaia (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1611-1616. 20 refs. In Russian.

A82-19747 † The role of extracellular O2 and CO2 tensions in membrane mechanisms of cerebral arterial smooth muscle regulation (Rol' P/O2/ i P/CO2/ vnekletochnoi sredy v membrannykh mekhanizmakh reguliatsii gladkikh myshts arterii golovnogo mozga). A. L. Azin (Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1652-1660. 20 refs. In Russian.

A82-19748 † The temperature dependence of the kinetics of isometric myocardium relaxation (Temperaturnaia zavisimost' kinetiki izometricheskogo rasslableniia miokarda). V. Ia. Izakov, B. L. Bykov, and I. Ia. Kimmel'man (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1670-1675. 11 refs. In Russian.

The dependence of the exponential decay constant expressing the isometric relaxation of the myocardium on temperature is investigated in animals with various specific contents of myocardial sarcoplasmic reticulum. Experiments were performed on cardiac ventricles and atria isolated from rabbits, frogs and turtles and electrically stimulated to produce maximal contraction at temperatures from 10 to 35 C. Arrhenius plots derived from the data are found to be linear in the myocardia of the rabbit and frog, with a greater activation energy for the relaxation found in the rabbit. The Arrhenius plot for the turtle, which has a sarcoplasmic reticulum content intermediate between those of the frog and rabbit, corresponds to two straight lines with different activation energies. Results thus support the hypothesis of two separate mechanisms of calcium removal, involving the sarcoplasmic reticulum and cellular membrane, in muscle relaxation. A.L.W.

A82-19749 † The influence of muscular work on the vestigial effects of cold acclimation (Vliianie myshechnoi raboty na sledovnye effekty kholodovoi akklimatsii). V. I. Sobolev and G. I. Chirva (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Nov. 1981, p. 1710-1716. 17 refs. In Russian.

The persistence of the vestigial effects of long-term cold acclimation and the effects of regular muscular work on these effects are investigated in studies on male albino rats preliminarily exposed to a temperature of 2 C for 28 days. Measurements of the calorigenic effect of noradrenaline, cold tolerance at -25 C, the level of working hyperthermia and organ and tissue weights were performed on the first, tenth, 20th, and 30th days of the post-acclimation period in control rats and rats performing 50 min of treadwheel exercise daily. Results indicate noradrenaline-dependent thermogenesis to be the most persistent effect of long-term cold acclimation. Muscular activity is found to accelerate the process of deacclimation due to its effects on physical, and then chemical, thermoregulation. A.L.W.

A82-20016 * Rates of fixation by lightning of carbon and nitrogen in possible primitive atmospheres. W. L. Chameides (Georgia Institute of Technology, Atlanta, GA) and J. C. G. Walker (Michigan, University, Ann Arbor, MI). *Origins of Life,* vol. 11, Dec. 1981, p. 291-302. 35 refs. Grant No. NAG1-85; Contract No. NAGW-176.

A thermochemical-hydrodynamic model of the production of trace species by electrical discharges has been used to estimate the rates of fixation of C and N by lightning in the primitive atmosphere. Calculations for various possible mixtures of CH4, CO2, CO, N2, H2, and H2O reveal that the prime species produced were probably HCN and NO and that the key parameter determining the rates of fixation was the ratio of C atoms to O atoms in the atmosphere. Atmospheres with C more abundant than O have large HCN fixation rates, in excess of 10 to the 17th molecules/J, but small NO yields. However, when O is more abundant than C, the NO fixation rate approaches 10 to the 17th molecules/J while the HCN yield is small. The implications for the evolution of life are discussed. (Author)

A82-20017 New data on abiogenic synthesis of prebiological compounds in volcanic processes. N. E. Podkletnov and E. K. Markhinin (Akademiia Nauk SSSR, Institut Vulkanologii, Petropavlovsk-Kamchatskiy, USSR). *Origins of Life,* vol. 11, Dec. 1981, p. 303-315. 13 refs.

Volcanoes were deduced to be high-productive generators of complex organic compounds. Ash-gas clouds produced by volcanic eruptions can be considered as many-kilometer chemical reactors with a wide range of temperatures and pressures, powerful electric discharges and a large catalytic surface. In the eruption products investigated, nitrogen-containing components of nucleic acids of uracil type, metal complexes of porphyrins and porphyrins in the metal-free form and polycyclic aromatic hydrocarbons have been found. In all, 54 carbon-containing compounds have been identified in the volcanic juvenile ash and in volcanic bombs and 13 groups of carbon-containing compounds whose composition is yet unidentified have been found. (Author)

A82-20018 Amino acids derivatives synthesis from nitrogen, carbon and water by electric discharges. Y. Yamagata, Y. Kusano, and K. Inomata (Kanazawa University, Kanazawa, Japan). *Origins of Life,* vol. 11, Dec. 1981, p. 317-320. 9 refs.

A82-20019 * The radiolysis and radioracemization of amino acids on silica surfaces. W. A. Bonner (Stanford University, Stanford, CA) and R. M. Lemmon (California, University, Lawrence Berkeley Laboratory, Berkeley, CA). *Origins of Life,* vol. 11, Dec. 1981, p. 321-330. 25 refs. Research supported by the U.S. Department of Energy; Grant No. NGL-05-020-582.

Results are presented of experiments on the radioracemization of amino acids in the presence of silica surfaces such as may have been found on the prebiotic earth. L-leucine and a DL-leucine mixture deposited on samples of 1-quartz and an amorphous silica preparation (Syloid 63) was subjected to Co-60 gamma-ray irradiation, then analyzed by gas chromatography to determine the radiolysis and racemization rates. The quartz surface is found to have a marginal efficacy in enhancing radiolysis when compared with a crystalline L-leucine control, although enhancing radioracemization symmetrically by a factor of two. Both the radiolysis and radioracemization of L-leucine and DL-leucine on a Syloid-63 silica surface are observed to increase with increasing radiation dose, and to be substantially greater than in the crystalline controls. Additional experiments with the nonprotein amino acid isovaline deposited on Syloid 63 confirm the greater radiolysis susceptibility of amino acids deposited on silica with respect to the crystalline state, although racemization is not observed. The observations suggest that the presence of a silica surface would have a deleterious effect on any mechanism for the origin of molecular chirality relying on stereoselective beta-radiolysis. A.L.W.

A82-20020 * A model for the enantiomeric enrichment of polypeptides on the primitive earth. N. E. Blair and W. A. Bonner (Stanford University, Stanford, CA). *(College Park Colloquium on Chemical Evolution, 5th, University of Maryland, College Park, MD, Oct. 31, 1980.) Origins of Life,* vol. 11, Dec. 1981, p. 331-335. 24 refs. Grant No. NGL-05-020-582.

A potential model is presented for the origin of optical activity in polypeptides on the primitive earth due to enantiomeric enrichment in succeeding polymerization-hydrolysis cycles. The model was developed in experiments with the polymerization of a DL-leucine N-carboxyanhydride mixture with a 31.2% enantiomeric excess of the L isomer with sodium methoxide initiator to yield a polyleucine product which was in turn partially hydrolyzed by acid. The polymerization-hydrolysis was found to produce a net 23.8% increase in the enantiomeric excess of the remaining unhydrolyzed polypeptide (14.2% from the polymerization and 9.6% from the partial hydrolysis). On the basis of these results, it is suggested that a slight excess produced by an appropriate chiral physical process may be enhanced by cycles of stereoselective polymerization and hydrolysis driven by fluctuating wet and dry environmental cycles on the primitive earth. A.L.W.

A82-20021 * **Search for effect of longitudinally polarized protons on optically active amino acids.** R. M. Lemmon, H. E. Conzett (California, University, Lawrence Berkeley Laboratory, Berkeley, CA), and W. A. Bonner (Stanford University, Stanford, CA). *Origins of Life,* vol. 11, Dec. 1981, p. 337-341. 14 refs. Contract No. W-7405-eng-48; Grant No. NGL-05-020-582.

The influence of irradiation by longitudinally polarized protons on the differential decomposition of amino acid is investigated in a test of the Vester Ulbricht hypothesis that L-amino acids were produced in preference to the D isomers on the primitive earth due to the effects of parity violation in beta decay. Samples of DL-leucine were irradiated with protons of both positive and negative longitudinal polarization, then analyzed by gas chromatography. Despite advantages of higher polarization, lower velocity and higher ionization density of protons with respect to electrons, proton irradiation is found to lead to no detectable asymmetries in DL-leucine degradation, even at 50% gross degradation. A.L.W.

A82-20022 **Origin of translation - The hypothesis of permanently attached adaptors.** S. Tyagi (Jawaharlal Nehru University, New Delhi, India). *Origins of Life,* vol. 11, Dec. 1981, p. 343-351. 29 refs.

A mechanism is proposed for the prebiotic translation of polynucleotides into a sequence of amino acids fulfilling the function of a template-dependent nucleotide polymerase, based on the permanent attachment of adaptors (tRNA) to nucleic acid molecules. The mechanism postulates the existence of a primal tRNA with an acceptor system bearing the amino acid located near the anticodonic region, and with regions capable of associating with neighboring primal tRNAs as well. The messenger-tRNA complex thus formed would be capable of high fidelity translation with a small degree of amino acid-anticodon specificity without the need for ribosomes or aminoacyl synthetases. Structural evidence supports the possibility of inter-primal-tRNA associations, and thermodynamic constraints are compatible with the hypothesis. The approximate date of occurrence of the proposed system is also consistent with the period of occurrence of the earliest organisms with ribosomes. A.L.W.

A82-20023 **A theory of the origin of life.** C. B. Olson (Stanford University, Stanford, CA). *Origins of Life,* vol. 11, Dec. 1981, p. 353-368. 28 refs.

A theory is developed for the functioning of the processes essential to life in the primordial earth environment and the evolution of the primordial translation apparatus. Mechanisms are proposed regarding the supply of the energy required for biological transfer reactions from activated compounds, nucleic acid replication by single template-directed bond formation and cell retention and division by environmental factors. The evolution of the nucleic acid replication process to include the synthesis of enzymes facilitating replication is explained by the formation of a transfer nucleic acid which acted to catalyze the transfer of activated amino acids to accessible amino groups. Successive steps in evolution are characterized by an increase in the number of amino acids linked together, and the appearance of a messenger nucleic acid to specify the composition and sequence of the amino acids. Ribosomes would arise acting to improve the translation apparatus as it became more complex. Finally, it is proposed that the present genetic code evolved by a process of codon length refinement. A.L.W.

A82-20024 **A neutral theory of biogenesis.** A. Ferracin (Policlinico Umberto I, Rome, Italy). *Origins of Life,* vol. 11, Dec. 1981, p. 369-385. 170 refs.

The selective Darwinian theory of chemical evolution is critically reviewed and the tentative conclusion is reached that neither the theoretical analyses nor the experiments with phages can really prove it. An alternative proposal is put forth which considers the possibility that the biogenetic process has been driven by stochastic forces, e.g. it took place in the absence of Darwinian selection which, in turn, started only when the first protocells came into existence. The dynamics of the early self-organization of living structures should be understood in terms of self-assembly. The complexification of living matter is thus not represented as a gradual phenomenon but as a series of abrupt and relatively fast transitions consisting in the aggregation of pre-systems which had evolved by their own. The shift towards new and variegated states proposed by the bifurcation theory are not considered particularly relevant for reasons reported in the text, nor is it believed that dissipation can entirely account for the order observed in living cells. (Author)

A82-20025 * **Could life have evolved in cometary nuclei.** A. Bar-Nun (Tel Aviv University, Tel Aviv, Israel), A. Lazcano-Araujo (Universidad Nacional Autónoma de México, Villa Obregón, Mexico), and J. Oró (Houston, University, Houston, TX). *Origins of Life,* vol. 11, Dec. 1981, p.387-394. 66 refs. Research supported by the Consejo Nacional de Ciencia y Tecnología of México; Grant No. NGR-44-005-002.

The suggestion by Hoyle and Wickramasinghe (1978) that life might have originated in cometary nuclei rather than directly on the earth is discussed. Factors in the cometary environment including the conditions at perihelion passage leading to the ablation of cometary ices, ice temperatures, the absence of an atmosphere and discrete liquid and solid surfaces, weak cometary structure incapable of supporting a liquid core, and radiation are presented as arguments against biopoesis in comets. It is concluded that although the contribution of cometary and meteoritic matter was significant in shaping the earth environment, the view that life on earth originally arose in comets is untenable, and the proposition that the process of interplanetary infection still occurs is unlikely in view of the high specificity of host-parasite relationships. A.L.W.

A82-20146 **The biological effects of low-level ionizing radiation.** A. C. Upton (New York, University, New York, NY). *Scientific American,* vol. 246, Feb. 1982, p. 41-49.

The hazard to human health posed by low levels of ionizing radiation from natural and artificial sources is discussed. The natures of the natural background radiation and man-made radiation sources are considered, and carcinogenic and heritable effects are identified as the principal health hazards associated with small doses of radiation. The mechanisms of the cell damage by radiation with low and high rates of linear energy transfer are examined, with particular emphasis on damage to DNA resulting in chromosomal abnormalities. It is pointed out that the frequency of chromosomal aberrations increases linearly with radiation dose in the low to intermediate range for both low and high energy transfer radiation, however increases more quickly at high doses for the low transfer radiation. Studies of the dose-mutation rate relationship in mice and humans are discussed which indicate that the dose required to double the human mutation rate lies between 0.2 and 2.5 sieverts, along with studies of cancer incidence rates which indicate the total excess of cancers of all types to be from 4 to 18/year per 10,000 people per sievert. The relatively low risk associated with low levels of ionizing radiation is discussed in relation to public perceptions and the concept of acceptable risk. A.L.W.

A82-20257 * **Survival in space.** B. Webbon (NASA, Ames Research Center, Moffett Field, CA). *Natural History,* vol. 90, Dec. 1981, p. 50-57.

The evolution of space suit design to meet the needs of past and future manned space missions is discussed. Following a brief consideration of the purposes of the space suit in providing an artificial atmosphere and protection from environmental hazards, attention is given to the first high-altitude suits developed in the 1930's for the protection of balloon pilots, and for high-altitude airplane flights. The Mercury project space suit is presented as essentially similar to those for high-altitude military aircraft developed since World War II, providing pressurization and oxygen as a backup to the capsule systems. Modifications to the suit allowing it to be worn without discomfort during work outside the spacecraft, which were stimulated by experience in Gemini missions, are considered, which culminated in the suits of the Apollo and Skylab programs which provided insulation, cooling and life support for periods of up to eight hours. Finally, changes to suit design made necessary by the increasing numbers of men and women to perform Space Shuttle flights and space construction operations are considered. A.L.W.

A82-20301 † **Investigation of the otolithic membrane of the utricle of the guinea pig (Issledovanie otolitovoi membrany utrikuliusa morskoi svinki).** Ia. A. Vinnikov, D. V. Lychakov, K. A. Koichev, A. Boiadzhieva-Mikhailova, I. Khristov, and E. A. Lavrova (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Bio-

khimii, Leningrad, USSR; Meditsinska Akademiia, Pleven; B'lgarska Akademiia na Naukite, Institut po Morfologiia, Sofia, Bulgaria). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 17, Sept.-Oct. 1981, p. 474-479. 16 refs. In Russian.

A study is presented of the structure and composition of the guinea pig otolithic membrane at various stages of development. The scanning and transmission electron microscopy reveal several morphological classes of otoconia, the most common being smooth, transitional and rough otoconia, with rhombohedral shapes less frequently encountered. The smooth and rough otoconia appear to be independent morphological forms, with transition from one type to the next not taking place and the numerical ratio between them not changing over course of development. The mean sizes of the otoconia are observed to increase only during embryological development. A linear relation is found between otoconial length and diameter. Chemical analysis reveals the presence of small amounts of Na and Mg in addition to Ca, and trace amounts of Ca in the membrane; the chemical composition does not change in the course of development. The results may be used in the study of the effects of prolonged weightlessness on the vestibular apparatus of vertebrates. A.L.W.

A82-20302 † Some indicators of carbohydrate metabolism in rat lung during repeated and chronic hypoxia (Nekotorye pokazateli uglevodnogo obmena v legkikh krys pri povtornoi i khronicheskoi gipoksii). N. N. Pribylova (Khabarovskii Meditsinskii Institut, Khabarovsk, USSR). *Voprosy Meditsinkoi Khimii,* vol. 27, Sept.-Oct. 1981, p. 634-636. 26 refs. In Russian.

The effects of prolonged chronic exposure to hypoxia on carbohydrate metabolism in the rat lung are investigated. Determinations of glucose and glycogen levels, proteins, lactate and pyruvate concentrations and hexokinase and lactate dehydrogenase activities were made in male and female rats following 7 and 35 days of 6-hr exposures to a simulated altitude of 9000 m. The 7-day exposures are found to be accompanied by increases in lactic acid concentrations and the lactate/pyruvate ratio and reductions in glycogen levels, indicative of the activation of the glycolitic pathway in the lung. A reduction in hexokinase activity is observed associated with the increased glucose, possibly due to an increase in glucocorticoid secretion. The decrease in hexokinase activity and increase in glucose content are observed to be more marked in the females than in the males during both stages of hypoxia, which may explain the greater hypoxia tolerance of females. With longer exposure to hypoxia, it is observed that lung glycogen stores are depleted, and glucose levels increase paralleled by a drop in hexokinase activity. A.L.W.

A82-20303 † Physiology and pathology of respiration and means of correcting oxygen deficiencies in an organism /Meeting of the Interdepartmental Commission on the Coordination of Studies in Medicine of the Academy of Sciences of the Ukrainian SSR and the Ministry of Health of the Ukrainian SSR/ (Fiziologiia i patologiia dikhannia ta zasobi korektsii staniv kisnevogo goloduvannia organizmu /Narada Mizhvidomchoi Komisii po Koordinatsii Doslidzhen' u Galuzi Meditsini AN URSR i MOZ URSR/). M. M. Seredenko. *Akademiia Nauk Ukrains'koi RSR, Visnik,* vol. 45, Aug. 1981, p. 86. In Ukrainian.

A82-20304 † EEG description algorithm for use in clinical practice and studies of work capacity (Algoritm opisaniia EEG dlia ispol'zovaniia v klinicheskoi praktike i ekspertize trudosposobnosti). A. G. Povorinskii, V. A. Zabolotnykh, and N. N. Lebedeva (Leningradskii Institut Ekspertizy Trudosposobnosti i Trudoustroistva Invalidov; Leningradskii Institut Usovershenstvovaniia Vrachei-Ekspertov, Leningrad, USSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova,* vol. 81, no. 8, 1981, p. 1130-1133. In Russian.

An EEG description algorithm based on the quantitative assessment of the bioelectric activity of the brain is proposed. In describing a given rhythm, attention is given to its distribution, pattern, degree of distortion by other signals, the presence of generalized manifestations, and local outbreaks and paroxysms. The algorithm includes a description of the orientation reaction, responses to rhythmic and trigger photostimulation, hyperventilation, and pharmocological loads. The algorithm makes a more complete use of EEG information and can serve as the basis of special-purpose computer programs. B.J.

A82-20305 † The effect of the motor activity regime on the development, conservation, and regeneration of defensive conditioned reflexes in rats (Vliianie rezhima dvigatel'noi aktivnosti na vyrabotku, sokhranenie i vosproizvedenie oboronitel'nykh uslovnykh refleksov u krys). N. G. Zhuravleva and Iu. G. Shirokov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Sept.-Oct. 1981, p. 790-793. 12 refs. In Russian.

A82-20306 † The influence of some triterpenic glycosides on C-14-alanine inclusion into the bone-marrow cells of rats (Vliianie nekotorykh triterpenovykh glikozidov na vkliuchenie C-14-alanina v kletki kostnogo mozga krys). N. G. Prokof'eva, Iu. N. Loenko, and M. M. Anisimov (Akademiia Nauk SSSR, Tikhookeanskii Institut Bioorganicheskoi Khimii, Vladivostok, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Sept.-Oct. 1981, p. 794-797. 20 refs. In Russian.

A82-20307 † Acute experimental emotional stress in rabbits in a modulated electromagnetic field (Ostryi eksperimental'nyi emotsional'nyi stress u krolikov v usloviiakh modulirovannogo elektromagnitnogo polia). A. V. Gorbunova, N. V. Petrova, V. V. Portugalov, and S. K. Sudakov (Akademiia Nauk SSSR, Institut Normal'noi Fiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Sept.-Oct. 1981, p. 774-780. 15 refs. In Russian.

The effects of a modulated electromagnetic field on the state of emotional stress induced by alternating or combined stimulation of the ventromedial nuclei of the hypothalamus and electrocutaneous stimulation are investigated in rabbits. Experimentally stressed animals and unstressed, restrained controls, were placed in a field of intensity 30 V/m, carrier frequency 39 mHz and modulation frequency 7 Hz, and arterial pressure and heart rate, water soluble protein levels in various extramural autonomic and sympathetic ganglia, and lactate dehydrogenase isoenzyme spectra were determined. Application of the modulated electromagnetic field is found to reduce the number of rabbits susceptible to the harmful effects of stresses, as well as reverse the decrease in protein content and eliminate the tendency towards increased aerobic metabolism in the cardiac conductive system. The stressed rabbits in the electromagnetic field also exhibited slightly greater activities of the fast LDH fractions in the superior cervical, stellate and nodose ganglia. A.L.W.

A82-20308 † The functional condition of the ampullar apparatus in Meniere's disease (Funktsional'noe sostoianie ampuliarnogo apparata pri bolezni Men'era). Z. I. Munchaev, A. O. Radzhabov, and Iu. O. Bulaev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* July-Aug. 1981, p. 7-9. 20 refs. In Russian.

The functional characteristics of Meniere's disease are investigated in tests involving graded threshold and subthreshold stimulation of the ampullar receptors. Clinical examination of 50 patients reveals the disease to be characterized by a definite sequence of injury to inner ear receptors, in the first stages involving the cochlea and ampulla and in the final stage the sacculus vestibuli. It is found that the longer a patient has had the disease, the greater are the chances for the second ear to be affected. Threshold stimulation studies on a rotating chair reveal a decline in vestibular function, progressing with the duration of the disease. Vestibular recruitment was discovered in 73% of the cases. A.L.W.

A82-20309 † Vestibular responses of neurons in the feline anterior suprasylvian gyrus and their interaction with responses to acoustic and facial stimuli (Vestibuliarnye reaktsii neironov perednei suprasil'vievoi oblasti kory koshki i ikh vzaimodeistvie s reaktsiiami na zvukovoe razdrazhenie i razdrazhenie litsevogo nerva). V. S. Dem'ianenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Neirofiziologiia,* vol. 13, no. 4, 1981, p. 353-358. 9 refs. In Russian.

A82-20310 † Laws governing readaptation for seamen after a low-latitude cruise (Nekotorye zakonomernosti protsessa readaptatsii u moriakov posle plavaniia v nizkikh shirotakh). V. V. Berdyshev. *Voenno-Meditsinskii Zhurnal,* Aug. 1981, p. 50-52. In Russian.

A82-20311 † **Natural resistance of the organisms of seamen during postcruise rest (Estestvennaia rezistentnost' organizma moriakov vo vremia poslepokhodovogo otdykha).** V. S. Novikov. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 51, 52. 8 refs. In Russian.

A82-20312 † **Deontology in the practice of otorhinolaryngology (Deontologiia v praktike otorinolaringologa).** N. G. Chichkin. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 54, 55. In Russian.

A82-20313 † **Functional condition and work capacity under mountain conditions (Funktsional'noe sostoianie organizma i rabotosposobnost' v gornykh usloviiakh).** I. D. Kudrin, R. N. Korobov, V. A. Mozin, and V. A. Ivanov. *Voenno-Meditsinskii Zhurnal,* Sept. 1981, p. 45-47. 7 refs. In Russian.

The dynamics of changes in human functional condition and work capacity during the process of adaptation to middle (2200-2400 m) and high (3200-3400 m) altitudes is investigated. In persons not previously adapted to hypoxia, altitude exposure is found to lead to decreases in work capacity as measured by the accuracy of visual-motor responses, and in the quality and tempo of professional activities, particularly those connected with intense physical exercise. Fatigue is found, accompanied by an impairment in cardiovascular and respiratory capacities. These changes in functional condition and work capacity are noted to be especially marked in the 7 days following ascent to altitude, and to persist for at least 2 months. A.L.W.

A82-20314 † **Frequency characteristics of visual evoked potentials in different regions of the human cerebral cortex (Osobennosti chastotnoi struktury vyzvannykh potentsialov na svet v razlichnykh otdelakh kory bol'shogo mozga cheloveka).** G. A. Shchekut'ev (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) and Iu. M. Koptelov (Akademiia Nauk SSSR, Institut Problem Upravleniia, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, July-Aug. 1981, p. 845-847. 8 refs. In Russian.

A82-20315 † **Electroencephalographic correlates of the differentiation between verbal stimuli during natural night sleep in humans (Elektroentsefalograficheskie korreliaty razlicheniia slovesnykh razdrazhitelei vo vremia estestvennogo nochnogo sna cheloveka).** E. K. Arons and V. M. Vasil'eva (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, July-Aug. 1981, p. 839-841. 9 refs. In Russian.

A82-20316 † **The effects of narcotic analgesics on animal sensitivity to hypoxia (Vliianie narkoticheskikh anal'getikov na chuvstvitel'nost' zhivotnykh k gipoksii).** B. G. Volynskii, L. A. Martynov, and N. S. Solun (Saratovskii Meditsinskii Institut, Saratov, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 65-68. 14 refs. In Russian.

A comparative study is presented of the effects of morphine and promedol on the sensitivity of the mouse to hypoxic hypoxia and the state of glycolysis under conditions of oxygen insufficiency. Determinations of blood glucose, lactate, pyruvate and excess lactate levels, redox potentials, free energy and lactate dehydrogenase isoenzyme activities were performed in animals injected with 25 mg/kg morphine or promedol and exposed to a stimulated altitude of 10 km for 1 hour. Whereas morphine had no effect on survival relative to uninjected controls, promedol is observed to increase mortality from 55 to 72%. These differences are reflected in the effects of the two drugs on carbohydrate metabolism, with morphine leading to increases in blood pyruvate, redox potential and free energy, creating favorable conditions for the oxygen utilization, which are not found with promedol. Analysis of lactate dehydrogenase isoenzyme distributions reveals that promedol favors the final stage of glycolysis in organs with aerobic metabolism, while morphine favors it in anaerobic organs. Finally, observations that adrenalin does not induce an elevation in blood sugar levels are noted as evidence for the depletion of glycogen and glucose stores. A.L.W.

A82-20317 † **Special and clinical physiology of hypoxic states (Spetsial'naia i klinicheskaia fiziologiia gipoksicheskikh sostoianii).** M. M. Filippov. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 91, 92. In Russian.

The conference on the special and clinical physiology of hypoxic states held in October 1979 at the Bogomol'tz Institute of Physiology in Kiev is briefly described. Particular consideration is given to the new classification of hypoxic states proposed by Kolchinskaia. B.J.

A82-20318 † **The measurement of oxygen and carbon dioxide partial pressures in tissues by the gas depot method (Izmerenie partsial'nogo napriazheniia kisloroda i uglekislogo gaza v tkaniakh organizma po metodu gazovogo depo).** V. L. Popkov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 87-89. 6 refs. In Russian.

The use of the gas depot method of Campbell (1926) and Van Liew (1962) in the determination of the partial pressures of oxygen and carbon dioxide in the tissues of an organism is discussed. The method involves the introduction of a gas of any composition into a tissue so that a gas cavity is formed which eventually comes into equilibrium with the gases in the surrounding tissue, followed by the extraction and analysis of cavity gases. The slow response time of the method makes it most suitable for studies of long duration, such as experiments on acclimatization over several months to altitude hypoxia, the effects of hypoxic, hypercapnic and hyperoxic breathing mixtures over several hours or days and prolonged hypergravity, where the responses of polarographic electrodes become unstable. The gas depot method may also be used in studies of the tensions of N2 and other gases dissolved in body tissues. A.L.W.

A82-20319 † **Elevation of hypoxia resistance with the use of gutimine (Povyshenie rezistentnosti k gipoksii s pomoshch'iu gutimina).** V. M. Vinogradov, L. V. Pastushenkov, and E. N. Sumina. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 81-85. 43 refs. In Russian.

Experimental data demonstrating the protection from the adverse effects of hypoxia offered by the antioxidant gutimine and its analogs is presented. The experiments included preliminary studies of hypoxia resistance and recovery under simulated altitude, studies of circulatory hypoxia in the brain and in intrauterine fetuses, studies of myocardial ischemia during acute and chronic experiments and studies where cardiac, kidney and limb circulation is cut off. The compound was also found to be effective in cases of hemorrhagic hypotension, complex hypoxia in peritonitis, meningococcal meningitis, and the weakening of uterine muscle contractility during prolonged deliveries, and in cranial-cerebral trauma. Mechanisms of the antihypoxic action of gutimine and its analogs have been found to include the reduction of oxygen utilization, the activation of aerobic and anaerobic metabolism, the acceleration of lactate utilization, the inhibition of lipolysis in fat tissue, and stabilization of cell membranes. Clinical observations also support the experimental data. A.L.W.

A82-20320 † **The influence of adaptation on the periodic effect of hypoxia on the poststress activation of the primary immune response (Vliianie adaptatsii k periodicheskomu deistviiu gipoksii na poststressornuiu aktivatsiiu pervichnogo immunnogo otveta).** G. T. Sukhikh, B. A. Frolov, and F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow; Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 73-77. 8 refs. In Russian.

The present work studies the influence of emotional-pain stress (EPS) on the primary immune response and lymphocyte blast transformation (LBT) in Wistar rats adapted or nonadapted to the periodic effect of hypoxia. It is found that EPS in nonadapted animals caused intensification of the immune response, manifested in the number of antibody-producing cells (ABPC). The LBT indices did not change significantly in such cases. In animals adapted to the periodic effect of hypoxia the total force of the immune response increased but the formation of ABPC was delayed and their relative and absolute maximum values were reached on the eighth and not the fifth day after immunization. The LBT was reduced by 33.4-52.4% as compared with that in nonadapted animals. B.J.

A82-20321 † **A combined method for the study of tissue respiration under conditions corresponding to natural gas homeo-**

stasis (Kombinirovannyi metod izucheniia tkanevogo dykhaniia v usloviiakh estestvennogo gazovogo gomeostaza). E. S. Mailian, E. A. Kovalenko, and L. B. Buravkova. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* July-Aug. 1981, p. 85-87. 6 refs. In Russian.

A method based on a combination of the Warburg flask with a polarographic electrode has been developed for the study of tissue respiration which enables the oxygen tension in the incubation medium to be maintained at levels corresponding to those in the in vivo tissue. The polarographic electrode placed in the flask is used to monitor the oxygen tension in the incubation medium, while the manometer of the Warburg apparatus measures the respiration rate under the prescribed oxygen tension. The combined method has been used to measure tissue respiration in rats following exposure to slowly increasing hypoxia and to combined hypoxia and hypercapnia. When compared to experiments performed in air, the variations in the oxygen consumption of brain tissue homogenates taken from animals at three stages of hypoxia exhibit more marked variation, becoming greatest at the second stage (70-50 mm Hg). A.L.W.

A82-20322 † Contractile dysfunction of vascular wall smooth muscle under emotional nociceptive stress (Narusheniia sokratitel'noi funktsii gladkoi myshtsy sosudistoi stenki pod vliianiem emotsional'no-bolevogo stressa). F. Z. Meerson, M. I. Gurevich, S. A. Bershtein, A. I. Solov'ev, V. A. Saltykova, and O. V. Baziliuk (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Kardiologiia,* vol. 21, Aug. 1981, p. 108-110. 9 refs. In Russian.

A82-20323 † Changes in microcirculatory flow with respiratory insufficiency (Izmeneniia mikrotsirkuliatornogo krovoobrashcheniia pri dykhatel'noi nedostatochnosti). O. V. Aleksandrov, I. S. Ezhova, R. M. Alekhina, Iu. A. Gubin, V. N. Raibman, S. M. Larionov, I. I. Savchenkov, and A. M. Shenshina (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia,* vol. 21, Aug. 1981, p. 95-100. 15 refs. In Russian.

A82-20324 † Microcirculation, tolerance to physical strain, and certain homeostasis parameters in patients with angina pectoris (Mikrotsirkuliatsiia, tolerantnost' k fizicheskoi nagruzke i nekotorye pokazateli gomeostaza u bol'nykh so stenokardiei). V. V. Anikin and V. V. Trotsiuk (Kalininskii Meditsinskii Institut, Kalinin, USSR). *Kardiologiia,* vol. 21, Aug. 1981, p. 92-95. 6 refs. In Russian.

A82-20325 † Models of a functional lapse in one hemisphere and of the neuropharmocological effects on the deep structures of the brain (Modeli funktsional'nogo vykliucheniia odnogo polushariia i neirofarmakologicheskikh vozdeistvii na glubokie struktury mozga). V. V. Menshutkin (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR), T. P. Suvorova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), and L. Ia. Balonov (Psikhiatricheskaia Bol'nitsa, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 880-888. 23 refs. In Russian.

A82-20326 † The use of linear models for EEG analysis (Ispol'zovanie lineinykh modelei dlia issledovaniia EEG). V. K. Bochkarev and A. I. Nikiforov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 868-879. 36 refs. In Russian.

The method of main components and the method of canonical correlations are used to study the organization of the background EEG of healthy subjects and those suffering from paranoid schizophrenia. Nonspecific forms of EEG organization are obtained which reflect the state of the activating and synchronizing mechanisms of the brain. These forms of organization were found to be informative with respect to the action of neuroleptics, and can be used in the prognosis of the effectiveness of therapy on a statistically confident level. Forms of EEG organization which correlate with psychopathological disorders are also obtained. B.J.

A82-20327 † The significance of airflow resistance to changes in responses to increasing hypercapnia (O znachenii rezistivnogo soprotivleniia v izmeneniiakh reaktsii na narastaiushchuiu giperkapniiu). M. A. Pogodin, A. M. Shmeleva, and E. L. Kalacheva (Akademiia Nauk SSSR, Nauchno-Issledovatel'skii Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 616-622. 25 refs. In Russian.

The effects of supplementary respiratory resistance on pulmonary ventilation and inspiratory muscle work during the progressively increasing hypercapnia are investigated. Measurements of inspiratory flow velocity and intrasternal pressure and calculations of ventilation and inspiratory work were performed for awake subjects exposed to 12, 20 and 28 cm H2O/l per sec during controlled alveolar hypercapnia. Resistive loading is shown to reduce ventilatory reactions to CO2, and induce a more rapid increase in inspiratory muscle work that is not proportional to the magnitude of the increased resistance. The characteristics of the ventilatory response are indicative of cortical influences. A.L.W.

A82-20328 † The role of biofeedback in the adaptive regulation of pathological bioelectric brain activity (Znachenie obratnoi sviazi pri adaptivnom regulirovanii patologicheskoi bioelektricheskoi aktivnosti mozga). A. A. Vereshchagina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and E. A. Kaidanova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 579-585. 12 refs. In Russian.

A82-20329 † The effects of an aqueous potassium loading test on kidney function (Vliianie vodno-kalievoi nagruzochnoi proby na funktsiiu pochek). R. I. Aizman (Novosibirskii Gosudarstvennyi Pedagogicheskii Institut, Novosibirsk, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 687-692. 26 refs. In Russian.

Normal human kidney functioning in response to aqueous potassium loading is investigated with particular attention given to the specificity of the potassiouretic response. Blood and urine samples were taken from 28 healthy subjects before and after loading with 50 mg KCl/kg body weight in a 20% aqueous solution, or water alone. The ingestion of KCl, while not inducing any variation in circulatory cation concentrations, is found to cause a two-phase diuretic reaction, a marked increase in potassium excretion, and a shorter-duration and lower elevation in natriuresis as compared with the controls. The magnitude of the potassiouretic reaction is observed to depend on the initial level of ion excretion. Results suggest the presence of a reflex mechanism of potassium balance, and demonstrate specificity in kidney ionouretic responses. A.L.W.

A82-20330 † Investigation of recurrent inhibition in the human spinal cord during static skeletal muscle activity (Issledovanie vozvratnogo tormozheniia v spinnom mozge cheloveka pri staticheskoi deiatel'nosti skeletnykh myshts). I. N. Pleshchinskii and V. I. Alatyrev (Kazanskii Gosudarstvennyi Universitet, Kazan, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 737-742. 17 refs. In Russian.

The characteristics of recurrent inhibition in the human spinal cord during and after static activity of the skeletal muscles are investigated. Determinations were made of the relation of the amplitudes of the H responses of the soleus muscle obtained during paired and single stimulation of the tibial nerve by stimuli of various intensities in subjects exerting force on a foot pedal. Static muscle activity is found to be accompanied by a reduction in the recurrent inhibition of the motoneurons innervating the muscle. Cessation of the muscle work leads to an initial decline in motoneuron reflex excitability and enhancement in recurrent inhibition, which is followed by an elevation in excitability as the inhibition continues to increase. Muscle rest during analogous activity of opposing muscles induces less marked changes in motoneuron excitability, and no response in the level of recurrent inhibition. In addition, voluntary muscular activity in one extremity is found not to influence neural activity in the spinal center of the other extremity. A.L.W.

A82-20331 † Pulse rate evaluation of the relative physiological intensity of aerobic muscular work (Pul'sovaia otsenka otnositel'noi fiziologicheskoi napriazhennosti aerobnoi myshechnoi raboty). V. M. Alekseev and Ia. M. Kots (Gosudarstvennyi Tsentral'nyi Institut Fizkul'tury, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, July-Aug. 1981, p. 728-736. 20 refs. In Russian.

Relations between absolute and relative indicators of heart rate and oxygen uptake as measures of physiological work intensity are investigated in athletes and nonathletes during aerobic muscular

activity. Bicycle ergometer exercise at the same absolute aerobic power (equal oxygen uptake) is found to be accompanied by different absolute exercise heart rates in subjects with different characteristic maximal oxygen uptakes and maximal heart rates. In work at the same relative aerobic power (percentage of maximal oxygen uptake equal), the differences in exercise heart rates between groups are reduced, and are a function primarily of maximal heart rate and heart rate reserve (the difference between actual and maximal rates). Relative pulse rate indicators (percentage maximal rate and exercise increase) remained approximately the same at equal relative aerobic powers in subjects of different capacities. It is concluded that the percent maximal heart rate and the relative increase in heart rate are the most suitable indicators of the comparative physiological intensities of aerobic work. A.L.W.

A82-20332 † ***Parameters of the interaction of bradykinin* with cardiovascular system receptors (Parametry vzaimodeistuiia bradikinina s retseptorami serdechno-sosudistoi sistemy).** V. I. Kiselev and A. L. Panchenko (Altaiskii Meditsinskii Institut, Barnaul, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1342-1347. 12 refs. In Russian.

A quantitative investigation is presented of cardiovascular receptor stimulation by bradykinin to produce a lowering of arterial pressure. Dose-response curves were constructed to express the relation between intravenous and intraarterial injections of bradykinin and arterial pressure in dogs and albino rats. The resulting equation is found to resemble that obtained describing depressor adrenergic and certain cholinergic reactions. The greatest hypotensive response to bradykinin injection is obtained when the peptide is administered intraaortically, and the kininergic reaction is noted to be significantly more pronounced in dogs than in rats. A.L.W.

A82-20333 † **Changes of the aggregation and orientation structure of blood in pulsating flow (Ob izmenenii agregatsionnoi i orientatsionnoi struktury krovi pri pul'siruiushchem techenii).** V. A. Levtov, N. I. Nikiforuv, and N. Kh. Shadrina (Akademiia Nauk SSSR, Laboratoriia Fiziologii Krovoobrashcheniia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1336-1341. 8 refs. In Russian.

Reflection photometry was used to investigate erythrocyte suspensions in a rigid glass tube in an effort to examine structural changes of blood as a function of hydrodynamic pulsation frequency. It is shown that the aggregation-orientation structure of the erythrocytes distinctly changes as a function of the hydrodynamic oscillation frequency of blood flow within the range of natural heart rate. B.J.

A82-20334 † **Bioenergetic characteristics of various kinds of physical loads (Bioenergeticheskaia kharakteristika fizicheskikh nagruzok razlichnogo kharaktera).** S. V. Usik and R. I. Lenkova (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1370-1374. 12 refs. In Russian.

Bioenergetic characteristics of physical loads of various intensities and durations were obtained from experiments on adult white rats. These characteristics were used to classify the loads with respect to the character of the energy maintaining muscle activity and the use of hydrocarbon and nonhydrocarbon sources of energy. This approach can be used to evaluate the character and degree of adaptation of animals subjected to various types of loads. B.J.

A82-20335 † **Functional condition of the rat sympato-adrenal system during emotional and nociceptive stress (Funktsional'noe sostoianie simpato-adrenalovoi sistemy krys pri emotsional'no-bolevom stresse).** B. N. Manukhin, V. I. Pavlova, T. G. Putintseva, E. V. Volina, L. V. Berdysheva, G. D. Kurbanova, G. P. Selivanova, and F. Z. Meerson (Akademiia Nauk SSSR, Laboratoriia Fiziologii; Akademiia Meditsinskikh Nauk SSSR, Moscow; Cheliabinskii Gosudarstvennyi Pedagogicheskii Institut, Chelyabinsk, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Aug. 1981, p. 1182-1188. 16 refs. In Russian.

A82-20336 † **Respiration of brain synaptosomes under *conditions of depolarization in rats deprived of paradoxal sleep* (Dykhanie sinaptosom golovnogo mozga krys, lishennykh paradoksal'noi fazy sna, v usloviiakh depoliarizatsii).** N. S. Nilova (Akademiia Nauk SSSR, Laboratoriia Funktsional'noi Neirokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Sept. 1981, p. 1324-1328. 20 refs. In Russian.

A82-20337 † **The myenteric plexus - Basic principles of *modeling neuronal organization* (Mienteral'noe spletenie - Bazisnye printsipy modelirovaniia neironnoi organizatsii).** A. V. Gnetov, A. D. Nozdrachev, and S. V. Reiman (Akademiia Nauk SSSR, Laboratoriia Fiziologii Vegetativnoi Nervnoi Sistemy, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Aug. 1981, p. 1268-1272. 11 refs. In Russian.

A82-20529 **Flight simulation - The military need.** P. D. M. Moore (RAF, London, England). In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 4 p.

Military applications of simulators for helicopter and jet pilot training are reviewed. Experience in simulators which mock the VC 10, Hercules, and Nimrod helicopters is intended to eliminate much airborne training, noting that simulation of all known threat radars is now possible. Although the RAF currently uses 23 simulators for jet flight, emphasis is placed on the fact that the simulators allow practice at emergency conditions, procedures, and instrumentation, while only with new Tornado simulators will there be full handling capability simulation. The use of g seats, the length of an acceleration impulse, and the possibilities for full-image motion generation by computer are discussed. The instructor's instrument panel is criticized, and suggestions are made for improving switch spacing, more accurate feedback instrumentation from the trainee's panel, and a more advantageous viewing position. M.S.K.

A82-20534 **Flight simulation in the current Australian airline scene.** A. R. Gray (Transport Australia, Australia). In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 7 p.

The use of simulators by the two nationally and one internationally franchised Australian airlines is described. The simulators for 747 aircraft flying are considered to be sufficient for credit for all air-work sequences, for engine failure in take-off, and for all instrument flight sequences and two- and three-engine approaches, but not for landing and flare. Accreditation levels for the internal operators are reviewed, noting that thus far no pilot has received landing credits in a simulator, and the near term arrival of six degrees-of-freedom simulators with wraparound visuals is mentioned. Personnel isolation and formal radio conversations are used to maintain the fidelity of the simulations, and pilots are frequently employed to judge the effectiveness of the simulators in giving the actual feel of a real aircraft. M.S.K.

A82-20538 ***Visual technology and the future.*** D. Shorrock (Redifon Simulation, Inc., Arlington, TX). In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 4 p.

The development of visual reproductions with high realism fidelity for flight simulators is traced, and attention is given to regulatory requirements. Computer generated imagery reached the stage of two-window, full color landing maneuvers in about 1980, and the 747 simulator features four-window, three channel projection, in line with FAA Phase II requirements. Flight through low cloud layers and the matching of a variable coefficient of friction to visual representation of a contaminated runway are reviewed, and a distinction is made between the necessities of normal flight training simulators and the task-oriented complexities of military simulators. The installation of redundant architecture and parallel processing units in a modular approach to simulator computer design is asserted to be the means for highly complex, realistic, Phase III simulators. M.S.K.

A82-20539 **The semi-automatic instructional system.** W. S. Reese and R. A. Hansen (Singer Co., Link Div., Binghamton, NY).

In: Experience and needs of civil and military flight simulator users; Proceedings of the Flight Simulation Symposium, London, England, April 7, 8, 1981. London, Royal Aeronautical Society, 1981. 17 p.

The requirements and operational characteristics of the B-52 Weapon System Trainer are discussed. The WST has functional simulation for six crew members in two groups of three, with six degrees-of-freedom and the option of separate operation by any two-man team in their own segment. Noting that many of the WST functions cannot be performed for practice on board the aircraft, the system has been designed to easily accommodate changes in the weapons and avionics of the actual B-52. Provisions have been made for instructor data gathering and scoring of trainee performance, and the requirements for software development are outlined. The instructor is provided with a three module console with access to the views being displayed in the WST, and is given broad selection in choosing the flight environment to which the trainees are subjected. M.S.K.

A82-20772 # **Working in space.** G. V. Butler (McDonnell Douglas Astronautics Co., Huntington Beach, CA). Research sponsored by the American Institute of Aeronautics and Astronautics. New York, American Institute of Aeronautics and Astronautics (AIAA Aerospace Assessment Series. Volume 5), 1981. 134 p. 17 refs. Members, $20; nonmembers, $24.

The developing capability of human beings to work in space are examined, with consideration given to the lessons learned from previous U.S. and Soviet space missions. Noting the innovative measures taken by the crewmembers of the Apollo 13 flight to avert disaster, the equipment and procedures for spending extended periods of time in space which were developed and tested during the Skylab and Salyut missions are reviewed. Repairs were effected on the Skylab solar panels and psychological and physical requirements were defined, as were spacecraft re-entry profiles when the Skylab finally came down. The functions and the experimental packages designed for the Space Shuttle are described, with particular attention given to the equipment intended to provide a greater range of activity and usefulness for space activities. Finally, projections are made for future, expanded space missions, including the construction of large space structures, the use of manned orbit transfer vehicles, and the colonization of space and the moon. M.S.K.

A82-20778 # **Flow visualization techniques in medical and biological applications.** W.-J. Yang (Michigan, University, Ann Arbor, MI). In: International Symposium on Flow Visualization, Bochum, West Germany, September 9-12, 1980, Preprints of Contributed Papers. Bochum, West Germany, Ruhr-Universität Bochum, 1981, p. 13-25. 60 refs.

The application of flow visualization techniques to medicine, pharmacology, and biology are reviewed. Contrast media, in liquid or gas state, or as fine particles suspended in solution, are used to intensify the image in contrast to its surrounding tissues through dyes, fluorescein, radioactive contrast media, and radioisotope-labeling. Dyes and optical methods are used most often, whereas photography and radiology are commonly used in either a single or sequential recordings. The morphology and functions of many biological systems may be observed by the unaided eye or with the aid of an optical instrument. A magnified image may also be produced by either (1) photographic or optical magnification; (2) direct geometric magnification; or (3) electronic magnification. J.F.

A82-20853 * **Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, University of Maryland, College Park, MD, October 29-31, 1980.** Colloquium supported by NASA. Edited by C. Ponnamperuma (Maryland, University, College Park, MD). Dordrecht, D. Reidel Publishing Co., 1981. 287 p. $39.50.

Papers are presented concerning the characteristics of comets and their possible role in the origin of life. Specific topics include the characteristics, origin and structure of the cometary nucleus, cometary chemical abundances, the nature of interplanetary dust and its entry into terrestrial planet atmospheres, and the mechanism of ray closure in comet tails. Attention is also given to chemically evolved interstellar dust as a source of prebiotic material, the relation of comets to paleoatmospheric photochemistry, comets as a vehicle for panspermia, limits to life posed by extreme environments, and the status of cometary space missions as of 1980. A.L.W.

A82-20863 **Chemical evolution of interstellar dust - A source of prebiotic material.** J. M. Greenberg (Leiden, Rijksuniversiteit, Leiden, Netherlands). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 111-127. 12 refs. Research supported by the Stichting voor Fundamenteel Onderzoek der Materie and Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

The chemical evolution of interstellar matter is examined in relation to the possibility of an extraterrestrial origin for prebiotic molecules. Theoretical and laboratory studies of the chemical evolution of interstellar dust grains are summarized which indicate a chemical composition at the time of the early pre-solar nebula of complex nonvolatile molecular mixtures of oxygen, carbon and nitrogen with hydrogen in addition to volatiles, which may be the predominant constituents of an accreting comet. The photoprocessing of interstellar material is found capable of converting on the order of 10% of all available carbon, oxygen and nitrogen into large molecules after 10 million years. Consideration of the possible mechanisms for the transport of interstellar organic molecules to the primitive earth indicates that direct accretion during the passage of the solar system through a dense interstellar cloud is a more likely source of prebiotic molecules than accretion from cometary material. A.L.W.

A82-20864 **Comets and the origin of life - The stable isotope approach.** P. I. Abell (Cambridge University, Cambridge, England; Rhode Island, University, Kingston, RI), A. E. Fallick, N. J. McNaughton, and C. T. Pillinger (Cambridge University, Cambridge, England). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 129-139. 31 refs. Research supported by the Science Research Council, Natural Environment Research Council of England, and Nuffield Foundation.

An improved knowledge of the carbon isotopic composition of comets would be important in the establishment of links between comets and the origin of life on earth. The paper presents suggestions concerning a possible method for measuring stable isotope ratios in presumed terrestrial cometary debris or in situ. The method under development for carbon isotope measurements on Brownlee particles collected in the stratosphere involves static mass spectrometry with all carbon samples converted to CD4 by a gas phase process using D2 and a nickel catalyst. A cometary isotope front end reactor is also under development which would perform the same function on a space probe on a cometary fly-by mission. A.L.W.

A82-20865 * **Are comets connected to the origin of life.** A. H. Delsemme (Toledo, University, Toledo, OH). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 141-159. 27 refs. NSF Grant No. AST-80-18919; Grant No. NsG-7381.

Possible connections between comets and the origin of life on earth are discussed. The orbital evolution of comets and their origin are considered within a framework for the origin of the solar system, with particular attention given to the origin of the biosphere, and the origin of the Oort cloud. Evidence suggesting that cometary nuclei are undifferentiated throughout is considered, and a model of the average composition of a mean new comet is obtained from observational data which is similar to that of an interstellar frost. The chemistry of the model composition giving rise to the species observed in cometary spectra is considered, as well as the relations of cometary to cosmic abundances of oxygen, carbon and sulfur. The characteristics of possible sites for prebiotic chemistry, including interstellar clouds, the protosolar nebula, comets in the Oort cloud, periodic comets and the primitive earth, are examined, and a possible role of comets in bringing the interstellar prebiotic chemistry to earth is suggested. A.L.W.

A82-20866 * Comets and the photochemistry of the paleoatmosphere. J. S. Levine, R. E. Boughner (NASA, Langley Research Center, Hampton, VA), T. R. Augustsson (Old Dominion University, Norfolk, VA), M. Natarajan (Joint Institute for Advancement of Flight Sciences, Hampton, VA), and L. J. Sacks (Christopher Newport College, Newport News, VA). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 161-190. 56 refs.

Ozone (O3) is a key atmospheric gas in considerations of the photochemistry/chemistry of the paleoatmosphere, chemical evolution, and the origin and evolution of life. The photochemistry/chemistry of atmospheric O3 in the paleoatmosphere is investigated using a one-dimensional photochemical model that includes the chemistry of oxygen, nitrogen, hydrogen, carbon, and chlorine gases. The role of cometary influx of H2O on the photochemistry of the paleoatmosphere is also examined. Recently, it has been suggested that the planet received a significant portion of the volatiles presently in the atmospheric/oceanic/biospheric system from cometary volatile influx. Several consequences of a cometary H2O influx on the photochemistry and structure of the paleoatmosphere are presented. (Author)

A82-20867 * Cometary material and the origins of life on earth. A. Lazcano-Araujo (Universidad Nacional Autónoma de México, Villa Obregón, Mexico) and J. Oro (Houston, University, Houston, TX). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 191-225. 160 refs. Research supported by the Consejo Nacional de Ciencia y Tecnologia; Grant No. NGR-44-005-002.

The role of cometary material in determining the environmental conditions of the prebiotic earth is reviewed. The organic synthesis pathways that occur in dense interstellar clouds and in comets are examined, and complex organic molecules believed to exist (amino acids, carboxylic acids, purines, pyrimidines and hydrocarbons) based on spectral detections of degradation products are noted. Estimates of the amount of terrestrial volatiles of cometary origin that may have been acquired in collisions during the early history of the earth are considered, and shown to dominate any estimated contributions to terrestrial carbon from other extraterrestrial sources. Current evidence that the origin and early evolution of life began about four billion years ago is discussed in relation to the cometary bombardment processes occurring at the time and the resultant shock waves, reducing atmospheres and reactive chemical species. It is thus concluded that comets contributed significantly to the processes of chemical evolution necessary for the emergence of life on earth. A.L.W.

A82-20868 Comets - A vehicle for panspermia. F. Hoyle and C. Wickramasinghe (University College, Cardiff, Wales). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 227-239. 12 refs.

Arguments are presented for the panspermia hypothesis, according to which life is a phenomenon inherent in the cosmos, and for the role of comets in the transport, amplification and dispersal of life throughout the universe. Panspermia is shown to be a consequence of the observation that life is always derived from life, which observation is supported by the fossil record up to 3.83 billion years ago, when the Isua sediments were deposited. Problems with the probability of specifying the information necessary for living processes from an initially chaotic assemblage of biological monomers are discussed as evidence that life could not have arisen independently on earth, and astronomical evidence for the possibility of the interstellar dispersal of spores is noted. It is argued, however, that a more efficient process for the amplification and dispersal of life on a cosmic scale would be development and transport within comets. It is also shown that the properties of interstellar extinction may be explained by the bacterial nature of the interstellar grains. A.L.W.

A82-20869 Extreme environments - Are there any limits to life. D. Kushner (Ottawa, University, Ottawa, Canada). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 241-248. 24 refs.

Limits to the environments in which microorganisms can survive and grow are considered in relation to the possibility of the existence and evolution of life on comets. Microbial growth in boiling and freezing water, conditions of high salinity, extreme acidity and alkalinity up to pH 11.5 and high radiation is discussed, and it is noted that the mechanisms of life under these extreme conditions appear similar to those under more normal conditions. It is observed that all growth requires relatively abundant amounts of liquid water, as growth does not take place within ice or water activities below 0.6 although organisms may survive much drier or colder conditions. It is concluded that unless comets have substantial zones of liquid water, terrestrial-type life cannot exist or arise there. A.L.W.

A82-20871 * Comets and the origin of life - Bibliography. L. G. Pleasant (George Washington University, Medical Center, Washington, DC). In: Comets and the origin of life; Proceedings of the Fifth College Park Colloquium on Chemical Evolution, College Park, MD, October 29-31, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 255-268. 168 refs. Contract No. NASw-3165.

A82-20891 Measurement of radio frequency permittivity of biological tissues with an open-ended coaxial line. I. T. W. Athey (U. S. Food and Drug Administration, Bureau of Radiological Health, Rockville, MD), M. A. Stuchly (Department of National Health and Welfare, Radiation Protection Bureau; Ottawa, University, Ottawa, Canada), and S. S. Stuchly (Ottawa, University, Ottawa, Canada). *IEEE Transactions on Microwave Theory and Techniques,* vol. MTT-30, Jan. 1982, p. 82-86. 11 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada and Ontario Ministry of Labor.

A82-20892 Measurement of radio frequency permittivity of biological tissues with an open-ended coaxial line. II - Experimental results. M. A. Stuchly (Department of National Health and Welfare, Radiation Protection Bureau; Ottawa, University, Ottawa, Canada), T. W. Athey (U.S. Food and Drug Administration, Bureau of Radiological Health, Rockville, MD), G. M. Samaras, and G. E. Taylor (Maryland, University, Baltimore, MD). *IEEE Transactions on Microwave Theory and Techniques,* vol. MTT-30, Jan. 1982, p. 87-92. 9 refs.

A82-20893 Waveguide technique for the calibration of miniature implantable electric-field probes for use in microwave-bioeffects studies. D. A. Hill (Defence Research Establishment, Protective Sciences Div., Ottawa, Canada). *IEEE Transactions on Microwave Theory and Techniques,* vol. MTT-30, Jan. 1982, p. 92-99. 17 refs.

A82-20901 Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Meetings sponsored by the International Society for the Study of the Origin of Life, Israel Academy of Sciences and Humanities, Weizmann Institute of Science, and Hebrew University of Jerusalem. Edited by Y. Wolman (Jerusalem, Hebrew University, Jerusalem, Israel). Dordrecht, D. Reidel Publishing Co., 1981. 626 p. $73.50.

Papers are presented on various aspects of the origin of life as they relate to interstellar molecules, meteorites, the abiotic synthesis of small molecules, prebiotic polymerization, the origin of optical activity and the genetic code, early biochemical evolution, and fossils. Specific topics include the origin of organic molecules in interstellar space, the role of comets in the origin of life, the nitrogenous compounds in carbonaceous meteorites, the role of UV light and electric discharges in the chemical evolution of a reducing atmosphere, the role of clays as prebiotic photocatalysts and the formation of amino acids from sugars and ammonia in an ocean medium. Attention is also given to metal ion catalysis of the template-directed synthesis of oligoguanylic acids, the cold theory of the origins of life, the amplification of optical activity by crystallization processes, evolutionary processes of the genetic code, a search for primitive replication, the phylogentic sequence of metabolic

pathways in the Precambrian, and the evolution of Rhodospirillaceae and mitochondria. A.L.W.

A82-20902 **Interstellar molecules and the origin of life.** R. D. Brown (Monash University, Clayton, Victoria, Australia). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 1-9. 11 refs.

The hypothesis that life on earth arose not as a consequence of in situ chemical evolution but instead arrived at earth from interstellar space is considered. Problems with the orthodox view related to the probable nature of the original earth atmosphere and the accumulation of prebiotic molecules in the presence of solar UV radiation are first noted. The complex organic molecules detected in dark nebulae, from which stars and planetary systems are believed to be formed, are listed, and studies of the spectroscopic properties of gaseous forms of urea and glycine are noted. The collapse and heating of a dark cloud are considered, and evidence from carbonaceous chondrites that some cloud material is never heated above 100 C during star formation is noted. Hypotheses for the transport of complex organic material to earth in meteorites and the transport of life evolved in cometary nuclei to earth in micrometeorites are also considered. A.L.W.

A82-20904 **On the origin of organic molecules in interstellar space and some of its consequences.** K. L. V. Johansson (Astronomiska Observatoriet, Uppsala, Sweden). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 19-25.

Possible sources for the complex organic molecules observed in interstellar space are examined, and consequences of the likley sources for the origin of life on earth are discussed. Calculations are presented which show that the amount of molecules that may have escaped from lifebearing planets such as earth is insufficient to account for the observed quantities of organic molecules in interstellar space. Rather, the molecules must have formed in interstellar clouds, either free in space or on the surfaces of grains. Such interstellar clouds may have been a source of organic compounds in the formation of the solar system, or may have deposited a substantial amount of organic molecules on earth as the solar system passed through a cloud. The subsequent chemical evolution of this material into biological molecules may be investigated by Urey-Miller type experiments with more complex starting mixtures than usual. A.L.W.

A82-20905 * **Comets and the origin of life.** W. M. Irvine (Onsala Space Observatory, Onsala, Sweden), S. B. Leschine, and F. P. Schloerb (Massachusetts, University, Amherst, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 27-32. 38 refs. Grant No. NGL-22-010-023.

The possible role of comets as sites for chemical and/or biological evolution is considered from both the positive and the negative viewpoints. On the negative side, it is pointed out that direct evidence for the chemical composition and size of cometary nuclei is lacking and the thermal history of comets is unknown, so that the length of time that liquid water could have been available ranges from zero to over a billion years. On the positive side, there remains the possibility that there may have been comets which retained liquid water in their interior for a sufficient time and that have more complex molecules than the amino acids and nucleic acid bases found in carbonaceous chondrities, and that the cometary environment may have been more favorable to the origin of life than the terrestrial. It has also been demonstrated that cometary material falls to earth at a significant rate. Problems in understanding the course of chemical evolution on earth may thus have a solution in cometary processes. A.L.W.

A82-20906 * **Nature and origin of organic molecules in comets.** A. H. Delsemme. In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 33-42. 29 refs. NSF Grant No. AST-79-14789; Grant No. NsG-7301.

The organic molecules sublimating from the cometary nucleus either represent the 'frost' of interstellar molecules that condensed onto those interstellar grains that have later accreted into comets, or they represent the 'snows' that condensed onto silicate grains during the cooling phase of the presolar nebula. Even if one does not accept the speculations of Hoyle and Wickramashinghe (1977), the fact that prebiotic chemistry could have been brought from the interstellar space or from the solar nebula to the Earth by comets is an intriguing possibility that cannot be ruled out at this stage. (Author)

A82-20907 **Liquid water on a planet over cosmic periods.** M. D. Papagiannis (Boston University, Boston, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 43-50. 13 refs.

From the equation that determines the average temperature of a planet, it is seen that even small changes in the distance, albedo and greenhouse effect of the planet, if not properly compensated, can eliminate liquid water from the surface of the planet through either runaway glaciation or a runaway greenhouse effect. Since active life requires the presence of liquid water, and since its evolution to higher intelligence seems to require billions of years, it follows that the ability of planets to maintain liquid water over cosmic periods is probably the critical factor that determines the abundance of advanced civilizations in the cosmos. (Author)

A82-20908 * **Organic analysis of the Antarctic carbonaceous chondrites.** R. K. Kotra, A. Shimoyama, C. Ponnamperuma (Maryland, University, College Park, MD), P. E. Hare (Carnegie Institution of Washington, Washington, DC), and K. Yanai (National Institute of Polar Research, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 51-57. 14 refs. NSF Grants No. DPP-77-06993; No. DPP-79-00991; Grant No. NGR-21-002-317.

Thus far, organic analysis of carbonaceous chondrites has proven the only fruitful means of examining complex organic matter of extraterrestrial origin. The present paper presents the results of organic analysis of two Antarctic meteorites, Allan Hills (77306) and Yamato (74662), which may be considered free from terrestrial contamination. Ion-exchange chromatography, gas chromatography and mass spectrometery of meteorite samples reveal the presence in Yamato of 15 and in Allan Hills of 20 protein and nonprotein amino acids, the most abundant of which are glycine and alanine. Abundances of the D and L enantiomers of each amino acid are also found to be nearly equal. Data thus indicate an abiotic extraterrestrial origin for the matter, and confirm a lack of terrestrial contamination. A.L.W.

A82-20909 **Nitrogen compounds in carbonaceous meteorites - A reassessment.** P. G. Stoks and A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 59-64. 28 refs.

A reinvestigation of the presence of N-heterocyclic compounds in the Murray, Murchison and Orgueil carbonaceous meteorites has been undertaken. The positive identification of the pyrimidine uracil and the purines adenine, guanine, xanthine and hypoxanthine is reported. The s-triazines melamine, ammeline, ammelide and cyanuric acid could not be detected in any meteorite, above a detection limit of 50 ppb. These results, together with laboratory data on the formation of s-triazines, are discussed in relation to proposed mechanisms of formation of organic compounds in carbonaceous meteorites. (Author)

A82-20910 **Abiotic organic synthesis in space.** M. R. Bloch (Max-Planck-Institut für Kernphysik, Heidelberg, West Germany) and H. L. Wirth (Negev, University, Beersheba, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 65-71. 14 refs.

An experimental model for the formation of iron meteorites in space is presented which may also account for the presence of

organic substances in comets and meteorites. The model consists of passing iron carbonyl and nickel carbonyl gas mixtures with H2S at 180 C between the poles of a permanent magnet. Strings of iron-nickel globules are formed which are similar in structure and chemical composition to the kamacite, taenite, troilite and pentlandite phases of meteorites. The carbonyl groups may then react in a Fischer-Tropsch-type reaction to form graphite and hydrocarbons, as observed in commercial processes. It is suggested that temperature gradients produced as comets near the sun may lead to the collection of metal carbonyls in the cometary interior, and that the resultant synthesis in a magnetic field may account for the optical activity of organic compounds. A.L.W.

A82-20911 Formation of prebiotic precursors from model reducing atmospheres - Role of hydrogen escape. D. Mourey, F. Raulin, and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 73-82. 12 refs. Research supported by the Centre National d'Etudes Spatiales; Centre National de la Recherche Scientifique Grant No. 3721.

The influence of the atmospheric escape of hydrogen on the chemical evolution of a reducing atmosphere and on the synthesis of organic compounds within it is investigated. Experiments were performed in the absence of liquid water in a discharge chamber containing 50 torr CH3 and 100 torr gaseous H2O with palladium membranes to permit the escape of the H2 formed. In experiments performed without H2 escape, H2 rapidly becomes the most abundant product, and a steady-state CO/CO2 concentration ratio of about 7 is reached by the end of the experiment. In contrast, hydrogen escape during the course of the reaction causes a more rapid decline in CH4 concentration, decreases in CO and H2O concentration, and a steady state characterized by greater levels of CO2 than CO. The hydrocarbons formed are also observed to be more rapidly destroyed in the oxidizing atmosphere resulting from hydrogen escape, although hydrogen escape has no effect on the synthesis of oxygen-containing organics. A.L.W.

A82-20912 Organic chemical evolution of reducing model of the atmosphere of the primitive earth - Role of UV light and electric discharges. A. Bossard, F. Raulin, D. Mourey, and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 83-92. 24 refs. Research supported by the Centre National d'Etudes Spatiales.

A82-20913 Far UV photolysis of methane-water gaseous mixtures and the prebiotic synthesis of aldehydes. A. Bossard and G. Toupance (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 93-100. 18 refs. Research supported by the Centre National d'Etudes Spatiales.

A82-20914 * Photolysis of CH4-NH3 mixtures and PH3 as models for the photochemical transformations on the primitive earth and Jupiter. J. P. Ferris, J. Y. Morimoto, and R. Benson (Rensselaer Polytechnic Institute, Troy, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 101-105. 13 refs. Grant No. NGR-33-018-148.

Methane, ammonia and phosphine are some of the possible constituents of the atmospheres of the Jovian planets and their satellites. Photolysis of NH3 in the presence of CH4 at 185 nm in the temperature range of 25 C to -100 C results in the decomposition of CH4. The reaction is inhibited by added H2 or SF6. These findings are consistent with the reaction of hot hydrogen atoms with CH4 to give the CH3 radical. P2H4 is the initial product formed by the photolysis of PH3 at 206 nm. Kinetic studies established that it is the intermediate in the formation of P4 from PH3. The potential significance of these reactions to the atmospheric photochemistry of the Jovian planets and moons is discussed. (Author)

A82-20915 * Possible role of phosphine in chemical evolution. F. Raulin (Paris XII, Université, Créteil, Val-de-Marne, France) and C. Ponnamperuma (Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 107-114. 18 refs. Research supported by the Centre National de la Recherche Scientifique and NSF; Grant No. NGR-21-002-317.

Experiments simulating the formation of organic molecules in model reducing atmospheres including phosphine show that a variety of organic molecules can be synthesized. From the experiments using UV light as an energy source, it appears that the presence of phosphine drastically increases the yield of photolysis of methane and, thus, the yield of the formation of organic matter. The presence of phosphine enhances the formation of organophosphorous compounds, such as methyl and dimethylphosphine. (Author)

A82-20916 * Clays as prebiotic photocatalysts. L. M. Coyne, J. Lawless (NASA, Ames Research Center, Moffett Field, CA), N. Lahav (Jerusalem, Hebrew University, Rehovot, Israel), S. Sutton (Washington University, St. Louis, MO), and M. Sweeney (Santa Clara, University, Santa Clara, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 115-124. 24 refs.

Clay minerals catalyze peptide bond formation in fluctuating environments. A number of plausible mechanisms have been proposed and tested. The possibility that clays may actually be energizing the reaction by means of electronic excitation, creating mobile or trapped holes and electrons in the lattice, is explored. It has been discovered that clays emit light upon dehydration. The correlation between dehydration-induced, or thermoluminescent, processes and the yield of glycine oligomers after treatments known to affect the luminescent yields is being tested, in an effort to understand the catalytic mechanism. (Author)

A82-20917 * Clay-mediated reactions of HCN oligomers - The effect of the oxidation state of the clay. J. P. Ferris, K. W. Alwis, E. H. Edelson, N. Mount, and W. J. Hagan, Jr. (Rensselaer Polytechnic Institute, Troy, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 125-128. 12 refs. NSF Grant No. CHE-76-11000; Grant No. NGR-33-018-148.

Montmorillonite clays which contain Fe(III) inhibit the oligomerization of aqueous solutions of HCN. The inhibitory effect is due to the rapid oxidation of diaminomaleonitrile, a key intermediate in HCN oligomerization, by the Fe(III) incorporated into the aluminosilicate lattice of the clay. The Fe(III) oxidizes diaminomaleonitrile to diiminosuccinonitrile, a compound which is rapidly hydrolyzed to HCN and oxalic acid derivatives. Diaminomaleonitrile is not oxidized when Fe(III) in the montmorillonite is reduced with hydrazine. The oxidation state of the clay is an important variable in experiments designed to simulate clay catalysis on the primitive earth. (Author)

A82-20918 Chemical evolution and plate tectonics. D. E. Ingmanson (California, University, La Jolla, CA) and M. J. Dowler (San Diego State University, San Diego, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 129-134. 25 refs.

Laboratory analysis of Red Sea Atlantis II Deep brine solutions revealed a significant thiocyanate concentration (0.000024 M). Amino acid analysis revealed large quantities of glycine (about 1 micromole per liter), and no other dissolved free amino acids. This brine and the underlying sediment constitute a reducing, acidic, clay-rich, anhydrous-to-hydrous gradient system that can vary in temperature from 1100 C underlying magma to 63 C water. Since these conditions occur along a sea floor spreading zone, there may be an important link between the origin and evolution of the earth's crust and chemical evolution. (Author)

A82-20919 The Strecker synthesis in the primitive ocean. S. L. Miller and J. E. Van Trump (California, University, La Jolla, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and

Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 135-141. 6 refs.

Most prebiotic amino acid syntheses proceed through the amino nitrile (Strecker synthesis). The equilibrium constants for the formation of glycine nitrile and alanine nitrile have measured as well as the kinetics of their hydrolysis to the amides and amino acids. From the data the yields of amino and hydroxy acids can be calculated as a function of pH, temperature and ammonia concentration. It can also be shown that amino acids can be synthesized at high dilutions in the primitive ocean. (Author)

A82-20920 * Photoassisted carbon dioxide reduction and formation of two- and three-carbon compounds. M. Halmann, B. Aurian-Blajeni (Weizmann Institute of Science, Rehovot, Israel), and S. Bloch (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 143-150. 25 refs. Research supported by the U.S.-Israel Binational Science Foundation and NASA.

The photoassisted reduction of aqueous carbon dioxide in the presence of naturally occurring minerals is investigated as a possible abiotic precursor of photosynthesis. Aqueous carbon dioxide saturated suspensions or surfaces of the minerals nontronite, bentonite, anatase, wolframite, molybdenite, minium, cinnabar and hematite were irradiated with high-pressure mercury lamps or sunlight. Chemical analyses reveal the production of formic acid, formaldehyde, methanol and methane, and the two and three-carbon compounds glyoxal (CHOCHO) and malonaldehyde (CH2(CHO)2). It is suggested that such photosynthetic reactions with visible light in the presence of semiconducting minerals may provide models for prebiological carbon and nitrogen fixation in both oxidized and reduced atmospheres. A.L.W.

A82-20921 Melanoidin polymers as possible oxygen sinks in the pre-biotic oceans. A. Serban and A. Nissenbaum (Weizmann Institute of Science, Rehovot, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 151-156. 8 refs.

An environment in which oxygen is lacking, or at least depleted, is generally believed to be a prerequisite for abiotic organic synthesis. The present paper proposes melanoidin scavenging as an alternative to ferrous ion reactions as a sink for oxygen in the prebiotic atmosphere. Results are presented of experiments in which melanoidins, formed by the Maillard reaction between carbohydrates and amino acids, are allowed to react with molecular oxygen. In all glucose-amino acid mixtures investigated, oxygen concentration in the gas phase above the reacting mixture is found to decrease as the reaction proceeds, with the oxygen consumption rate dependent on the nature of the amino acid as well as the temperature. Variations in the oxygen consumption rate also indicate the presence of several intermediates in melanoidin-polymer synthesis. It is concluded that the prebiotic formation of amine and carbohydrate monomers should lead to the generation of melanoidin-like polymers which, as they condense, would remove oxygen into ocean sediments. A.L.W.

A82-20922 Formation of energy rich phosphate in Fenton's reaction. O. Saygin and P. Decker (Hannover, Tierärztliche Hochschule, Hanover, West Germany). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 157-164. 28 refs.

The oxidation of various substrates by a modified Fenton's reagent is examined as a possible source of radical intermediates capable of incorporating phosphate or acylate ions into energy-rich compounds, under prebiotic conditions. Experiments were performed in systems of Na2HPO4.2H2O, FeSO4.7H2O, ascorbic acid, amd EDTA at 0 C with H2O2 or O2 added as the oxidant and substrates including imidazoles, purines, pyrimidines, cyanamide, and formamide. Yields of up to 32% inorganic phosphate transformed into organic form are obtained with 2-methylimidazole as the substrate, with positive results also found in reactions with imidazole, 1-methylimidazole, 4-hydroxymethylimidazole, histamine, and pyrimidine. The organic phosphate formed from 2-methylimidazole has been shown to be an alkali-labile phosphoric acid ester of a 4,5-dihydroxyimidazoline. Results emphasize the importance of reactions, such as those involving coupling between energy and group transfer, in the first steps of chemical organization in open systems capable of generalized Darwinian evolution. A.L.W.

A82-20923 Abiotic synthesis of phosphoric esters of monosaccharides according to the 'cold model'. C. I. Simionescu, S. Dumitriu and A. Constantinescu (Iasi, Institutul Politehnic, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 165-172. 13 refs.

A82-20924 Synthesis and degradation of amino acids by contact glow discharge electrolysis, a possible route for prebiotic formation of bio-organic compounds. K. Harada, J.-I. Terasawa, and H. Gunji (Tsukuba, University, Sakura, Ibaraki, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 173-180. 13 refs.

A82-20925 Genesis of amino acids in the primeval sea - Formation of amino acids from sugars and ammonia in a modified sea medium. H. Yanagawa, Y. Kobayashi, and F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 181-187. 11 refs.

A82-20926 Porphyrin-like compounds genesis under simulated abiotic conditions. C. I. Simionescu, B. C. Simionescu, M. Leanca, C. Ananiescu, and R. Mora (Iasi, Institutul Politehnic, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 189-196. 16 refs.

Investigations into the synthesis of porphyrins, carried out according to 'the cold theory' of the appearance and evolution of the first living forms, showed that porphyrin-like pigments are formed in abiotic simulated conditions. Parallel studies on the classical organic synthesis of porphyrins indicated that pyrrole and formaldehyde were involved in their abiogenesis. The ready formation of these compounds - and especially that of their metallic chelates - in abiotic conditions is significant, suggesting the possibility of their appearance and intervention during the early stage of chemical evolution. (Author)

A82-20927 The role of analytical procedures in the formation of biochemicals from experiments simulating the chemical evolution of primeval earth. F. Stoetzel, A. Shimoyama, C. Ponnamperuma, and R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France; Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 197-199.

A82-20928 * Reduction of thionucleosides - A prebiotic pathway to deoxyribonucleosides. A. D. Patel, W. H. Schrier, M. A. Hrncir, and J. J. Nagyvary (Texas A & M University, College Station, TX). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 201-207. 14 refs. NASA-supported research.

A mechanism is proposed for the prebiotic synthesis of deoxyribonucleotides and possible nucleic acid analogs from ribonucleotides by a pathway involving 2'-thio-2'-deoxyribonucleosides. The mechanism is supported by laboratory experiments in which 2'-thio-2'-deoxycytidine was synthesized from anhydro arabinosyl cytosine in dithiophosphate and CS2. The subsequent reduction of the thio-analogs has been achieved with ferrous ion, and photochemically. It is noted that the proposed pathway for prebiotic deoxyribonucleotide synthesis is in harmony with the Principle of

Continuity, as both the proposed and present pathways rely on the reduction of a 2' functional group. A.L.W.

A82-20929 * Factors influencing the rate of non-enzymatic activation of carboxylic and amino acids by ATP. D. W. Mullins, Jr. and J. C. Lacey, Jr. (Alabama, University, Birmingham, AL). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 209-215. 12 refs. Grant No. NGR-01-010-001.

The nonenzymatic formation of adenylate anhydrides of carboxylic and amino acids is discussed as a necessary step in the origin of the genetic code and protein biosynthesis. Results of studies are presented which have shown the rate of activation to depend on the pKa of the carboxyl group, the pH of the medium, temperature, the divalent metal ion catalyst, salt concentration, and the nature of the amino acid. In particular, it was found that of the various amino acids investigated, phenylalanine had the greatest affinity for the adenine derivatives adenosine and ATP. Results thus indicate that selective affinities between amino acids and nucleotides were important during prebiotic chemical evolution, and may have played a major role in the origin of protein synthesis and genetic coding. A.L.W.

A82-20930 HCN oligomerization - Isolation and preliminary characterization of a new precursor of adenine. A. B. Voet and A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 217-223. 22 refs.

A82-20931 * Cyanamide mediated syntheses of leu, ala, and phe peptides under plausible primitive earth conditions. J. R. Hawker, Jr. and J. Oro (Houston, University, Houston, TX). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 225-232. 20 refs. Grant No. NGR-44-005-002.

A82-20932 * Template-directed synthesis of oligoguanylic acids - Metal ion catalysis. P. K. Bridson, H. Fakhrai, R. Lohrmann, L. E. Orgel, and M. van Roode (Salk Institute for Biological Studies, San Diego, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 233-239. 7 refs. Grants No. NGR-05-067-001; No. NIH-GM-13435.

The effects of Zn(2+), Pb(2+) and other metal ions on the efficiency and stereo-selectivity of the template-directed oligomerization of guanosine 5'-phosphorimidazolide are investigated. Reactions were run in the presence of a polyC template in a 2,6-lutidine buffer, and products analyzed by high-performance liquid chromatography on an RPC-5 column. The presence of the Pb(2+) ion is found to lead to the formation of 2'-5' linked oligomers up to the 40-mer, while Zn(2+) favors the formation of predominantly 3'-5' linked oligomers up to the 35-mer. When amounts of uracil, cytidine or adenosine 5'-phosphorimidazole equal to those of the guanosine derivative are included in the reaction mixture, the incorrect base is incorporated into the oligomer about 10% of the time with a Pb(2+) catalyst, but less than 0.5% of the time with Zn(2+). The Sn(2+), Sb(3+) and Bi(3+) ions are also found to promote the formation of 2'-5' oligomers, although not as effectively as Pb(2+), while no metal ions other than Zn(2+) promote the formation of the 3'-5' oligomers. The results may be important for the understanding of the evolution of nucleic acid replication in the absence of enzymes. A.L.W.

A82-20933 Chemical evolution of model systems of primeval earth periphery and thermal polymerisation of aqueous solutions of cyanides. F. Stoetzel and R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 241-246. 6 refs.

A82-20934 The polymerization products of alpha-aminopropionitrile - The component separation using cation-exchange resin. S. Morimoto, K. Kawashiro, H. Yoshida, and K. Sugiura (Tokushima University, Tokushima, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 247-254.

The separation of the products of the polymerization of alpha-aminopropionitrile (APN) on Amberlite CG-50 cation-exchange resin is discussed. The polymerization products, which were formed from the reaction of APN with alpha, alpha-prime-iminodipropionitrile at 0 C over the course of eight years, underwent batch separation with Amberlite CG-50 equilibrated with water to yield the acidic and neutral component, equilibrated with aqueous acetic acid to yield the weakly basic component, and equilibrated with ammonia to yield the basic component. Each component was then fractionated through a Sephadex G-10 column to separate polymer and oligomer sections. Amino acid analysis was performed on the gel-filtration fractions of each component, indicating the peptide, peptide amide and peptide nitrile nature of the acidic and neutral, weakly basic, and basic components, respectively, as well as the presence of imino compounds in each component. A.L.W.

A82-20935 The cold theory of the origins of life - Assumptions for the theory and experimental evidence. C. I. Simionescu and F. Denes (Institute of Macromolecular Chemistry, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 255-262. 13 refs.

Experimental results obtained in low temperature conditions and using a cold plasma as an energy source are presented as a basis for a cold theory of the origins of life. Reasoning that a recombination of active species does not occur in chemical thermodynamics, experiments were performed to find evidence that macromolecular precursors to living matter accumulated on ice-covered surfaces. Polypeptide-like and polysaccharide-like materials were formed when a feed composition of NH3 was injected into an apparatus which modeled the early earth's environment by having ice at -60 deg at the bottom of a reactor and an RF electrode to create a plasma on the top. Protobiopolymers were found to form lipid-like structures which self-assembled and exhibited membrane-like structures with electrical properties suggestive of reversible transducers of various kinds of energies. M.S.K.

A82-20936 The appearance of protobiopolymers and protomembranes in accordance with the 'cold theory' of the origins of life. C. I. Simionescu, F. Denes, and M. Totolin (Institute of Macromolecular Chemistry, Iasi, Rumania). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 263-269. 14 refs.

Analyses of the reaction products of an RF cold plasma discharge in a mixture of CH4, NH3, and H2O gases which formed protobiopolymers are reported. Polypeptide and polysaccharide type substances were formed in the presence of dominant concentrations of NH3 and H2O, while methane dominated mixtures yielded lipid-like structures. Spectral analyses, chromatography, gel permeation measurements, elemental analysis, electron microscopy, SEM, and optical microscopy were employed, and it is noted that the lipid-like materials are induced to form specific orientations to the fluid medium and form organized entities with protomembranes. Double layers were found in the microspheres, which had a membrane potential of 30 mV. Microsphere-assisted phosphorylation was investigated starting from KH2PO4, and yielded a polyphosphate, which is considered significant for early bioenergetical processes. M.S.K.

A82-20937 * Terrestrial evolution of polymerization of amino acids - Heat to ATP. S. W. Fox and T. Nakashima (Miami, University, Coral Gables, FL). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 271-276. 10 refs. Grant No. NGR-10-007-008.

Sets of amino acids containing sufficient trifunctional monomer are thermally polymerized at temperatures such as 65 deg; the amino acids order themselves. Various polymers have diverse catalytic

activities. The polymers aggregate, in aqueous solution, to cell-like structures having those activities plus emergent properties, e.g. proliferatability. Polyamino acids containing sufficient lysine catalyze conversion of free amino acids, by ATP, to small peptides and a high molecular weight fraction. The lysine-rich proteinoid is active in solution, within suspensions of cell-like particles, or in other particles composed of lysine-rich proteinoid and homopolyribonucleotide. Selectivities are observed. An archaic polyamino acid prelude to coded protein synthesis is indicated. (Author)

A82-20938 Potentiometric titration behavior of polyamino acids prepared by thermal polycondensation. E. Kokufuta and K. Harada (Tsukuba, University, Sakura, Ibaraki, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 277-284. 10 refs.

Potentiometric titrations of thermally prepared polyamino acids were carried out at different ionic strengths. The intrinsic dissociation constants of carboxyl groups or amino groups in the polymers were evaluated by the curves of the apparent dissociation constant against the degree of dissociation and the Henderson-Hasselbalch plots. The ratio of alpha- and omega-linkages of amino acid residues was also evaluated by the analysis of the titration data. (Author)

A82-20939 On the polycondensation of amino acid adenylates on montmorillonites. F. R. Eirich (New York, Polytechnic Institute, Brooklyn, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 285-293. 9 refs.

A number of studies on the mechanisms of adsorption underlying the catalysis mechanism show, at least, three types of adsorption, i.e. two ion exchange mechanisms on clay faces and edges, and a general, possibly ion-pair mediated, polar adsorption. X-ray data on dry clay-peptide sandwiches show clearly adsorption in well defined layers, while analysis of rates of polymerization, of blocking experiments of clay agglomeration, and of the effects of polypeptide preadsorption show that the clay faces and edges are involved in the enhancement of the polycondensation which also requires that the clay platelet stacks can expand by interlayer adsorption during the reaction. (Author)

A82-20940 * Polymerization of serine guanylate in the presence of montmorillonite. M. Paecht-Horowitz (Jerusalem, Hebrew University, Rehovot, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 295-299. 7 refs. Grant No. NGR-33-006-070.

Serine guanylate was prepared and its polymerization studied in the presence of montmorillonite and in its absence. In water, without clay, serine guanylate polymerizes in the same way as does serine adenylate. In the presence of montmorillonite, serine guanylate polymerizes to a lesser extent and produces also lower degrees of polymerization than does serine adenylate. It is postulated that the reason for this difference in behavior might lie in the fact that guanylic acid is much more acidic than adenylic acid; hence would bind much more strongly to the edges of montmorillonite and thus, by blocking these sites, would inhibit the catalytic activity of the clay. (Author)

A82-20941 Quantum mechanical conformational analysis of aminoacyladenylates - Implication in the origin of life. H. Broch, D. Cabrol, and D. Vasilescu (Nice, Université, Nice, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 301-308. 16 refs. Research supported by the Centre National de la Recherche Scientifique and Direction des Recherches, Etudes et Techniques.

A82-20942 Environmental conditions for the formation of marigranules and kinetic studies on the formation. H. Yanagawa and F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 309-312. 5 refs.

Highly organized particles, 'marigranules', were found to be produced from glycine and acidic, basic, and aromatic amino acids in a modified sea medium. The marigranules had membrane-like structures and were packed with polymers having molecular weights of 1,800, 6,800, 15,000, and 82,000 daltons. It is considered that these marigranules represent a new type of protocell-like structures that were present on the primitive earth. The environmental conditions for the formation of marigranules are described and kinetic studies made on them are presented. Among amino acids, tryptophan was an essential amino acid for the formation of marigranules and among the metal components of modified sea medium, cupric ion was absolutely necessary for the formation of marigranules. The form of marigranules was dependent on temperature and time. The time course for the formation of these marigranules was oscillatory. (Author)

A82-20943 * Membrane lipids and the origin of life. J. Oro, G. Holzer, M. Rao (Houston, University, Houston, TX), and T. G. Tornabene (Colorado State University, Fort Collins, CO). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 313-322. 36 refs. Grant No. NGR-44-005-002. Contract No. EE-77-5-02-4478.

The current state of knowledge regarding the development of biological systems is briefly reviewed. At a crucial stage concerning the evolution of such systems, the mechanisms leading to more complex structures must have evolved within the confines of a protected microenvironment, similar to those provided by the contemporary cell membranes. The major components found normally in biomembranes are phospholipids. The structure of the biomembrane is examined, and attention is given to questions concerning the availability of the structural components which are necessary in the formation of primitive lipid membranes. Two approaches regarding the study of protomembranes are discussed. The probability of obtaining ether lipids under prebiotic conditions is considered, taking into account the formation of cyclic and acyclic isoprenoids by the irradiation of isoprene with UV. G.R.

A82-20944 Resolution of underivatized amino acids by high pressure liquid chromatography, using chiral eluants. E. Gil-Av, A. Tishbee, S. Weinstein (Weizmann Institute of Science, Rehovot, Israel), and P. E. Hare (Carnegie Institution of Washington, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 323-330. 15 refs.

Chiral recognition through coordination to a metal ion used in conjunction with a chromatographic mode of operation is reported as a method of improving the techniques of enantiometric analysis. Dissolving a chiral coordination complex in an aqueous mobile phase led to resolution of underivatized amino acids obtained by using as a support either a cation exchange resin or a reversed phase silica gel. Eluates are detected by post-column derivatization to fluorescent compounds. A reversed phase column was found to be more efficient for determining the resolution factor for enantiomer emergence than by use of an exchange resin, and chiral recognition was discovered to occur mainly in the mobile phase. Picomoles of eluate were observable, but only with primary, rather than secondary amino groups. M.S.K.

A82-20945 Stereoselective interactions of small biological molecules. Y. H. Kim, A. Tishbee, and E. Gil-Av (Weizmann Institute of Science, Rehovot, Israel). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 331-336. 19 refs.

Work being done on charge transfer complexation and chiral recognition is surveyed, with attention given to its extension to stationary phases consisting of relatively small biological molecules. The experiments reported deal with the resolution of synthetic molecules, the helicenes, not found in nature. They focus attention on the discrimination of certain optical isomers by biological substances through the combined effect of charge transfer complexation and chiral recognition through a sugar residue. These observa-

tions are thought to be of considerable interest since modern carbohydrate chemistry puts much emphasis on the information content of sugars and their functions in molecular recognition. It is noted that, by examining, as stationary phases, a systematically modified series of compounds, the influence of structural factors on chiral recognition could be investigated and eventually a model for the mechanism evolved. C.R.

A82-20946 * Possible selective adsorption of enantiomers by Na-montmorillonite. E. Friebele, A. Shimoyama, and C. Ponnamperuma (Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 337-346. 13 refs. NSF Grant No. EAR-77-00013; Grant No. NGR-21-002-317.

Racemic amino acids including (D,L) alpha-alamine, (D,L) alpha-aminobutyric acid, (D,L) valine, and (D,L) norvaline were incubated with Na-montmorillonite at 100% CEC at three hydrogen ion concentrations, and amino acid adsorption was determined by ion exchange chromatography. Enantiomers were analyzed by gas chromatography. Differences in the quantities of D and L enantiomers in any of the fractions was no larger than a few percent. Although a large difference in the adsorption of the amino acid enantiomers was not observed, the analysis may indicate a small preferential adsorption (0.5-2%) of L-amino acids by Na-montmorillonite. V.L.

A82-20949 Asymmetrical radical formation in beta-irradiated D- and L-alanines. M. Akaboshi, M. Noda, K. Kawai, H. Maki, and K. Kawamoto (Kyoto University, Osaka, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 373-378. 5 refs.

It was demonstrated that the relative radical concentration was distinguishably higher in D-alanine than in L-alanine when irradiation was carried out by using a yttrium-90 beta-ray source. On the other hand, when irradiation was carried out by using non-polarized beta-rays derived from a Van de Graaf generator, no such difference was observed in the radical formation of both alanines. The results suggested that some process being involved in the parity non-conservation in a beta-decay must play an important role in the observed phenomenon. (Author)

A82-20951 Competition, coexistence and irreversibility in models of early molecular evolution. C. Blomberg, G. von Heijne, and O. Leimar (Kungl. Tekniska Hogskolan, Stockholm, Sweden). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 385-392. 5 refs.

Mathematical models of prebiotic systems are considered for particular applications to the cases of irreversibility and coexistence in early molecular evolution. It is found that irreversibility in biologic systems is not well defined, and several models are considered which are limited by monomer availability. Attention is paid to a linear model, where fitness results in the survival of a specific polymer over another through more successful use of available monomers, to a model of hypercycle growth, where evolution must occur within a cycle by species which require fewer monomers. Consideration is also given to a dimerization model, where different species will coexist while monomer concentrations will decrease, to a model for the incorporation of monomers by one species to form another species, to coexistent hypercycle systems in niches beside one another, and to a steady-state existence between two species unable to eliminate one another, implying coexistence in prebiotic conditions. M.S.K.

A82-20952 * Histidyl-histidine catalysis of glycine condensation in fluctuating clay environments. D. H. White and J. C. Erickson (Santa Clara, University, Santa Clara, CA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.
Dordrecht, D. Reidel Publishing Co., 1981, p. 393-397. Research supported by the Research Corp.; Grants No. NCA2-OR-685-708; No. NCA2-OR-685-806.

Histidyl-histidine is a remarkably effective catalyst of peptide bond formation in the reaction of glycine in a fluctuating (hot-dry, cold-wet) clay environment. It has shown turnover numbers (molecules of glycine incorporated in oligoglycines per molecule of catalyst) as high as 18 in a single cycle and as high as 52 overall. A number of other dipeptides were tested, as well as monomeric histidine, N-acetyl histidine, and imidazole, none of which showed turnover numbers greater than one. Histidyl-histidine is a model for a prebiotic protoenzyme, and implications for the development of a simple translation mechanism are discussed. (Author)

A82-20953 A mathematical method for the enumeration of doublet codes. G. Cullmann (Institut Georges Gamow, Clermont-Ferrand, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 405-413. 7 refs.

A single nonsense mutation is a mutation of a codon outside its code, wherein only one base changes under the mutation. The best code is one which has the minimum number of single nonsense mutations and, therefore, a definite Hamming's distance. The Hamming's distance (Hamming, 1950) represents the maximum number of codons which differ in one base only. All the codes for a given Hamming's distance can be listed by a process known as combinatory analysis. A simple example of theoretical doublet codes with four bases is presented; it is maintained, however, that the method can be extended to any length, and in particular, to triplet codes. J.F.

A82-20954 * Evolving nucleotide binding surfaces. T. Kieber-Emmons and R. Rein (Roswell Park Memorial Institute, Buffalo, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 415-422. 14 refs. Grant No. NsG-7305.

An analysis is presented of the stability and nature of binding of a nucleotide to several known dehydrogenases. The employed approach includes calculation of hydrophobic stabilization of the binding motif and its intermolecular interaction with the ligand. The evolutionary changes of the binding motif are studied by calculating the Euclidean deviation of the respective dehydrogenases. Attention is given to the possible structural elements involved in the origin of nucleotide recognition by non-coded primordial polypeptides. (Author)

A82-20955 Origin and evolution of the genetic code. M. Shimizu (Tokyo, University, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 423-430. 23 refs.

A hole on a complex of anticodon and discriminator base on a tRNA has a key hole - key relation to the side chain of the corresponding amino acid. The protein synthesis system might have evolved so that it could have continuously utilized the above stereochemical discrimination scheme. 'Half tRNA' might have been the form of the primitive tRNA and the primitive ribosome might have had a hairpin structure with two CAAGR on both sides of it. (Author)

A82-20956 The origin and evolution of the genetic code. A. Figureau (Lyon I, Université, Villeurbanne, Rhône, France) and J.-M. Labouygues (Institut Georges Gamow, Clermont-Ferrand, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 431-437. 13 refs.

A quantitative model is examined, which suggests that the present genetic code appeared under the influence of mutations and evolved by optimizing its resistance to their effects. The number of sense codons grew progressively, whereas the number of terminators decreased. The most important constraint is due to the selection against the appearance of nonsense codons. The competition between ancestor codes favors those which best resist mutational effects leading to nonsense. The structure of the selected systems converges towards that of the present genetic code. (Author)

A82-20957 **Evolutionary processes of the genetic code.** T. Noguchi (Tokyo College of Economics, Kokubunji, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 439-446. 7 refs.

Evolution of the genetic code is analyzed in terms of codon-reading ability and amino-acid-recognizing ability. Three basic rules are formulated in relation to the codon-reading ability of tRNAs which make it possible to classify the evolution of this ability into seven stages according to the degree of perceptivity of codon-anticodon interaction. Evolutionary trees are presented for tRNAs which show how tRNAs are related to one another. V.L.

A82-20958 * **Summary of evidence for an anticodonic basis for the origin of the genetic code.** J. C. Lacey, Jr. and D. W. Mullins, Jr. (Alabama, University, Birmingham, AL). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 447-456. 27 refs. Grant No. NGR-01-010-001.

This article summarizes data supporting the hypothesis that the genetic code origin was based on relationships (probably affinities) between amino acids and their anticodon nucleotides. Selective activation seems to follow from selective affinity and consequently, incorporation of amino acids into peptides can also be selective. It is suggested that these selectivities in affinity and activation, coupled with the base pairing specificities, allowed the origin of the code and the process of translation. (Author)

A82-20959 **Primitive transfer RNA and origin of Darwinian system.** M. Ishigami (Jichi Medical School, Minamikawachi, Tochigi, Japan) and M. Kinjo (Utsunomiya University, Utsunomiya, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 457-464. 22 refs.

The effect of polynucleotide and polypeptide on the formation of polypeptide is tested in order to support the theory that the protein synthesis mechanism originated in the stepwise evolution of polynucleotides, which not only activate amino acids, but evolve to produce better polypeptides for probionts as well (Ishigami et al., 1977). The basic protein, histone, is found to promote the reaction of polypeptide formation from aminoacyl adenylate. The relationship between the origin and development of the genetic code and the increase of the invariable site in protein in the course of molecular evolution is discussed. Finally, an analogy is drawn between the learning system and Darwinian evolution. J.F.

A82-20960 **Evolution of the terrestrial atmosphere and its fossils in biosystems.** M. Shimizu (Tokyo, University, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 465-471. 18 refs.

Various fossil vestiges of C3O2 and HCHO polymers can be found in the living biosystem, and are thought to have resulted from the presence of CO in the primitive earth atmosphere. The possible evolutional route of the genetic code is derived by combining the discussion of Eigen and Schuster (1978) for the formation of mRNA and that of Egami (1979) for the classification of amino acids and nucleic acid bases in relation to the genetic code. The codes are specified by a series of 3rd-2nd-1st anticodons, and the C4N holes for the terminators are both small. It is found that fossil vestiges of C3O2 appear most clearly in the sequence serine-leucine-phenylalanine, while those of HCHO appear most clearly in the sequence glycine-alanine-asparatic acid. Thus, the classified evolutional route of the genetic code provides good evidence for a primitive environment, especially for a primitive atmosphere consisting of CO and N2. J.F.

A82-20961 **Organic geochemistry of the Isua supracrustals.** C. Walters, A. Shimoyama, and C. Ponnamperuma (Maryland, University, College Park, MD). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 473-479. 21 refs. NSF Grants No. DPP-77-06993; No. DPP-79-00991.

The Isua supracrustals of western Greenland are the oldest terrestrial rocks known, dated at greater than 3,750 m.y. Metamorphosed to lower amphibolite facies, they still can provide indications of their original environment of deposition. Graphite is widely dispersed throughout the meta-sediments, particularly within the ironstones. Most of the graphite is very well ordered. However, several samples show a marked disorder of crystallinity. These samples, when pyrolyzed at high temperatures, liberate organic fragments of low molecular weight (m/e less than 200). The fragments suggest that at least some of the Isua graphite is derived from condensation of kerogen. Carbon isotope data has been interpreted as indication of photosynthetic fractionation. Whether the original organics, which are now seen as graphite, were biologically produced has not yet been unequivocally established. The pyrolyzed organics detected within the meta-sediments may well be the oldest molecular fossils yet found on the earth. (Author)

A82-20962 **Secondary structures of polypeptides as evolutionary growing points.** H. Baltscheffsky (Stockholm, Universitet, Stockholm, Sweden). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 481-486. 9 refs. Statens Naturvetenskapliga Forskningsrad Grant No. 2292-100.

The formation of beta-pleated sheet structures in experiments on Clostridia-type ferredoxin apoproteins has revealed secondary structures which may serve to orient appropriate cysteine sulfur residues to bind 2 Fe atoms in two 4(Fe + S) cubes. The beta-structures then disappear, yielding a hydrogen bond change which holds significance in the protein function. Three-dimensional structures are formed by concerted hydrogen bond formation, some in which reversible, functionally useful changes are regarded as evolutionary growing points that are a basis for more complex three-dimensional patterns found in present-day proteins. M.S.K.

A82-20963 **Search for primitive replicative properties on early polypeptides.** A. Brack and G. Spach (CNRS, Centre de Biophysique Moléculaire, Orléans, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 487-493. 9 refs.

The sequences of polypeptide chains which are built up with alternating hydrophilic-hydrophobic residues concentrate themselves in the beta-pleated sheet conformation when dissolved in salted water. The sheets are more stable than the alpha-helix and are shown to constitute a pathway to the enrichment in one enantiomer. They are considered as a single system with potential template activity. (Author)

A82-20964 **Emergence of flavin catalysis - An approach based on the concept of bioorganic evolution.** C. M. Visser (Groningen, Rijksuniversiteit, Groningen, Netherlands). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 495-504. 37 refs.

Bioorganic chemical analysis of present-day coenzyme mechanisms (via chemical models) can reveal something about the stage of evolution of life in which those cofactors were introduced (and vice versa). Some cofactors date back to the time before the origin of the genetic code (RNA-like metabolism) whereas others are relatively recent. Flavin prosthetic groups are anomalous however, in that they have pre-genetic code structures but a great number of post-genetic code functions (oxygen handling) and reaction mechanisms. The recent isolation of a deazaflavin cofactor from one of the Archaebacteria suggests a possible way out of this dilemma. The significance of this for present-day flavoenzyme mechanisms is discussed. (Author)

A82-20965 **Selective acylability of amino acids by non-enzymic model reactions of biochemical transacylations.** D. Brice, L. Le Port, and R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980.

Dordrecht, D. Reidel Publishing Co., 1981, p. 505-511. 18 refs.

The results of experiments on the acylability of various amino acids by differing acyl donors to study the reactions of biochemical transacylations are reported. The reactions were performed in aqueous solutions with no enzymes and a small presence of hydroxyl ions. Data on the acetylation yield obtained from acetylthioglycolate, acetylthiocholine, and acetylphosphate show that the acetylation yields of hydrocarbonated side chain amino acids are highest with acetylthioglyconates, an inversion of the acetylation yields between two thioesters occurs for amino acids which have a thiol function, reactions from the hydroxylated side chain amino acids result in lower acetylation yields, and specifically high acetylation yields are obtained in the case of cysteine and homocysteine acetylation. Finally, it was found that, in the nonenzymatic conditions in primitive synthesis of polypeptides, the hydrophobic character of the amino acid chains influences the NH2 reactivities of the compounds with respect to their acetylation with acetyl donors. M.S.K.

A82-20966 Experiments on transfer of organic molecular information into crystal lattice superstructures. P. Decker and H. Schweer (Hannover, Tierärztliche Hochschule, Hanover, West Germany). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 513-520. 22 refs.

Evolution in bioids, open systems which can exist in several steady states involves the accumulation of information relevant to its selection value, i.e. in the simplest case, the choice by mutation of the most stable steady state (species). Therefore it appears problematical how alien information like nonstatistical structures arising in mineral crystallization or in interplanetary carbon compounds found in meteorites could become incorporated into the terrestrial biosphere. In contrast, an interaction of evolving biosystems with inorganic matter, involving temporal storage of bioinformation in crystal structures, appears more compatible with the bioid concept. A model of how three independent messages can be stored in a three-dimensional lattice is presented. As a first experimental approach, attempts to induce information from linear biomolecules into a nonstatistical distribution of components of mixed crystals are reported. (Author)

A82-20967 * Phylogenetic sequence of metabolic pathways in Precambrian cellular life. J. Barnabas (Ahmednagar College, Ahmednagar, India), R. M. Schwartz (National Biomedical Research Foundation, Washington, DC), and M. O. Dayhoff (Georgetown University, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 521-528. 55 refs. Grant No. NIH-GM-08710; Contract No. NASw-3317.

A sequence of major metabolic events is presented as they may have appeared during prokaryote evolution. This is based on (1) the phylogenetic schema derived from sequences of bacterial ferredoxin, 2Fe-2S ferredoxin, 5S ribosomal RNA, and c-type cytochromes; (2) metabolic settings in which these macromolecules are found; and (3) metabolic capabilities of the prokaryotes that carry these molecules. (Author)

A82-20968 Coupling to solar energy: Sensitized photoreactions - The primary source of self-organization. P. Decker (Hannover, Tierärztliche Hochschule, Hanover, West Germany). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 529-536. 31 refs.

Life is modelled as a thermodynamically dissipative mechanism, and the chemical reactions most amenable to the formation of 'bioids' which form and change from one generation to the next are examined. The self-organization is assumed to occur on a planetary surface exposed to 6000 deg light quanta, in the availability of reactive chemicals, with nonenzymatic catalysts being present, and with macromolecules able to mediate the reactivity through catalytic concentration of metal ions. The model is taken to indicate that experimentation should look for photochemical reactions with autocatalytic feedback which yield an organization into cycles in a steady state scenario. The oxidation of methane is mentioned for the production of formaldehyde and the autocatalytic formation of sugars from the formaldehyde, and experiments on a nonenzymatic photophosphorylation is described as an example of the synthesis of energy rich intermediates. M.S.K.

A82-20969 Ultraviolet selection pressure in the Prephanerozoic. M. B. Rambler (Boston University, Boston, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 537-542. 34 refs.

The late appearance of metaphyta and metazoa in the fossil record has often been attributed to low concentrations of ambient oxygen and restriction of organisms to shielded habitats due to intense ultraviolet selection pressure (Berkner-Marshall hypothesis). Microorganisms examined for survival as a function of UV dosage consistantly exhibit a capacity for radiation resistance and repair. Comparisons of lethal UV dosages of various microbes to calculations of present solar UV fluxes at 253.7 nm result in an average radiation tolerance of 30 minutes. However, inspection of survival of protected cells increases radiation tolerance by three orders of magnitude or 24 hours of continual radiation exposure. The observation of protective mechanisms in extant microbes may be legacies from UV exposure in the Prephanerozoic. Radiation resistance taken together with the well preserved microbiota known from the Prephanerozoic suggests the Berkner-Marshall hypothesis to be indefensible. (Author)

A82-20970 DNA-protein complex from an extreme halophile - A histone-like protein in archaebacteria. M. Ohba and T. Oshima (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 543-549. 17 refs.

A82-20971 * The evolution of blue-greens and the origins of chloroplasts. R. M. Schwartz (National Biomedical Research Foundation, Washington, DC) and M. O. Dayhoff (Georgetown University, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 551-558. 26 refs. Contract No. NASw-3317; Grants No. NIH-GM-08710; No. NIH-RR-05681.

All of the available molecular data support the theory that the chloroplasts of eukaryote cells were originally free-living blue-greens. Of great interest is what the relationships are between contemporary types of blue-greens and eukaryote chloroplasts and whether the chloroplasts of the various eukaryotes are the result of one or more than one symbiosis. By combining information from phylogenetic trees based on cytochrome c6 and 2Fe-2S ferredoxin sequences, it is shown that the chloroplasts of a number of eukaryote algae as well as the protist Euglena are polyphyletic; the chloroplasts of green algae and the higher plants may be the result of a single symbiosis. (Author)

A82-20972 * Evolution of the rhodospirillaceae and mitochondria - A view based on sequence data. M. O. Dayhoff (Georgetown University, Washington, DC) and R. M. Schwartz (National Biomedical Research Foundation, Washington, DC). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 559-566. 22 refs. Contract No. NASw-3317; Grant No. NIH-GM-08710.

New sequence data from several protein families and from 5S ribosomal RNA confirm and elaborate a previously proposed description of the phylogenetic connections between a variety of bacteria and the eukaryotes. Probably, the first organisms were nonphotosynthetic anaerobic prokaryotes, which were followed soon by photosynthetic anaerobes. From this photosynthetic stock, the aerobic line to Pseudomonadacae, Rhodospirillaceae, and blue-greens arose. The eukaryotes derived genetic material from the symbioses of at least three separate bacterial lines. Ancestors of Rhodopseudomonas globiformis gave rise to the eukaryote mitochondria, probably

through at least three separate symbioses, one early on the flagellate line, one on the ciliate line, and one on the stem to the multicellular forms. (Author)

A82-20973 On the origin of photosynthetic eukaryotic cells - Cyanidium caldarium as a 'bridge' alga between prokaryotic cyanobacteria and eukaryotic rhodophytes: Evidence from environmental, polysaccharide biochemistry and ultrastructural studies. J. Seckbach (Jerusalem, Hebrew University, Jerusalem, Israel) and J. F. Fredrick (Dodge Chemical Co., Bronx, NY). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 567-574. 43 refs.

A82-20974 Microbial life in cold saline environments. S. B. Leschine, K. J. Miller, and R. L. Huguenin (Massachusetts, University, Amherst, MA). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 575-582. 22 refs.

Microorganisms form Dry Valley (Antarctica) soils, from Great Salt Lake (Utah, USA) water, and from refrigerated salt codfish were enriched and isolated at 5 C in media containing high concentrations of salts. The microbial flora that developed varied considerably depending on the source of the inoculum. A variety of morphologically distinct microorganisms was isolated. Most isolated strains grew over a wide range of temperature (e.g., 0-25 C) and salt concentration (e.g., 0.1-2 M NaCl) suggesting that the evolutionary strategy for adaptation of these organisms to low temperature and high salt involved an increased tolerance of (rather than dependance on) these extreme conditions. (Author)

A82-20975 * Mutagens and carcinogens - Occurrence and role during chemical and biological evolution. A. Giner-Sorolla (Sloan-Kettering Institute for Cancer Research, New York, NY) and J. Oro (Houston, University, Houston, TX). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 583-588. 28 refs. Grants No. NIH-CA-08748; No. NGR-44-005-002.

The roles of mutagenic and carcinogenic substances in early biologic evolution is examined, along with terrestrial and extraterrestrial sources of mutagens and carcinogens. UV solar radiation is noted to have served to stimulate prebiotic life while also causing harmful effects in plants and animals. Aromatic compounds have been found in meteorites, and comprise leukemogens, polycyclic hydrocarbons, and nitrasamine precursors. Other mutagenic sources are volcanoes, and the beginning of evolution with mutagenic substances is complicated by the appearance of malignancies due to the presence of carcinogens. The atmosphere of the Precambrian period contained both mutagens and early carcinogens and, combined with volcanic activity discharges, formed an atmospheric chemical background analogous to the background ionizing radiation. Carcinogenesis is concluded to be intrinsic to nature, having initiated evolution and, eventually, cancer cells. M.S.K.

A82-20976 Could the biochemical metabolism be different. R. Buvet (Paris XII, Université, Créteil, Val-de-Marne, France). In: Origin of life; Proceedings of the Third ISSOL Meeting and Sixth ICOL Meeting, Jerusalem, Israel, June 22-27, 1980. Dordrecht, D. Reidel Publishing Co., 1981, p. 589-599. 8 refs.

The inevitableness of life having formed from the reactivities of carbonaceous molecules with derivatives of oxygen, sulfur, nitrogen, phosphorus, and some metallic ions and complexes is examined. Consideration is given to redox processes, condensations, the synthesis of chemical bonds, additional bonds, reciprocal eliminations, enol-oxo polymerizations, and the isoprenyl pyrophosphate polycondensations. Restrictions for biochemical processes are defined, and standard potentials which define the transition from a nonoxydized carbon atom to an alcohol or ethylenic group, alcohol to an aldehydic or ketonic group, and an aldehydic group to a carboxylic group are explored. The transitions are found to occur at the lowest energy levels possible, considering that they take place at room temperature. Life then formed from reactions which were determined from the physico-chemical properties of the carbonaceous compounds in aqueous media. M.S.K.

A82-21208 * Organic and inorganic interpretations of the Martian UV-IR reflectance spectrum. K. D. Pang, J. M. Ajello (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), S. F. S. Chun (California, University, San Francisco, CA), Z. Nansheng (Beijing Planetarium, Beijing, People's Republic of China), and L. Minji (Beijing Glass Institute, Beijing, People's Republic of China). *Nature,* vol. 295, Jan. 7, 1982, p. 43-46. 45 refs. NASA-sponsored research.

Viking Lander biology experiment gas chromatography-mass spectrometer analysis has detected no organic molecules above a concentration of parts per billion. The questions considered here include the reason for the lack of organic molecules at the landing sites, whether the sterility of the two sites is representative of the whole of Mars, and whether there may be locations more conducive to organic compound formation and preservation. After simulating the destruction of organic compounds in Mars-like laboratory conditions and examining whether the destructive mechanism might obtain throughout the planet, UV and IR reflectance spectra are re-examined for any evidence of organic molecules and an upper limit is determined for organic carbon content of average Martian soil. It is found that the average Martian soil is poor in inorganics, presents a poor habitat for carbon chemistry-based life forms, and is not likely to preferentially preserve such organisms anywhere on the planet. O.C.

A82-21213 Body temperature changes during the practice of g Tum-mo yoga. H. Benson, J. W. Lehmann (Beth Israel Hospital, Boston, MA), M. S. Malhotra (Netaji Subhas National Institute of Sports, Patiala, India), R. F. Goldman (U.S. Army, Research *Institute of Environmental Medicine, Natick, MA),* J. Hopkins (Virginia, University, Charlottesville, VA), and M. D. Epstein (Harvard University, Boston, MA). *Nature,* vol. 295, Jan. 21, 1982, p. 234-236. 16 refs. Research supported by the American Institute of Indian Studies, Fleischmann Foundation, and Fetzer Foundation; NSF Grant No. INT-80-16982; Grants No. NIH-HL-22727; No. NIH-HL-07374.

It is reported that three practitioners of the Tibetan Buddhist meditational practice known as g Tum-mo, or heat yoga, have exhibited the capacity to deliberately increase the temperature of their fingers and toes by as much as 8.3 C. Skin temperatures were measured in the area of the navel and lumbar region, the nipple, the left forearm, the left fifth finger nailbed, the left calf, the left toe nailbed, and the forehead. The ages of the three subjects were 46, 50 and 59 years. It is suggested that the physiological mechanism responsible for the marked increase of finger and toe temperature recorded is vasodilation. O.C.

A82-21268 Microelectronics and computers in medicine. J. D. Meindl (Stanford University, Stanford, CA). *Science,* vol. 215, Feb. 12, 1982, p. 792-797. 56 refs.

Computer use in medicine and medical research is discussed, along with the applications of microelectronics in biosystems. Systems for experimentation demand consideration of the uses of microelectronic sensors for acquiring data bases and for implantable telemetry. Data gathered from 'under the skin' are much harder than personal descriptions of medical history, and can be directly input to a computer for analysis. The computer's role in medical decision-making processes is examined, including the implications of CAT scans as an effective diagnostic tool. Numerous routine and specially ordered hospital tests can be automatically performed under computer control, and the data stored, correlated, and selectively displayed on demand. Additionally, results which are regarded as abnormal can be scanned for automatically and the physician notified. M.S.K.

A82-21454 † Electroencephalographic correlates of the hemispheric functional asymmetry in the human brain (Elektroentsefalograficheskie korreliaty funktsional'noi asimmetrii bol'shikh polusharii mozga cheloveka). E. A. Zhirmunskaia, V. S. Losev, and T. P. Evpakova (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 13, Jan.-Mar. 1982, p. 42-65. 58 refs. In Russian.

Recent work concerning the background electro-

encephalographic correlates of the functional asymmetry of the left and right cerebral hemispheres connected with speech, visual, auditory or spatial perception, and other forms of mental activity is reviewed. Following a brief summary of current formulations of the problems of the relation of psychological and physiological phenomena and hemispheric asymmetry in performing the same functions on different levels, a review is presented of the goals, methods and results of experimental studies in the literature of the past 3-4 years. Attention is then given to the results of three series of experiments conducted by the present authors concerning the general characteristics of EEG changes during changes in cerebral functional condition, EEG changes in different regions of the brain, and EEG changes in different cerebral functional conditions. The potential of electroencephalography for further studies of hemispheric functional asymmetry and interactions is also discussed. A.L.W.

A82-21455 † **The structural and functional organization of the ventrolateral nucleus of the thalamus (Strukturno-funktsional'naia organizatsiia ventrolateral'nogo iadra talamusa).** L. V. Cherenkova and A. S. Batuev (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 13, Jan.-Mar. 1982, p. 66-88. 163 refs. In Russian.

Literature data concerning the structure and functional organization of the ventrolateral nucleus (VLN) of the thalamus and its connections with various brain structures engaged in the processing of information necessary for the integration of motor activity is reviewed. The three types of neurons making up two zones of the VLN are distinguished, and connections of the VLN are examined, including somatic afferents, afferents from the cerebellum, fornix, thalamic nuclei and cortex, and efferents to the sensorimotor cortex. The structural data are noted to suggest that the VLN plays an important role in the organization of the cerebellar-thalamic-cortical system. Physiological data on neuronal activity, the control of cerebellar impulse transmission, control on the part of the cortex and the role of the VLN in motor organization is considered, and the role of the structure in filtering sensory information to allow the initiation and realization of motion is emphasized. A.L.W.

A82-21456 † **Cellular mechanisms of the Frank-Starling phenomenon (Kletochnye mekhanizmy fenomena Franka-Starlinga).** V. Ia. Izakov, V. S. Markhasin, Iu. L. Protsenko, and O. N. Bershitskaia (Sverdlovskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 13, Jan.-Mar. 1982, p. 89-108. 109 refs. In Russian.

Recent data concerning the cellular basis for the relation between length and tension discovered in skeletal and myocardial muscle by Frank and serving as the basis of Starling's law of the heart is reviewed. The general characteristics of the relation between initial muscle length and isometric contraction in skeletal muscle and the myocardium are discussed, and ultrastructural evidence is presented which shows that changes in the overlap between the thick and thin sarcomeric filaments are insufficient to explain the length-tension relation. Studies of the influence of initial length on the calcium activation of myofibrils are then presented which demonstrate that inotropic factors act through both electromechanical coupling and calcium activation to influence contractile forces. A.L.W.

A82-21457 † **Change in the cytochemical indicators of carbohydrate metabolism in the peripheral blood neutrophils of pilots (Izmenenie tsitokhimicheskikh pokazatelei uglevodnogo obmena neitrofilov perifericheskoi krovi letchikov).** P. S. Pashchenko. *Voenno-Meditsinskii Zhurnal,* Dec. 1981, p. 52, 53. In Russian.

Glycogen levels and phosphorylase enzyme activities in the peripheral blood neutrophils of pilots are measured as indicators of the effects of flight stress on carbohydrate metabolism and physiological condition in general. Blood samples were taken from 21 pilots 1 to 1 1/2 hours before and 10 to 15 min after flight, and compared with those of age-matched healthy controls. In 52% of the subjects, preflight glycogen levels are found to be about equal to or even exceed control values. Post-flight glycogen levels are observed to depend on the preflight values, increasing in those with initially low values, decreasing in those with slightly higher levels, and remaining the same for those with normal or greater than normal values. The results are explained in terms of the effects of sympatho-adrenal and parasympathetic hormones on the activity of the phosphorylase enzyme, which activates the cellular breakdown of glycogen. A.L.W.

A82-21470 † **Filtration properties of receptive fields of visual-cortex neurons (Fil'tratsionnye svoistva retseptivnykh polei neironov zritel'noi kory).** Iu. E. Shelepin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 261, no. 6, 1981, p. 1506-1509. 8 refs. In Russian.

An analysis is presented of the amplitude spatial-frequency characteristics of the neuron receptive fields in the visual cortexes of 35 cats. The general filtration properties (i.e., the isolation of spatial frequency and image orientation) were determined for receptive fields situated in various projection zones of the visual cortex, and a relationship between image orientation, spatial frequency, and neuron response was established. B.J.

A82-21676 **Effects of long-term exposure to low levels of ozone - A review.** C. E. Melton (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 105-111. 39 refs.

Available literature regarding long-term effects of ozone on animals and humans is reviewed. This review shows that ozone concentration is more important than duration of exposure in determining the effects of an ozone exposure. This conclusion calls into question the validity of the time-weighted average as an index of severity of ozone exposure. The literature review further reveals a wide variation in susceptibility of different animal species to ozone, making it difficult to apply results of animal experiments to humans. It further appears that a dose of ozone that is acutely innocuous is also innocuous over the long term. The effects of a symptom-producing dose of ozone are initially cumulative for the first two or three exposures; then an adaptive response may ensue that involves a plateau of response or even a reversal. These effects are shown by both animals and humans. The mechanisms are unknown. Ozone probably causes damage by free radical formation. Free radical scavengers, such as vitamins E and C, may provide protection against ozone damage. (Author)

A82-21677 **A study of treadmill exercise protocols for Chinese males.** B.-L. Ho (Institute of Aviation Medicine, Taipei, Republic of China). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 112-116. 14 refs. Research supported by the National Science Council of the Republic of China.

A82-21678 **The effect of two years' training of aerobic power and muscle strength in male and female cadets.** W. L. Daniels, J. E. Wright, D. S. Sharp, D. M. Kowal, R. P. Mello, and R. S. Stauffer (U.S. Army, Research Institute of Environmental Medicine, Natick, MA; U.S. Military Academy, West Point, NY). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 117-121. 10 refs.

The considered investigation is concerned with a comparison of the responses of male and female cadets to extended military training at the U.S. Military Academy. During the course of the study, the training program of both male and female cadets was similar and, in some respects, identical. Volunteer cadets, 11 males and 7 females, completed all phases of this study. On all strength measures, the values for female cadets averaged approximately 30-40% lower than for males. The female cadets did not significantly narrow the gap with male cadets in terms of muscle strength and aerobic power, even after 2 years of similar training. These results indicate that post-pubertal females are unable to reduce the difference between themselves and males, even after extended training in a situation where many social, cultural, and environmental factors are very similar. G.R.

A82-21679 **Psychological testing at high altitudes.** M. Nelson. *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 122-126. 20 refs.

Psychological testing was done on 20 subjects at various altitudes (sea level, 3,810 m, and 5,000 m) during a 35-d mountaineering expedition to Denali (Mt. McKinley). Intellectual functioning and personality changes were studied. While little variation was noted at the lower altitude, at 5,000 m there was a marked deterioration in cognitive ability. This was accompanied by a sharp

increase in paranoia and obsessive-compulsiveness and smaller increases in depression and hostility. (Author)

A82-21680 Effects of relative metabolic rate and heart rate variation on the performance of flight attendants. T. Yoshioka, M. Narusawa, K. Nagami, C. Yabuki, Y. Nakahara, S. Nakano (Tokai University, Isehara, Japan), C. Sekiguchi (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan), K. Noda (Japan Air Line Co., Ltd., Health Control Service Div., Tokyo, Japan), T. Nagai, and Y. Kobayashi (Jikei University, Tokyo, Japan). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 127-132. 15 refs.

A82-21681 Regional distribution of cardiac output in unanesthetized baboons during +Gz stress with and without an anti-G suit. M. H. Laughlin, J. W. Burns, and M. J. Parnell (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 133-141. 43 refs.

The F-16 and other recently developed high-performance aircraft can produce levels of +Gz (head-to-foot acceleration) which may exeed man's physiologic tolerance for +Gz stress. In this connection, it is pointed out that the effects of +Gz on regional flow and resistance in humans have remained a subject for conjecture. An investigation was, therefore, conducted to obtain information regarding this important subject. Eight female baboons were used in the experiments, because the baboon is a subhuman primate which is phylogenetically close to man. The results of the experiments demonstrate that, in baboons, +Gz stress causes a significant decrease in cardiac output and a redistribution of blood flow away from visceral organs. Acceleration exposure had no statistically significant effect on blood flow to the cerebrum, cerebellum, or brain stem. G.R.

A82-21682 * The effects of horizontal body casting on blood volume, drug responsiveness, and +Gz tolerance in the rhesus monkey. D. T. Dickey, G. E. Billman, K. Teoh, H. Sandler, and H. L. Stone (Oklahoma, University, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 142-146. 18 refs. Grant No. NsG-2282.

To simulate the weightless condition, eight rhesus monkeys, instrumented with solid-state pressure transducers, were horizontally restrained in body casts for 28 days. Blood volume decreased an average of 13% after 14 days of restraint, due mainly to a drop in plasma volume. Aortic pressure and heart rate responses to norepinephrine and phenylephrine decreased after 14 days of restraint. The monkeys did not show a statistically significant decreased tolerance to a 90 deg sudden upright tilt after horizontal restraint. During the fifth week of casting, four animals were subjected to +Gz acceleration tests on a centrifuge. The acceleration tolerance of the casted monkeys was significantly reduced compared to four similarly instrumented control animals. These findings indicate that the cardiovascular deconditioning associated with simulated weightlessness results from an inability to maintain central blood volume during orthostatic stress. (Author)

A82-21683 Acceleration induced voltage variations in the electrocardiogram during exhaustive simulated aerial combat maneuvering. J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 147-152. 34 refs.

A description is presented of the effects of exhaustive simulated aerial combat +Gz stress on the amplitudes of the P, QRS, and T waveforms as seen on the surface electrocardiogram. Twenty-two healthy males were exposed to an exhaustive simulated aerial combat maneuver (SACM) +Gz profile. It was found that marked changes in the electrocardiographic amplitudes occur as a result of exhaustive SACM + Gz stress. Positional, pressure/volume, humoral and electrolyte changes may all be significant causative factors either alone or in combination. Attention is given to T-wave response to exercise and training, hyperkalemia as an etiology for T-wave changes, T-wave response to +Gz stress, catecholamines as an etiology for T-wave changes, QRS response to exercise and clinical considerations, and QRS response to +Gz stress. G.R.

A82-21684 Posturography of ataxia induced by Coriolis- and Purkinje-effects. C. Fitger and T. Brandt (Alfried Krupp von Bohlen und Halbach Krankenhaus, Essen, West Germany). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 153-161. 33 refs. Research supported by the Deutsche Forschungsgemeinschaft.

One aim of the study is to provide information on clinical vertigo symptoms. Standing on a rotatable stabilometer, 25 healthy subjects execute lateral head tilts during (Coriolis), or after (Purkinje), rotation with different constant velocities. The conditions are varied with respect to eyes open vs eyes closed, head upright vs head tilted to the right and left, direction of rotation (clockwise vs counterclockwise), head tilt (active vs passive), and body rotation (active vs passive). The results are as expected in that destabilization is less severe with open than closed eyes and that sway amplitudes are increased after head tilt as well as with a higher velocity of rotation. The direction of the induced body shift is also as expected, opposite to the initial vestibular stimulus. A forward shift after stop without head tilt is frequently found, being independent of the previous direction of rotation. Reported perceptions coincide mostly not with the initial vestibular signal but with the actual movement of compensation. C.R.

A82-21685 A statistical examination of three approaches for predicting motion sickness incidence. D. E. Smith (Desmatics, Inc., State College, PA). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 162-165. 6 refs. Contract No. N00014-74-C-0154. NR Project 207-037.

This paper examines three approaches which have been suggested for predicting motion sickness incidence (MSI) for actual or simulated broadband ship motion. Although only a small amount of empirical MSI data exists for motion other than that produced by a single sinusoid, this data provides strong statistical evidence that two approaches based on single sinusoid models fail to produce accurate predictions. Statistical judgments about a least-squares weighting approach must be reserved until enough data exists to provide an adequate test. In view of these results, it must be concluded that much empirical research remains to be done in order to develop a reasonably accurate method of predicting motion sickness incidence for broadband motion. (Author)

A82-21686 Difference between eye closure and visual stabilization in the control of posture in man. P. P. Vidal, A. Berthoz, and M. Millanvoye (CNRS, Laboratoire de Physiologie Neurosensorielle; Conservatoire National des Arts et Métiers, Paris, France). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 166-170. 11 refs.

Stabilizing the visual surroundings of human subjects influences postural control during perturbations of their equilibrium. The latency of the first EMG burst is increased and its amplitude is reduced. Body pitch is 36 percent stronger than with normal vision. Eye closure does not produce any significant modification of muscular responses and postural performance. This result explains why vision is not considered a rapid source of postural reaction. Eye closure cannot be considered to be visual deprivation. (Author)

A82-21687 Cardiovascular origins of heatstroke pathophysiology - An anesthetized rat model. A. J. Kielblock, N. B. Strydom (Chamber of Mines Research Organization, Johannesburg, Republic of South Africa), F. J. Burger, M. Manjoo (Durban-Westville, University, Durban, Republic of South Africa), and P. J. Pretorius (Potchefstroom University for Christian Higher Education, Potchefstroom, Republic of South Africa). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 171-178. 43 refs.

A reappraisal of the nature and sequence of early circulatory responses to heat stress is undertaken by subjecting male albino rats to an environmental temperature of 45 C at 15% relative humidity until overt circulatory failure occurs. Although the initial circulatory responses are normal for mild exertion, an inapparent circulatory crisis develops, which is thought to be a result of the abolishment of compensatory splanchnic vascoconstriction. The impending threat of functional hypovolemia is, temporarily at least, obscured by cardiac compensation; the extent of cardiovascular commitments may, therefore, have been underestimated. This also indicates that cardiovascular adjustments during the stress of heat may prove to be an essential feature of heatstroke pathophysiology. C.R.

A82-21688 The prevalence of visual deficiencies among 1979 general aviation accident airmen. J. R. Dille and C. F. Booze, Jr. (FAA, Civil Aeromedical Institute, Oklahoma City, OK). *Aviation, Space, and Environmental Medicine,* vol. 53, Feb. 1982, p. 179-182. 5 refs.

The reported study of 1979 accidents shows that the relatively small number of pilots with aphakia and artificial lens implants, as well as the total eye pathology population, had significantly higher accident rates, but the monocular pilots did not. There are questions about the functional importance of 20/30 and 20/40 best corrected visual acuity in one case, and entry of 'no fusion' in another, and the dynamic, peripheral, depth and accommodative performance of several with appreciable pathology who have a corrected central acuity of 20/20. It is recommended to continue investigations of the considered type. The obtained findings should be taken into account in the design of research on contemporary problems in aviation medicine. Meanwhile, continuing emphasis must be placed on the accurate measurement of visual functions required for medical certification in communications with FAA aviation medical examiners. G.R.

A82-21701 † The economy of muscular work during unfused tetanus (Ekonomichnost' raboty myshts v rezhime zubchatogo tetanusa). V. S. Gurfinkel' and Iu. S. Levik (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, Mar.-Apr. 1981, p. 371-373. In Russian.

The economy of skeletal muscle work, defined as the relation between tension produced and energy utilized in a given time, during the three stages of unfused tetanus in humans is investigated. Measurements of intramuscular temperature were made under local blood arrest during sustained isometric tetanus of the flexor digitorum superficialis stimulated at a frequency of 9.5 pulses/sec, and compared with measurements of the tension of the second phalange of the fourth finger. The rate of temperature rise is found to be greatest in tetanus phase II, which is characterized by the largest tension oscillations and extends from the 5th to the 30th second of contraction. The economy of muscle contraction is accordingly 1.3 to 1.7 times lower at this stage than at the beginning of tetanus. In phase III, where increased mechanical efficiency is obtained, the muscle economy is also found to rise progressively, reaching a final level 3.5 times greater than initial by the 40-50th second of contraction. A.L.W.

A82-21702 † A mathematical model of cell populations with stem cells (Matematicheskaia model' kletochnoi populiatsii so stvolovymi kletkami). A. M. Zhabotinskii (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR). *Biofizika,* vol. 26, Mar.-Apr. 1981, p. 329-332. 7 refs. In Russian.

The principal properties of stationary tissue populations are explained within the framework of a hypothesis stating that the binding of chalone, a tissue inhibitor, by a stem cell results in asymmetric cell division with the formation of a daughter stem cell and a partially differentiated cell. A chalone-free stem cell divides symmetrically yielding two daughter stem cells. V.L.

A82-21703 † Functional model of the conversion of stationary signals in the auditory analyzer (Funktsional'naia model' preobrazovaniia statsionarnykh signalov v slukhovom analizatore). E. G. Karnitskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biofizika,* vol. 26, May-June 1981, p. 517-521. 14 refs. In Russian.

A model for spectral processing in the auditory analyzer is developed which consists of three layers: (1) a layer of filters whose characteristics imitate the masking curves; (2) a layer of nonlinear converters whose nonlinearity parameters are chosen in such a way that the calculated results correspond to the basic characteristics of the perception of stationary-signal loudness; and (3) a layer of lateral inhibition. This model can distinguish the formant structure of sound in a synthetic speechlike signal; at low frequencies up to 1000 Hz the first harmonics are distinguished in addition to the formants. B.J.

A82-21704 † Differentiation of muscles on the basis of trace-element composition (Razlichiia myshts po mikroelementnomu sostavu). M. M. Ogievetskaia (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR), O. D. Maslov (Ob'edinennyi Institut Iadernykh Issledovanii, Dubna, USSR), and N. S. Shelud'ko (Akademiia Nauk SSSR, Institut Biologii Moria, Vladivostok, USSR). *Biofizika,* vol. 26, May-June 1981, p. 512-516. 7 refs. In Russian.

X-ray fluorescence analysis was used to perform a comparative evaluation of the compositions of trace elements in phasic and tonic muscles of the scallop Patinopecten Yessoensis. It is shown that the phasic muscles are richer in Fe and Cu, while the tonic muscles are richer in Zn, Br, and Sr; there is no difference in Rb content. The results make it possible to classify Fe, Cu, Zn, Br, and Sr according to their properties connected with various homeostatic requirements of the muscles with respect to the trace elements. B.J.

A82-21705 † Rhodopsin aggregation under the damaging effects of light on the photoreceptor membranes (Agregatsiia molekul rodopsina pri povrezhdaiushchem deistvii sveta na fotoretseptornye membrany). I. D. Pogozheva, V. A. Kuznetsov, I. B. Fedorovich, V. A. Livshits, M. A. Ostrovskii, and N. M. Manoshkina (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 692-700. 20 refs. In Russian.

Rhodopsin aggregation and structural changes in the photoreceptor membranes under the damaging effects of visible light are investigated. The rotational mobility of spin-labeled rhodopsin in the photoreceptor membrane was studied by means of saturation-transfer ESR spectroscopy, and concentrations of various rhodopsin oligomers, rhodopsin SH-group oxidation levels and the degree of lipid membrane peroxidation were determined in suspensions of frog outer segment rods irradiated at 100,000 lux. Photooxidation of the photoreceptor membrane is found to lead to a reduction in rhodopsin mobility within the membrane which is attributed to the irreversible molecular aggregation as a result of the formation of disulphide bonds between hydrophobic SH groups on the rhodopsin molecule. A decrease in lipid microviscosity and degree of order is observed upon membrane photodestruction, in contrast to the significant increase in microviscosity observed upon oxidation in the presence of Fe ions. Lipid oxidation is also shown to accelerate protein aggregation, which in turn influences the lipid bilayer. A.L.W.

A82-21706 † The relationship between carbohydrate and lipid metabolisms in muscle cell energetics under the influence of ATPase loading - Mathematical model (Sootnoshenie uglevodnogo i lipidnogo obmenov v energetike myshechnykh kletok pri deistvii ATFaznoi nagruzki - Matematicheskaia model). V. V. Dynnik (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 712-718. 17 refs. In Russian.

A82-21707 † The dynamics of muscular relaxation following unfused tetanuses of different durations (Dinamika myshechnogo rasslableniia posle zubchatykh tetanusov razlichnoi dlitel'nosti). V. S. Gurfinkel' and Iu. S. Levik (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 709-711. 10 refs. In Russian.

A82-21708 † Effect of calcium on the temporal characteristics of muscle contraction (Vliianie kal'tsiia na vremennye kharakteristiki myshechnogo sokrashcheniia). A. E. Bukatina, M. F. Chaplii, and L. L. Alievskaia (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Biofizika,* vol. 26, July-Aug. 1981, p. 749-751. 15 refs. In Russian.

It is shown that the time constant of the delayed tension of m. psoas fibers in rabbits increases with calcium concentration in the medium. This dependence becomes less pronounced in the presence of inorganic phosphate. Results of the study suggest a possible link between bridges via a reaction product. V.L.

A82-21709 † The possibility of using mathematical methods for predicting the results of the surgical treatment of patients with vasorenal hypertension (O vozmozhnosti ispol'zovaniia matematicheskikh metodov dlia prognozirovaniia rezul'tatov khirurgicheskogo lecheniia bol'nykh vazorenal'noi gipertoniei). G. S. Krotovskii, M. M. Ellanskii, A. N. Shcherbiuk, S. A. Turpitko, and S. V. Suris (I

Moskovskii Meditsinskii Institut, Moscow, USSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 32-35. In Russian.

A82-21710 † Investigation and evaluation of cardiac arrhythmias in healthy young persons (Issledovanie i otsenka narushenii ritma serdtsa u molodykh zdorovykh liudei). A. G. Dembo and E. V. Zemtsovskii (Leningradskii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Kardiologiia,* vol. 21, Oct. 1981, p. 51-55. 23 refs. In Russian.

The incidence of cardiac arrhythmias in athletes was investigated by performing EKG examinations (continuous recording of 100 cardiac cycles) on 1293 young athletes and 482 young nonathletes. The athletes were found to have disorders of the heart rhythm in a statistically significant higher proportion of cases. Depressed activity of the sinus pacemaker was especially common, indicating arrhythmias of the depressed sinus node and extrasystoles. These disorders are due to pathological changes related to the foci of chronic infections, myocardial dystrophy due to chronic physical overexertion, and marked myocardial hypertrophy. B.J.

A82-21711 † Changes in the main characteristics of the central hemodynamics of healthy individuals and hypertension patients during physical exercise (Izmenenie osnovnykh pokazatelei tsentral'noi gemodinamiki u zdorovykh i bol'nykh gipertonicheskoi bolezn'iu pri fizicheskoi nagruzke). A. I. Minovich and T. G. Vatsadze (Akademiia Nauk Gruzinskoi SSR, Institut Klinicheskoi i Eksperimental'noi Kardiologii, Tiflis, Georgian SSR). *Kardiologiia,* vol. 21, Mar. 1981, p. 44-47. 17 refs. In Russian.

A82-21712 † The role of natriuresis in the prophylactic effect of adaptation to hypoxia in the case of hereditary hypertension (Rol' natriiureza v profilakticheskom effekte adaptatsii k gipoksii pri nasledstvennoi gipertonii). F. Z. Meerson, N. A. Barbarash, G. Ia. Dvurechenskaia, and N. S. Prokina (Akademiia Meditsinskikh Nauk SSSR, Moscow; Kemerovskii Meditsinskii Institut, Kemerovo, USSR). *Kardiologiia,* vol. 21, July 1981, p. 25-32. 27 refs. In Russian.

Experiments on male Wistar rats and rats with spontaneous hereditary hypertension (SHH) showed that the development of SHH was accompanied by a significant decrease in the renal excretion of water and sodium. Acute hypoxia in Wistar rats resulted in a significant decrease in diuresis, glomerular filtration, and K and (insignificantly) Na excretion, while in SHH rats acute hypoxia increased diuresis significantly and enhanced Na and K excretion. Adaptation to hypoxia during six hours per day resulted in an increase of diuresis, glomerular filtration, Na excretion, and the Na/K coefficient of urine in both Wistar and SHH rats. During the first month of adaptation changes were more pronounced in SHH rats than in Wistar rats; as a consequence, the hypertension did not develop in SHH rats. It is concluded that the natriuretic effect is probably the main mechanism of the prophylactic effect of adaptation to hypoxia on the development of hereditary hypertension. B.J.

A82-21713 † The effect of motor activity on the development of cardiac arrhythmias in experimental emotional stress (Vliianie dvigatel'noi aktivnosti na vozniknovenie serdechnykh aritmii pri eksperimental'nom emotsional'nom stresse). L. S. Ul'ianinskii, T. G. Urmancheeva, E. P. Stepanian, A. A. Fufacheva, A. V. Gritsak, B. A. Kuznetsova, and A. A. Kvitka (Akademiia Meditsinskikh Nauk SSSR; Moskovskii Inzhenerno-Fizicheskii Institut, Moscow, USSR; Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Kardiologiia,* vol. 21, Oct. 1981, p. 64-67. 18 refs. In Russian.

Investigations on monkeys and rabbits have shown that emotional stress can produce various disorders of the heart rhythm: sinus tachycardia, atrial fibrillation, ventricular extrasystoles, and paroxysmal ventricular tachysystoles. Under these conditions the adrenaline content in the blood and myocardium increases three-to-four times, while the noradrenaline level increases in the blood and decreases in the myocardium. Marked motor activity leads to an increase of the adrenaline and noradrenaline level in the myocardium and to the development of disorders of cardiac rhythm including ventricular fibrillation. B.J.

A82-21714 † Peculiarities of the middle ear structure in rodents as an index of the frequency tuning of their auditory system (Osobennosti stroeniia srednego ukha gryzunov kak pokazatel' chastotnoi nastroiki slukhovoi sistemy). V. N. Movchan and I. N. Orlova. *Leningradskii Universitet, Vestnik, Biologiia,* Aug. 1981, p. 85-90. 17 refs. In Russian.

A82-21715 † Adaptation to high-altitude hypoxia at different ambient temperatures /before and during adaptation/ (Adaptatsiia k gornoi gipoksii v usloviiakh raznykh /predvariaiushchei i soprovozhdaiushchei/ temperatur vneshnei sredy). I. B. Khodzhamberdiev, N. M. Iartsev, A. A. Altymyshev, and A. A. Aidaraliev (Akademiia Nauk Kirgizskoi SSR, Institut Organicheskoi Khimii, Frunze, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* Mar.-Apr. 1981, p. 55, 56. 6 refs. In Russian.

Rats and male rabbits were tested for adaptation to high-altitude hypoxia at ambient temperature ranges of 9-13 C and 22-27 C. It is found that distrophic processes in the myocardium, kidneys, and skeletal muscles are exacerbated during adaptation in the lower-temperature range. B.J.

A82-21716 † Functional characteristics of receptors connected with sustaining the flight of the roach Periplaneta Americana L (Funktsional'nye osobennosti retseptorov, sviazannykh s podderzhaniem poleta tarakana Periplaneta Americana L). S. V. Iagodin and V. L. Sviderskii (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 250, no. 5, 1980, p. 1277-1280. 14 refs. In Russian.

A82-21717 † Evaluation of safety of decompression from the critical volume of gas bubbles formed in the organism (Printsip otsenki bezopasnosti dekompressii po kriticheskomu ob'emu gazovykh puzyr'kov, obrazovavshikhsia v organizme). V. P. Nikolaev (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 255, no. 1, 1980, p. 246-249. 12 refs. In Russian.

A decompression safety criterion is proposed whereby decompression is considered safe if no tissue of the human organism contains more than the critical amount of gas bubbles which varies with tissue types. The proposed criterion is shown to be valid for both multiple-step and single-step decompression. V.L.

A82-21718 † The dynamics of protein and nucleic acid content in rat raphe nucleus cells after total deprivation of sleep /in a rotating cylinder/ and selective deprivation of its paradoxical phase (Dinamika soderzhaniia belkov i nukleinovykh kislot v kletkakh iader shva krysy pri polnom lishenii sna /v tretbane/ i selektivnom lishenii ego paradoksal'noi fazy). U. M. Malikov and A. N. Panov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 257, no. 2, 1981, p. 501-503. 15 refs. In Russian.

A82-21719 † Oxygen transport in dogs native to high altitudes during exercise (Transport kisloroda u sobak-aborigenov vysokogor'ia pri fizicheskikh nagruzkakh). M. V. Balykin (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Kirgiz SSR). *Akademiia Nauk Kirgizskoi SSR, Izvestiia,* Mar.-Apr. 1981, p. 66-72. 24 refs. In Russian.

Parameters characterizing oxygen transport during exercise of stepwise increasing intensity are investigated in dogs native to high altitudes. Measurements of blood pH, oxygen and carbon dioxide tensions, acid-base balance, temperature and hemoglobin concentration in arterial and venous blood were made in dogs native to altitudes of 760 m and 2700 m at rest and during 10-min recovery periods between treadmill exercise at speeds of 5, 10, 15 and 20 km/h. At rest, the high-altitude dogs exhibit a shift in acid base-balance towards the side of respiratory alkalosis with respect to the controls, as well as high arterial blood oxygenation and oxygen utilization in the presence of reduced oxygen transport. Moderate exercise under low-altitude conditions is observed not to decrease arterial blood oxygenation, while intense muscular work may lead to arterial hypoxemia. Exercise in mountain natives, however, induces a slight reduction in arterial oxygenation and a marked venous hypoxemia. Results demonstrate the efficiency of the respiratory and circulatory systems of high-altitude natives during exercise. A.L.W.

A82-21720 † **Disturbances in biological rhythms as a result of a conflict of incompatible stimuli (Narusheniia biologicheskikh ritmov kak rezul'tat konflikta nesovmestimykh pobuzhdenii).** V. A. Zotov and V. A. Nepomniashchikh (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, July-Aug. 1981, p. 622-627. 5 refs. In Russian.

The organization of the groups of oscillators believed to control the rhythmic activities of an organism is investigated in studies of the consequences of the superposition of incompatible stimuli. The characteristics of foreleg cleaning behavior in the mite Varroa jacobsoni and of the circadian motility cycle in the beetle Trigonoscelis gigas were observed under stressful conditions: isolation from the host in the first case and constant temperature and illumination in the second. The experiments have shown the behavioral acts consisting of the cleaning of the right and left limbs in mites and burrowing into the soil and emerging from it in beetles to be under the control of separate oscillators, as they are characterized by different periodicities. As the phases of the rhythms controlled by these oscillators begin to overlap, conflict behavior is observed, and arrhythmias and other disturbances of the rhythm appear. A.L.W.

A82-21721 † **Characteristics and patterns of the individual development of male and female rats in the light of the energy rule of skeletal muscles (Osobennosti i zakonomernosti individual'nogo razvitiia samtsov i samok krys v svete energeticheskogo pravila skeletnykh myshts).** I. A. Arshavskii, V. D. Rozanova, and T. G. Savkiv (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Sept.-Oct. 1981, p. 698-707. 21 refs. In Russian.

A82-21722 † **Introduction prognosis and its methodological aspects (Introduktsionnyi prognoz i ego metodicheskie aspekty).** S. E. Korovin and A. S. Demidov (Akademiia Nauk SSSR, Glavnyi Botanicheskii Sad, Moscow, USSR). *Zhurnal Obshchei Biologii,* vol. 42, Sept.-Oct. 1981, p. 673-679. 17 refs. In Russian.

The present status, together with the prospects for development of introduction prognosis is considered. Factual material is presented showing the possibility of predicting the reactions of subtropical plants to the conditions under which they are introduced. The predictions are based on a method of ecological and geographical comparisons. C.R.

A82-21723 † **Absence of the additive effect in the combined irradiation of Crepis capillaris seeds and seedlings by gamma rays and neutrons (Otsutstvie additivnogo effekta pri kombinirovannom obluchenii semian i prorostkov Crepis capillaris gamma-luchami i neitronami).** E. V. Fesenko and N. V. Luchnik (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 630-632. 11 refs. In Russian.

A82-21724 † **Some indicators of protein metabolism in erythrocytes during radiation sickness and following cystamine injection (Nekotorye pokazateli belkovogo obmena v eritrotsitakh pri luchevoi bolezni i vvedenii tsistamina).** I. A. Serebrennikova and N. I. Kolesova (Tomskii Meditsinskii Institut, Tomsk, USSR). *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 577-581. 17 refs. In Russian.

The effects of high-energy betatron irradiation and the preliminary injection of cystamine on erythrocyte protein metabolism are investigated. Determinations of total, amine, urea and residual nitrogen, free amino acid, and proteolytic enzyme activities were made in rabbits before and up to 30 days after exposure to 10 gram-roentgens of 25-MeV betatron radiation. Ionizing radiation is found to lead to the activation of erythrocyte proteolytic enzymes, resulting in the breakdown of endogenous proteins and an increase in the nitrogenous products of protein metabolism. The preliminary intravenous injection of cystamine reduces the deleterious effects of radiation on protein metabolism, and increases the survival rate after 30 days from 67 to 82%. A.L.W.

A82-21725 † **Characteristics of the relations of the primary responses of the pentose phosphate pathway to glycolysis in the bone marrow of irradiated rats (Osobennosti vzaimosviazi vazhneishikh reaktsii pentozofosfatnogo puti s glikolizom v kostnom mozge obluchennykh krys).** I. V. Savitskii and V. K. Napkhaniuk (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR). *Radiobiologiia,* vol. 21, July-Aug. 1981, p. 598-602. 12 refs. In Russian.

A82-21726 † **Changes in morphological and cytogenetic hematopoietic indicators in hamadryas baboons exposed to chronic low-level radiation (Izmeneniia morfologicheskikh i tsitogeneticheskikh pokazatelei krovetvornoi sistemy u pavianov gamadrilov pri khronicheskom obluchenii v malykh dozakh).** E. K. Dzhikidze, M. I. Kuskova, and L. P. Kosichenko (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Radiobiologiia,* vol. 21, Sept.-Oct. 1981, p. 705-711. 9 refs. In Russian.

A82-21727 † **Auditory depth perception - Localization of nonmoving and moving sound sources (Prostranstvennyi slukh - Lokalizatsiia nepodvizhnykh i dvizhushchikhsia istochnikov zvuka).** Ia. A. Al'tman (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 28-51. 76 refs. In Russian.

The literature on the localization of nonmoving and moving sound sources is surveyed in an effort to study the basic characteristics of the depth perception of moving sources. It is shown that there is a critical time interval for the formation of the perception of moving sources. The differential sensitivity of the auditory system for the perception of moving sources is higher than for the localization of nonmoving sources. The neurophysiological aspects of the spatial localization of moving sound sources are examined with particular attention given to the role of central auditory neurons. B.J.

A82-21728 † **Pulmonary shunting and its regulation (Legochnyi shunt i ego reguliatsiia).** L. G. Dukov (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 112-128. 104 refs. In Russian.

On the basis of studies of ventilation-perfusion relationships, recent data on the mechanisms governing the development and regulation of pulmonary shunting are presented. The ability of existing techniques to measure and separate the shunting is discussed in detail. It is found that in healthy subjects shunting derives from two causes. The first is an anatomic shunting, that is, the discharge of venous blood through bronchial veins into the pulmonary veins and along the thebesian channels into the left heart. The second is a ventilation-perfusion irregularity, that is, the perfusion of hypoventilated alveoli. Attention is also given to the mechanisms controlling pulmonary shunting, namely collateral ventilation, pulmonary hypoxic vasoconstriction, and bronchoconstriction from hypocapnia. C.R.

A82-21729 † **A systems analysis of human motor reactions in various modes of operation of goal-directed behavioral acts (Sistemnyi analiz dvigatel'nykh reaktsii cheloveka v raznykh rezhimakh raboty tselenapravlennogo povedencheskogo akta).** O. Ia. Bokser (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and K. V. Sudakov (Ivanovskii Meditsinskii Institut, Ivanovo, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Jan.-Mar. 1981, p. 3-31. 125 refs. In Russian.

The way in which goal-directed activity in humans is ensured somatically and autonomically on the basis of a temporal organization of start and stop signals is investigated. Laws are established for the programming of the results of the working of the space-time continuum of stage results and effector components directed toward the attainment of a finite adaptive effect that is characteristic of each type of behavioral act investigated. C.R.

A82-21730 † **The dynamics of forming a prediction system in goal-directed behavior (Dinamika formirovaniia apparata prognozirovaniia v tselenapravlennom povedenii).** G. N. Rychkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Oct.-Dec. 1981, p. 99-111. 37 refs. In Russian.

A hypothesis describing a dynamic principle at work in the formation of a system for prediction is elaborated. The stage of generalization involves the setting up of an inexact and redundant reinforcement model in the acceptor for evaluating the results of actions; here, ineffective methods of attaining goals prevail. In the stage of concentration, a precise reinforcement model is set up, and

there are effective means of attaining goals. The system for prediction evolves by means of a mechanism of orienting and exploratory reactions; these arise from discrepancies between the predicted and the actual. The evolution also depends on a system of positive and negative emotions that operates simultaneously. C.R.

A82-21731 † **Study of the electrical activity of the extraocular muscles (Issledovanie elektricheskoi aktivnosti vneshnikh glaznykh myshts).** R. B. Nebieridze (Akademiia Nauk Gruzinskoi SSR, Institut Kibernetiki, Tiflis, Georgian SSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 12, Jan.-Mar. 1981, p. 119-132. 84 refs. In Russian.

The characteristics of the electrical activity associated with the extraocular muscles in tonus and during tracking and saccadic eye movements are discussed on the basis of experimental and literature data. Electromyographic studies of the motor units of the ocular muscles are considered, and morphological and physiological evidence for the existence of two types of motor units, tonic and phasic, in the extraocular muscles is reviewed. On the basis of this evidence, it is proposed that rather than there being units functioning either to maintain tonus or induce movements, there exists one type of motor unit functioning at rest and during the fast and slow phases of nystagmus, and a second type functioning only during the fast phase of nystagmus, primarily during large-amplitude saccades. The characteristics of motorneuron control of tracking and saccadic eye movements are also discussed. A.L.W.

A82-21732 † **The effect of cold stress on the level and activity of microsomal cytochrome P-450 in the rat liver (Vliianie kholodovogo stressa na soderzhanie i aktivnost' mikrosomal'nogo tsitokhroma P-450 pecheni krys).** L. I. Deev, M. Ia. Akhalaia, and Iu. B. Kudriashov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Aug. 1981, p. 28-30. 15 refs. In Russian.

A82-21733 † **The correlation between hematologic and biochemical indicators in the turtles Testudo horsfieldi (Korreliatsionnye sviazi mezhdu gematologicheskimi i biokhimicheskimi pokazateliami u cherepakh Testudo horsfieldi).** L. A. Tiunov, V. A. Ivanova, A. I. Kliorin, A. A. Turdyev, and V. P. Timofeev. *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, July 1981, p. 47-49. 12 refs. In Russian.

Experiments are described showing that the blood, even though having a low level of erythrocytes, has a high content of hemoglobin. This is interpreted to mean that the low number of erythrocytes is balanced by a high degree of hemoglobin saturation. The concentration of leukocytes in the blood is found to be relatively high. C.R.

A82-21734 † **Activation of succinate dehydrogenation in rat liver by noradrenalin, cAMP and acute cooling (Aktivatsiia degidrirovaniia suktsinata v pecheni krys pod vliianiem noradrenalina, tsAMF i ostrogo okhlazhdeniia).** V. I. Kulinskii, A. K. Kuntsevich, and L. V. Trufanova (Krasnoiarskii Meditsinskii Institut, Krasnoyarsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Aug. 1981, p. 33, 34. 15 refs. In Russian.

A82-21735 † **The effect of low temperature on the activity and substrate specificity of monoamine oxidases in rat brain mitochondria (Vliianie nizkoi temperatury na aktivnost' i substratnuiu speksifichnost' monoaminoksidaz v mitokhondrial'noi fraktsii mozga krys).** I. A. Goroshinskaia, A. A. Krichevskaia, and Z. G. Bronovitskaia (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Apr. 1981, p. 431-433. 14 refs. In Russian.

A82-21736 † **Peroxidation of lipids in the liver and lungs of rats during prolonged adaptation to the cold (Reaktsii perikisnogo okisleniia lipidov v pecheni i legkikh krys pri dolgovremennoi adaptatsii k kholodu).** N. G. Kolosova, Iu. P. Shorin, and V. Iu. Kulikov (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Apr. 1981, p. 436, 437. 10 refs. In Russian.

A82-21737 † **Effect of low-temperature on the membrane permeability of erythrocytes reconstituted in media of different ionic composition (Vliianie nizkotemperaturnogo vozdeistviia na pronitsaemost' membran eritrotsitiv, rekonstruirovannykh v sredakh razlichnogo ionnogo sostava).** A. K. Gulevskii (Akademiia Nauk Ukrainskoi SSR, Institut Problem Kriobiologii i Kriomeditsiny, Kharkov, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, May 1981, p. 551-553. 9 refs. In Russian.

A82-21738 † **The effect of blood pressure in the pulmonary artery on gas exchange in functionally heterogeneous lungs (Vliianie davleniia krovi v legochnoi arterii na gazoobmen v funktsional'no neodnorodnykh legkikh).** A. I. D'iachenko (Moskovskii Fiziko-Tekhnicheskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, May 1981, p. 564-566. 6 refs. In Russian.

The blood pressure in the common pulmonary artery in humans is determined on the basis of measurements of the alveolar-arterial difference in oxygen pressures and the arterial-alveolar difference in carbon dioxide pressures. The study is carried out for a variety of gas compositions of mixed venous blood and at different levels of lung ventilation. A mathematical model for the operation of heterogeneous lungs is used. The model consists of three parts, describing blood flow, ventilation, and gas exchange in individual lobules; it also includes equations of the gas composition average of arterial blood and alveolar air. C.R.

A82-21739 † **Change in the nature of the psychotropic effect on the emotional reactivity and behavior in stress situations depending on the state of the catecholaminergic systems of the brain (Izmenenie kharaktera psikhotropnogo effekta na emotsional'nuiu reaktivnost' i povedenie v stress-situatsii v zavisimosti ot sostoianiia katekholaminergicheskikh sistem mozga).** N. A. Bondarenko, A. V. Validman, and V. A. Kamysheva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, July 1981, p. 35-38. 15 refs. In Russian.

A82-21740 † **Effect of cooling of the rhythmo-inotropic ratio in a pathologically altered myocardium (Vliianie okhlazhdeniia na ritmo-inotropnye otnosheniia v patologicheski izmenennom miorarde).** E. G. Vornovitskii, V. B. Ignat'eva, A. N. Kaidash, A. D. Arapov, and E. B. Mogilevskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, July 1981, p. 10-14. 12 refs. In Russian.

A82-21741 † **The effect of synaptically active drugs on the hyperthermic effect of prostaglandin E2 in rats (Vliianie sinapticheski aktivnykh veshchestv na gipertermicheskii effekt prostaglandina E2 u krys).** V. N. Gurin, F. E. Vismont, and V. V. Tsariuk (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Mar. 1981, p. 304, 305. 14 refs. In Russian.

A82-21742 † **An investigation of the biological activity of chalones separated from normal livers and from livers that are being regenerated (Izuchenie biologicheskoi aktivnosti keilonov, vydelennykh iz normal'noi i regeneriruiushchei pecheni).** S. A. Ketlinskii and E. V. Parfenova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, July 1981, p. 96-98. 6 refs. In Russian.

A82-21743 † **The circadian rhythm of activity of adrenergic nerve fibers in the dura mater of rats (Sutochnyi ritm aktivnosti adrenergicheskikh nervnykh volokon tverdoi mozgovoi obolochki krys).** V. S. Karedina (Vladivostokskii Meditsinskii Institut, Vladivostok, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Oct. 1981, p. 485, 486. 5 refs. In Russian.

A82-21744 † **A histochemical investigation of the microvascular effectors regulating the supply of blood to the cerebral cortex (Gistokhimicheskie issledovaniia mikrovaskuliarnykh effektorov regulirovaniia krovosnabzheniia kory golovnogo mozga).** D. G. Baramidze, R. Gadamskii, and G. Szumanska (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR; Polish Academy of Sciences, Experimental and Clinical Medicine Centre, Warsaw, Poland). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 91, Feb. 1981, p. 228-231. 9 refs. In Russian.

A82-21745 † **A three-dimensional model for the arrangement of the vascular and tubular components of the renal osmoregulatory apparatus (Ob'emnaia model' zakladki sosudistogo i kanal'tsevogo komponentov osmoreguliruiushchego apparata pochki).** V. I. Proniaev (Chernovitskii Meditsinskii Institut, Chernovtsy, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 92, Aug. 1981, p. 114-116. 13 refs. In Russian.

A82-21746 † **Activation of the metabolism of the gamma-aminobutyric acid system in the cerebral hemispheres under various types of stress (Aktivatsiia metabolizma GAMK-sistemy v polushariiakh golovnogo mozga pri deistvii razlichnykh stressornykh faktorov).** F. Z. Meerson, V. I. Pavlova, V. S. Iakushev, and S. P. Sinitsyn (Akademiia Meditsinskikh Nauk SSSR, Moscow; Cheliabinskii Pedagogicheskii Institut; Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 91, Jan. 1981, p. 23, 24. 10 refs. In Russian.

The activation of the gamma-aminobutyric acid system's metabolism is thought to occur through a nonspecific mechanism which responds to a variety of extreme irritants. By limiting the stress syndrome, the mechanism prevents harmful effects. To test this hypothesis, the main parameters of the gamma-aminobutyric acid system are compared in four groups of animals. It is found that activation can be brought about by an extremely wide range of irritants. C.R.

A82-21747 † **Noise and vibration effects on vestibular and visual functions in teenagers (Shumovibratsionnye vozdeistviia na vestibuliarno-zritel'nye funktsii u podrostkov).** Ts. Popivanova (Meditsinska Akademiia, Sofia, Bulgaria). *Gigiena i Sanitariia*, Sept. 1981, p. 58, 59. In Russian.

The purpose is to assess the effects of noise and vibration on the activity of the vestibular and visual analyzers of teenagers receiving training in the textile and machine-building industries. Special attention is given to the vestibular effect on the visual system when the vestibular analyzer is in a noninertial state. It is found that these teenagers are more susceptible, in terms of both frequency and severity, to impaired spatial perception. These disorders are found to be independent of the amount of attention paid to the task at hand. C.R.

A82-21748 † **Complex physiological-hygienic characteristics of a new work-rest regime for seamen (K kompleksnoi fiziologo-gigienicheskoi kharakteristike novogo rezhima truda i otdykha plavsostava).** Iu. M. Sten'ko, D. S. Slutsker, L. M. Shafran, and V. N. Evstaf'ev (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). *Gigiena i Sanitariia*, Jan. 1981, p. 27-29. In Russian.

A82-21749 † **Physiological-hygienic substantiation of admissible noise level in school rooms in a hot climate (Fiziologo-gigienicheskoe obosnovanie dopustimogo urovnia shuma v uchebnykh pomeshcheniiakh shkol i vuzov v usloviiakh zharkogo klimata).** M. P. Magai (Uzbeksii Nauchno-Issledovatel'skii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent, Uzbek SSR) and I. L. Karagodina (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR). *Gigiena i Sanitariia*, Mar. 1981, p. 26-28. 12 refs. In Russian.

A82-21750 † **Summary of a discussion on the problem of the 'biological norm' /in relation to an assessment of criteria of the harmfulness of chemical effects/ (Itogi diskussii po probleme 'biologicheskaia norma' /k otsenke kriteriev vrednosti khimicheskikh vozdeistvii/).** I. M. Trakhtenberg and M. N. Korshun (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Gigiena i Sanitariia*, May 1981, p. 49-52. 21 refs. In Russian.

The concept of the biological norm is discussed in relation to criteria of harmfulness in hygiene and toxicology. Ways of determining this norm are considered, and particular attention is given to the development of quantitative and qualitative criteria of the harmfulness of chemical (and other pollution-related) effects on the organism. B.J.

A82-21751 † **The effects of successive ionizing radiation and heat on antibody formation (Posledovatel'noe deistvie ioniziruiushchei radiatsii i tepla na protsess antiteloobrazovaniia).** I. A. Gamzaeva, N. S. Gabai, R. F. Iagubov, and D. Kh. Aivazova (Ministerstvo Zdravookhraneniia Azerbaidzhanskoi SSR, Respublikanskii Nauchno-Issledovatel'skii Institut Virusologii, Mikrobiologii i Gigieny, Baku, Azerbaidzhan SSR). *Gigiena i Sanitariia*, Jan. 1981, p. 35, 36. 8 refs. In Russian.

The responses of antibody formation processes to prolonged successive exposures to low doses of ionizing radiation and hyperthermia are investigated. Rats were exposed to a constant Co-60 gamma-ray source at dose rates of 0.0000305 to 0.0000292 A/kg for 7 hours daily, temperatures of 40 C for 4 hours daily or radiation followed by heat for the course of 1 month, following which the numbers of antibody forming cells in the spleen were determined by the method of Ierne and Nordin (1963). Prolonged exposure to radiation is found to lead to an 18.3% reduction in the number of antibody-forming cells, while hyperthermia has little influence on antibody production in unirradiated animals. Successive exposure to both radiation and heat is observed to result in an even more pronounced suppression of antibody-forming cell production in the spleen. A.L.W.

A82-21752 † **The effects of elevated environmental temperature combined with radiation on the organism (Deistvie povyshennoi temperatury okruzhaiushchei sredy v sochetanii s radiatsionnym faktorom na organizm).** M. M. Tsapkov. *Gigiena i Sanitariia*, Jan. 1981, p. 50-53. 24 refs. In Russian.

Literature data concerning the combined effects of ionizing radiation and elevated temperatures on the physiological functions of laboratory animals is reviewed. The data demonstrate effects of combined exposures on the cardiovascular system, impairments in the enzymatic activity of various tissues and the inactivation of chromosomal repair processes following radiation damage. The degree of radiation damage depends both on the radiation dose and the duration of the temperature factor, although elevated temperatures accelerate the elimination of radioactive substance from the body. A need for further experimental data for the evaluation of human working conditions and radiation safety is expressed. A.L.W.

A82-21753 † **Echoencephalographic indices in patients with hypertensive disease under the effect of functional loads (Ekhoentsefalograficheskie pokazateli u bol'nykh gipertonicheskoi bolezn'iu pod vliianiem funktsional'nykh nagruzok).** Iu. S. Gaiduk (Ukrainskii Nauchno-Issledovatel'skii Institut Kardiologii, Kiev, Ukrainian SSR). *Vrachebnoe Delo*, June 1981, p. 56-58. 8 refs. In Russian.

A82-21754 † **Phasic energy analysis of rheoencephalograms in the detection of the decompensation of cerebral hemodynamics (Fazovo-energeticheskii analiz reoentsefalogramm pri raspoznavanii dekompensatsii tserebral'noi gemodinamiki).** O. N. Keller (Zaporozhskaia Oblastnaia Klinicheskaia Bol'nitsa, Zaporozhe, Ukrainian SSR) and I. Ia. Eingorn (Proizvodstvennoe Ob'edinenie Zaporozhtransformator, Zaporozhe, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1981, p. 99-102. 5 refs. In Russian.

A82-21755 † **Clinical results on thymectomy in patients with myopathy in relation to the degree of muscular weakness (Klinicheskie rezul'taty timektomii u bol'nykh miopatiei v zavisimosti ot stepeni myshechnoi slabosti).** T. A. Valikova (Tomskii Meditsinskii Institut, Tomsk, USSR). *Vrachebnoe Delo*, May 1981, p. 89-92. 6 refs. In Russian.

A82-21756 † **Mechanisms of compensation and adaptation in relation to the hyperfunction of the heart (Mekhanizmy kompensatsii i adaptatsii pri giperfunktsii serdtsa).** V. N. Dziak and S. F. Valevskii (Dnepropetrovskii Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR). *Vrachebnoe Delo*, Mar. 1981, p. 88-92. 9 refs. In Russian.

Results of a study of 167 patients with ischemic heart disease are presented. It is found that, under conditions of urgent adaptation to physical stress, a process of latent decomposition occurs during the early preclinical stage of cardiac insufficiency. This stage is characterized by a reduction of the diastolic relaxation rate of the heart, a reduction of ejection fractions, stroke volume, and oxygen pulse, and an increase in terminal diastolic and systolic volume. B.J.

A82-21757 † **The effect of physical training on the lipid and lipoprotein metabolism in people of various ages (Vliianie fizicheskoi trenirovki na obmen lipidov i lipoproteidov u liudei raznogo vozrasta).** S. V. Gogush, P. P. Chailo, T. A. Kirienko, L. V. Riabokon' (Kievskii Nauchno-Issledovatel'skii Institut Meditsinskikh Problem Fizicheskoi Kul'tury, Kiev, Ukrainian SSR; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), and V. P. Perfilov. *Vrachebnoe Delo,* Sept. 1981, p. 51-53. 9 refs. In Russian.

A82-21758 † **Metabolic change in test animals as an indicator of the biological effect of an electromagnetic field having a frequency of 50 Hz (Izmenenie metabolizma v organizme podopytnykh zhivotnykh kak odin iz pokazatelei biologicheskogo deistviia EMP chastotoi 50 GTs).** L. A. Tomashevskaia and Iu. D. Dumanskii (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* July 1981, p. 98-100. In Russian.

A82-21759 † **Certain features of cerebral hemodynamics in doing mental work at different air temperatures (Nekotorye osobennosti tserebral'noi gemodinamiki pri vypolnenii umstvennoi raboty v usloviiakh razlichnykh temperatur vozdukha).** A. A. Lashchuk (Kievskii Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Vrachebnoe Delo,* Aug. 1981, p. 102-104. 8 refs. In Russian.

A82-21760 † **The physical activity of humans as a social and biological problem (Fenomen fizicheskoi aktivnosti cheloveka kak sotsial'no-biologicheskaia problema).** V. K. Bal'sevich. *Voprosy Filosofii,* no. 8, 1981, p. 78-89. 18 refs. In Russian.

A82-21761 † **Changes in the structure and cellular composition of the inguinal lymph nodes of white rats subjected to static and dynamic stresses (Izmenenie struktury i kletochnogo sostava pakhovykh limfaticheskikh uzlov belykh krys pod vliianiem dinamicheskoi i staticheskoi nagruzok).** T. I. Bikhruk (Leningradskii Institut Fizicheskoi Kul'tury, Leningrad; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, May 1981, p. 23-29. 7 refs. In Russian.

A82-21762 † **Decussations in the human muscular system (Perekresty v myshechnoi sisteme cheloveka).** P. M. Petrova and G. D. Keis (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, Apr. 1981, p. 32-38. 11 refs. In Russian.

A classification is presented which divides decussations of the human muscular system into three groups: (1) decussations of muscles situated in neighboring layers of the same topographic area; (2) decussations of muscle-synergists; and (3) decussations of fibers of one muscle as well as of tendons of one muscle. It is proposed that decussation in a particular muscle group always presupposes decussation in the antagonistic group. The conformity of decussations in antagonistic groups of muscles is morphological evidence of their functional unity. B.J.

A82-21763 † **Dynamics of the condition of granulation tissue after injuries sustained at different times of the day (Dinamika sostoianiia granuliatsionnoi tkani posle travmy, nanesennoi v raznoe vremia sutok).** Kh. M. A. Marrades and L. P. Sapozhnikova (I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Oct. 1981, p. 47-51. 27 refs. In Russian.

A82-21764 † **An electron microscope study of hyperplasia in fibers of the skeletal muscles of athletes (Elektronno-mikroskopicheskoe issledovanie proiavlenii giperplazii myshechnykh volokon skeletnykh myshts sportsmenov).** V. F. Kondalenko, Iu. P. Sergeev, and V. V. Ivanitskaia (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 80, June 1981, p. 66-70. 15 refs. In Russian.

A82-21765 † **The morphology of the lungs of dogs whose movement is completely restricted (Morfologiia legkikh sobak pri kruglosutochnom ogranichenii podvizhnosti).** M. K. Karimov (Tadzhikskii Gosudarstvennyi Meditsinskii Institut, Dyushambe, Tadzhik SSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Aug. 1981, p. 82-86. 9 refs. In Russian.

Various histological and morphometric methods were used to study vascular and tissue structures in the lungs of 49 dogs whose movement was completely restricted for 1, 3, 7, 15, 30, 60, and 90 days. In nearly every period of the experiment, edema was found in the bronchial wall, perivsal and peribronchial tissue, and interalveolar septa. As the time of hypokinesia increases, the connective tissue becomes coarse and the collagenous fiber fasciculi become thicker along the vascular bed. All the components are subject to morphological alterations due to hypokinesia, which in turn affects the gas-exchange function. B.J.

A82-21766 † **Age morphofunctional characteristics of chromaffin tissue in the celiac nodes, both in the norm and with hypokinesia (Vozrastnaia morfofunktsional'naia kharakteristika khromaffinnoi tkani chrevnykh uzlov v norme i pri gipokinezii).** S. A. Kakabadze (Severo-Osetinskii Meditsinskii Institut, Ordzhonikidze, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Aug. 1981, p. 57-64. 14 refs. In Russian.

A82-21767 † **Features of the reaction to noise of the spinal capillaries of white rats (Osobennosti reaktsii krovenosnykh kapilliarov spinnogo mozga beloi krysy pri vozdeistvii shuma).** G. A. Ivanenko (Khabarovskii Gosudarstvennyi Meditsinskii Institut, Khabarovsk, Ukrainian SSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, July 1981, p. 54-58. 5 refs. In Russian.

A82-21768 † **The source of reparative regeneration in skeletal muscle tissue (Ob istochnike reparatiunoi regeneratsii skeletnomyshechnoi tkani).** A. A. Klishov and V. N. Vinogradova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Aug. 1981, p. 72-77. 16 refs. In Russian.

Experiments were performed on 30 white rats to investigate the source of reparative regeneration in skeletal muscle tissue. Anterior tibial muscle was cut open and studied using light and electron microscopy. The source of regeneration was found to be type I satellite cells which are transformed into type II satellite cells and, further, into myoblasts. These myoblasts are able to divide mytotically and fuse with each other, forming myosymplasts. B.J.

A82-21769 † **Neuronal-glial alterations in the cerebral cortex of animals under the influence of white noise (Neirono-glial'nye izmeneniia v kore bol'shogo mozga zhivotnykh pri vozdeistvii belogo shuma).** N. I. Artiukhina, K. K. Hecht, I. P. Levshina, and O. F. Kubaeva (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR; Berlin, Humboldt-Universität, Berlin, East Germany). *Arkhiv Anatomii, Gistologii i Embriologii,* vol. 81, Sept. 1981, p. 27-33. 20 refs. In Russian.

A82-21770 † **Lysosomes under conditions of stress (Lizosomy v usloviiakh stressa).** N. N. Maianskaia and L. E. Panin (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Uspekhi Sovremennoi Biologii,* vol. 92, July-Aug. 1981, p. 64-80. 161 refs. In Russian.

Changes in the characteristics of lysosomes under conditions of stress are reviewed in relation to the role of lysosomes in stress adaptation. Experimental data demonstrating changes in lysosome enzyme activities, membrane permeability, numbers, sizes and cellular locations upon organism exposure to stress factors including cooling, physical exercise, hypoxia, ionizing radiation, hyperbaric oxygenation, nutritional insufficiencies and altitude hypoxia training is presented, and the hormonal regulation of lysosomal functions under stressful conditions is discussed. The role of the lysosome in adaptive responses to subextremal and extremal environmental factors is then considered in the areas of metabolic adjustment, the provision of cells with energy and material substrates, intracellular regeneration, proliferative processes and stromal-parenchymal interactions. A.L.W.

A82-21771 † **The state of the vegetative functions during sleep (Sostoianie vegetativnykh funktsii vo vremia sna).** N. A. Vlasov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Uspekhi Soure-*

mennoi Biologii, vol. 92, July-Aug. 1981, p. 127-139. 158 refs. In Russian.

Recent studies on vegetative functions and the dynamics of their changes during various stages of night sleep are reviewed. Particular attention is given to the vegetative regulation during sleep of the cardiovascular, respiratory, and gastrointestinal systems, brain and skin temperature, electrodermal resistance, and the cutaneogalvanic reflex. B.J.

A82-21772 † **Nucleic acid and protein metabolism in cardiac muscle (Metabolizm nukleinovykh kislot i belkov v serdechnoi myshtse).** M. P. Iavich (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Sovremennoi Biologii,* vol. 91, May-June 1981, p. 334-349. 141 refs. In Russian.

A82-21773 † **Cellular and molecular bases of local immunity (Kletochnye i molekuliarnye osnovy mestnogo immuniteta).** A. E. Vershigora and V. V. Ovod (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Uspekhi Sovremennoi Biologii,* vol. 91, May-June 1981, p. 393-408. 163 refs. In Russian.

Experimental investigations of the last five years concerned with the mechanisms of cellular and humoral immunity are reviewed with particular emphasis on the local immunity of the mucous membranes. The origin, antigen induction and migration pathways of the cells synthesizing class A immunoglobulins (IgA) are examined. Mechanisms controlling the relative populations of the plasmacytes synthesizing IgA in the lymphoid formations associated with the mucous membranes and exocrine glands and the differentiation of cells producing IgA dimers are discussed. Attention is also given to results of studies of the integration of separate polypeptides, the physical and chemical properties of secretory molecules IgA, and mechanisms of IgA dimer transport through the granular epithelium. A.L.W.

A82-21774 † **Mechanisms for the regulation of the intracellular calcium distribution (Mekhanizmy reguliatsii vnutrikletochnogo raspredeleniia kal'tsiia).** S. N. Orlov (Ministerstvo Zdravookhraneniia SSR, IV Glavnoe Upravlenie - Tsentral'naia Nauchno-Issledovatel'skaia Laboratoriia, Moscow, USSR). *Uspekhi Sovremennoi Biologii,* vol. 92, July-Aug. 1981, p. 19-34. 151 refs. In Russian.

Mechanisms involved in the hormonal and ionic regulation of cellular calcium levels and calcium binding by the various cellular membranes are reviewed. Consideration is given to the regulation of the calcium intake through changes in the potential-dependent and potential-independent membrane channels and the channels controlling sodium intake, and of calcium outflow through Ca-Na exchange and Ca-ATPase which serve to maintain cellular calcium levels an order of magnitude lower than those of the extracellular fluid. Also examined are the kinetics of calcium bonding to the interior plasma membrance, mitochondria and the endoplasmic reticulum. A.L.W.

A82-21775 † **The application of bicycle ergometry to the early detection of ischemic heart disease (O primenenii veloergometrii dlia rannego vyiavleniia ishemicheskoi bolezni serdtsa).** V. Ia. Grigorov, E. G. Tarasik, and L. V. Mel'nikova. *Voenno-Meditsinskii Zhurnal,* Aug. 1981, p. 56, 57. In Russian.

A clinical study on the application of exercise cardiography to the detection of latent ischemic heart disease in apparently healthy persons is presented. The study involved the measurement of three- and six-channel EKGs in 400 subjects undergoing submaximal bicycle ergometer exercise. Indicators of coronary insufficiency were found in 17.8% of persons considered to be practically healthy, 66.2% of persons considered to be at high risk for ischemic heart disease, 56.4% of persons with unusual resting EKGs characteristics of ischemia and 46.1% of persons with cardialgia. Results thus demonstrate the usefulness of exercise cardiography in clinical situations for the detection of latent ischemic heart disease in otherwise healthy persons or persons at high risk undergoing close medical surveillance. A.L.W.

A82-21776 † **Effects of pyrroxane and methylapogalantamine on cerebral blood circulation and oxygen regime (Vliianie pirroksana i metilapogalantamina na krovoobrashchenie i kislorodnyi rezhim golovnogo mozga).** V. E. Pogorelyi (Piatigorskii Farmatsevticheskii Institut, Pyatigorsk, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Mar.-Apr. 1981, p.167-170. 14 refs. In Russian.

A82-21777 † **The effect of piracetam on the body's resistance to hypoxia (Vliianie piratsetama na ustoichivost' organizma k gipoksii).** L. F. Roshchina (Vsesoiuznyi Nauchno-Issledovatel'skii Khimiko-Farmatsevticheskii Institut, Moscow, USSR) and R. U. Ostrovskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Mar.-Apr. 1981, p. 210-213. 16 refs. In Russian.

Experiments show that piracetam increases the resistance of animals to various types of hypoxia: hypoxic in mice and cats, circulatory in rats, and histotoxic in cats. But the drug does not exert protective action in cats, rats, and mice with hemic hypoxia induced by the injection of sodium nitrite. B.J.

A82-21778 † **Effects of dioxalim and oxamide on succinate and lactate dehydrogenase activities in rat liver, kidney and brain tissues and on the chromosomal apparatus of bone marrow cells (Vliianie dioksalima i oksamida na aktivnost' suktsinat- i laktatdegidrogenazy v tkaniakh pecheni, pochek, golovnogo mozga i na khromosomnyi apparat kletok kostnogo mozga krys).** I. P. Fomochkin, A. I. Beketov, G. T. Pis'ko, I. R. Bariliak, N. P. Barsukov, V. I. Bondarenko, G. F. Gusev, V. B. Levandovskii, T. G. Prokopenko, and V. V. Svistov (Krymskii Meditsinskii Institut, Simferopol, Ukrainian SSR). *Farmakologiia i Toksikologiia,* vol. 44, Mar.-Apr. 1981, p. 611-616. 9 refs. In Russian.

A82-21779 † **The effect of the prolonged administration of sodium hydroxybutyrate on the physical work capacity and muscle tissue state of rats (Vliianie natriia oksibutirata pri prodolzhitel'nom vvedenii na fizicheskuiu rabotosposornost' i sostoianie myshechnoi tkani u krys).** R. U. Ostrovskaia, N. N. Kleimenova, and V. A. Arefolov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Sept.-Oct. 1981, p. 534-539. 13 refs. In Russian.

Experiments on albino rats involving the administration of sodium hydroxybutyrate for a two-month period (100 and 1000 mg/kg daily) are described. It is found that such administration increased the work capacity and body weight of the rats and produced marked changes in the mitochondrial apparatus of cardiac myocytes and skeletal muscles. Prolonged administration of the drug resulted in an increased amount of mitochondria, polyploidy of cardiomyocyte nuclei (for a dose of 100 mg/kg) and marked hypertrophy (for a dose of 1000 mg/kg). It is suggested that this drug has a specific anabolic effect based on hormonal control and an effect on protein synthesis. B.J.

A82-21780 † **Adaptogenic effect of mebicar during emotional stress, exercise, and hypoxia (Adaptogennyi effekt mebikara pri emotsional'nom napriazhenii, fizicheskoi nagruzke i gipoksii).** M. M. Kozlovskaia, R. U. Ostrovskaia, N. N. Kleimenova, V. A. Kamysheva, and S. N. Sudareva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Nov.-Dec. 1981, p. 654-657. 13 refs. In Russian.

Experiments on cats, mice, and rats disclosed the adaptogenic effect of mebicar. The drug decreased emotional stress and removed the stupor-like state in cats induced by stress and pain stimulation. The drug slightly increased the life span of animals under hypoxic hypoxia and raised the limits of maximum tolerable physical load. It reduced the accumulation of hypoxic lactate, and produced an increase in glycogen content in muscle cells of the myocardium and skeletal muscles. B.J.

A82-21781 † **The effect of cholinomimetics on the development of hypothermia (Vliianie kholinomimetikov na skorost' razvitiia gipotermii).** N. O. Bazhanov and V. N. Saliaev (Iaroslavskii Meditsinskii Institut, Yaroslavl, USSR). *Farmakologiia i Toksikologiia,* vol. 44, Jan.-Feb. 1981, p. 40-43. 8 refs. In Russian.

Experiments were performed on 120 male rats to study the rate of hypothermia development in different stages: mild, medium, and deep; corresponding to rectal temperatures of 33, 26, and 19 C. This rate decreased significantly in mild hypothermia induced by nicotine (4 mg/kg), in medium hypothermia induced by nicotine and pilocarpine (25 mg/kg), and methacine (20 mg/kg) combined with arecoline (20 mg/kg), and in deep hypothermia induced by methacine combined with arecoline. However, the rate of development was found to rise in deep hypothermia induced by methacine (20 mg/kg) combined with proserine (0.45 mg/kg). B.J.

A82-21782 † The ultrastructure of the liver sinusoids of mice under conditions of acute stress - Morphometric study (Ul'trastruktura sinusoidov pecheni myshei v usloviiakh ostrogo stressa - Morfometricheskoe issledovanie). V. A. Shkurupii (Novosibirskii Meditsinskii Institut, Novosibirsk, USSR). *Tsitologiia i Genetika,* vol. 15, May-June 1981, p. 3-8. 8 refs. In Russian.

An analysis is presented of structural changes in the endothelial and Kupffer liver cells of male mice after acute physical stress. It is found that these changes are evidence of the intensification of endocytose processes and the inhibition of protein synthesis. B.J.

A82-21783 † The existence of an endogenous biorhythm in chromatin-positive cells of the buccal epithelium in women (O sushchestvovanii endogennogo bioritma khromatinpolozhitel'nykh kletok bukkal'nogo epiteliia zhenshchin). T. A. Zaletaeva and Iu. E. Ershikova (Tsentral'nyi Institut Usovershenstvovaniia Vrachei, Moscow, USSR). *Tsitologiia i Genetika,* vol. 15, July-Aug. 1981, p. 7-9. 14 refs. In Russian.

A82-21784 † EEG evaluation of mental stress (K EEG-otsenke umstvennogo napriazheniia). I. M. Volkova and S. I. Gorshkov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Sept.-Oct. 1981, p. 1071-1075. 7 refs. In Russian.

The paper reviews several EEG studies of mental stress and mental work capacity involving visual search. The search performance was studied as a function of the duration of the preparation period, and the electrophysiological correlates of this search activity were investigated along with its efficiency, the state of preparedness, and the associated intercentral relations. B.J.

A82-21785 † The effects of emotional activation on the spatial synchronization of human brain biopotentials (Vliianie emotsional'noi aktivatsii na prostranstvennuiu sinkhronizatsiiu biopotentsialov golovnogo mozga cheloveka). M. N. Rusalova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Mar.-Apr. 1981, p. 403-405. 9 refs. In Russian.

A82-21786 † Functional state of the hippocampal-reticular complex under submaximal physical load and fatigue (Funktsional'noe sostoianie gippokampo-retikuliarnogo kompleksa pri submaksimal'noi fizicheskoi nagruzke i utomlenii). V. M. Boev (Orenburgskii Gosudarstvennyi Meditsinskii Institut, Orenburg, USSR) and V. A. Krauz (Dnepropetrovskii Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Sept.-Oct. 1981, p. 1029-1037. 27 refs. In Russian.

Results are presented on 22 rabbits with bipolar electrodes implanted in the dorsal hippocampus and the midbrain reticular formation. It is shown that a submaximal physical load in nontrained animals results in a stable reduction in the excitability of the structures studied. In the course of a 30-day training program, the excitability of the hippocampus was reduced, while the excitability of the reticular formation underwent a short-term increase but then returned to the initial level on the 20th day of training. High-amplitude activity predominated in the EEG of the structures studied, while local blood flow increased only in the reticular formation. B.J.

A82-21787 † The relationship between cardiac and motor components of a conditioned reflex upon the local cooling of various zones of the cerebral cortex in cats (O sootnoshenii serdechnogo i dvigatel'nogo komponentov uslovnogo refleksa pri lokal'nom okhlazhdenii razlichnykh zon kory bol'shikh polusharii u koshek). E. M. Berdichevskaia, Iu. M. Perov, and V. M. Pokrovskii (Kubanskii Meditsinskii Institut, Krasnodar, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, Jan.-Feb. 1981, p. 64-69. 23 refs. In Russian.

A82-21788 † Coordination of processes in the hierarchic structure of the visual analyzer (Koordinatsiia protsessov v ierarkhicheskoi strukture zritel'nogo analizatora). V. B. Val'tsev (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 31, no. 3, 1981, p. 598-604. 21 refs. In Russian.

The effect of prolonged light stimulation on different parts of the visual analyzer was investigated in cats. The adaptation process was found to be very complex as manifested in the diverse parallel processes in the hierarchic structure of the analyzer. Adaptive reorganization in the distal parts of the retina is directed towards the regulation of general sensitivity, while in the optic channel and lateral geniculate body this reorganization is directed towards the reduction of the dependence of cortical process on fluctuations of the illumination level. The predominance of inhibitory processes in the cortex characterizes the increasing complexity of cortical processes. It is also shown that the reorganization of electrical activity expresses not only a change of sensitivity but also adaptation to many parameters which characterize the transition from darkness to light. B.J.

A82-21789 † Types of spontaneous discharges in muscle receptors (Tipy spontannykh razriadov myshechnykh retseptorov). V. I. Zalkind (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Neirofiziologiia,* vol. 13, no. 3, 1981, p. 315-321. 12 refs. In Russian.

Based on an analysis of spontaneous and induced discharges from the receptors of passive m. triceps muscle spindles in cats, three types of responses have been identified: (1) continuous pulse train with unimodal symmetric intervals between pulses; (2) bunched action potentials with bimodal interval distribution; and (3) sporadic pulses with long intervals between pulses. Comparison of the characteristics of spontaneous discharges and discharges induced by static muscle stretching indicates that both types of responses have the same mechanism. It is suggested that spontaneous activity may be viewed as a static response of receptors to internal factors related to interaction between extrafusal and intrafusal muscular fibers. V.L.

A82-21790 † Comparative neurophysiological characteristics of cold and caudate tremors (Sravnitel'naia neirofiziologicheskaia kharakteristika kholodovogo i kaudatnogo tremora). Iu. V. Lupandin (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR). *Neirofiziologiia,* vol. 13, no. 3, 1981, p. 257-263. 21 refs. In Russian.

In experiments carried out on cats, comparisons are made between two models of postural tremor, one induced by exposure to cold, the other by an injection of oxotremorine into the caudate nucleus. The electromyograms of both models are identical; the frequency of activity of the motor units, which operate independently, is 4-12 pulses/sec. C.R.

A82-21791 † Poststimulatory auditory adaptation in humans according to computer audiometry (Poststimuliatsionnaia slukhovaia adaptatsiia u cheloveka po dannym kompiuternoi audiometrii). B. M. Sagalovich and G. G. Melkumova (Ministerstvo Zdravookhraneniia SSSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Nosa i Gorla, Moscow, USSR). *Vestnik Otorinolaringologii,* Mar.-Apr. 1981, p. 15-20. 27 refs. In Russian.

A82-21792 † Cochlear analysis of sound intensity and some mechanisms of auditory sensations (Kokhlearnyi analiz sily zvuka na nekotorye mekhanizmy slukhovykh oshchushchenii). V. N. Akimov (Kazanskii Meditsinkii Institut, Kazan, USSR). *Vestnik Otorinolaringologii,* May-June 1981, p. 15-18. 21 refs. In Russian.

A82-21793 † Methods for diagnosing hearing loss in workers exposed to high noise levels in accordance with state standards (Metody opredeleniia poter' slukha u rabochikh 'shumovykh' professii v sootvetstvii s gosudarstvennym standartom). V. E. Ostapkovich, G. A. Suvorov, L. N. Shkarinov, N. I. Ponomareva, and E. I. Denisov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii,* July-Aug. 1981, p. 12-16. 5 refs. In Russian.

A82-21794 † Hygienic standards for industrial noise (Gigienicheskoe normirovanie proizvodstvennogo shuma). G. A. Suvorov, L. N. Shkarinov, V. G. Ovakimov, and E. I. Denisov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 1, 1981, p. 62-66. 10 refs. In Russian.

A82-21795 † **A comparative evaluation of the hemodynamic effects of large doses of morphine, dipidolor, pentazocine, and phentanyl (Sravnitel'naia otsenka gemodinamicheskikh effektov bol'shikh doz morfina, dipidolora, pentazotsina i fentanila).** F. F. Beloiartsev, B. I. Islamov, and V. G. Stranin (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 8, 1981, p. 22-28. 10 refs. In Russian.

Four series of experiments are carried out on 84 mongrel dogs to study the effect of morphine (3 mg/kg), dipidolor (4.5 mg/kg), pentazocine (2.5 mg/kg), and phentanyl (0.0084 mg/kg) on systemic and pulmonary hemodynamics, on myocardial contraction, and on coronary blood flow and microcirculation. It is found that in contrast to general anesthetics, large doses of the narcotic analgesics used clinically for anesthetic purposes in operations do not suppress hemodynamics. C.R.

A82-21796 † **Emotional stress as a factor in cardiovascular disorders (Emotsional'nyi stress kak faktor serdechno-sosudistykh narushenii).** K. V. Sudakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 9, 1981, p. 10-18. 27 refs. In Russian.

It is shown in experiments on animals that conflict can bring on serious cardiovascular orders, including ischemia and myocardial infarction. The roles played by limbic structures and by the reticular formation of the brain stem in mechanisms responsible for arterial hypertension and disturbances in cardiac activity in times of emotional stress are established. Genetic characteristics of resistance and of predisposition to stress-induced cardiovascular disorders are identified. Attention is also given to the distribution of catecholamines in the brain stem structures of the animals that are either resistant or predisposed to these disorders. C.R.

A82-21797 † **Computer-aided analysis of the effect of the initial narcosis on the central hemodynamics (Komp'iuternyi analiz vliianiia razlichnykh variantov vvodnogo narkoza na tsentral'nuiu gemodinamiku).** A. A. Buniatian, M. N. Seleznev, E. V. Flerov, G. I. Kalina, and Ia. A. Solomka (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchnyi Tsentr Khirurgii, Moscow, USSR). *Akademiia Meditsinskikh Nauk SSSR, Vestnik,* no. 8, 1981, p. 33-40. 20 refs. In Russian.

A82-21798 † **LDH isoenzyme spectrum in intact and denervated skeletal muscles of rats of various age during cold adaptation (Izofermentnyi spektr LDG v intaktnykh i denervirovannykh skeletnykh myshtsakh krys razlichnogo vozrasta pri adaptatsii k kholodu).** L. F. Shcherbak (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Jan.-Feb. 1981, p. 69-72. 5 refs. In Russian.

A82-21799 † **The role of urokinase in the regulation of the fibrinolytic activity of blood under normal conditions (Rol' urokinazy v reguliatsii fibrinoliticheskoi aktivnosti krovi v estestvennykh usloviiakh).** V. I. Kuznik and D. V. Vasil'ev (Chitinskii Meditsinskii Institut, Chita, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* May-June 1981, p. 45-47. 7 refs. In Russian.

A82-21800 † **The role of CO2 in the mechanism of the reparative regeneration of bone tissue /a radioisotopic study/ (Rol' CO2 v mekhanizme reparativnoi regeneratsii kostnoi tkani /radioizotopnoe issledovanie/).** I. M. Dmitriev (Odesskii Meditsinskii Institut, Odessa, Ukrainian SSR) and Iu. A. Petrovich (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* May-June 1981, p. 28-32. 14 refs. In Russian.

A82-21801 † **The use of oxygen as the test gas in the determination of the closing volume of respiratory ducts (Primenenie kisloroda kak test-gaza dlia opredeleniia ob'ema zakrytiia dykhatel'nykh putei).** V. E. Bagdat'ev, V. I. Platonov, I. Iu. Lapshina, and Iu. V. Andreev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Sovetskaia Meditsina,* no. 5, 1981, p. 28-31. 13 refs. In Russian.

The use of oxygen as the indicator gas in the determination of pulmonary closing volumes in the single breath expiration test is investigated. Closing volumes, calculated as the volume of gas expired at the moment when sharp changes in indicator gas concentration signal the onset of phase IV of the single breath curve, were obtained in 10 subjects with normal spirographic data by both oxygraphic and nitrographic techniques. A high degree of correlation between the results of the techniques is found, indicating the oxygraphic method to be as useful as nitrography for the examination of the small respiratory ducts. In addition, the use of oxygen as a test gas facilitates the detection of the inflection point in the single breath curve, increasing test accuracy. A.L.W.

A82-21802 † **Seasonal rhythm of the immune reactivity and heart tolerance to physical load in patients with ischemic heart disease (Sezonnyi ritm tolerantnosti serdtsa k nagruzke i immunnoi reaktivnosti u bol'nykh ishemicheskoi bolezn'iu serdtsa).** I. E. Oranskii, V. P. Ditiatev, I. M. Kheinonen, I. S. Golod, and E. I. Solov'eva (Sverdlovskii Nauchno-Issledovatel'skii Institut Kurortologii i Fizioterapii; Sverdlovskii Meditsinskii Institut, Sverdlovsk, USSR). *Sovetskaia Meditsina,* no. 7, 1981, p. 11-14. 9 refs. In Russian.

A82-21803 † **Evaluation of the functional state of the cardiovascular system in patients with ischemic heart disease with reference to the nature of their occupational activity (Otsenka funktsional'nogo sostoianiia serdechno - sosudistoi sistemy bol'nykh iskhemicheskoi bolezn'iu serdtsa v zavisimosti ot kharaktera ikh trudovoi deiatel'nosti).** B. M. Kogan, L. E. Kuz'mishin, D. I. Lavrova, D. A. Sokolova, and O. S. Andreeva (Tsentral'nyi Nauchno-Issledovatel'skii Institut Ekspertizy Trudosposobnosti i Organizatsii Truda Invalidov, Moscow, USSR). *Sovetskaia Meditsina,* no. 8, 1981, p. 9-13. 13 refs. In Russian.

A82-21804 † **Emotions, sleep, and health (Emotsii, son i zdorov'e).** V. Rotenberg (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Nauka i Zhizn',* Aug. 1981, p. 86-91. In Russian.

The paper reviews some of the topics discussed at the Baku symposium (held in October 1981) on search performance, motivation, and sleep. Particular consideration is given to harmful types of stress and the protective function of sleep. B.J.

A82-21805 † **Physical health of truck drivers in the open-pit mining industry of the far north (Sostoianie zdorov'ia voditelei avtotransporta kar'erov dobyvaiushchei promyshlennosti Krainego Severa).** G. N. German (Iakutskii Gosudarstvennyi Universitet, Yakutsk, USSR). *Zdravookhranenie Rossiiskoi Federatsii,* no. 9, 1981, p. 14, 15. In Russian.

A82-21806 † **A study of tropomyosins in human muscular and nonmuscular organs (Izuchenie tropomiozinov myshechnykh i nemyshechnykh organov cheloveka).** A. A. Davydov, G. F. Sycheva, and A. B. Zborovskii (Volgogradskii Meditsinskii Institut, Volgograd, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, May-June 1981, p. 330-334. 15 refs. In Russian.

A82-21807 † **The multiple forms of tyrosine aminotransferase in rat liver cells and their role in cellular homeostasis (Mnozhestvennye formy tirozinaminotransferazy v kletkakh pecheni krys i ikh rol' v gomeostaze kletki).** N. P. Mertvetsov (Glavmikrobioprom, Spetsial'noe Konstruktorsko-Tekhnologicheskoe Biuro Biologicheski Aktivnykh Veshchestv, Novosibirsk, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Mar.-Apr. 1981, p. 154-166. 57 refs. In Russian.

A82-21808 † **The dynamics and physiological importance of the activation of the gamma-amino-butyric acid system in the brain and cardiac muscle under pain and emotional stress (Dinamika i fiziologicheskoe znachenie aktivizatsii GAMK-sistemy v golovnom mozge i serdechnoi myshtse pri emotsional'no-bolevom stresse).** F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR), R. I. Lifshits (Cheliabinskii Gosudarstvennyi Pedagogicheskii Institut, Chelyabinsk, USSR), and V. I. Pavlova (Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Jan.-Feb. 1981, p. 35-39. 7 refs. In Russian.

A82-21809 † **Nonesterified fatty acid metabolism during exercise in humans (Obmen neesterifitsirovannykh zhirnykh kislot**

pri fizicheskikh nagruzkakh u cheloveka). S. P. Anikeeva and Iu. M. Shternberg (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, July-Aug. 1981, p. 435-441. 72 refs. In Russian.

The characteristics of nonesterified fatty acid metabolism during exercise and physical training in humans are discussed. The mobilization of nonesterified fatty acids due to the action of sympathetic intermediaries during exercise is discussed, and the importance of the nonesterified fatty acids as an energy source is emphasized. Problems in the understanding of the mechanisms by which physical training increases the capability of the muscles to utilize nonesterified fatty acids are examined, and it is pointed out that the degree of fatty acid mobilization is determined by the intensity of the exercise relative to maximal oxygen uptake. Data on the variations in plasma fatty acid levels during work is reviewed, and the concepts of the plasma pool and its turnover rate are introduced as quantitative indicators of metabolic processes. Finally, attention is given to the factors determining the transport, oxidation rate and de nova synthesis of single fatty acids, carbon, and to changes in the quantitative and qualitative characteristics of nonesterified fatty acid metabolism upon the cessation of exercise. A.L.W.

A82-21810 † Approaches to the removal of G2-chalone from the liver of rats (Nekotorye podkhody k ochistke G2-khalona pecheni krys). V. M. Rodionov, N. A. Kuz'micheva, A. V. Pospelova, and M. V. Pleskova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, July-Aug. 1981, p. 569-572. 15 refs. In Russian.

A82-21811 † The effects of daily blood sampling on creatine phosphokinase, aspartate aminotransferase and alanine aminotransferase activities in the blood serum of the monkey (Vliianie ezhednevnogo vziatiia krovi na aktivnost' kreatinfosfokinazy, AST i ACT v syvorotke krovi obez'ian). N. E. Lemondshava and Sh. L. Dzhalagoniia (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Jan.-Feb. 1981, p. 64-67. 11 refs. In Russian.

A82-21812 † Temperature dependence of alanine and aspartate aminotransferase activities in rat brain during hypothermia of various durations and adrenalectomy (Temperaturnaia zavisimost' aktivnosti alanin- i asparat-aminotransferaz v mozge krys pri gipotermii raznoi dlitel'nosti i pri adrenalektomii). T. N. Daudova, I. S. Meilanov, and E. Z. Emirbekov (Dagestanskii Gosudarstvennyi Universitet, Makhachkala, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, May-June 1981, p. 359-362. 7 refs. In Russian.

A82-21813 † Blood serum nuclease activity in healthy persons and patients with various hematological diseases (Nukleaznaia aktivnost' syvorotki krovi zdorovykh liudei i bol'nykh s nekotorymi gematologicheskimi zabolevaniiami). M. N. Blinov, I. S. Luganova, and A. D. Vladimirova (Leningradskii Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Leningrad, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Mar.-Apr. 1981, p. 211-215. 17 refs. In Russian.

A82-21814 † Predicting the potentials of young swimmers based on clinical and physiological data (Prognozirovanie perspektivnosti iunykh plovtsov s uchetom kliniko-fiziologicheskikh dannykh). I. P. Nikitin (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Sept. 1981, p. 22-24. 16 refs. In Russian.

A82-21815 † The dynamics of heart rate recovery following work of various aerobic intensities (Dinamika vosstanovleniia chastoty serdechnykh sokrashchenii posle rabot raznoi aerobnoi moshchnosti). V. M. Alekseev (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 24-26. 11 refs. In Russian.

A82-21816 † Development of an automatic data bank for managing physical education of students (Razrabotka avtomatizirovannogo banka dannykh dlia upravleniia fizicheskim vospitaniem studentov). S. S. Prapor, I. G. Sokolov, V. A. Soldatov, A. L. Galitskii, and R. M. Nosova (Moskovskii Institut Stali i Splavov, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 39, 40. In Russian.

A82-21817 † Trial on the use of stabilography in the medical supervision of boxers (Opyt ispol'zovaniia stabilografii v meditsinskom kontrole za bokserami). E. B. Liubchinskii and R. Z. Kravets (Orenburgskii Gosudarstvennyi Meditsinskii Institut, Orenburg, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 23, 24. 13 refs. In Russian.

A clinical trial is presented on the application of stabilography to the detection and subsequent monitoring of vestibular impairments resulting from cranio-cerebral trauma in boxers. Oscillations of subject center of gravity while standing in the Romberg position in the frontal and sagittal planes were measured in 112 subjects over the course of six years, with 27 serving as controls and 89 boxers having undergone head trauma as the result of a knockout. Measurements made before and after injuries reveal the vestibular apparatuses of boxers having had previous equilibrium training to be more resistant to athletic trauma, indicative of a need for the development of a method for training the organs of equilibrium during the preparation of a boxer. Head traumas are also found to be occasionally accompanied by evident and persistent disorders in static coordination. The method of stabilography is thus recommended for use in the medical supervision of boxers. A.L.W.

A82-21818 † Rationalizing physical regimen of sedentary workers (Obosnovanie ratsional'nogo dvigatel'nogo rezhima liuder umstvennogo truda). V. V. Mitrokhina (Moskovskii Tekhnologicheskii Institut Bytovogo Obsluzhivaniia Naseleniia RSFSR, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 32-34. 8 refs. In Russian.

A82-21819 † Effect of the functional properties of the vestibular analyzer on the effectiveness of instruction in gymnastics (Vliianie funktsional'nykh svoistv vestibuliarnogo analizatora na effektivnost' obucheniia gimnasticheskim uprazhneniiam). A. I. Popugaev (Udmurtskii Gosudarstvennyi Universitet, Izhevsk, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 30, 31. 8 refs. In Russian.

A82-21820 † Mechanisms of adaptation to ergothermic hypoxemia in athletes specializing in different sports (Mekhanizmy adaptatsii k ergotermicheskoi gipoksemii u sportsmenov razlichnykh spetsializatsii). V. A. Romanenko (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Aug. 1981, p. 22, 23. 18 refs. In Russian.

The effects of athletic training for speed, endurance or strength on physiological responses to hypoxemia resulting from physical exercise under thermal stress are investigated, along with the role of these responses in establishing the elevated heat tolerance of athletes. Measurements of heart rate, blood oxygenation, oxygen uptake, and respiratory minute volume and rate were made during ergometer exercise at an ambient temperature of 50 C and relative humidity of 50% in sprinters, distance runners and weightlifters, and a control group of students. Ergothermic stress is found to produce a less marked decrease in blood oxygenation in the athletes than in the controls which is associated with a hyperfunction of the oxygen transport system in the weightlifters, and improvements in the mechanisms of oxygen utilization and transport in the runners. In the sprinters, improved heat tolerance is related to mechanisms counteracting the effects of ergothermic hypoxemia, while the distance runners are better able to tolerate the hypoxemia. A.L.W.

A82-21821 † Stress and immunity in athletes (Stress i immunitet u sportsmenov). I. D. Surkina (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* Mar. 1981, p. 18-20. 9 refs. In Russian.

The effects of the physical, and emotional stresses encountered during competition on the immune status of athletes are investigated. Experiments involving a functional test (maximal exercise) and evaluation of the levels and activities of T and B lymphocytes were performed on healthy young athletes from different sports during competitive periods of various durations, at various stages of preparation and following the competitive seasons. Changes in

immune processes, particularly the T system of immunity, were observed in all types of sports and in all times of the year. The suppression of the immune reaction found under the influence of the training stresses in the preparatory period is observed to be transient, and alternates with a recovery following rest. Changes in immunity are indicative of a general adaptive stress syndrome resulting in an exhaustion phase, which leads to an increased morbidity risk. Immunological monitoring may thus be used to predict individual likelinesses of becoming ill, and to develop training schedules minimizing health risks. A.L.W.

A82-21822 † **Radiometric determination of potassium content in athletes (Radiometricheskoe opredelenie soderzhaniia kaliia v organizme sportsmenov).** O. Z. Paikin, E. V. Ivanov, V. A. Plakhtienko, and Iu. N. Shishmarev (Voennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Teoriia i Praktika Fizicheskoi Kul'tury,* July 1981, p. 26, 27. In Russian.

A82-21823 † **Characteristics of the structure and functions of the middle ear of lizards (Osobennosti stroeniia i funktsii srednego ukha iashcherits).** S. V. Smirnov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Zhurnal Evoliutsionnoi Biokhimii i Fiziologii,* vol. 17, July-Aug. 1981, p. 395-400. 14 refs. In Russian.

A82-21824 † **The mathematics of immunity (Matematika immuniteta).** A. Galeva. *Nauka i Zhizn',* Mar. 1981, p. 66-74. In Russian.

The mathematical modeling of immune responses to a viral intrusion is discussed. Following a review of the functions and major components of the immune system and its interactions with the processes occurring during the course of a disease infection, a mathematical model of infection and immune responses to it is presented which is formulated in terms of viral growth, the responses of plasma cells and antibody production, and damage to the target organs. Possible applications of the model in clinical practice and to the understanding of the nature of disease are then examined. A.L.W.

A82-21825 † **Acute experimental emotional stress in rabbits /physiological and cytochemical aspects/ (Ostryi eksperimental'nyi emotsional'nyi stress u krolikov /fiziologo-tsitokhimicheskie aspekty/).** A. V. Gorbunova, N. V. Petrova, V. V. Portugalov, and S. K. Sudakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1981, p. 45-53. 17 refs. In Russian.

Cardiovascular and autonomic neuronal responses to acute emotional stress induced by the electrical stimulation of the hypothalamus and skin are investigated in immobilized chinchilla rabbits. Measurements of arterial pressure and heart rate were obtained as a function of time during the experiment, along with determinations of water-soluble protein content, neuronal cell body and nuclear volume and weight in neurons of the superior cervical ganglion, nodose ganglion, stellate ganglion and sympathetic chain. From the cardiovascular responses it was possible to identify three types of reactions: resistance, adaptation, and the development of stress effects. Various metabolic changes were observed in the extramural autonomic neurons of the stress-susceptible animals, the most marked being an enhancement of catabolism in the nodose ganglion. A tendency towards increased activity of the fast isoenzymes of lactate dehydrogenase is also observed in the conductive system of the heart. A.L.W.

A82-21826 † **Comparative study of several physiological parameters in the evaluation of functional condition in nurses (Sravnitel'noe izuchenie nekotrykh fiziologicheskikh pokazatelei pri otsenke funktsional'nogo sostoianiia u meditsinskikh sester).** P. Ullsperger, H.-G. Gille, E. Otto, M. Pietschmann, B. Weickmann (Ministerstvo Zdravookhraneniia GDR, Tsentral'nyi Institut Rabochei Meditsiny, Berlin, East Germany), and L. Ia. Zybkovets (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Gigiena Truda i Professional'nye Zabolevaniia,* July 1981, p. 23-27. 11 refs. In Russian.

The effects of night work on psychophysiological reactions are investigated together with the usefulness of several neurophysiological methods in assessing functional condition following night work and sleep. Responses to auditory and visual stimuli, electrocardiograms, electrooculograms, electroencephalograms, as well as evoked potentials and contingent negative variation were observed in nurses immediately following work on the night shift or a night's sleep preceding work on the evening shift. The neurophysiological tests as well as the more routine techniques reveal a reduction in the general activity level in nurses following the night shift, which is particularly evident as a reduction in attention. Results suggest the potential applications of the techniques employed in the establishment of optimal work-rest cycles. A.L.W.

A82-21893 † **Mathematical model of a human operator detecting a signal on a noise background (Matematicheskaia model' cheloveka-operatora, obnaruzhivaiushchego signal na fone shuma).** N. M. Novikova. *Radioelektronika,* vol. 25, Jan. 1982, p. 91-93. In Russian.

In the problem considered, the human operator must detect a signal with an unknown arrival time on a background of Gaussian noise. It is shown that the functioning of the operator can be described by a nonparametric sign detector model. The probability of correct detection is examined as a function of signal-to-noise ratio, and the effectiveness of the model is confirmed by experimental results. B.J.

A82-21926 An asymmetrical model of the airways of the dog lung. K. Horsfield, W. Kemp, and S. Phillips (Midhurst Medical Research Institute, Midhurst, Sussex, England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Jan. 1982, p. 21-26. 16 refs.

An asymmetrical model is developed for the branching of the brachial tree in dog lung. The model is based on measurements made on a resin cast of the bronchial tree of a 25-kg dog, for which dimensions and branching relationships were obtained in branches down to 0.5-mm diameter. The branches were ordered, the number in each order was counted, and the mean diameter and length in an order was calculated. The model was then constructed according to delta, the difference in order between the two daughter branches at a bifurcation, with delta taken as identical for all parent branches of a given order. The model is thus especially useful for computer analysis of such variables as input impedance. A.L.W.

A82-21927 Increased excretion of urea and N/tau/-methylhistidine by rats and humans after a bout of exercise. G. L. Dohm, R. T. Williams, G. J. Kasperek, and A. M. van Rij (East Carolina University, Greenville, NC). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Jan. 1982, p. 27-33. 30 refs.

A82-21928 * **Phase V of the single-breath washout test.** G. M. Nichol, D. B. Michels, and H. J. B. Guy (Christchurch Clinical School of Medicine, Christchurch, New Zealand; California, University, La Jolla, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 52, Jan. 1982, p. 34-43. 34 refs. Research supported by the Medical Research Council of New Zealand and North Canterbury Hospital; Grant No. NsG-9075.

A downward-deflecting phase V is often seen following the terminal rise (phase IV) in single-breath washout tests. To investigate the nature of phase V, experiments using simultaneous washouts of N2 and tracer boluses of Ar were performed on eight normal nonsmoking subjects aged 27-41 who exhibited a phase V. Phase V is found to occur in all subjects at expiratory flow rates between 0.1 and 2.0 l/sec shortly after expiration became flow limited. Volumes of both phases IV and V increase with increasing flow rate. The difference between the exhaled volumes at which flow became limited and phase V appeared is shown to be approximately equal to the anatomic dead space. Results support a model of lung emptying in a gravitational field in which flow limitation occurs first in the lower lung regions and then progresses toward the upper regions, causing phase IV. A decrease in the amount of flow from the upper relative to the lower regions after all regions have become flow limited then causes phase V. A.L.W.

A82-21929 A computational model for expiratory flow. R. K. Lambert, T. A. Wilson, R. E. Hyatt, and J. R. Rodarte (Minnesota, University, Minneapolis; Mayo Clinic and Mayo Founda-

tion, Rochester, MN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 44-56. 18 refs. Grant No. NIH-HL-21584.

A mathematical model of maximal expiratory flow was developed. Coupled equations describing the pressure losses in the flow and the pressure-area behavior of the airway were integrated along the airway from the periphery to the flow-limiting site. Equations describing pressure losses in the flow were adapted from studies of bronchial casts. The bronchial anatomy utilized was that described by Weibel. Bronchial mechanical properties were obtained from measurements in excised human lungs for the central airways and by extrapolations of these data for the peripheral airways. The maximal flow for air and helium predicted by the model agrees with that of five lungs from which mechanical properties were obtained. The model predictions agree with published values of density and viscosity dependence of maximal flow. At high and midlung volumes, maximal flow is determined primarily by the wave-speed mechanism. At low lung volumes, maximal flow is primarily determined by the coupling of viscous pressure losses and airway mechanical properties. (Author)

A82-21930 Rate of uptake of carbon monoxide at different inspired concentrations in humans. H. A. Jones, J. C. Clark, E. E. Davies, R. E. Forster, and J. M. B. Hughes (Royal Postgraduate Medical School, London, England; Pennsylvania, University, Philadelphia, PA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 109-113. 15 refs. Grants No. NIH-HL-19737; No. NIH-5-P50-HL-15061-10.

A82-21931 Air embolism - Possible role of surfactant on recompression. B. A. Hills and R. E. Barrow (Texas, University, Houston, TX). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 119-123. 25 refs.

The influence of lung surfactants on the passage of venous gas emboli through the pulmonary circulation into arterial blood during recompression treatment is investigated. Relationships between apparent surface tension and surface area were determined with a Wilhelmy balance for the first compression of films of the pulmonary surfactants dipalmitoyl lecithin (DPL), dipalmitoyl phosphatidylethanolamine (DPPE) and sphyngomyelin under simulated physiological conditions. Results show that DPL reduces apparent surface tension appreciably more than DPPE or sphygomyelin at the same surface concentration, producing tensions below 8 dyn/cm, the highest level at which normal pulmonary systeolic pressure could force trapped air into systemic arterial blood. Additional experiments in which compression was stopped for 1-min intervals as soon as surface tension fell below 15 dyn/cm demonstrate the possibility of reaching compression levels of up to 30% without accompanying excessively low surface tension. Results support the rule of stopping compression in cases of limb bends at 60 fsw, and suggests the advisability of stopping at the depth of relief. A.L.W.

A82-21932 Erythrocyte indices during a competitive marathon. M. A. Kolka, L. A. Stephenson, and J. E. Wilkerson (Indiana University, Bloomington, IN). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 168-172. 32 refs.

Changes in erythrocyte count, plasma osmolality and erythrocyte indicators occurring within the course of long-duration exercise are investigated. Measurements of the hematocrit, whole blood hemoglobin concentration and erythrocyte counts were made in blood drawn from three healthy adult males immediately prior to and at 4.8-km intervals during a competitive marathon (42.2 km). Despite running times of 3, 4 and 5 hr, the erythrocyte count is found to decrease linearly for the first 15 km of the race in all subjects, reaching a level 4.7% below the prerace control, then to rise back to control levels by 19.3 km, where it remained for the remainder of the race. Calculated values of the mean corpuscular hemoglobin concentration, mean corpuscular hemoglobin, and total red blood cell volume did not change significantly during the race, while plasma osmolality increased linearly and mean corpuscular volume displayed a negative linear correlation with osmolality. Data demonstrate the value of obtaining sequential blood samples during an exercise bout, as well as the ability of the organism to maintain erythrocyte indices within narrow limits. A.L.W.

A82-21933 Summated circulatory responses of thermal and baroreflexes in humans. T. J. Ebert, D. F. Stowe, J. A. Barney, J. H. Kalbfleisch, and J. J. Smith (U.S. Veterans Administration Medical Center, Wood; Wisconsin Medical College, Milwaukee, WI). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 184-189. 35 refs.

Interactions between thermal and baroreceptor inputs in the elicitation of cardiovascular reflexes are investigated in a study of the integration of multiple afferent information by the vasomotor centers. Noninvasive techniques were used to monitor variations in blood flow parameters induced by changes in central blood volume created by lower body negative pressure and leg elevation in the presence or absence of local thermal receptor stimulation by hand immersion in 10 C water. LBNP at -10, -25, and -40 Torr and leg elevation are found to result in changes in forearm vascular resistance, while the two high levels of LBNP are accompanied by decreases in stroke volume, caridac index and blood pressure and increases in heart rate and total peripheral resistance. Total peripheral resistance, forearm vascular resistance and blood pressure are also observed to increase during hand immersion. Combined stimuli induced simple additive responses in all variables except heart rate, where a central interaction between thermal and baroreflex control of heart rate is indicated. A.L.W.

A82-21934 Effects of temperature on the duration of arousal episodes during hibernation. A. R. French (California, University, Riverside, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 216-220. 23 refs. Research supported by the University of California; NSF Grant No. DEB-80-03513.

A82-21935 Pulmonary gas exchange during altered density gas breathing. S. K. Christopherson and M. P. Hlastala (Washington, University, Seattle, WA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 221-225. 21 refs. Grants No. NIH-HL-12174; No. NIH-HL-06081-02.

The role of changes in the alveolar ventilation/perfusion distribution in determining the improvement in alveolar-arterial gas exchange observed during breathing of carrier gases with increased density is investigated. The alveolar ventilation/perfusion distribution was measured directly by the multiple inert gas elimination technique and compared to changes in the alveolar-arterial O2 partial pressure difference in dogs ventilated with room air alone or with a 20.9% O2 in He mixture. While no difference between air and heliox is observed in the overall cardiorespiratory parameters, oxygen exchange is observed to worsen with heliox breathing, as the alveolar ventilation/perfusion distribution improved slightly. It is thus concluded that the improvement in oxygen exchange cannot be explained by an improvement in ventilation/perfusion distribution; an alternative mechanism involving the interaction of diffusion and convection on inspiration is suggested. A.L.W.

A82-21936 Cardiac output increase and gas exchange at start of exercise. M. L. Weissman, P. W. Jones, A. Oren, N. Lamarra, B. J. Whipp, and K. Wasserman (California, University, Torrance, CA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 52, Jan. 1982, p. 236-244. 17 refs. Grants No. NIH-HL-07388; No. NIH-HL-11907.

The dynamics of the increase in alveolar gas exchange induced by increasing cardiac output pursuant to the onset of exercise is investigated. Temporal patterns of gas exchange were measured during the first 10-20 sec of cycle ergometer exercise with minute ventilation constant at the resting level and during a single prolonged constant airflow exhalation. A rapid response of increased gas exchange following the beginning of exercise is evidenced by a progressive elevation in alveolar CO2 tension and fall in O2 tension in the controlled ventilation experiment, and by a steepening of the slope of the alveolar phase of O2 and CO2 in the prolonged exhalation experiment. These changes, which would occur during the first one to two breaths of exercise in free-breathing subjects, are attributable to a reduction in overall pulmonary ventilation/perfusion ratio as cardiac output rapidly increased. A.L.W.

A82-21987 Possible impact of cosmochemistry on terrestrial biology - Historical introduction. N. W. Pirie (Rothamsted

Experimental Station, Harpenden, Herts., England). *(Royal Society, Discussion on Molecules in Interstellar Space, London, England, May 20, 21, 1981.) Royal Society (London), Philosophical Transactions, Series A,* vol. 303, no. 1480, Dec. 24, 1981, p. 589-594. 29 refs.

Attention is given to opinions held by prominent men regarding the existence of life on celestial bodies other than earth, taking into account philosophers in ancient Greece, and scientists and non-scientist intellectuals in Europe. It is found that pluralism was the dominant outlook during the last few centuries. The separation of a belief in life elsewhere from a belief in intelligence elsewhere had to await the resolution of the spontaneous generation controversy. Extraterrestrial intrusion had been postulated to explain specific biological phenomena. The general proposition that all life came here from elsewhere seems to have originated with Richter (1865). The concepts of an introduction of 'seeds' from space to earth is considered along with the impact which components of meteorites and cosmic dust may have on biology. G.R.

A82-21988 Organic matter in meteorites and Precambrian rocks - Clues about the origin and development of living systems. J. Brooks (British National Oil Corp., Exploration Div., Glasgow, Scotland). *(Royal Society, Discussion on Molecules in Interstellar Space, London, England, May 20, 21, 1981.) Royal Society (London), Philosophical Transactions, Series A,* vol. 303, no. 1480, Dec. 24, 1981, p. 595-608; Discussion, p. 608, 609. 77 refs.

Modern hypotheses about the origin of life on earth follow suggestions made originally by Oparin (1924) and Haldane (1929) about a chemical synthesis in which precursors of biomolecules could be formed from a primitive early atmosphere. The current knowledge of the abiogenesis of organic molecules is derived from the identification of organic molecules in astronomical spectra, the presence of organic compounds in carbonaceous chondrites, studies of the organic contents in early Precambrian rocks, and laboratory experiments. The considered investigation is concerned with an evaluation of the available information against the Oparin-Haldane hypothesis, taking into account the ancient geological record and information contained in carbonaceous chondrites. G.R.

A82-21989 Problems in the rate of evolution in biological systems. F. R. Whatley (Oxford University, Oxford, England). *(Royal Society, Discussion on Molecules in Interstellar Space, London, England, May 20, 21, 1981.) Royal Society (London), Philosophical Transactions, Series A,* vol. 303, no. 1480, Dec. 24, 1981, p. 611-622; Discussion, p. 622, 623. 18 refs.

Questions regarding the earliest organization of systems leading to the evolution of life are considered, taking into account the amino acids of the prebiotic soup, and the adenine molecule as a component of the energy carrier ATP. Aspects of the biochemical evolution are examined, giving attention to living systems based on proteins or nucleic acids, living systems based on nucleic acids, and living systems based on nucleic acids and proteins. The origin of enzymatic systems is discussed. It is pointed out that a modern example of the self-assembly of a catalytic protein from its constituent parts can be seen in the enzyme ferredoxin. The greatest single discontinuity in the evolution of living systems is thought to be the attainment of the eukaryotic state of organization. According to the theory of serial endosymbiosis, the characteristic eukaryotic organelles are derived from unicellular symbionts. Attention is also given to the origin of chloroplasts. G.R.

A82-22078 * # A program for assessing pilot mental state in flight simulators. A. T. Pope and R. L. Bowles (NASA, Langley Research Center, Hampton, VA). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 20th, Orlando, FL, Jan. 11-14, 1982, Paper 82-0257.* 16 p. 17 refs.

A program to apply proposed measures of pilot mental state in the simulator flight deck environment has been undertaken at NASA Langley Research Center. Literature survey identified a promising subset of methods for assessing workload, attention and vigilance, and task-related stress, and revealed a need for improved analytical techniques in the physiological area. An effort to apply functional modelling techniques has been initiated. A psychophysiological laboratory has been designed for simulator application. The program is designed to develop improved techniques for evaluating simulator cue fidelity and for imposing realistic workload and attentional demands on the simulator pilot. (Author)

A82-22200 Genetic damage in Escherichia coli K12 AB2480 by broad-spectrum near-ultraviolet radiation. R. B. Webb and M. S. Brown (Argonne National Laboratory, Argonne, IL). *Science,* vol. 215, Feb. 19, 1982, p. 991-993. 26 refs. Contract No. W-31-109-eng-38.

A82-22206 # The thermal response of a human in the near-zone of a resonant thin-wire antenna. R. J. Spiegel (U.S. Environmental Protection Agency, Health Effects Research Laboratory, Research Triangle Park, NC). *IEEE Transactions on Microwave Theory and Techniques,* vol. MTT-30, Feb. 1982, p. 177-185. 14 refs.

The thermal response of a human in the near-zone of a resonant thin-wire antenna has been determined using a model consisting of a series of transient conduction equations with internal heat generation due to metabolism, internal convective heat transfer due to blood flow, external reaction by convection and radiation, and cooling of the skin by sweating and evaporation. Numerical results are presented for two cases: a human in the near-zone of a quarter-wave monopole and a half-wave dipole operating at 45 and 200 MHz, respectively. It is found that thermal effect is negligible for antennas with input power levels of less than 50 W. V.L.

A82-22248 * Enzymatic capacities of skeletal muscle - Effects of different types of training. F. W. Booth (Texas, University, Houston, TX) and G. R. Hugman (Baylor College of Medicine, Houston, TX). *Medicine and Sport,* vol. 13, 1981, p. 153-164. 39 refs. Research supported by the Muscular Dystrophy Association of America; Grant No. PHS-AM-19393; Contract No. NAS9-15388.

Long-term adaptation mechanisms to maintain homeostasis at increased levels of exertion such as those caused by regular exercise are described. Mitochondrial changes have been found to be a result of endurance exercises, while mitochondrial responses to other types of exercise are small. Further discussion is devoted to long-term changes in glucose transport, hexokinase, phosphofructokinase, pyruvate kinase, and the increased sensitivity of an endurance trained muscle to insulin. Less lactate has been found to be produced by the skeletal muscles at the same work rate after adaptation to endurance exercise training, and the capacity for the flux of the two-carbon acetyl chain through the citric acid cycle increases in skeletal muscles in response to endurance training. Finally, endurance training is noted to result in glycogen sparing and an increase in the capacity to utilize fatty acids. M.S.K.

A82-22249 * In vitro Ca-45/++/ uptake and exchange by otoconial complexes in high and low K/+/Na/+/ fluids. M. D. Ross, K. G. Pote, P. L. Cloke, and C. Corson (Michigan, University, Ann Arbor, MI). *Physiologist,* vol. 23, Dec. 1980, p. S-129, S-130. 10 refs. Grant No. NsG-9047.

Recently, data have been accumulating to indicate that saccular and utricular otoconial complexes of the gravity receptor organs are dynamic and interact constantly with their environment. This study investigates the possibility that the ionic composition of the surrounding fluid influences calcium ion binding and release, and explores the importance of the K(+)/Na(+) ratio. Two in-vitro methods were developed, the first of which employed artificial endolymph and perilymph while ionically balanced fluids in which only the K(+)/Na(+) was altered were used in the second. The ability of rat complexes to take up Ca-45(++) during incubation with these fluids was assessed using liquid scintillation spectrometry. In vitro uptake of Ca-45(++) was greater in fluids with a high K(+)/Na(+) ratio than in fluids in which the ratio was low. The ability of the complexes to take up Ca-45(++) appeared to decline with age. (Author)

STAR ENTRIES

N82-16700# Oak Ridge National Lab., Tenn. Biology Div.
POSSIBLE MECHANISM FOR CHEMICAL INDUCTION OF CHROMOSOME ABERRATIONS IN MALE MEIOTIC AND POSTMEIOTIC GERM CELLS OF MICE
Walderico M. Generoso 1981 16 p refs Presented at 4th Intern. Symp. of the Radiation Biol. Center, Kyoto, 28 Sep. 1981 Sponsored in part by EPA
(DE81-031999; CONF-810966-1) Avail: NTIS HC A02/MF A01

The mechanisms by which chemically induced lesions in the chromosomes of mammalian germ cells are actually converted to aberrations and transmitted to progeny are investigated. An attempt is made to explain how dominant-lethal mutations and heritable translocations are produced from chemical treatment of meiotic and postmeiostic germ cells of male mice. DOE

N82-16701# Environmental Protection Agency, Corvallis, Oreg. Environmental Research Lab.
VARIATION IN PLANT RESPONSE TO OZONE: A CONCEPTUAL MODEL OF PHYSIOLOGICAL EVENTS
D. T. Tingey and G. E. Taylor, Jr. 1980 47 p refs Presented at 32nd Symp. on Effects of Gaseous Air Pollution in Agr. and Hort., Nottingham, England, 1 Sep. 1980 Prepared in cooperation with Oak Ridge National Lab.
(Contract W-7405-eng-26)
(DE81-029692; CONF-8009172-1) Avail: NTIS HC A03/MF A01

The environment and genotype exert profound influences on a plant's ozone response. Based on the multiplicity of physiological mechanisms responsible for variable response, a common progression of events is proposed: ozone conductance (gas and liquid phase), perturbation, homeostasis, and injury. Injury is the repercussion of the preceeding events. Gas and liquid phase conductances are significant sources of variable ozone response. Genic expression and environmental stimuli affect ozone conductance and homeostasis and thereby the extent of injury. Based on conceptual model, gas phase conductance would be the decisive factor controlling injury only if it were the rate limiting step. Any physiologically significant intervening event between gas-phase conductance and injury would reduce the association between them. Either liquid phase conductance of homeostasis could reduce that association. DOE

N82-16702# Colorado State Univ., Fort Collins. Dept. of Microbiology.
MICROBIOLOGICALLY-MEDIATED MUTAGENIC ACTIVITY OF CRUDE OIL Final Report, 1976 - 1979
Bruce A. Cummings and Ronald C. Gordon Sep. 1981 302 p refs
(Grant EPA-R-805041)
(PB82-105131; EPA-600/3-81-053) Avail: NTIS HC A14/MF A01 CSCL 06T

Crude oil was incubated with raw and sterile river water samples and assayed for mutagenic activity for the Ames test to determine the ability of naturally occurring freshwater microorganisms to form mutagenic biodegradation products from crude oil. River water samples supplements with inorganic salts were incubated with one percent crude oil in Erlenmeyer flasks for 1-6 weeks and 4 and 20 C with shaking. Replicate flasks were extracted at various time intervals with 1,1-2 trichloro-1,2,2-trifluoroethane, the solvent evaporated and the residues taken up in dimethyl sulfoxide for mutagenicity testing. The extracts were assayed for mutagenic activity by the plate incorporation method of the Ames test with Salmonella tester strains TA 100, TA 1535, TA 1537, TA 1538 and TA 98. Mammalian liver microsomes were not used in the mutagenicity test system as the oil degrading microorganisms constituted the enzyme activation system in the study. GRA

N82-16703# Cincinnati Univ., Ohio. Inst. of Environmental Health.
MECHANISMS OF CADMIUM ABSORPTION IN RATS
Ernest. C. Foulkes, D. R. Johnson, Naoki Sugawara, Roland F. Bonewitz, and Cathleen Voner Sep. 1981 59 p refs
(Grant EPA-R-805840)
(PB82-108184; EPA-600/1-81-063) Avail: NTIS HC A04/MF A01 CSCL 06T

The study was undertaken in order to help clarify the factors which determine the fractional absorption of an oral load of cadmium (Cd) from the intestine of the rat. The experiments utilized intact segments of intestine, perfused or incubated in situ, with their blood supply intact. Absorption of Cd from the jejunal lumen can be ascribed to a saturable membrane system, that is after short periods of exposure essentially all the metal removed from the lumen was recovered in mucosal issue (Step 1). The second step in Cd absorption, i.e., transfer of the metal from mucosa into blood, proceeded at only 1-2% of the rate of uptake from the lumen (Step 1). No evidence was obtained for a role of metal lothionein in the mucosal retention of Cd. Step 1 of Cd absorption was inhibited by a variety of exogenous and endogenous factors. Thus, zinc was found to depress Cd transport in an apparently competitive manner. Addition of milk to the lumen also inhibited Cd uptake, an effect entirely due to the Ca content. Bile salts act as endogenous modulators of Cd absorption; their effect may be related to micelle formation. The research also included studies of duodenal and ileal Cd transport. GRA

N82-16704# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 15, NO. 6, NOVEMBER - DECEMBER 1981
12 Jan. 1982 154 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med (Moscow), v. 15, no. 6, Nov. - Dec. 1981 (JPRS-79849) Avail: NTIS HC A08/MF A01

Articles are presented which address life support systems; human and animal physiological responses to spacecraft environments, radiation and weightlessness; and flight fatigue in helicopter crews.

N82-16705# Joint Publications Research Service, Arlington, Va.
QUESTION OF REDISTRIBUTION OF BLOOD IN ORTHOSTATIC POSITION
G. S. Belkaniya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 1-9 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 4-9

Avail: NTIS HC A08/MF A01

The concept of two interacting constituents involved in the redistribution of the circulating blood volume in orthostasis, redistribution along the vertical (hydrostatic) and functional (metabolic) gradients, is discussed. On this basis, the possible mechanism responsible for orthostatic circulatory intolerance following an exposure to bed rest or weightlessness is described. Author

N82-16706# Joint Publications Research Service, Arlington, Va.
WAYS AND MEANS OF MAINTAINING HEAT BALANCE IN PILOTS AND COSMONAUTS
A. S. Barer *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 10-18 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 9-15

Avail: NTIS HC A08/MF A01

Different principles used in systems ensuring thermal balance of pilots and cosmonauts are discussed. Physiological and hygienic characteristics of the passive thermal insulation, ventilation systems, and liquid cooling (heating) suits are presented. A classification of the means and methods is proposed. Author

N82-16707# Joint Publications Research Service, Arlington, Va.

SYSTEMIC AND CEREBRAL HEMODYNAMICS IN FLIGHT PERSONNEL EXPOSED TO MODERATE HYPOXIA

V. N. Denisov, S. F. Rayev, and I. I. Antufyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 19-23 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 16-19

Avail: NTIS HC A08/MF A01

For the purposes of medical expertise the state of systemic and cerebral hemodynamics was investigated in 66 pilots with autonomic-vascular instability and in 36 healthy subjects exposed to moderate hypoxia (in an altitude chamber). The pilots showed noticeable tachycardia or systolic hypertension, as well as certain changes in cardiac output and stroke volume. These alterations were accompanied by rheoencephalographic changes of two types one of which can be regarded as an adverse response of cerebral circulation to hypoxia. It is concluded that the study of systemic and cerebral circulation in hypoxia yields important diagnostic information that allows better estimates. M.G.

N82-16708# Joint Publications Research Service, Arlington, Va.

CAUSES OF FATIGUE AMONG CREWS OF CIVIL AVIATION HELICOPTERS

Yu. N. Kamenskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 24-27 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 19-22

Avail: NTIS HC A08/MF A01

The role of vibration and noise in the development of fatigue in helicopter crews was assessed. The exposure to these factors during the flying shift results in an early and marked fatigue of pilots the level of which depends on the vibration effects to a larger extent than on the noise effects. The fatigue is followed by a decline of the psychophysiological parameters characterizing the visual and motor functions as well as the ratio of the basic processes in the central nervous system. M.G.

N82-16709# Joint Publications Research Service, Arlington, Va.

PHYSIOLOGICAL AND HYGIENIC EVALUATION OF VIBRATION IN THE COCKPIT OF A CARGO HELICOPTER

Yu. G. Matveyev and Yu. N. Kamenskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 28-32 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 22-25

Avail: NTIS HC A08/MF A01

The correlations between statistical parameters of vibration in the work place, work schedules, and functional state of subjects when performing commercial flights were studied. In the cockpit of five helicopters the floor and the chair vibrated in a band of 8 Hz at a frequency of 112.5 and 114.0 dB, respectively. Before and after the flying shift 66 crewmembers were interviewed and examined. Vibration was referred to as the most unpleasant factor by 30.4% of them, noise was defined as the most unpleasant factor by 6.5% of them; 63.1% described both factors as similarly adverse. The level of psychophysiological changes was proportional to the flight time. The first signs of fatigue were seen after flights of up to 5 hours in duration, to increase drastically after flights of 6 and 7 hours. M.G.

N82-16710# Joint Publications Research Service, Arlington, Va.

EVALUATION OF MAN'S ENDURANCE OF LOCAL PRESSURE TO THE HEAD AND OBJECTIVE ASSESSMENT OF HYGIENIC SPECIFICATIONS FOR PROTECTIVE HELMETS

V. M. Sinigin, Yu. G. Konakhevich, L. N. Sholpo, and A. I. Uglanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 33-37 Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 25-28

Avail: NTIS HC A08/MF A01

To obtain reference data for a statistically substantiated evaluation of man's tolerance to the local pressure on the head (as applied to protective helmets kept on for a long time), 86 experiments were carried out in which 11 test subjects participated. The local pressure of 0.05 to 0.5 kg/sq cm was applied to eight areas of the head. The tolerance time was measured as the time interval from the beginning of the exposure to the emergence of localized sensations of the type: unpleasant, painful, very painful, or intolerable. As a result, statistically significant relationships between the tolerance time and the level of the local pressure were obtained for the eight locations and four grades of subjective sensations. These data can be used in evaluating protective helmets to be worn for a long time as well as in developing hygienic requirements for the advanced helmet-like devices. Author

N82-16711# Joint Publications Research Service, Arlington, Va.

EFFECT OF TRANSMERIDIONAL FLIGHTS ON BIORHYTHM OF ZONE FORMATION BY STREPTOMYCES LEVORIS

A. P. Savelyev, A. Kh. Akhmadiyeva, and I. G. Akoyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 38-41 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 28-31

Avail: NTIS HC A08/MF A01

The transmeridioneal transportation of the temperature controlled colonies of Streptomyces levoris exerted a marked effect on its biorhythms. This included changes in the growth and zone formation rates and differences in the vector of changes as related to the flight direction. The vector of changes during an east-oriented airborne flight coincided with that in orbital flight with a similar direction of transportation. These findings as well as the results of studies of seasonal and diurnal rhythms of the actinomycete zone formation suggest the synchronizing effect of the periodicity of geophysical factors. M.G.

N82-16712# Joint Publications Research Service, Arlington, Va.

SIMULATION OF SOME OF MAN'S MOVEMENTS IN DIFFERENT GRAVITY FIELDS

A. V. Zinkovskiy, I. A. Trofimova, and V. A. Chistyakov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 42-45 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 31-33

Avail: NTIS HC A08/MF A01

The control of man's movements during adaptation to an altered gravity field was modeled by mathematical methods. Two types of movements were investigated: forearm displacement with various loads and repulsions from a support in zero-G and at high G's. It was shown that movement coordination in altered gravity fields can be maintained due to a rearrangement of the control over muscle contraction which includes changes in the amplitude and pattern of joint momenta in harmony with the gravity changes. M.G.

N82-16713# Joint Publications Research Service, Arlington, Va.

POSITIONS, MOVEMENTS AND EQUILIBRIUM OF RATS AFTER FLIGHTS ABOARD BIOSATELLITES

G. S. Ayzikov and A. S. Markin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 46-53 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 33-38

Avail: NTIS HC A08/MF A01

An examination of the Wistar-SPF rats flown onboard the biosatellites Cosmos-782, 936 and 1129 demonstrated significant changes in their postural, motor, and equilibrium reactions. The use of artificial gravity inflight produced a beneficial effect on the health state, motor activity, and simple reflex acts of the animals but worsened their movement coordination and equilibrium function. M.G.

N82-16714# Joint Publications Research Service, Arlington, Va.

CATHEPSIN ACTIVITY OF SKELETAL MUSCLE AND

MYOCARDIA MYOFIBRILS AFTER EXPOSURE TO WEIGHTLESSNESS AND ACCELERATIONS

S. S. Oganesyan and M. A. Eloyan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 54-59 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 38-42

Avail: NTIS HC A08/MF A01

The rats flown onboard Cosmos-605 and exposed to a synchronous experiment for 22 days showed an increased activity of myofibrillar cathepsins in skeletal muscles of different groups. In the flight rats the increase was greater than in the synchronous ground-based animals. This suggests a significant effect of weightlessness on the cathepsic activity. The parameter was partially normalized at R+ 25 or 26 days. The exposure of rats to accelerations of 4 and 5 G for 2 min daily during 2 weeks also increased the cathepsic activity of skeletal and myocardial myofibers. The parameter returned to normal a month after completion of acceleration exposures. Thus, changes in the proteolytic activity of myofibers of different muscles induced by weightlessness and acceleration are reversible. The significance of changes in the muscle tension as related to the mechanism of stimulation of proteolytic reactions is discussed. M.G.

N82-16715# Joint Publications Research Service, Arlington, Va.

CYTOKINETIC EVALUATION OF ERYTHROPOIESIS DURING LONG-TERM ORBITAL FLIGHTS

A. V. Ilyukhin and T. Ye. Vurkovskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 60-64 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 42-46

Avail: NTIS HC A08/MF A01

The mechanisms of erythropoietic changes at the cellular level during a prolonged exposure to weightlessness were investigated. Following 96-, 140- and 175-day space flights cytokinetic and morphological changes in erythropoiesis were observed. The count of circulating erythrocytes decreased inflight and their life time reduced postflight. The shortening of the life time of erythrocytes postflight was paralleled by increased proliferative activity of erythroid cells. The erythrocytic balance was not reached as late as R+36 days. B.W.

N82-16716# Joint Publications Research Service, Arlington, Va.

NOREPINEPHRINE AND ENZYMES OF SYNTHESIS AND DEGRADATION THEREOF IN THE RAT HYPOTHALAMUS FOLLOWING FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

T. Torda, R. Kvetnyanski, R. A. Tigranyan, Yu. Chulman, and A. M. Genin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 65-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 46-48

Avail: NTIS HC A08/MF A01

In the hypothalamus of weightless and centrifuged rats flown for 18.5 days onboard the biosatellite Cosmos-936, the noradrenaline concentration and activity of the enzymes involved in the *catecholamine synthesis and degradation were measured. It was* found that under the space flight influence the noradrenaline concentration and tyrosine hydroxylase, dopamine-beta-*hydroxylase, and monoamine oxidase activities remained unaltered.* These findings indicate that a prolonged exposure to weightlessness was not a stressogenic agent that could activate the *adrenergic system in the rat hypothalamus.* B.W.

N82-16717# Joint Publications Research Service, Arlington, Va.

HYGIENIC PRINCIPLES OF ONGOING MONITORING OF QUALITY OF RECYCLED WATER DURING SPACE FLIGHTS

V. M. Skuratov, V. B. Gaydadymov, and S. V. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 69-72 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 181 p 48-51

Avail: NTIS HC A08/MF A01

The hygienic principles used in the evaluation of the quality of reclaimed water onboard the spacecraft are presented. The parameter required for operational control and their hygienic significance are discussed. Author

N82-16718# Joint Publications Research Service, Arlington, Va.

TOXICOLOGICAL AND HYGIENIC ASPECTS OF IMPROVING ADDITIONAL PURIFICATION OF WATER RECLAIMED FROM URINE

Z. P. Pak, G. V. Lobacheva, M. M. Spiryayeva, Yu. Ye. Bezumova, T. P. Korotkova, V. P. Petina, and Ye. S. Yevdokimova *In its* USSR Rept.: *Space Biol. and Aerospace Med.*, Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 73-78 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 51-54

Avail: NTIS HC A08/MF A01

Comparative toxicological and hygienic studies of samples of reclaimed water obtained from urine with the use of different final purification variants were conducted. The sorption-catalytic *method of urine condensate repurification using a platinum-carbon* catalyst proved to be the most promising since it can ensure the production of toxicologically safe potable water. It was shown *experimentally that the quality of reclaimed water as related to* its chemical and toxicological parameters depends on the efficiency of the repurification unit. B.W.

N82-16719# Joint Publications Research Service, Arlington, Va.

POSSIBLE USE OF HOUSE FLY LARVAE FOR UTILIZATION OF ORGANIC WASTE IN BIOLOGICAL LIFE-SUPPORT SYSTEMS

Ye. G. Golubeva and T. V. Yerofeyeva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, v. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 79-83 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 54-57

Avail: NTIS HC A08/MF A01

Musca domestica larvae were grown in organic substrates of three types. The larval density was shown to influence certain parameters characterizing the fly life cycle and the larval utilization of the substrate. The larval development led to a decrease of the substrate mass, humidity and the content of organic matter. Man's native excrements were found to be the best substrate for M. domestica larvae. Author

N82-16720# Joint Publications Research Service, Arlington, Va.

DISTINCTIONS OF REGENERATION OF CONFINED ATMOSPHERE BY MEANS OF PHOTOSYNTHESIS OF UNICELLULAR ALGAE

G. I. Meleshko, L. M. Krasotchenko, and Ye. K. Lebedeva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 84-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 58-62

Avail: NTIS HC A08/MF A01

Systems of biological air regeneration using photosynthesis of unicellular algae are examined. An oxygen-carbon dioxide mismatch associated with the difference in gas exchange coefficients of man and algae is shown. The value and vector of the mismatch depend on the degree of the above difference. In the system balanced with respect to oxygen consumption and carbon dioxide production, the rate of the mismatch equals *to 1 per cent of either process per each unit of the difference* of the gas exchange coefficients in the second decimal point. Methods for regulating the algal assimilation coefficient based *on the use of various nitrogen forms for algal nutrition and* controlled biosynthesis are discussed. Optimal variants of gas exchange balance in the semi-closed biological life support systems *are described.* B.W.

N82-16721# Joint Publications Research Service, Arlington, Va.

PHENOMENA OF FLUCTUATION OF HUMAN REACTION TO ANTIORTHOSTATIC POSITION

L. Lkhagva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan.

1982 p 91-94 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 63-65
Avail: NTIS HC A08/MF A01

The biorhythmological analysis of the data obtained from seven healthy male test subjects in the head-down position at -8 deg revealed phemonena of sine-shaped reactions. This pattern was seen in the range (the difference between mean day-time and mean night-time values) of heart rate, amplitude (the difference between the maximum and minimum) of variations of body temperature and renal potassium excretion, and the evening-morning difference of body temperature variations. Author

N82-16722# Joint Publications Research Service, Arlington, Va.

RESULTS OF STUDY OF HEMODYNAMICS AND PHASE STRUCTURE OF THE CARDIAC CYCLE DURING FUNCTIONAL TEST WITH LOWER BODY NEGATIVE PRESSURE DURING 140-DAY SALYUT-6 STATION FLIGHT

A. D. Yegorov, O. G. Itsekhovskiy, I. I. Kasyan, A. P. Polyakova, V. F. Turchaninova, I. V. Alferova, V. G. Savelyeva, M. V. Domracheva, V. G. Doroshev, Ye. A. Kobzev et al *In its* USSR Rept.: Space Biol. and Aerospace Med. Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 95-100 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 65-69

Avail: NTIS HC A08/MF A01

The two members of the 140-day permanent Salyut-6 space flight were exposed to five lower body negative pressure (LBNP) tests at -25 and -35 mm Hg for 2 and 3 min, respectively. Circulation responses to the LBNP tests were measured with respect to the heart rate, arterial pressure, chronocardiogram, and cardiac output. As compared to the preflight data, inflight responses were characterized by a greater tachycardia, preload insufficiency, and vascular tone in the absence of orthostatic intolerance. Possible mechanisms of the changes in the circulation responses are discussed. Author

N82-16723# Joint Publications Research Service, Arlington, Va.

SUCCINATE DEHYDROGENASE AND CYTOCHROME OXIDASE ACTIVITY IN TISSUES OF RATS SUBMITTED TO LONG-TERM HYPOKINESIA

V. V. Smirnov and P. P. Potapov *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 101-103 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 69-71

Avail: NTIS HC A08/MF A01

The activity of cytochrome oxidase in the liver, skeletal muscles, kidneys, brain and lungs of 56 white rats decreased on days 15 and 60 of the hypokinetic study. The activity of succinate dehydrogenase significantly lowered in the brain and slightly diminished in the lungs and skeletal muscles on the same days. The activity of succinate dehydrogenase in the liver increased on the 90th hypokinetic day. Author

N82-16724# Joint Publications Research Service, Arlington, Va.

LIPID SPECTRUM OF THE MYOCARDIUM OF WHITE RATS EXPOSED TO HYPOXIC HYPOXIA

S. A. Sergeyev and G. A. Gribanov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 104-108 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 71-74

Avail: NTIS HC A08/MF A01

By a modified microthin-layer chromatography the total lipid spectrum of the cardiac muscle of white rats exposed to acute oxygen deficiency in an altitude chamber was investigated. It was found that the content of total lipids, phospholipids, free cholesterol, free fatty acids and triglycerides decreased during acute hypoxia. The exposure induced changes in the amount of glycerophosphatids, phosphatid acids and polyglycerophosphatids whose content diminished significantly. The concentration of phosphatidyl serines and phosphatidyl ethanol amines lowered to a lesser extent while that of sphyngomyelins increased. Acute oxygen deficiency accelerates the release of inorganic phosphate from the heart, thus, together with other factors, leading to disorders in the heart energetics. These findings indicate an important role of hypoxic hypoxia in the disturbances of lipid metabolism of the myocardium. This needs to be taken into consideration in the diagnostics and treatment of such states. Author

N82-16725# Joint Publications Research Service, Arlington, Va.

STATIONARY MAGNETIC FIELDS AND RETICULAR INFLUENCES ON ADRENERGIC AND CHOLINERGIC SYSTEMS

L. D. Klimovskaya and A. F. Maslova *In its* USSR Rept.: Space Biol. and Aerospace Med. Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 109-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 74-76

Avail: NTIS HC A08/MF A01

An exposure of rabbits to a constant magnetic field of 0.4 T for one hour caused increases in the blood content of adrenaline, noradrenaline, and acetylcholine, and in the adrenal content of adrenaline. Stimulation of the midbrain reticular formation led to a significant increase of the blood concentration of catecholamines and acetylcholine. After an exposure to the constant magnetic field the stimulatory effects of the reticular formation on the adrenergic systems diminished and on the cholinergic systems remained elevated. R.J.F.

N82-16726# Joint Publications Research Service, Arlington, Va.

CLINICAL DISTINCTIONS OF RADIATION SICKNESS WITH EXPOSURE OF DIFFERENT PARTS OF THE HUMAN BODY TO RADIATION

G. F. Nevskaya, G. M. Abramova, M. A. Volkova, Ye. V. Kavlycheva, A. S. Skorik, and V. V. Yurogov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 113-118 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 77-80

Avail: NTIS HC A08/MF A01

The clinical picture of radiation sickness of 139 radiological patients exposed to local irradition of the head, chest, and stomach with efficient doses of 210 rad was examined. It was found that at fractionated local irraditions the clinical symptom-complex of radiation sickness was identifical to that seen as a result of total-body irradiation. During head irradiation the major symptom was headache and during stomach irradiation nausea. The severity level of radiation damage measured with respect to the clinical symptom-complex as a whole with the aid of the bioinformation model was similar during irradiations of the head and stomach, much higher during irradiation of the chest. During head and stomach irradiations the severity level of radiation damage was proportional to the efficient dose. During chest irradiation there was no correlation between the severity level and the exposure to doses of 210 rad. Author

N82-16727# Joint Publications Research Service, Arlington, Va.

METHOD OF RECORDING ROTATORY EYE REFLEXES

M. M. Levashov and A. V. Dmitriyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 119-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec 1981 p 80-82

Avail: NTIS HC A08/MF A01

A method of recording rotatory eye reflexes in real time using polarized light is described. When a beam of light going to the photodetector is passed successively through two polarizers, illumination of the detector will depend on reciprocal orientation of polarization planes. Reciprocal rotation of polarization planes alters illumination proportionally to the cosine of angle of rotation. When the planes are parallel (0 degree angle), illumination is at a maximum, and when one of the planes is rotated 90 degrees in relation to the other, it is minimal. A miniature photoresistor is used as a detector, and it is covered with polarizing layer. The detector is placed on the anesthetized eyeball with suction cups. The light source and miniaturized amplifier unit were assembled on a mask worn over the subject's head. R.J.F.

N82-16728# Joint Publications Research Service, Arlington, Va.

ELECTRODE UNIT FOR TESTING HUMAN H REFLEX

V. I. Zborovskaya and E. A. Skiba *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 123-124 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 82-83

Avail: NTIS HC A08/MF A01

Use of a method of recording H reflexes that makes it possible to test the level of reflex activity of spinal motoneurons at rest and during movement, as well as to make qualitative and quantitative evaluations of various supraspinal and afferent factors is discussed. An electrode unit for electrostimulation of peripheral nerves or muscles was made. It has 6 electrodes 8-10 mm in diameter, which are mounted on an elastic dielectric plate. Rounded corners of the plate protect the skin from trauma when the electrode unit is secured firmly. The electrode unit is secured firmly to the region of the popliteal fossa, connected to the electrosimulator through a selector which connects the unit electrodes one after the other. The stimulation point is determined from the nature and magnitude of responses elicited in the muscle innervated by the stimulated nerve. R.J.F.

N82-16729# Joint Publications Research Service, Arlington, Va.

COMPARATIVE ANTIHYPOXIC EFFICACY OF PRESSURE CHAMBER CONDITIONING AND FASTING OF MAN

A. Yu. Katkov, Ye. A. Kovalenko, R. N. Chabdarova, G. A. Davydov, S. A. Vtoryy, and N. M. Utkina *In its* USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec. 1981 (JPRS-79849) 12 Jan. 1982 p 125-128 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 84-86

Avail: NTIS HC A08/MF A01

Two theoretically possible means of enhancing man's resistance to rapidly increasing hypoxia, pressure chamber conditioning and fasting, are studied. Eleven essentially healthy men were divided into two groups. The first group of subjects was submitted to 10-day pulsed pressure chamber conditioning. The second group of subjects spent 14 days on a total fast, without limiting water intake. Endurance of hypoxia in the first group was determined before pressure chamber conditioning and immediately after it, and in the second group before the fast and on the 14th day of food deprivation. The subject was raised continuously in the chamber at the rate of 20 m/s at rest, to maximum tolerance of altitude. The subject was raised again at the same speed 30 minutes after descending to 'Earth', but with concurrent performance of exercise on a bicycle ergometer constituting 200 kg-m/minutes. In both cases, the subject had to report the current altitude when so instructed. In the course of the test, a continuous recording of oxygen tension in the skin of the left forearm was made by the polarographic method. At normal barometric pressure, body weight, gas exchange, morphological and gas composition, and acid-base equilibrium of capillary blood was determined. R.J.F.

N82-16730# Joint Publications Research Service, Arlington, Va.

CONDITION OF MENINGEAL NERVOUS SYSTEM DURING REPEATED EXPOSURE TO TRANSVERSE ACCELERATIONS

G. A. Konstantinovskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 6, Nov. - Dec 1981 (JPRS-79849) 12 Jan. 1982 p 129-132 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 6, Nov. - Dec. 1981 p 86-88

Avail: NTIS HC A08/MF A01

The nerve elements of the dura and pia mater of the brain of 19 puberal cats weighing 2 to 3 kg were examined following repeated exposure to transverse accelerations (chest-back) for 20 minutes at 24-hour intervals, for 6 days. A force of 8 units with a gradient of acceleration build-up and decline of 0.5 to 0.4 unit/s was generated on a centrifuge with a 5 m arm, equipped with specially molded containers, in which the animals were immobilized in their physiological position. The cats were sacrificed using ether fumes at different times after the experiments: 1, 3, 7, 30 and 90 days, which enabled experimentors to track the dynamics of recovery processes. The meninges of five intact animals of the same ages and weight served as a control. Nervous elements were demonstrated by means of silver nitrate impregnation according to Bielschowsky, in various modifications, followed by gold-plating and additional staining with nuclear-plasma stains. R.J.F.

N82-16732*# Electro-Optics Consultants, Inc., Huntsville, Ala.

DETECTION OF AMBLYOPIA UTILIZING GENERATED RETINAL REFLEXES Final Report

J. H. Kerr and S. H. Hay 13 Nov. 1981 52 p refs (Contract NAS8-33819)
(NASA-CR-161944; Rept-5153-33819) Avail: NTIS HC A04/MF A01 CSCL 06E

Investigation confirmed that GRR images can be consistently obtained and that these images contain information required to detect the optical inequality of one eye compared to the fellow eye. Digital analyses, electro-optical analyses, and trained observers were used to evaluate the GRR images. Two and three dimensional plots were made from the digital analyses results. These plotted data greatly enhanced the GRR image content, and it was possible for nontrained observers to correctly identify normal vs abnormal ocular status by viewing the plots. Based upon the criteria of detecting equality or inequality of ocular status of a person's eyes, the trained observer correctly identified the ocular status of 90% of the 232 persons who participated in this program. T.M.

N82-16733# Civil Aeromedical Inst., Oklahoma City, Okla.

FATIGUE IN FLIGHT INSPECTION FIELD OFFICE (FIFO) FLIGHT CREWS

C. E. Melton, J. M. McKenzie, S. M. Wicks, and J. T. Saldivar Apr. 1981 51 p refs
(AD-A106791; FAA-AM-81-13) Avail: NTIS HC A04/MF A01 CSCL 06/19

Studies related to FIFO aircrew stress and fatigue were carried out at seven FIFO's in the Continental U.S. Forty-one men served as subjects and all crew positions were presented. Each crewmember was studied during flight activities and during office based activities. Generally, crews were in travel status during flight inspection activities and away from the office for 5 d. Crewmembers completed fatigue checklists before and after each duty on every workday. Urine specimens were collected that represented the night sleep period and the work period; they were analyzed for 17 ketogenic steroids, epinephrine, and norepinephrine, and values were expressed as weight per hundred milligrams of urinary creatinine. Ambulatory electrocardiograms were recorded for determination of heart rate (HR) during work. The data indicate that office work is distinctly less fatiguing than flight work. This finding is supported by the HR data that indicate a lower workload in the office than in flight. The statement is commonly made by crewmembers that office work is more fatiguing than flight work. It is probable that such statements are based on work preference rather than work level. Some crewmembers at Oklahoma City, Atlanta, Los Angeles, and Battle Creek show severe fatigue associated with flight work. GRA

N82-16734# Desmatics, Inc., State College, Pa.

ACCELERATION MEASURES AND MOTION SICKNESS INCIDENCE

Carl A. Mauro and Dennis E. Smith Nov. 1981 24 p refs Presented at the Intern. Workshop on Res. Methods in Human Motion and Vibration Studies, New Orleans 16-18 Sep. 1981
(Contract N00014-79-C-0128; NR Proj. 207-037)
(AD-A107996; TR-112-10) Avail: NTIS HC A02/MF A01 CSCL 06/19

An important aspect of motion sickness research is to establish quantitative relationships between sickness incidence and various parameters of the motions that induce sickness. At present, however, only wholebody vertical sinusoidal motion has been studied to any reasonable degree. The purpose of this report is to examine the predictive utility of six different characterizations of sinusoidal motion and to investigate their possible extension to dual frequency motion. Author (GRA)

N82-16735# Oak Ridge National Lab., Tenn. Chemical Effects Information Center.

CHEMICALS IDENTIFIED IN HUMAN BIOLOGICAL MEDIA

M. Virginia Cone and Cindy Stroup (EPA) 1981 6 p refs Presented at 2nd EPA/NCI Ann. Collaborative Workshop Environ.

and Occupational Cancer Studies, Rockville, Md., 9-11 Sep. 1981
(Contract W-7405-eng-26)
(DE81-030813; CONF-810959-1) Avail: NTIS HC A02/MF A01

Sources of data are from the world literature, retrospective to 1974. Information from approximately 1500 documents is in the data base at the present time. The data base contains information on 750 chemicals. Approximately 10% of the total documents in the file concerned pesticides; 30% drugs; and 40% metals. The remaining 20% were about other substances, including industrial chemicals and organics which are of interest to NCI and EPA. T.M.

N82-16736# Michigan Univ., Ann Arbor. Highway Safety Research Inst.
REVIEW OF LITERATURE AND REGULATION RELATING TO THORACIC IMPACT TOLERANCE AND INJURY CRITERIA Final Report, Jul. 1980 - Jun. 1981
Robert L. Hess, Kathleen Weber, and John W. Melvin Jul. 1981 281 p refs Sponsored in part by Motor Vehicle Manufacturers Association
(PB82-108697; UM-HSRI-81-38) Avail: NTIS HC A13/MF A01 CSCL 06S

The technical and scientific literature dealing with thoracic injury to or within the rib cage, from blunt loading is reviewed. The history of the development of associated Federal Motor Vehicle Safety Standards is reviewed from the aspect of its relationship to the history of development of the research information. Field case data from car-to-car and car-to-tree/pole crashes has been examined and summarized. This study suggests that the laboratory research has not adequately covered the principal variables found to exist in actual injury cases. Specifically more research attention should be given to the shape of the impactor, to the loading location and directory, and to injuries in the contusion and/or laceration family. Correspondingly, the accident investigation process needs to be more sensitive to occupant/vehicle interior interaction variables so that laboratory research can be properly guided. GRA

N82-16737# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
HUMAN REACTIONS TO ELF ELECTRIC AND MAGNETIC FIELDS: AN ANNOTATED BIBLIOGRAPHY OF CURRENT LITERATURE
J. Patrick Reilly Jul. 1981 42 p
(PB82-102567; PPSP/JHU/PPSE-T-20) Avail: NTIS HC A03/MF A01 CSCL 06P

This annotated bibliography lists current literature (since 1960) which applies to human reactions to electric and magnetic fields from 10 Hz to 100 Hz, with an emphasis on power frequency fields. This includes direct experimental work with humans, epidemiological studies, work which uses animal studies to draw interferences about human reactions, studies concerning human dosimetry, and works which discuss means for human protection. GRA

N82-16738# Centro Informazioni Studi Esperienze, Milan (Italy).
IN VIVO RECORDING OF BLOOD VELOCITY PROFILES AND STUDIES IN VITRO OF PROFILE ALTERATIONS INDUCED BY KNOWN STENOSES
M. Bassini, E. Gatti (Politecnico di Milano), T. Longo (Milan Univ.), G. M. Martinis, P. Pignoli (Milan Univ.), and P. L. Pizzolati 1980 36 p refs Presented at the 4th Intern. Conf. of the Cardiovascular System Dyn. Soc. Peripheral Vascular Hemodyn.: Basic and Clinical Aspects, Miami, Fla., 12-15 Nov. 1980
(PB81-244139; CISE-1655) Avail: NTIS HC A03/MF A01 CSCL 06B

Measurements were obtained with a pulsed ultrasonic instrument based on the analysis of the cross-correlation function of blood diffused echoes. The alterations and velocity in the time domain were studied in vitro as function of the distance between stenosis and measuring point, and position of the sample volume along the diameter. These studies may be useful for a better comprehension of blood velocity measurements made with ultrasound equipments for clinical non-invasive diagnostic purposes. T.M.

N82-16739# Rice Univ., Houston, Tex. Dept. of Psychology.
CHOOSING AMONG ALTERNATIVES WITH UNCERTAIN OUTCOMES: EFFECT OF PRIOR CURING AND ESTIMATION REQUIREMENTS
Shanta P. Kerkar and William C. Howell Aug. 1981 45 p refs
(Contract N00014-78-C-0555; NR Proj. 197-050)
(AD-A106143; TR-81-2) Avail: NTIS HC A03/MF A01 CSCL 05/1

Previous investigations by the authors have shown that judgments of frequency or probability have a facilitatory influence on subsequent predictive choice performance. The present study examined both these judgement processes more closely in an attempt to understand how they affect choices. Five groups of subjects served as emergency vehicle dispatchers for a hypothetical city. The experimental design involved a 2 x 2 factorial combination of response set and estimation task. More specifically, response set, defined as expectation of a frequency or probability response requirement, was crossed with actual response requirement, either frequency or probability estimation, in a between-groups design. Author (GRA)

N82-16740# RAND Corp., Santa Monica, Calif.
AN ANALYSIS OF COGNITIVE MAPPING SKILL Interim Report
Perry W. Thorndyke and Sarah E. Goldin Mar. 1981 66 p refs
(Contract MDA903-79-C-0549)
(AD-A106145; RAND/N-1664-ARMY) Avail: NTIS HC A04/MF A01 CSCL 08/2

Compares the performance of good and poor cognitive mappers on a variety of spatial knowledge acquisition and judgment tasks. Cognitive mapping skill was assessed by measuring subjects' knowledge of a highly overlearned environment, their home community. Subjects categorized as good or poor cognitive mappers participated in a series of experiments that examined learning a novel environment from navigation experience, map learning, map using and map interpretation, spatial judgments based on a memorized map, and navigation in a novel environment based on a memorized map. Good mappers performed more accurately than poor mappers in learning a novel environment, learning maps, and making spatial judgments based on a memorized map. Map using, map interpretation, and navigation tasks did not distinguish good from poor mappers. We conclude that, relative to poor mappers, good cognitive mappers are better able to encode and retain spatial information in memory and to mentally transform or manipulate spatial information in order to make spatial judgements, and we hypothesize that differences in spatial visualization and visual memory abilities may underlie these variations in task performance. Author (GRA)

N82-16741# RAND Corp., Santa Monica, Calif.
ABILITY DIFFERENCES AND COGNITIVE MAPPING SKILL Interim Report
Perry W. Thorndyke and Sarah E. Goldin Mar. 1981 66 p refs
(Contract MDA903-79-C-0549)
(AD-A106389; RAND/N-1667-Army) Avail: NTIS HC A04/MF A01 CSCL 08/2

Compares good and poor cognitive mappers on a number of individual difference variables potentially related to cognitive mapping skill: spatial abilities, visual/verbal processing style, motivation, and experience. Good and poor mapper groups were given several assessment tests for each of these categories. Comparisons of good and poor mappers' performance on these tests indicated that only spatial abilities reliably distinguished good mappers from poor mappers. Good cognitive mappers showed greater visualization ability, spatial orientation ability, visual memory, and field independence. Other measures showed no between-group differences. It is concluded that spatial ability is a major determinant of cognitive mapping skill and that spatial ability tests can be used to select personnel for tasks requiring navigation, orientation, and spatial judgment skills. Author (GRA)

N82-16742*# Minnesota Univ., St. Paul. Dept. of Food Science and Nutrition.
STORAGE STABILITY AND IMPROVEMENT OF INTERMEDIATE MOISTURE FOODS, PHASE 5 Final Report, 1 Oct. 1976 - 28 Feb. 1978
Theodore P. Labuza 28 Feb. 1978 399 p refs
(Contract NAS9-12560)
(NASA-CR-167503) Avail: NTIS HC A17/MF A01 CSCL 06H

A method for measuring water binding (a sub w) in gels

which was developed and applied to various macromolecular geling agents in order to elucidate their mechanism of water binding was confirmed with concurrent studies using NMR, X-ray diffraction and dye diffusion. The vapor pressure manometric method for a sub w was further refined to give a sub w to + or - 0.0001 units, and a new fiber cup procedure was tested against it. The effectiveness of low a sub w on inhibiting potential toxin production by S. aureus was demonstrated. In addition, ethanol, was shown to be an effective antimicrobial agent at low concentration in lowered a sub w systems. The results of a study of vitamin C loss during processing at high temperature (60-150C) show a change to zero order kinetics due to poor oxygen solubility. Steady state temperature data can be used to predict losses during unsteady state processing. Non-enzymatic browning can be reduced at higher process temperature if residence time decreases. A shelf stable IMF processed cheese food was developed and shown to be acceptable in storage.
A.R.H.

N82-16743*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A HYDRODYNAMIC MODEL OF AN OUTER HAIR CELL
Bo O. Jacobson 1982 14 p refs To be presented at the 19th Ann. Northeast Bioengr. Conf., Hanover, New Hampshire, 15-16 Mar. 1982; sponsored by the Thayer School of Engineering Dartmouth Med. School, IEEE, ASME, and the American Society for Engineering Education
(NASA-TM-82773; E-1098) Avail: NTIS HC A02/MF A01 CSCL 06P

On the model it is possible to measure the force and the force direction for each individual hair as a function of the flow direction and velocity. Measurements were made at the man flow velocity .01 m/s, which is equivalent to a flow velocity in the real ear of about 1 micrometer/s. The kinematic viscosity of the liquid used in the model was 10,000 times higher than the viscosity of perilymph to attain hydrodynamic equality. Two different geometries for the sterocilia pattern were tested. First the force distribution for a W-shaped sterocilia pattern was recorded. This is the sterocilia pattern found in all real ears. It is found that the forces acting on the hairs are very regular and perpendicular to the legs of the W when the flow is directed from the outside of the W. When the flow is reversed, the forces are not reversed, but are much more irregular. This can eventually explain the half wave rectification of the nerve signals. As a second experiment, the force distribution for a V-shaped sterocilia pattern was recorded. Here the forces were irregular both when the flow was directed into the V and when it was directed against the edge of the V. T.M.

N82-16744# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE EFFECTS OF MICROPHONES AND FACEMASKS ON LPC VOCODER PERFORMANCE
Elliot Singer 25 Sep. 1981 26 p refs
(Contract F19628-80-C-0002; AF Proj. 2283)
(AD-A107908; TR-584; ESD-TR-81-277) Avail: NTIS HC A03/MF A01 CSCL 05/8

The effects of oxygen facemasks and noise cancelling microphones on LPC vocoder performance were analyzed and evaluated. Likely sources of potential vocoder performance degradation included the non-ideal frequency response characteristics of the microphone, the acoustic alterations of the speech waveform due to the addition of the facemask cavity, and the presence of breath noise imposed by the close-talking requirement. It is shown that the presence of the facemask produces a vowel-dependent reduction in the bandwidths of the upper speech formants. In addition, the low frequency emphasis normally associated with small enclosures is shown to occur when a pressure microphone is employed for transduction. Noise cancelling microphones, which are sensitive to the pressure gradient, do not exhibit this effect. Finally, an acoustic tube model of the vocal tract and facemask is presented which predicts the absence of spurious resonances within the frequency band of typical narrowband vocoders. Evidence supporting these assertions is presented based on observed vowel spectra. Evaluations performed using Diagnostic Rhyme Tests indicate that the presence of the oxygen facemask and noise cancelling microphone does not result in a significant increase in the LPC vocoder processing loss. Author (GRA)

N82-16745# Bunker-Ramo Corp., Westlake Village, Calif. Electronics Systems Div.
PILOT WORKLOAD: A SURVEY OF OPERATIONAL PROBLEMS Final Technical Report, Apr. 1979 - Sep. 1980
Larry Butterbaugh, Debra Warner, Peter Lovering, and Sam Herron Wright-Patterson AFB AFWAL Aug. 1981 186 p refs
(Contract F33615-78-C-3614; AF Proj. 2403)
(AD-A107758; AFWAL-TR-81-3011) Avail: NTIS HC 09/MF A01 CSCL 01/3

Five hundred and seventy three USAF pilots responded to a survey which had as its objective the identification of operational, crew station design related causes of high pilot workloads. The survey consisted of mailed survey forms and personal interviews structured to conform with the critical incident technique of collecting user-provided data. The survey canvassed over 50 USAF organizations in collecting data for more than 30 currently flown USAF aircraft types. The role control/display design, crew station design, and equipment malfunctions play in contributing to cockpit workload is unique to each aircraft. Other factors, such as weather, flight schedules, and mission phase appear to contribute to cockpit workloads in most all the aircraft surveyed. Further, the reported situations, or critical incidents, indicate that high workloads result from the simultaneous occurrence or existence of several causes. For example, a high workload situation reported for the FB-111 consisted of an equipment failure while flying the low level penetration portion of a mission at night. All data collected has been catalogued for the establishment of an information base, and available for future use in conjunction with aircraft development programs or modernization/retrofit programs.Author (GRA)

N82-17239# Joint Publications Research Service, Arlington, Va.
STATUS OF SPACE BIOMEDICAL PROGRAMS
Avadalik Ignatyevich Burnazyan *In its* USSR Rept.: Space, No. 14 (JPRS-79711) 22 Dec. 1981 p 29-33 Transl. into ENGLISH from Pravda (Moscow), 15 Jun. 1981 p 3

Avail: NTIS HC A05/MF A01

Four specialized biological satellites in the Cosmos series conducted research to study the mechanisms of the effect of weightlessness, the combined effect of weightlessness and ionizing radiation, and the biological effect of artificial gravity on living systems. Devices developed included: a centrifuge for the creation of artificial gravity, an irradiator, instruments for rowing and fixing plant organisms. The cardiovascular system as studied during the so-called period of acute adaptation to weightlessness (the first 7 days of a flight). Special features of central and peripheral blood circulation and blood circulation in the brain were studied. A ballistic cardiography method judged the contractive function of the evaluated dynamics of blood flow, and detected functional disruptions in the cardiovascular system. A densiotography method was also used. An 'Oxygen' physiological experiment was performed utilizing a portable 'Oxymeter' instrument to determine oxygen pressure level changes and its consumption by body tissues. Radiation safety tests were also conducted using thermoluminescent dosimeters. Results of these tests are given. A center for processing of the data and hygienic and biophysical information that serves as a consultative-prognostic group is also described. M.D.K.

N82-17810 Rush Univ., Chicago, Ill.
SOME MECHANISMS OF CALCIUM TRANSPORT BY THE CARDIAC SARCOLEMMA Ph.D. Thesis
Ronald F. Ledvora 1981 80 p
Avail: Univ. Microfilms Order No. 8124733

Purified sarcolemmal membrane vesicles were prepared from frozen dog heart ventricles by a combination of differential and sucrose step gradient ultracentrifugation. The Ca ++ flux measurements were made using a rapid filtration technique. About 80 percent of the Ca(++) accumulated by Na(+)/Ca(++) exchange or Ca(++)/Ca(++) exchange could be released as free Ca(++), while up to 20 percent was probably bound. The mechanisms for Na(+)/Ca(++) exchange and Ca(++)/Ca(++) exchange are located in the sarcolemmal membrane of cardiac muscle cells. Both processes transport freely-exchangeable Ca(++) across the membrane. Electrogenic Na(+)/Ca(++) exchange may influence the excitability of the cardiac muscle cell. Both processes are probably carrier mediated transport mechanisms, although not by the same carrier. Both Na(+)/Ca(++) exchange and Ca(++)/Ca(+) exchange probably play important roles as Ca(++) homeostatic mechanisms in the cardiac muscle cell. Dissert. Abstr.

N82-17811 Illinois Univ. at Urbana-Champaign.
THE STRUCTURE AND FUNCTION OF CHLOROPHYLL-

PROTEINS IN PHOTOSYSTEM 1 AND THE LIGHT HARVESTING COMPLEX OF PHOTOSYSTEM 2 Ph.D. Thesis
John Emerson Mullet 1980 150 p
Avail: Univ. Microfilms Order No. 8127654

The functional units of chloroplast membranes which mediate photosynthetic electron transport from water to NADP are structurally organized into integral complexes. Two of these membrane-bound complexes, Photosystem I (PSI) and Photosystem II (PS II), consist in part of chlorophyll proteins. Photosystem I complexes were isolated by a technique which allowed purification of PSI which retained characteristics attributed to PS I in vivo. The purified PS I complexes were further fractionated by detergent treatment and PS I complexes which were depleted of chlorophyll proteins were isolated. The major chlorophyll-protein of chloroplast membranes which is structurally organizing into light harvesting complexes associated with PS II was isolated and characterized and its role in thylakoid adhesion tested. The chlorophyll-protein complex, termed LHC-II, were incorporated into lipid vesicles; this preparation was used to demonstrate the involvement of LHC-II in cross-membrane adhesion between thylakoid membranes. Dissert. Absrt.

N82-17812# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL. 15, NO. 5, SEP. - OCT. 1981
O. G. Gazenko, ed 2 Nov. 1981 146 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981
(JPRS-79346) Avail: NTIS HC A07/MF A01

The varied effects of space flight factors on the human body are addressed. Results of simulation studies as well as data gathered in-flight are presented. Experimental studies performed on rats flown onboard various Cosmos satellites are also included.

N82-17813# Joint Publications Research Service, Arlington, Va.
IN-FLIGHT DIETS AND QUANTITATIVE ADEQUACY THEREOF TO PILOT EXPENDITURE
I. G. Popov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 1-13 refs Transl. into English from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 4-14

Avail: NTIS HC A07/MF A01

Nutrition of aircraft crews in prolonged flights is discussed. Meal arrangements in flights of up to 4 hours, physiological-hygienic requirements to flight diets and, on this basis, possible improvement of crew nutrition through a better utilization of meals on the ground are addressed. The Soviet and foreign data on pilot energy expenditures and caloric value of diets in flights over 4 hours are reviewed with emphasis on potential development of excessive food intake with symptoms of acute overeating in prolonged flights. J.M.S.

N82-17814# Joint Publications Research Service, Arlington, Va.
EFFECT OF STATIONARY MAGNETIC FIELD ON THE ENDOCRINE SYSTEM
Ye. A. Zagorskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 14-20 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 14-17
Avail: NTIS HC A07/MF A01

It is indicated that endocrine glands react to the constant magnetic field (CMF). The phasic pattern of the hypophyseal-adrenal reaction and GMF effects on the sympathoadrenal system and thyroid are discussed. The potential therapeutic applications of the CMF is addressed with emphasis on the fact that most morphological data available need biochemical support. J.M.S.

N82-17815# Joint Publications Research Service, Arlington, Va.
DIET OF CREWS OF THREE MAIN EXPEDITIONS ABOARD SALYUT-6 ORBITAL STATION
V. P. Bychkov, S. Kalandarov, M. V. Markaryan, N. D. Radchenko, K. A. Stepchkov, and M. L. Frumkin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 21-25 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 17-20
Avail: NTIS HC A07/MF A01

The advanced space diets of three prime crews who made 96-, 140- and 175-day flights aboard Salyut-6 are described. It is concluded that the diets facilitated maintenance of a good nutrient status, high work capacity and normal health condition. J.M.S.

N82-17816# Joint Publications Research Service, Arlington, Va.
AMINO ACID METABOLISM DURING PROLONGED INTAKE OF DEHYDRATED FOODS AND SIMULATION OF SOME SPACE FLIGHT FACTORS
V. P. Bychkov, I. I. Borodulina, and T. F. Vlasova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 26-29 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. Oct. 1981 p 21-23

Avail: NTIS HC A07/MF A01

Forty-two healthy volunteers, aged 19 to 49, participated in three bed rest studies of 69 to 180 days in duration. The test subjects were kept on the diet consisting of dehydrated foods: fresh, stored for up to 2 years, and exposed to proton irradiation at a dose of 24,000 rad. Metabolism of amino acids was investigated under these conditions. It was concluded that during prolonged storage and irradiation proteins of dehydrated foods retained their biological value. This allows their use in long term space flights. Author

N82-17817# Joint Publications Research Service, Arlington, Va.
EFFECT OF SPACE FLIGHTS OF DIFFERENT DURATION ON ENERGY METABOLISM OF HUMAN ERYTHROCYTES

A. S. Ushakov, S. M. Ivanova, S. S. Brantova, and O. I. Labetskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 30-34 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 23-27

Avail: NTIS HC A07/MF A01

The energy metabolism of red blood cells of cosmonauts was investigated before and after flights of varying duration. Certain changes in red blood metabolism were found after prolonged space flights. Author

N82-17818# Joint Publications Research Service, Arlington, Va.
PREVENTION OF STAPHYLOCOCCAL INFECTIONS DURING SPACE FLIGHTS
S. N. Zaloguyev, A. N. Viktorov, V. P. Gorshkov, T. Yu Norkina, and M. M. Shinkareva *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 35-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 27-29
Avail: NTIS HC A07/MF A01

The incidence of carriers of photogenic staphylococci among cosmonauts and candidates (applicants) for positions of crew members in spacecraft was investigated. The staphylococcal flora of carriers were assessed while they participate in space flights varying in duration. Samples of microflora were taken from people in their ordinary habitat by means of cotton swabs. To collect samples of miroflora from cosmonauts while in the cabin of a spacecraft, specially developed test tubes containing a preservative were used. The material was analyzed under laboratory conditions after delivering specimens to Earth. Pathogenic staphylococci (Staph. aureus) were identified by testing the capacity to decompose mannitol under anaerobic conditions, production of the enzymes, coagulase and lecithinase, as well as on the basis of presence and intensity of toxin production, in the isolated cultures. The strains of pathogenic staphylococci were submitted to phage typing using the international set of staphylococcal bacteriophages. J.M.S.

N82-17819# Joint Publications Research Service, Arlington, Va.
HUMAN ADRENOSYMPATHETIC SYSTEM DURING IMMERSION IN WATER
N. A. Davydova, R. A. Tigranyan, and Ye. B. Shulzhenko *In its*

USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 39-44 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 30-34

Avail: NTIS HC A07/MF A01

The activity of the sympathoadrenal system (SAS) of 12 volunteers exposed to water immersion for 7 days was studied. Before and after water immersion, six of the test subjects were exposed to acceleration of +3 Gz for 15 min. It was demonstrated that water immersion increased the hormonal activity and decreased the transmitter activity of the SAS. Exposure to acceleration stimulated the SAS, thus increasing immersion tolerance. Author

N82-17820# Joint Publications Research Service, Arlington, Va.

COMBINED EFFECT OF SIMULATED WEIGHTLESSNESS AND ACCELERATIONS ON ENERGY METABOLISM ENZYMES

Ye. G. Vetrova, T. Ye. Drozdova, R. A. Tigranyan, and Ye. B. Shulzhenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 45-49 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 34-38

Avail: NTIS HC A07/MF A01

Exposure to simulated weightlessness (7 day water immersion and 7 day head-down tilt) caused a decrease in the activity of malate (MDH) and isocitrate dehydrogenase (ICDH), and creatine phosphokinase (CPK) at the expense of its MM isoform whereas the activity of alanine (ALT) and aspartate aminotransferase (AST) and pattern of distribution of MDH isoforms remained unchanged. Exposure to acceleration of +3 Gz before and after simulated weightlessness revealed similar changes in the activity of MDH, ICDH, ALT, AST and MDH cytoplasmic fractions. However, the higher increase in the enzyme activity after simulated weightlessness may give evidence for a greater change in cell membrane permeability during acceleration effects that followed simulated weightlessness. Author

N82-17821# Joint Publications Research Service, Arlington, Va.

CARDIAC OUTPUT AND CARDIAC CYCLE PHASE STRUCTURE OF PILOTS DURING FLIGHTS

V. A. Degtyarev, V. S. Bednenko, A. B. Vasilyev, A. N. Kozlov, V. Ya. Kolyagin, and A. P. Yarunin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 50-54 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 38-41

Avail: NTIS HC A07/MF A01

Changes in cardiac output and systolic time intervals of pilots in-flight were examined by the Doppler ultrasound method. The changes were related to the degree of complexity of different flight stages. It is recommended that the above parameters be monitored during flight training in order to standardize professional loads. Author

N82-17822# Joint Publications Research Service, Arlington, Va.

HUMAN LIPID METABOLISM DURING CONFINEMENT IN PRESSURE CHAMBER

V. P. Bychkov and O. S. Khokhlova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 55-58 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 41-43

Avail: NTIS HC A07/MF A01

The effect of prolonged enclosure, changed diet, atmosphere, and hypolinesia on lipid metabolism was investigated in 115 test subjects during 27 experimental runs. It was conducted that the changes in lipid metabolism occurred primarily due to reduced work load. Author

N82-17824# Joint Publications Research Service, Arlington, Va.

VITAMIN C, B SUB 1 AND B SUB 6 EXCRETION IN URINE DURING 182-DAY ANTIORTHOSTATIC HYPOKINESIA

V. P. Bychkov and V. A. Korshunova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 63-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 46-49

Avail: NTIS HC A07/MF A01

Renal excretion of ascorbic acid, thiamin, and 4-pyridoxic acid was studied in 18 test subjects exposed for 182 days to head-down tilt. Two groups of subjects (6 subjects in each) performed exercises of different work load and the third control group was exposed to hypokinesia as such. It is shown that exercises produced a beneficial effect on vitamin metabolism. It is recommended to develop preliminary adaptation to the work load planned as a countermeasure in real or simulated weightlessness. Author

N82-17825# Joint Publications Research Service, Arlington, Va.

JUGULAR, RIGHT ATRIAL PRESSURE AND CEREBRAL HEMODYNAMICS OF HEALTHY MAN SUBMITTED TO POSTURAL TESTS

V. Ye. Katkov, V. V. Chestukhin, V. V. Rumyantsev, A. Z. Troshin, and O. Kh. Zybin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 6873 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 49-53

Avail: NTIS HC A07/MF A01

Ten test subjects were catheterized and exposed to head up and head down tilts at 10, 30, and 75 deg for 5 min each to measure blood pressure in the upper bulb of the internal jugular vein and right atrium. Blood acid base equilibrium, hemoglobin content, and oxygen saturation were also determined. In the head up position at 75 deg the jugular pressure decreased, remaining positive (2.8 mm Hg) in most cases, whereas the atrial pressure fell down to reach the subatmospheric level. In the head down position the jugular pressure increases in proportion to the tilt angle, amounting to 32.2 mm Hg at 75 deg the atrial pressure changed in a different fashion: in 7 cases it increased and in 3 cases decreased. Throughout the test the oxygen arteriovenous difference in the brain and the acid base equilibrium in the outflowing blood remained essentially unchanged. This reflects autoregulation of the cerebral blood flow and its adequacy to metabolic requirements. Author

N82-17826# Joint Publications Research Service, Arlington, Va.

EFFECTS OF EMBIENT PARAMETERS ON MAN

R. M. Arslanova, I. Ye. Ganelina, V. Ye. Manoylov, L. K. Sapozhkov, and S. K. Churina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 74-77 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 53-55

Avail: NTIS HC A07/MF A01

The effects of meteogeophysical parameters on the incidence of cardiovascular disorders were studied. It is shown that geomagnetic activity has a negative effect on the incidence and that at certain seasons this effect is minimal. Author

N82-17827# Joint Publications Research Service, Arlington, Va.

ANTIHYPOXIC EFFICACY OF INTERMITTENT MODE OF PRESSURE CHAMBER CONDITIONING OF MAN

A. Yu. Katkov, Ye. A. Kovalenko, G. A. Davydov, R. N. Chabdarova, S. A. Vtoryy, A. P. Manik, Yu. A. Spasskiy, Yu. P. Starshinov, and N. M. Utkina *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 78-81 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 56-58

Avail: NTIS HC A07/MF A01

It is shown that a 10-day altitude chamber training in an intermittent mode can increase the maximum altitude man tolerates from 8,400 to 9,500 m and maximum time of exposure to increasing hypoxia (from 5,000 m) from 37 to 49 min. The antihypoxic effect of the above training persists for 10 days after its completion, leading to a better oxygen supply to various tissues. Author

N82-17828# Joint Publications Research Service, Arlington, Va.

INFORMATIVENESS OF ULTRASONIC DOPPLER CARDIOGRAPHY IN EVALUATION OF CORONARY CIRCULATION

V. S. Bednenko, V. A. Degtyarev, A. N. Kozlov, N. N. Popov, and G. K. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 82-86 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 58-61

Avail: NTIS HC A07/MF A01

The use of ultrasonic Doppler cardiography (with respect to the integral values of the signal at systole) to determine efficient coronary circulation was investigated in acute dog experiments (in comparison to the electromagnetic method) and in biophysical models. On the basis of the comparative studies it is concluded that ultrasonic Doppler cardiography can be applied to measure relative changes in the efficient coronary circulation. Author

N82-17829# Joint Publications Research Service, Arlington, Va.

AGE RELATED DISTINCTIONS OF COSMONAUTS REGIONAL HEMODYNAMICS

I. D. Vasilyeva, Kh. Kh. Yarullin, and V. I. Zhuyko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 82-90 ref Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 61-64

Avail: NTIS HC A07/MF A01

Hemodynamics of the large hemispheres of the brain, vertebral basilar system, lungs and legs of 60 cosmonauts aged 30-37 and 38-47, were investigated rheographically. Measurements were made in the morning, under conditions of basal metabolism and in the daytime, before orthostatic tests. Comparison of hemodynamic parameters recorded in the morning and at the daytime and in the two age groups showed significant differences revealing the effects of different factors, first of all psychoemotional tension, on the vasomotor regulation, and greatest resistance of cerebral and pulmonary vascular systems of older cosmonauts to those effects. These investigations emphasize great importance of studies of regional hemodynamics, especially rheoencephalography, not only before provocative tests but also under conditions of basal metabolism. Author

N82-17830# Joint Publications Research Service, Arlington, Va.

COMPARATIVE EVALUATION OF ANTIMICROBIAL ACTIVITY OF SOME URINE PRESERVATIVES

T. Ye. Lebedeva, I. V. Yakimova, N. M. Nazarov, and S. V. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 91-94 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 64-66

Avail: NTIS HC A07/MF A01

Antiseptics were examined for their antimicrobial activity with respect to the microorganisms that are most likely to occur in the urine subject to prolonged storage. Chlorine and iodine containing compounds were found to have the highest antimicrobial activity combined with a wide spectrum of antimicrobial action. The antimicrobial effect of these compounds was mostly expressed in regard to the typical representatives of urobacteria that actively hydrolyze urea to yield ammonia during prolonged storage of urine. Author

N82-17831# Joint Publications Research Service, Arlington, Va.

RAT AMINO ACID COMPOSITION AFTER FLIGHT ABOARD COSMOS-1129 BIOSATELLITE

T. F. Vlasova, Ye. B. Miroshnikova, T. A. Smirnova, and I. A. Dmitriyeva *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 95-97 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 66-68

Avail: NTIS HC A07/MF A01

Data concerning the amino acid pool of rats flown onboard Cosmos-1129 and exposed to the ground based synchronous experiment are presented. Certain changes in the amino acid pool of flight and synchronous rats were found. The changes seem to be associated with the selective rate of incorporation of free amino acids into the biosynthetic processes during acute adaptation and with alterations in the protein synthesis rate. J.M.S.

N82-17832# Joint Publications Research Service, Arlington, Va.

MYOCARDIAL PROTEIN FRACTIONS AND ENZYMATIC ACTIVITY THEREOF IN EXPERIMENTAL RATS FLOWN ABOARD COSMOS-936 BIOSATELLITE

R. A. Tigranyan, Ye. A. Nosova, Ye. V. Kolchina, N. A. Veresotskaya, L. M. Kurkina, and N. S. Kolganova *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 98-102 refs Transl. into ENGLISH fom Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 68-71

Avail: NTIS HC A07/MF A01

The effect of artificial gravity on protein fractions and their enzyme activity in the myocardium of rats flown onboard Cosmos-936 was studied. In weightless rats the content of sarcoplasmatic proteins increased at R + 0 and that of T fraction proteins decreased at R + 25. In centrifuged rats such changes were not seen. In centrifuged rats the enzyme activity of sarcoplasmatic proteins did not alter. In weightless rats ATPase activity of myosin decreased significantly, and in centrifuged rats it remained almost unchanged. Author

N82-17833# Joint Publications Research Service, Arlington, Va.

METABOLIC PROCESSIS IN RAT SKELETAL MUSCLES AFTER FLIGHT ABOARD COSMOS-936

Ye A. Nosova, N. A. Veresotskaya, Ye. V. Kolchina, L. M. Kurkina, R. A. Belitskaya, and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 103-107 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 71-75

Avail: NTIS HC A07/MF A01

The study of skeletal muscles of rats flown on Cosmos-936 demonstrated different metabolic reactions in muscle fibers of different function and type to weightlessness and Earth gravity. The data obtained gave evidence that artificial gravity may considerably prevent metabolic changes in muscles developing in response to specific effects of weightlessness. Author

N82-17834# Joint Publications Research Service, Arlington, Va.

ACTIVITY OF SOME ENZYMES OF CARBONHYDRATE METABOLISM IN RAT SKELETAL MUSCLES AFTER SPACE FLIGHT

V. P. Nesterov, N. A. Veresotskaya, and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 p 108-112 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 75-78

Avail: NTIS HC A07/MF A01

Space flight factors did not influence activity of glycogen phosphorylase and adenylate cyclase in skeletal muscles of rats. Activity of glucose-6-phosphate and 6-phosphogluconate dehydrogenases increased noticeably in the most active muscles (gastrocnemius and tibialis anterior muscles). Activation of enzymes involved in the pentosephosphate pathway of glucose conversion may be associated with compensatory processes induced by muscle changes due to diminished motor activity of animals in space flight. Author

N82-17835# Joint Publications Research Service, Arlington, Va.

ULTRASTRUCTURE OF BLOOD VESSELS AND MUSCLE FIBERS OF RAT SKELETAL MUSCLES AFTER FLIGHTS ABOARD COSMOS-605 AND COSMOS-782 BIOSATELLITES

Z. F. Davik and K. D. Rokhlenko *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 113-118 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 78-83

Avail: NTIS HC A07/MF A01

Electron microscopy was used to study ultrastructures of the wall of blood vessels and muscle fibers of the red (soleus) and mixed gastrocnemius) muscles of rats flown on Cosmos 605 for 22.5 days and on Cosmos 782 for 19.5 days and sacrificed 4 to 6 hours, 48 hours and 25 to 27 days postflight. It was demonstrated that the orbital flight did not induce significant changes in the ultrastructure of blood vessels of the soleus and gastrocnemius muscles but caused atrophy of muscle fibers and reduction of the number of functioning capillaries. Readaptation of the soleus vascular system to 1 g led to degradation of permeability of capillary and venular walls and development of edema of the perivascular connective tissue. This may be one of the factors responsible for dystrophic changes in muscle fibers. Author

N82-17836# Joint Publications Research Service, Arlington, Va.

BLOOD FIBRINOGEN AS RELATED TO IMMERSION IN WATER FOR SEVEN DAYS AND SHORT-TERM SPACE FLIGHT

A. N. Fomin *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 119-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 83-85

Avail: NTIS HC A07/MF A01

A scrutiny of the literature dealing with hemocoagulation under hypokinetic conditions revealed that blood fibrinogen was studied exclusively in conjunction with other parameters characterizing the blood clotting system. Increase in fibrinogen concentration in blood was demonstrated in individuals submitted to prolonged hypokinesia, patients restricted to bed rest and animals used in experiments with hypokinesia. Blood tests were made on six healthy men before, during, and after seven days of immersion in water as well as cosmonauts before and after seven and four day flights. The microtechnique for measuring the concentration of fibrinogen in blood is based on the phenomenon of heat denaturation of this protein at a temperature of 56 C. Results indicate that the fibrinogen increased during the four to six days of the study. J.M.S.

N82-17837# Joint Publications Research Service, Arlington, Va.

METHOD OF ASSESSING INDIVIDUAL RESISTANCE OF RATS TO HYPOXIC HYPOXIA

Yu. V. Farber, A. Yu. Grigoryev, and A. I. Yelfimov *In its* USSR Rept.: Space Biol. and Aerospace Med., V. 15, No. 5, Sep. - Oct. 1981 (JPRS-79346) 2 Nov. 1981 p 123-125 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), v. 15, no. 5, Sep. - Oct. 1981 p 85-86

Avail: NTIS HC A07/MF A01

The question of screening experimental animals according to resistance to hypoxia is addressed in view of the need to investigate individual distinctions with regard to resistance to the body to various extreme factors, including a shortage of oxygen. There are some methodological approaches to the study of this question. In particular, one determines coefficient K as the ratio of rat survival time at an altitude of 12,000 m to restitution time. Experimental data on individual reactions to acute hypoxic hypoxia, which are obtained by determining the time of retention of the postural reflex with a static load are presented. J.M.S.

N82-17839# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

STUDY OF HOMING PIGEONS IN BRAZIL: SOME PRELIMINARY RESULTS

R. Ranvaud Oct. 1981 16 p refs Presented at Intern. Symp. on Avian Navigation, Tirrenia, Italy, 14-18 Sep. 1981

(INPE-2248-PRE/032) Avail: NTIS HC A02/MF A01

Observations of vanishing bearings are described. The ability of pigeons to home quite well under some rather unfavorable conditions, namely with the Sun not too far from the zenith and under total overcast in relatively weakly inclined magnetic fields, as well as in cases where the inclination of the magnetic field actually reverses during the flight home is discussed. Homing in regions where the apparent diurnal motion of the Sun's azimuth reverses during the year, the midday Sun being to the north in June and to the south in December, is reported. Homing right across the so called south atlantic anomaly, at which the principal component of the Earth's magnetic field has an absolute minimum, providing a situation in which the gradient of total intensity is zero in all directions, is also reported. T.M.

N82-17840# Litton Bionetics, Inc., Kensington, Md.

MAMMALIAN TOXICOLOGICAL EVALUATION OF DIMP AND DCPD (PHASE 3 - IMPA) Final Report, Dec. 1976 - Apr. 1980

Francis J. Mecler May 1981 277 p

(Contract DAMD17-77-C-7003; DA Proj. 3E1-62720-A-835) (AD-A107574) Avail: NTIS HC A13/MF A01 CSCL 06/20

IMPA (Isopropyl Methylphosphonic Acid) had oral LD50's of 7650 and 6070 mg/kg in male and female rats, respectively, and of 5620 and 6550 mg/kg in male and female mice. It was not irritant to rabbit eyes. It was mildly irritant to rabbit skin but produced no systemic toxicity at a dose of 2 mg/kg. IMPA did not induce dermal sensitization in guinea pigs. No evidence of toxicity followed administration of IMPA in the drinking water at levels up to 3000 ppm to rats for 90 days. IMPA was not mutagenic to five strains of Salmonella indicator organisms in the Ames assay both with and without rat liver activation. GRA

N82-17841# California Univ., Irvine, Dayton, Ohio.

RESPIRATORY TOXICOLOGY, 1981 Annual Technical Report, Jun. 1980 - May 1981

Paul E. Newton Wright-Patterson AFB, Ohio AFAMRL Aug. 1981 45 p refs

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

(AD-A107672; AFAMRL-TR-81-81) Avail: NTIS HC A03/MF A01 CSCL 06/20

The Respiratory Toxicology research programs conducted at the Toxic Hazards Research Unit (THRU), Wright-Patterson Air Force Base by the University of California, Irvine are reviewed in this annual report. Preliminary results are presented of studies concerning: (1) the effect of propylene glycol dinitrate on the cardiovascular system in the dog; (2) the evaluation of pulmonary clearance after exposure to 1.2 ppm of ozone, and (3) the evaluation of small airway test sensitivity in enzyme induced emphysema. Author (GRA)

N82-17842# California Univ., Irvine. Dept. of Community and Environmental Medicine.

COMPARATIVE BIOCHEMISTRY AND METABOLISM. PART 2: NAPHTHALENE LUNG TOXICITY Annual Report, Jun. 1980 - May 1981

Alan R. Buckpitt Wright-Patterson AFB, Ohio Aerospace Medical Research Labs. Oct. 1981 43 p refs

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

(AD-A107673; AFAMRL-TR-81-84) Avail: NTIS HC A03/MF A01 CSCL 06/20

Earlier studies have shown that intraperitoneal administration of naphthalene causes selective pulmonary bronchiolar necrosis in mice and have suggested a role for reactive naphthalene metabolites in the tissue damage. These studies have been extended to show that covalent binding of reactive naphthalene metabolites to tissue macromolecules in lung, liver and kidney is dose-dependent. High levels of covalent binding occur only after tissue glutathione levels are depleted substantially and only at doses of 200 mg/kg and above. The 200 mg/kg dose is the lowest dose at which lung lesions are observed. Piperonyl butoxide pretreatment decreases pulmonary damage and covalent binding and partially blocks glutathione depletion by 400 mg/kg naphthalene. In comparison, SKF 525 A pretreatment decreased covalent binding levels to a much smaller extent and failed to alter glutathione depletion or pulmonary damage after 400 mg/kg naphthalene. When compared to vehicle pretreated controls, phenobarbital or 3-methylcholanthrene pretreatment produced no change in the severity of lung damage after doses of naphthalene ranging from 50 to 400 mg/kg nor did these inducers alter covalent binding at doses of naphthalene of 200 mg/kg or less. Pretreatment of mice with p-xylene preferentially inactivated pulmonary cytochrome p450 and blocked naphthalene induced lung damage but failed to selectively decrease covalent binding of reactive metabolites in the lung. Current studies are continuing to examine the role of cytochrome P450 dependent metabolic activation of naphthalene in the lung in the bronchiolar damage. Author (GRA)

N82-17843# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Abt. Angewandte Physik.

BIOPHYSICAL FUNDAMENTALS AND INSTRUMENTATION

FOR THE ENDOVESICAL Nd:YAG-LASER APPLICATION
T. Halldorsson 5 Jun. 1981 25 p refs In GERMAN; ENGLISH summary
(MBB-UA-581-81-O) Avail: NTIS HC A02/MF A01

The laser irradiation power needed for tumor therapy was investigated. From considerations of the absorptivity of cellwater and blood as well as the multiple scattering of the radiation and heat conduction in tissue, a theoretical model was developed which enabled an accurate calculation of the temperature distribution up to the denaturation point as well as the percentage of the radiation power lost through backward and forward scattering of light. The theoretical calculations were experimentally verified in animal experiments and measurements on specimens of human bladder tissue performed with a thermocamera. According to the requirements of endoscopic laser therapy, a medical Nd:YAG laser system was developed. For the beam transport into the urinary bladder, flexible light pipes made from thin quartz fibers were used. A.R.H.

N82-17844# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 4
4 Jan. 1982 62 p refs Transl. into ENGLISH of various Russian articles
(JPRS-79780) Copyright. Avail: Issuing Activity

The effects of nonionizing electromagnetic radiation on organisms and tissues are discussed.

N82-17845# Joint Publications Research Service, Arlington, Va.
EFFECT OF COMMERCIAL FREQUENCY ELECTROMAGNETIC FIELD ON ANDROGEN FUNCTION OF RAT TESTS
A. G. Reznikov and L. V. Tarasenko *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 1-5 refs Transl. into ENGLISH from Fiz. Zh. (USSR), v. 27, no. 1, Jan. - Feb. 1981 p 121-124
Avail: Issuing Activity

The biological effects of commercial frequency electromagnetic fields (CFEMF) generated by high voltage electric power lines on the gonads of male rats were investigated. The effect of CFEMF on the endocrine function of rat tests consists of an intensification of steroidogenetic processes and a corresponding increase in the activity of the steroid delta(5)-3 beta-o1 dehydrogenase. No appreciable changes in testosterone levels in peripheral blood plasma were observed following CFEMF irradiation for a period of four months. J.D.H.

N82-17846# Joint Publications Research Service, Arlington, Va.
FEATURES OF METABOLIC DISTURBANCES IN RAT MYOCARDIUM UNDER EFFECT OF ALTERNATING MAGNETIC FIELDS OF DIFFERENT PARAMETERS
F. A. Kolodub, O. N. Chernysheva, and G. I. Yevtushenko *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 6-10 refs Transl. into ENGLISH from Kardiologiya (USSR), v. 21, no. 4, Apr. 1981 p 82-85
Avail: Issuing Activity

The effect of alternating magnetic fields of various voltages and exposures on the metabolism of carbohydrates, macroergic phosphates, and low molecular nitrogen compounds in the rat heart was investigated. The direction and degree of metabolic disturbances in the myocardium after exposure to industrial frequency alternating magnetic fields depend on the voltage of the field and the length of exposure. An alternating magnetic field with a voltage of 32 kA/m delays oxidation and phosphorylation processes without affecting their coupling, and the proportion of oxidized carbohydrates increases as compared with fatty acids. The conversion of carbohydrates and of nitrogen substances are stimulated by an alternating magnetic field with a voltage of 7.5 kA/m. J.D.H.

N82-17847# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ELECTROMAGNETIC WAVES IN MILLIMETER BAND ON INDUCTOPROTEIN SYNTHESIS OF PENICILLINASE BY STAPHYLOCOCCUS AUREUS
A. Z. Smolyanskaya, A. M. Makhov, E. A. Gelvich, and M. B. Golant *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 11-16 refs Transl. into ENGLISH from Biol. Nauki (USSR), no. 5, May 1981 p 24-28
Avail: Issuing Activity

The effect of electromagnetic waves in the millimeter band on the synthesis and activity of pencillinase produced by strains of Staphylococcus aureus and Escherichia coli is examined. Experiments demonstrated that wave lengths of 6,478 and 6,468 mm inhibit the induction of the enzyme by St. aureus. However, this type of radiation does not affect the activity of the exoenzyme released from the St. aureus strain, and also does not affect the constitutive synthesis of the penicillinase by E. coli. The relationship of effect of the duration of irradiation, bacterial population, and the strength of current density is elucidated. Author

N82-17849# Joint Publications Research Service, Arlington, Va.
EFFECTS ON BIOLOGICAL SYSTEMS OF ELECTROMAGNETIC OSCILLATIONS IN MILLIMETER RANGE OF WAVELENGTHS
N. D. Devyatkov, O. V. Betskiy, E. A. Gelvich, M. B. Golant, A. M. Makhov, T. B. Rebrova, L. A. Sevastyanova, and A. Z. Smolyanskaya *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 27-36 refs Transl. into ENGLISH from Radiobiol. (USSR), v. 21, no. 2, Mar. - Apr. 1981 p 163-171
Avail: Issuing Activity

The main patterns of the effects of millimeter radiation of nonthermal intensity on various biological objects are discussed on the molecular, cellular levels, as well as on the level of complex living organisms. The main objects of the studies were hemoglobin and erythrocytes and human blood, E. coli, Staphylococcus aureus, Aspergilla mold, mice and rats. Author

N82-17850# Joint Publications Research Service, Arlington, Va.
CURRENT PROBLEMS OF RADIOBIOLOGY OF ELECTROMAGNETIC RADIATION OF RADIO-FREQUENCY RANGE

I. G. Akoyev *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 37-43 refs Transl. into ENGLISH from Radiobiol. (USSR), v. 20, no. 1, Jan. - Feb. 1980 p 3-8
Avail: Issuing Activity

On the basis of analysis of the current state of the radiobiology of nonionizing radiation, the need for accelerated development of basic research on the biological action of these radiations, especially in the radio-frequency range, is substantiated. An objective is set for accumulation of experimental data on questions of reversibility and cumulative effects, selectivity, specificity and additivity, direct and indirect action, sensitivity, adaptation and stability in regard to radiation, species differences, and possible mechanisms of operation of radiation. Author

N82-17851# Joint Publications Research Service, Arlington, Va.
PARTICULAR FEATURES OF CONDITIONED ELECTRODEFENSIVE REFLEX IN WHITE RATS ON BACKGROUND OF CONSTANT MAGNETIC FIELD
I. V. Shust, S. I. Galantyuk, and Yu. V. Cheretyanko *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 44-50 refs Transl. into ENGLISH from Fiz. Zh. (USSR), v. 26, no. 2, Mar. - Apr. 1980 p 264-268
Avail: Issuing Activity

The formation of a conditioned electrodefensive reflex in white rats exposed to a 1,000 Oe constant magnetic field was investigated. The influence of the vitamin preparation galascorbin on the formation of the reflex was also studied. The tenacity of the conditioned reflex was reduced by exposure to the CMF, with a greater reduction observed in the initial phase of its development. Changes in conditioned reflex activity were observed during exposure and during the aftereffect period. The threshold of the avoidance reaction initially increased, then decreased, with normalization of the indicator observed until the end of the experiment. Administration of galascorbin promoted tenacious development of the conditioned reflex, which remained more pronounced in the CMF aftereffect period. J.D.H.

N82-17852# Joint Publications Research Service, Arlington, Va.

MORTALITY IN ACUTE MYOCARDIAL INFARCTION AS FUNCTION OF GEOMAGNETIC FIELD ACTIVITY IN YEREVAN

N. N. Karazyan and L. A. Akhverdyan *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 51-55 *Transl. into* ENGLISH from Dokl. Akad. Nauk Arm. SSR (USSR), v. 22, no. 3, 1981 p 188-191

Avail: Issuing Activity

The medical history of patients who died from acute myocardial infarction in the city of Yerevan, Armenian SSR, during 1974-1978 was analyzed and compared with records of geomagnetic field activity. The basic causes of death from complications of myocardial infarction were also evaluated. A direct connection was observed between the mortality rate and increased magnetic activity, with men exhibiting a greater sensitivity to high geomagnetic field activity than women. J.D.H.

N82-17853# Joint Publications Research Service, Arlington, Va.

EFFECT OF HYPOGEOMAGNETIC FIELD ON ACTIVITY OF SOME CEREBRAL ENZYMES

A. V. Shakula and G. M. Chernyakov *In its* USSR Rept.: Life Sci. Effect on Nonionizing Electromagnetic Radiation, No. 4 (JPRS-79780) 4 Jan. 1982 p 56-59 refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 9, Sep. 1981 p 11-13

Avail: Issuing Activity

The activity of key brain enzymes of rabbits whose embryonic and early postnatal development occurred during exposure to a hypogeomagnetic field was investigated. The activity of succinate dehydrogenase (SDH), glucose-6-phosphate dehydrogenase (G-6-PDH), tetrazolium oxyreductanse (NAD-H), and hexokinase (HK) as determined. Histological examination of neuronal bodies of the cortex, of astroglia and oligodendroglia revealed very high G-6-PDH and NAD-H activity, moderate SDH activity, and mild HK activity. A hypogeomagnetic field was found to be a biologically active factor having an adverse effect on the enzymes regulating energy metabolism. J.D.H.

N82-17854 Washington Univ., St. Louis, Mo.

MUSCLE, MOTOR CORTEX, CEREBELLAR NUCLEAR, AND SPINDLE AFFERENT DURING SLOW HOLD-RAMP-HOLD POSITION-TRACKING MOVEMENTS OF THE MONKEY'S WRIST Ph.D. Thesis

Marc Hudson Schieber 1982 469 p

Avail: Univ. Microfilms Order No. 8122756

Two Rhesus monkeys were trained to perform flexion and extension wrist movements guided by a tracking display. The monkey used a wrist position control to operate a cursor with which he pursued a visual target. The target, and therefore the monkey's wrist, moved in slow hold-ramp-hold (HRH) trajectories. By changing parameters of the target's trajectory, changes were produced in the parameters of the monkey's wrist movement. The second monkey was trained additionally to perform self-spaced alternating wrist movements and to receive occasional pulses of torque about the wrist. It is hypothesized that during slow HRH wrist movements, two parallel motor systems operated in relative dissociation. The first system included class I motor cortex neurons, alpha motoneurons, and extrafusal muscle. The second system included class II motor cortex neurons, nearly all related dentate and interposed neurons, gamma motoneurons, and spindle afferents. This system could have provided for the continuous acquisition of dynamically sensitive spindle afferent feedback constantly maintained in the face of widely varying peripheral conditions. Dissert. Abstr.

N82-17855 Minnesota Univ., Minneapolis.

FACILITATED DIFFUSION OF SMALL NON-ELECTROLYTES IN THE HUMAN RED BLOOD CELL

Robert Ray Mayrand 1981 136 p

Avail: Univ. Microfilms Order No. 8125991

The design of a new simple continuous flow system for the analysis of rates of permeation of small non-electrolytes across human red cell membranes is described. With this system it was demonstrated that ethylene glycol equilibrium exchange is saturable, KM = 175 mM, and inhibitable, glycerol K1 = 1200 mM. Ethylene glycol yielded a permeability coefficient of P sub s = .000336 cm/s. Urea equilibrium exchange was also examined with the continuous flow system. Saturation was again observed, KM = 218 mM. The maximal rate of urea exchange was P sub s = .000808 cm/s. The estimated non-inhibitable (presumably through the lipid) portion of urea equilibrium exchange was .0000258 cm/s which is 3.2 percent of the maximal rate. Dissert. Abstr.

N82-17856 Columbia Univ., New York.

TEMPORAL INTEGRATION OF ACOUSTIC POWER FOR INTERRUPTED STIMULI AT SUPRATHRESHOLD LEVELS Ph.D. Thesis

Joyce Rodriguez-Arrufat 1981 132 p

Avail: Univ. Microfilms Order No. 8125375

Threshold and suprathreshold temporal integration data employing experimental variables were investigated. Data were collected to experimental conditions: three stimulus types, nine signal durations and four presentation levels including threshold. Subjects were three normal hearing listener who participated in 20 practice sessions and 12 test sessions of 20 minutes each. Mean threshold and point of subjective equality (PSE) values were calculated for each subject and each experimental condition. It is indicated that the constants of the function are a product of the interaction between stimulus type and intensity as incorporated in a two part linear regression model. It is suggested that critical duration decreases with intensity and is essentially independent of stimulus type at 50 db and 80 dB SPL. The slope of the function varies as a function of intensity and stimulus type, being largest for 1000 Hz and smallest for white noise. These findings are discussed in terms of Zwislocki's exponential theory of loudness summation. Dissert. Abstr.

N82-17857 Ohio Univ., Athens.

QUANTIFICATION OF PSYCHOACOUSTIC TUNING CURVE SHARPNESS: AN ANALYSIS OF FREQUENCY RESOLUTION IN CHILDREN AND ADULTS Ph.D. Thesis

Neal Alan Sloane 1981 120 p

Avail: Univ. Microfilms Order No. 8126067

Probe tone frequencies were pulsed with a rise/fall time of 50 msec., duration of 400 msec., and were delivered at 10 dB SL using a simultaneous masking paradigm. Masked threshold was determined using a modified Hughson-Westlake technique. After the first set of tuning curves was obtained, each subject returned in 24 hours to replicate the test. Results show that the main effect for age is nonsignificant, the main effect for sessions also is nonsignificant, the main effect for frequency is significant, and all possible interactions are nonsignificant. A Tukey Test, calculated for the main effect of frequency, established that all three tuning curves differ significantly from one another in sharpness, it is concluded that within the age range under study, age does not influence tuning curve sharpness, d sub 1 oct. values do not change significantly across experimental sessions, and tuning curves increase significantly in sharpness across probe tone frequencies of 500, 1000, and 2000 Hz. Dissert. Abstr.

N82-17858 Florida State Univ., Tallahassee.

A STUDY OF THE ACOUSTIC REFLEX AS ELICITED BY SELECTED ENVIRONMENTAL NOISE STIMULI Ph.D. Thesis

Marshall Melvin Smith 1981 114 p

Avail: Univ. Microfilms Order No. 8125790

The acoustic reflex thresholds (ARTs) for the environmental noise ranged from 78.83 through 81.78 db SPL. The ARTs for the white noise, and the pure-tone were 81.38 and 95.19 dB SPL, respectively. For all practical purposes (19%) the ARTs for the environmental noises lie within + or - 5 db of the ART for the white noise. The latency at threshold for the environmental noises ranged from 452.5 through 552.50 msec. Similarly, the latencies were 402.5 and 487.5 msec for the white noise and the pure-tone, respectively. The latency at dB SL sub R (20 dB above the threshold) for the environmental noises ranged from 152 through 180 msec. There was a decrease in latency at 20 dB SL sub R compared to that at threshold across all the stimuli. The contraction rate at 20 dB SL sub R for all stimuli ranged from .0009 through .0011 cc/msec. The contraction magnitude at 20 dB SL sub R for all the environmental noises and the white noise ranged from .669 through .816 cc. Dissert. Abstr.

N82-17859 North Carolina Univ. at Chapel Hill.

STUDIES ON STRUCTURE AND FUNCTION RELATIONSHIP IN FIBRINOGEN Ph.D. Thesis

Nadia Aldyth Carrell 1981 160 p

Avail: Univ. Microfilms Order No. 8125561

The literature concerning the chemical properties of fibrinogen and the mechanisms of fibrinogen function was reviewed. The experimental work was aided by the availability of two patients with congenital molecular variants of fibrinogen and one patient with an inhibitor to fibrin polymerization. The fibrinogen level in the first patient was found to be about one third of the normal level by both coagulation and immunologic methods. The second patient had a low plasma level of clotable protein with normal antigen concentration, high amounts of fibrinogen related material in serum, and prolonged thrombin and reptilase clotting times. The third patient developed an inhibitor which markedly prolonged the thrombin and reptilase times of both patient and normal plasmas. A procedure was developed to direct chemical modifications selectively at lysine residues which function in polymerization. An assay to measure the binding of fibrinogen to fixed washed platelets was developed. Dissert. Abstr.

N82-17860 Florida Univ., Gainesville.
FORWARD MASKING OF AUDITORY NERVE (N SUB 1) AND BRAINSTEM RESPONSES (WAVE V) IN HUMANS Ph.D. Thesis
Steven John Kramer 1981 186 p
Avail: Univ. Microfilms Order No. 8127440

The influence of a response to one sound (probe) another sound (masker) when the two sounds occur simultaneously or in a temporal relation was demonstrated. The effects of forward masking on wave-V of the ABR along with N responses recorded simultaneously (on a separate channel) from the ear canal were investigated. Postmasking recovery functions were measured for different masker durations, masker levels, and masker low frequency cutoffs (high-pass masking). The effects on wave-V were different than on N1. The primary effects of forward masking on the probe responses were decreases in N1 amplitude and increases in wave-V latency. Characteristic changes in the recovery functions for variations on masker parameters were found. It is suggested that the relation between wave-V latency and N1 amplitude, along with other characteristics of underlying mechanisms include a recording of the neutral input (N1) within the brainstem pathways generating the wave-V potential.
Dissert. Abstr.

N82-17861 Ohio Univ., Athens.
HUMAN AUDITORY BRAINSTEM ELECTRIC RESPONSES TO BINAURAL AND MONAURAL STIMULI Ph.D. Thesis
Paul Alfred Lobaugh 1981 149 p
Avail: Univ. Microfilms Order No. 8126058

The auditory brainstem electric response (ABER) is recorded from electrodes attached to the scalp of humans and consists of a series of sub-microvolt peaks which occur in the 10 ms period following presentation of simple auditory stimuli such as clicks. The ABER differences due to binaural and monaural stimulation which are defined as binaural interaction are investigated. It is also possible that binaural signal processing, if reflected by the ABER, may occur in an asymmetric manner. The effects of a stimulus variable, click polarity, and a subject variable, headsize, upon the ABER are studied. Click-evoked ABERs were acquired from 44 normally hearing adolescent and adult subjects. Responses to binaural and monaural stimulation were analyzed. It is concluded that polarity of the stimulus does not affect ABERs in response to 60 and 70 dB SL clicks. For 80 dB SL stimulation, negative polarity clicks evoke shorter latency waves than do positive polarity clicks. Dissert. Abstr.

N82-17862*# Narco Scientific, Houston, Tex.
PORTABLE MEDICAL STATUS AND TREATMENT SYSTEM Final Report
Dec. 1981 25 p
(Contract NAS9-15821)
(NASA-CR-167496) Avail: NTIS HC A02/MF A01 CSCL 06E

A portable medical status and treatment system is discussed. The vital signs monitor includes electrocardiogram, respiration, temperature, blood pressure, alarm, and power subsystems, which are described. A DC defibrillator module, a radio module, and their packaging are also described. These subsystems were evaluated and the results and recommendations are presented.
S.L.

N82-17863# Institute of Human Performance, Fairfax, Va.
PHYSICAL PERFORMANCE TASKS REQUIRED OF U. S. MARINES OPERATING IN A DESERT ENVIRONMENT
Paul O. Davis, Arthur V. Curtis, Jr., and Steven A. Bixby Nov. 1981 62 p refs
(Contract N00014-80-C-0473)
(AD-A107866; TR-7) Avail: NTIS HC A04/MF A01 CSCL 15/7

Nine representatives of the Institute of Human Performance were integrated into a marine battalion during a CAX (combined arms exercise) for the purpose of gathering descriptive and objective information regarding the nature and types of physical performance tasks encountered by marine infantrymen (MOS 0311) during desert combat. Through the use of minicassette recorders, scales, cameras and other data collection equipment, scenarios were described which typify the critical, frequent and strenuous types of tasks indigenous to marines in this environment. Distances covered on foot, loads carried, rates of travel and grades encountered are detailed and described as well as other environmental overlays which impact on troop performance. It was determined that for the most part, a mechanized, motorized combat scenario does not require high levels of physical ability; however, fire team rushes represent a critical scenario, with high levels of aerobic and anaerobic power, particularly when performed in ambient temperatures of 100-107 F. A taxonomy of physical tasks from this environment will be added to physical performance data from other Marine Corps theaters of operations for the purpose of developing a complete job analysis of activities involving strength and endurance factors. Author (GRA)

N82-17864# California Univ., Irvine. Dept. of Community and Environmental Medicine.
CYTOLOGIC AND BIOCHEMICAL GENETIC EFFECTS OF CHEMICAL CARCINOGENS Annual Report, 1 Jul. 1980 - 30 Jun. 1981
Ronald E. Rasmussen Wright-Patterson AFB, Ohio Aerospace Medical Research Lab. Oct. 1981 43 p refs
(Contract F33615-80-C-0512; AF Proj. 6302)
(AD-A107615; AFAMRL-TR-81-82) Avail: NTIS HC A03/MF A01 CSCL 06/20

The first project is concerned with the relationship between initiation of cancer by chemicals and the damage and repair of DNA in cells and tissues susceptible to the carcinogenic action of the chemicals. The working hypothesis is that interaction of the carcinogen with cellular DNA is a necessary step in carcinogenesis and that this interaction may cause DNA damage which is then followed by DNA repair synthesis. The second project was conducted with the cooperation of the staff of the Toxic Hazards Research Unit at AMRL, WPAFB. Rats and hamsters were exposed by inhalation to hydrazine at 750 ppm for one hour. Groups of animals which had been exposed only once or which had been exposed 10 times were shipped to UC Irvine for study. The factors studied were (1) DNA replication in the lung; (2) DNA repair synthesis in the lung; (3) Cellular replication in the lung and nasal turbinates; and (4) Metabolism of a known lung carcinogen, 3H-benzo(a)pyrene, by lung slices from the treated animals. The third project was initiated during the current year with the goal of developing an animal model in which biochemical and cytogenetic factors could be studied during the process of tumorigenesis. Range-finding studies are underway at the Toxic Hazards Research Unit (THRU) to establish the intratracheal dosage of 3-methylcholanthrene (MCA) necessary to produce a high yield of lung tumors in Fischer 344 rats within 12 months. GRA

N82-17865# California Univ., Irvine. Dept. of Community and Environmental Medicine.
COMPARATIVE BIOCHEMISTRY AND METABOLISM. PART 1: CARCINOGENESIS Annual Report, Jun. 1980 - May 1981
Robert C. Shank Wright-Patterson AFB, Ohio Aerospace Medical Research Lab. Oct. 1981 38 p refs
(Contract F33615-80-C-0512; AF Proj. 6302)
(AD-A107614; AFAMRL-TR-81-83-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 06/20

Oral administration of the inorganic hepatotoxin, hydrazine, to male Fischer 344 or Sprague Dawley rats results in the endogenous methylation of liver DNA at the 7- and O6-positions of guanine. At doses below the LD50 (45, 60 or 75 mg hydrazine/kg body weight), methylation levels varied little and averaged about 500 micromol 7-methylguanine/mol guanine and 20 micromol O6-methylguanine/mol guanine. At 90 mg hydrazine/kg body weight (approximately the 7-day LD50) the

methylation levels were 869 micromol 7-methylguanine and 58 micromol O6-methylguanine/mol guanine 24 hours after toxicant administration. A single dose of 3 mg hydrazine/kg body weight did not result in detectable levels of methylguanines in liver DNA; however, after three or four daily administrations of hydrazine at this dose, liver damage was evident, and liver DNA contained 50-100 micromol 7-methylguanine/mol guanine, about the limit of analytical detection. Following a single oral administration of 90 mg hydrazine/kg body weight, liver DNA guanine rapidly became methylated. The time for half-maximum alkylation at 7-guanine was 30 minutes and at O6-guanine, 45 minutes. The rates of removal of these methylated bases were consistent with published values from experiments using methylating carcinogens and with values obtained in this laboratory with the model compound, 1,2-dimethylhydrazine.
GRA

N82-17866# Environmental Protection Agency, Ann Arbor, Mich. Inspection and Maintenance Staff.
HEALTH EFFECTS OF CARBON MONOXIDE AND OZONE
Jul. 1981 20 p refs Prepared in cooperation with Energy and Environmental Analysis, Inc., Arlington, Va.
(PB82-114265; EPA-AA-IMS-81-8) Avail: NTIS HC A02/MF A01 CSCL 06T

The information known about the health effects of carbon monoxide (CO) and ozone (O3) is summarized. How that information is used by EPA to set National Ambient Air Quality Standards is discussed. The sources most likely to contribute to high levels of CO and O3 and how EPA control programs will reduce emissions from these sources in the future are discussed. The health effects on humans and plants are discussed.
Author (GRA)

N82-17867 American Univ., Washington, D. C.
***A MODEL FOR ESSENTIAL HYPERTENSION*: METABOLIC STUDIES Ph.D. Thesis**
James Patterson Church 1981 101 p
Avail: Univ. Microfilms Order No. 8126862

The extent to which blood pressures and tissue lipid levels are manipulated by dietary control of low levels of essential fatty acids in rat strains used as models of hypertensive and normotensive man were determined. Procedures included gravimetric total lipids, colorimetric cholesterol and phospholipids, fluorimetric triglycerides and gas liquid chromatographic fatty acids. Samples were taken from plasma liver and kidney. Total lipids were lower in plasma, liver, and kidney of the SHR than the WKY. Liver triglyceride and kidney cholesterol and phospholipid (PL) were lower with liver PL higher in SHR than in WKY. Total individual fatty acids in plasma and in neutral lipid and PL fractions of liver and kidney exhibited several strain and diet differences. A high metabolic rate in the SHR suggests defective transport of essential fatty acids from the liver. Dissert. Abstr.

N82-17868 California Univ., San Diego.
CEREBRAL HEMISPHERIC ACTIVITY AND AUTOMONIC NERVOUS FUNCTION Ph.D. Thesis
Deborah Ann Werntz 1981 130 p
Avail: Univ. Microfilms Order No. 8125444

An otherwise unknown relationship between cerebral hemispheric activity, as exhibited by the EEG, and the autonomic nervous system as exhibited by the nasal cycle and its self-induced alteration as regulated by forced uninostril respiration is demonstrated. It is proposed that the correlation of the nasal cycle with alternating relative EEG amplitude asymmetry is indicative of and consistent with a single ultradian ocillator system. It is also proposed that the nasal cycle is controlled via a central mechanism, whereby the hypothalamus regulates the sympathetic/parasympathetic balance and the vasomotor tone throughout the body. The 'feedback' effect of nasal airflow on EEG asymmetry is mediated through the olfactory system and its connecting pathways to the hypothalamus. The data demonstrate the individual's ability to noninvasively and predictably after cortical activity and possibly other autonomic functions. Dissert. Abstr.

N82-17869 Michigan State Univ., East Lansing.
THE ROLE OF INTESTINAL NERVES IN THE NUTRIENT INDUCED INTESTINAL HYPEREMIA Ph.D. Thesis
Richard Arlan Nyhof 1981 124 p
Avail: Univ. Microfilms Order No. 8126536

The blood flow to the small intestine increases following a meal, and this hyperemia appears to be localized to those portions of the intestine exposed to nutrients. Evidence indicates that local intestinal nerves may participate in producing this hyperemia. The venous outflow of isolated canine jejunal segments, the arteriovenous oxygen difference, and the rate of oxygen consumption were measured before and after administration of a local anesthetic and several neurotransmitter antagonists. Intestinal nerves do not appear to play a role in the intestinal hyperemia produced by luminal placement of nutrient solutions. On the basis of the magnitude of hyperemic and metabolic responses, the hyperemia produced by glucose appears to be metabolically mediated. The oleic acid induced hyperemia more closely resembles that produced by vasodilator chemicals. The hyperemia produced by food would likely involve a combination of these mechanisms. Dissert. Abstr.

N82-17870 Yale Univ., New Haven, Conn.
REGULATION OF CALCIUM CURRENT AND CALCIUM ACTIVITY IN HEART CELLS Ph.D. Thesis
Eduardo Marban 1981 152 p
Avail: Univ. Microfilms Order No. 8125689

The regulation of calcium current in mammalian ventricular muscle and Purkinje fibers was studied by voltage clamp technique. The effects of changes in intracellular calcium on the size of the slow inward calcium current (I sub si) were found to explain the digitalis-induced increase in this current, as well as some properties of the inactivation of I sub si. The involvement of K+ as a charge carrier of the transient outward current is shown Ca entry leads to inactivation, as previously suggested for Paramecium, Aplysia neurons, and stick insect skeletal muscle. Enhancement of I sub si is observed in association with the positive inotropic effect of digitalis. It is suggested that a rise in Na sub I leads to increased I sub si possibly through a secondary rise in Ca. Quiescent ventricular muscle, a mean free Ca2+ concentration of micro is found. During contractures, transients rising up to 10 micro are reported. In studying the effects of catecholamines on free Ca2+ and force, it is evidenced that epinephrine reduces myofibrillar Ca2+ sensitivity in heart muscle. Dissert. Abstr.

N82-17871*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN EVALUATION OF HELICOPTER NOISE AND VIBRATION RIDE QUALITIES CRITERIA
C. E. Hammond, D. D. Hollenbaugh, S. A. Clevenson, and J. D. Leatherwood Dec. 1981 14 p refs Presented at the Technol. for the Jet Smooth Ride, A Natl. Specialists' Meeting on Helicopter Vibration, Hartford, Conn., 2-4 Nov. 1981; sponsored by the American Helicopter Society Prepared in cooperation with Army Research and Technology Lab., Fort Eustis, Va.
(NASA-TM-83251) Avail: NTIS HC A02/MF A01 CSCL 05H

Two methods of quantifying helicopter ride quality; absorbed power for vibration only and the NASA ride comfort model for both noise and vibration are discussed. Noise and vibration measurements were obtained on five operational US Army helicopters. The data were converted to both absorbed power and DISC's (discomfort units used in the NASA model) for specific helicopter flight conditions. Both models indicate considerable variation in ride quality between the five helicopters and between flight conditions within each helicopter. T.M.

N82-17872*# Singer Co., Sunnyvale, Calif.
VTOL/STOL VISUAL STUDY Final Report
Frank P. Lewandowski Jun. 1980 38 p
(Contract NAS2-10222)
(NASA-CR-166292) Avail: NTIS HC A03/MF A01 CSCL 05I

The development of data bases and real time techniques to improve the realism of sea state, bow and stern wake, and ship motion is addressed. This system was designed for use with the Vertical Motion Simulator to perform basic studies on VTOL/STOL aircraft. B.W.

N82-17873# Dunlap and Associates, Inc., La Jolla, Calif.
DEVELOPMENT OF THE AUTOMATED PERFORMANCE ASSESSMENT AND REMEDIAL TRAINING SYSTEM (APARTS): A LANDING SIGNAL OFFICER TRAINING AID Final Report, Sep. 1979 - Mar. 1981
Steven T. Breidenbach and Clyde A. Brictson Orlando, Fla. Naval Training Equipment Center Jun. 1981 53 p refs
(Contract N61339-79-D-0105)
(AD-A106224; NAVTRAEQUIPC-79-D-0105-1) Avail: NTIS HC A04/MF A01 CSCL 05/9

Development of the automated performance assessment and remedial training system (APARTS) is described. The APARTS is an automated training aid designed to assist the landing signal officer (LSO) in training pilots during the acquisition of carrier landing skills. The APARTS is based on general principles of learning and provides graphic displays of pilot landing technique problems for LSO evaluation and pilot feedback. The APARTS also integrates field carrier landing practice, conducted in the aircraft, with night carrier landing training (NCLT) instruction. Once landing problems are identified and feedback is provided to the pilot, remedial instruction is given in the NCLT. An improved APARTS conceptual model along with two computer programs designed to process, store and graphically display pilot performance data are described. Future APARTS developments are outlined for improved carrier landing effectiveness. GRA

N82-17874*# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.

TIME DOMAIN IDENTIFICATION OF AN OPTIMAL CONTROL PILOT MODEL WITH EMPHASIS ON THE OBJECTIVE FUNCTION

David K. Schmidt 1982 22 p refs Presented at AFFTC/NASA Dryden/AIAA Workshop on Flight Testing to Identify Pilot Workload and Pilot Dynamics, Edwards, Calif., 19-21 Jan. 1981 (Grant NAG4-1)

(NASA-CR-168487) Avail: NTIS HC A02/MF A01 CSCL 05H

A method for the identification of the pilot's control compensation using time domain techniques is proposed. From this information we hope to infer a quadratic cost function, supported by the data, that represents a reasonable expression for the pilot's control objective in the task being performed, or an inferred piloting strategy. The objectives for this method are: (1) obtain a better understanding of the fundamental piloting techniques in complex tasks, such as landing approach; (2) the development of a metric measuurable in simulations and flight test that correlate with subjective pilot opinion; and (3) to further validate pilot models and pilot vehicle analysis methods. E.A.K.

N82-17875*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

HUMAN-MACHINE INTERFACE ISSUES IN THE MULTI-SATELLITE OPERATIONS CONTROL CENTER-1 (MSOCC-1) Technical Memorandum, 1 Jun. - 7 Aug. 1981

Christine M. Mitchell (George Mason Univ.) Aug. 1981 68 p refs

(NASA-TM-83826) Avail: NTIS HC A04/MF A01 CSCL 05H

An analysis of the Multisatellite Operations Control Center facilities (MSOCC-1) is presented. The analysis focuses on the human machine interfaces and interactions present in the data operations control area, the computer support operations, and the mission operations rooms in both current facilities and the proposed automated MSOCC-1. An alternative approach to the design of the automated MSOCC-1, which highlights human factors and human machine interaction dimensions of the design process, is also presented. S.L.

N82-17876# Federal Aviation Administration, Washington, D.C.

DOT/FAA HUMAN FACTORS WORKSHOP ON AVIATION. TRANSCRIPT, VOL 1

Nov. 1980 112 p Workshop held at Cambridge, Mass., 24-25 Nov. 1980 2 Vol.

(AD-A107802) Avail: NTIS HC A06/MF A01 CSCL 01/2

The opinions of airline pilots are considered in a presentation of aviation human factors safety issues. Human behavior is considered in the design, operation, and maintenance of aviation man machine systems. GRA

N82-17877# Federal Aviation Administration, Washington, D.C.

DOT/FAA HUMAN FACTORS WORKSHOP ON AVIATION. TRANSCRIPT, VOLUME 2

25 Nov. 1980 219 p refs Workshop held at Cambridge, Mass., 24-25 Nov. 1980

(AD-A107803) Avail: NTIS HC A10/MF A01 CSCL 01/2

Training issues and flight fatigue are considered in a presentation of aviation human factors safety issues. Human behavior is considered in the design, operation, and maintenance of aviation man machine systems. GRA

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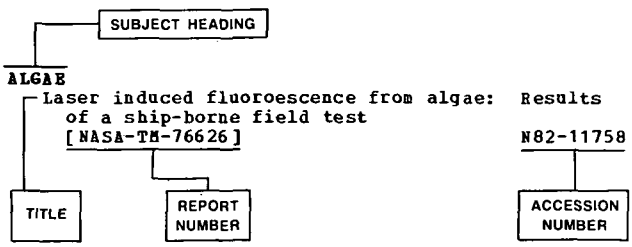

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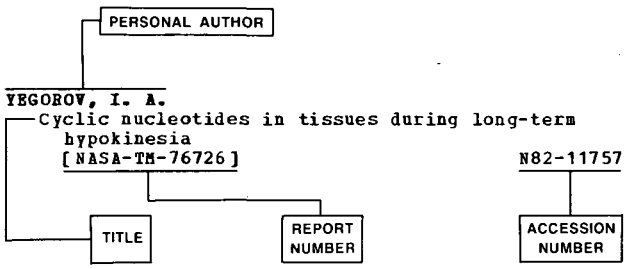

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