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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 127)

APRIL 1974

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (127)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 127)

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 March 1974 in

- *Scientific and Technical Aerospace Reports (STAR)*
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INTRODUCTION

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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.

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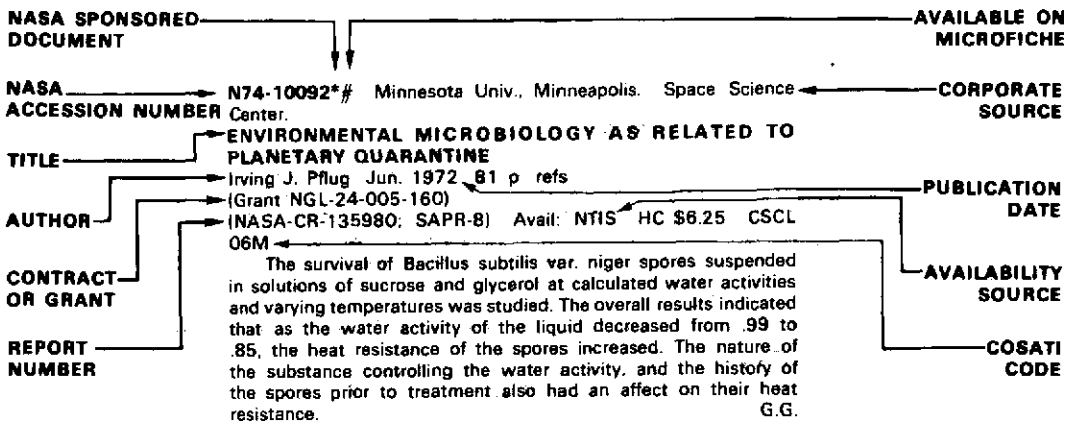

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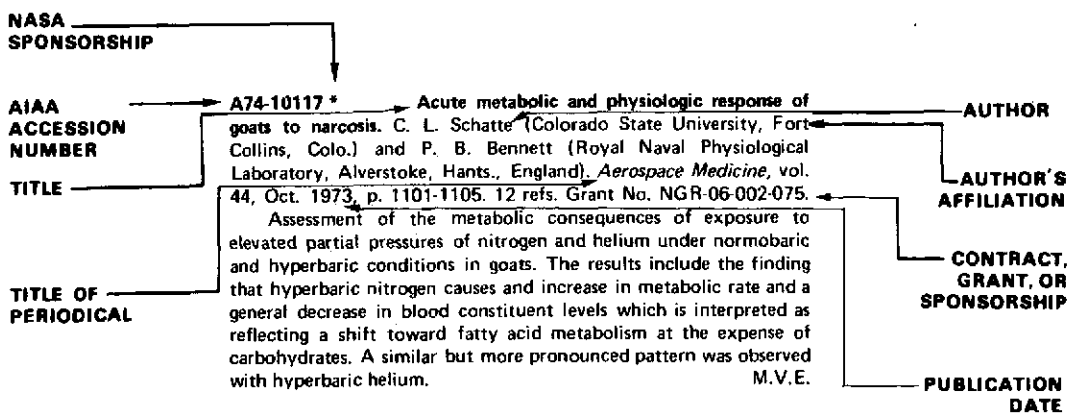

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 127) APRIL 1974

IAA ENTRIES

A74-16386 **Shock tube application in bio-acoustic research.** R. P. Hamernik, D. S. Dosanjh, and D. Henderson (New York, State University, Syracuse, N.Y.). In: Recent developments in shock tube research; Proceedings of the Ninth International Symposium, Stanford, Calif., July 16-19, 1973.
Stanford, Calif., Stanford University Press, 1973, p. 144-155. 8 refs.

A modified conventional shock tube and its successful application in psychophysiological acoustics are reported. An interesting attempt has been made to exploit the potential of the shock tube for the generation of well controlled transient pressure impulses. A conventional shock tube coupled to a variable-throat area exponential horn terminated in an anechoic chamber yields a wide range of rise times, durations, intensities and spectral characteristics of the impulses. The flexibility of the modified shock tube now provides the capability to simulate a wide spectrum of hazardous impulse noise. The chinchilla has been used as the experimental animal and some of the interesting and unexpected results that are presented are: (1) the possibility that large losses of sensory cells do not necessarily lead to losses in hearing; (2) 'safe' impulse and continuous noise, presented in combination, may lead to profound damage to hearing; and (3) the middle ear may break down with extreme overpressure and actually protect the sensory cells. (Author)

A74-16637 # **Properties of a nystagmus evoked by rhythmic photostimulation (Svoistva nistagma, vyzvannogo ritmicheskoi fotostimuliatsiei).** V. P. Neverov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1487-1493. 21 refs. In Russian.

Eye movements were recorded in experiments on rabbits when rhythmic light signals were delivered to the retina over a period of 60 min in darkness. Immediate photonystagmuses during photostimulation and also later reversive nystagmuses were observed in the rabbits. The interactions between immediate photonystagmuses, reversive trace nystagmuses, and reversive postkinetic nystagmuses are discussed. V.Z.

A74-16638 # **Double physiological tests for simple motor routines of man (Dvoinoe fiziologicheskoe testirovanie prostogo dvigatel'nogo navyka cheloveka).** M. S. Zalkind, E. I. Koz'mian, and A. V. Naidel' (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Fiziologicheski Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1500-1507. 30 refs. In Russian.

Observations of a monosynaptic H reflex and an evoked EEG response produced by electric stimulation of nerves during the execution of simple habitual movements by human subjects. In tests with wrist bending and foot straightening, the H reflex increased during the motion and decreased after the termination of motion, while the evoked EEG response decreased during the motion and vanished after its termination. A partial correlation between the magnitude of an H reflex and the amplitude of an evoked EEG response was observed. V.Z.

A74-16639 # **Electrical conductivity variations in a blood stream moving at variable rates (Izmeneniia elektroprovodnosti potoka krovi, dvizhushchegosia s peremennoi skorost'iu).** B. B. Zelikson (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1508-1515. 33 refs. In Russian.

Variations in electrical conductivity were studied in the blood stream of anesthetized cats when the blood stream rates were varied by a piston system. Interelectrode impedance variations due to reverse erythrocyte aggregation caused by blood stream rate variations were measured. The contribution of the results to the theoretical foundation of electroplethysmography is evaluated. V.Z.

A74-16640 # **Effect of local stimulation of pons Varolii on respiratory neuron activity and respiration (Vliianie lokal'nogo razdrazheniia Varolieva mosta na aktivnost' dykhatel'nykh neironov i dykhanie).** G. R. Temin (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1542-1547. 31 refs. In Russian.

A74-16641 # **Alveolar CO2 tension control and the mechanisms of voluntary respiration control in man (Upravlenie al'veoliarnym napriazheniem CO2 i mekhanizmy proizvol'nogo kontrolia dykhaniia u cheloveka).** I. S. Breslav, A. M. Shmeleva, N. N. Kariev, M. A. Pogodin, and R. I. Khvalibova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1548-1556. 13 refs. In Russian.

A74-16642 # **Mechanism of CO2-sensitivity variations in the respiration center (K mekhanizmu izmeneniia chuvstvitel'nosti dykhatel'nogo tsentra k CO2).** S. I. Frankshtein, T. I. Sergeeva, Z. N. Sergeeva, and E. S. Ivanova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1557-1561. 11 refs. In Russian.

The effects of the afferent activities of muscles, vagus nerves and brain on the CO2 sensibility of the respiration center are studied in anesthetized cats after vagotomy, decortication and severance of some muscles and spine. Measurements of lung ventilation, pH, blood pressure and partial CO2 pressure suggest that the chemosensitive structures of the respiration center are susceptible to CO2 pressure variations in blood but do not react on the afferent and efferent activities of nerves. V.Z.

A74-16643 # **Analysis of the 'negative phase' of oxygen consumption during a recovery period following intense muscular activity (Analiz 'otritsatel'noi fazy' potrebleniia kisloroda v vosstano-**

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vitel'nom periode posle intensivnoi myshechnoi deiatel'nosti). N. R. Chagovets, N. P. Eremenko, and L. G. Leshkevich (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1597-1601. 32 refs. In Russian.

A74-16644 # **Dependence of the mechanical sensitivity of the eye on the illumination conditions and visual adaptation (Zavisimost' mekhanicheskoi chuvstvitel'nosti glaza ot uslovii osveshchennosti i zritel'noi adaptatsii).** V. N. Prokof'ev (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1617-1620. 11 refs. In Russian.

A74-16645 # **Specific role of wrists in thermoregulation of man (Ob osoboi roli v termoreguliatsii kistei ruk cheloveka).** K. P. Ivanov and A. I. Eremiagin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1624-1628. 9 refs. In Russian.

Precision thermometry was applied to various parts of the bodies or subjects whose wrists were cooled by a water flow in special gloves in a study of the contribution of wrists to thermoregulation of the human body. The subjects were confined in a chamber at temperatures raised from room temperature to 41 to 43 C and their wrists were then cooled to about 25.3 C in simpler experiments, and also to 12.5 C, after a cooling recess, in cycled experiments. The effects of wrist cooling on the temperature distribution in various parts of the human body are discussed. Recommendations are given for achieving better overall cooling effects through wrist cooling. V.Z.

A74-16646 # **Diurnal activity rhythm of sweat glands and thermal adaptation (Sutochnyi ritm aktivnosti potovykh zhelez i adaptatsiia k teplu).** O. A. Virovets. *Fiziologicheskii Zhurnal SSSR*, vol. 59, Oct. 1973, p. 1628-1632. 6 refs. In Russian.

Sweat excretion was measured around the clock and the K and Na contents in sweat samples were determined in 3 and 10-day experiments on subjects who received low-salt diets and were kept at 40 C with 20 to 30% humidity in a daily routine of rest with periods of moderate physical exercises. Curves of diurnal variations in sweat discharges are plotted. V.Z.

A74-16666 **Analysis of the astronaut's activity when working in free space.** E. V. Khrunov. *(Kosmicheskie Issledovaniia*, vol. 11, May-June 1973, p. 470-477.) *Cosmic Research*, vol. 11, no. 3, Nov. 1973, p. 414-419. 5 refs. Translation.

The motions of an astronaut during the execution of extravehicular assignments are analyzed. Formulas are given to describe his hand movements as a function of time in slow motion photographs. Criteria are proposed for the evaluation of his extravehicular training performance. The positive effects of training on the extravehicular activity of Soviet astronaut Leonov are noted. Leonov's and Beliaev's heart beat rates during various phases of their extravehicular activities are discussed. Algorithms are proposed for some extravehicular assignments. V.Z.

A74-16667 **Cytogenetic analysis of seeds of diploid and autotetrapoid forms of Crepis capillaris after flight on the artificial earth satellite 'Kosmos-368.'** R. N. Platonova. *(Kosmicheskie Issledovaniia*, vol. 11, May-June 1973, p. 478-481.) *Cosmic Research*, vol. 11, no. 3, Nov. 1973, p. 420-423. 15 refs. Translation.

A74-16739 # **Carbon metabolism enzymes and ATP in eyes with disrupted innervation (Fermenty uglevodnogo obmena i ATF v glazu pri narushenii ego innervatsii).** Iu. A. Petrovich (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) and G. A. Borovik (Permskii Gosudarstvennyi Meditsinskii Institut, Perm, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 212, Oct. 21, 1973, p. 1465-1468. 21 refs. In Russian.

A spectrophotometer was used for recording the hexokinase and dehydrogenase activities in the eyes of 112 rabbits, kept one and eight days with traumatic eye innervation damage. Various chemical methods were applied to determine individual enzymes in the frozen aqueous humor, stroma and epithelium of experimental and control rabbits. Possible mechanisms responsible for the effects of innervation damage on ocular enzyme activities are discussed. V.Z.

A74-16740 # **Role of biogenous amines in memory mechanisms (O roli biogennykh aminov v mekhanizmakh pamiati).** I. M. Aivazashvili, G. S. Iordanishvili, and V. N. Chikvaidze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk SSSR, Doklady*, vol. 212, Oct. 21, 1973, p. 1479-1481. 10 refs. In Russian.

The effect of nardil administration on conditioned reflex memory was investigated in rats which developed a fear reflex when they received electric shock on entry in a dark compartment from an illuminated compartment through a hole and then returned into the illuminated compartment to escape the shock. Nardil doses of 10 mg/kg inhibited monoamine-oxidase activity in the rats and, as a consequence, suppressed the fear reflex when nardil was administered two hours before the shock. It is theorized that serotonin accumulation in the brain, due to monoamine-oxidase inhibition, is the cause of fear memorization suppression by previous nardil administration. V.Z.

A74-16754 # **Usefulness of hematological and biochemical variables for the differentiation of impact acceleration effects (O tsennosti gematologicheskikh i biokhimicheskikh pokazatelei dlia differentsirovaniia deistviia udarnykh peregruzok).** E. E. Simonov and V. A. Korzhen'iants. *Voenno-Meditsinskii Zhurnal*, Oct. 1973, p. 65-68. In Russian.

A74-16770 **Considerations and guidelines concerning the psychological selection of candidate pilots (Considerazioni e orientamenti in tema di selezione psicologica di candidati piloti).** F. Sparvier. *Rivista Aeronautica*, vol. 49, Sept. 1973, p. 57-68. 38 refs. In Italian.

Philosophical analysis of the underlying assumptions which allow a psychologist to select candidate pilots on the basis of predictions about future performance. A distinction is made between cognitive and practical activity, and it is shown that the selection of candidate pilots falls within this second category and can only lead to predictions of future performance rather than complete knowledge, since action no longer takes place in the realm of the true but in the realm of the useful. The formulation of the selection problem with respect to pilots is distinguished from the formulation of the problem with respect to manual workers in general, noting that in the case of pilots the underlying truth of the selection concerns learning, while in the case of the larger group of workers the essential aspect is not learning but productivity. A.B.K.

A74-16775 # **Metabolism under extremal conditions of a space flight and during its simulation (Obmen veshchestv v ekstremal'nykh usloviiakh kosmicheskogo poleta i pri ego imitatsii).** I. S. Balakhovskii and Iu. V. Natochin. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 22), 1973. 213 p. 324 refs. In Russian.

Data of metabolism studies covering a decade of manned Soviet space missions are evaluated. Metabolism data of Soviet astronauts are compared with those obtained in space flight simulation experiments and with those of the American space missions. Attention is given to water and salt excretion in flight and immediately after return to the earth. Blood microanalysis methods, including paper sampling and vial sampling techniques, are described. Osmotic water suction mechanisms in the urinary bladder are also topics of discussion. V.Z.

A74-16797 **Effects of cholinergic innervation on the mammalian heart - The cardiomodulator tonus (Effets de l'innervation cholinergique sur le coeur de mammifère - Le tonus cardiomodérateur).** P. Duchêne-Marullaz (Institut de Recherches Cardiologiques, Royat, Puy-de-Dôme, France). *Journal de Physiologie*, vol. 66, Dec. 1973, p. 373-397. 184 refs. In French.

The cardiac distribution of cholinergic fibers is first discussed, followed by a review of the effects of setting cardiomoderating innervations in motion. Effects on the cardiac frequency, on the myocardic contraction, on the excitability and on the propagation of the depolarization wave, and on ventricular compliance are considered. The cardiomoderator tonus is considered in terms of the mechanism of atropinic cardioacceleration, the importance of the cardiomoderator tonus, the influence of the tonus on the force of contractions, and the influence of the tonus on the excitability and on the wave of depolarization. Attention is given to interactions of cholinergic and adrenergic innervations. F.R.L.

A74-16798 **Superiority of the discriminatory power of mitral cells compared to that of olfactory receivers (Supériorité du pouvoir discriminateur des cellules mitrales comparé à celui des récepteurs olfactifs).** I. Giachetti and P. Mac Leod (Collège de France, Paris, France). *Journal de Physiologie*, vol. 66, Dec. 1973, p. 399-407. 15 refs. In French.

The responses of 63 mitral cells in the olfactory bulb of the rat were recorded during exposure to five olfactory stimuli. The overall response rate approximated 50 percent and the active/inhibition ratio 1.5. Each odor evoked a pattern of activations and of inhibitions totally different from the four others. This is in sharp contrast with the results obtained in a parallel study on the responses of 58 olfactory nerve units in the frog during exposure to the same five odorants. This latter study showed that three out of ten pairs of olfactory stimuli evoked significantly similar across-fiber patterns of response. F.R.L.

A74-16799 **Stimulation of the olfactory neuro-epithelium in man by long duration direct electric currents (Stimulation du neuro-épithélium olfactif chez l'homme par des courants électriques continus de longue durée).** A. Uziel (Clinique St.-Charles, Montpellier, France). *Journal de Physiologie*, vol. 66, Dec. 1973, p. 409-422. 17 refs. In French.

A74-17302 * **Systolic and diastolic time intervals in pulsus alternans - Significance of alternating isovolumic relaxation.** D. H. Spodick (Lemuel Shattuck Hospital; Boston University, Boston; Tufts University, Medford, Mass.), V. M. Quarry (Lemuel Shattuck Hospital, Boston, Mass.), and A. H. Khan. *American Heart Journal*, vol. 87, Jan. 1974, p. 5-10. 27 refs. Grant No. NGR-22-012-006.

Systolic and diastolic time intervals in 14 cardiac patients with pulsus alternans revealed significant alternation of preinjection period (PEP), isovolumic contraction time (IVCT), left ventricular ejection time (LVET), ejection time index (ETI), PEP/LVET, and carotid dD/dt with better functional values in the strong beats. Cycle length, duration of electromechanical systole (EMS) and total diastole, i.e., isovolumic relaxation period (IRP) and diastolic filling period (DFP) occurred in 7 out of 8 patients. These diastolic intervals alternated reciprocally such that the IRP of the strong beats encroached upon the DFP of the next (weak) beats. F.R.L.

A74-16800 **Electrical activity and transmembranar ionic current of the myocardial fiber of the monkey /family of cercopithecidae/ (Activité électrique et courants ioniques transmembranaires de la fibre myocardique de singe /famille des cercopithécidés/).** M. Walden, P. Kreher, K. J. Aka, and R. Tricoche (Abidjan, Université, Abidjan, Ivory Coast). *Journal de Physiologie*, vol. 66, Dec. 1973, p. 455-472. 35 refs. In French. Délégation Générale à la Recherche Scientifique et Technique Contract No. 72,70231,00221,7501.

The study of the cellular electrical activity and the membrane ionic currents was carried out with the double sucrose gap technique. The records obtained when intraventricular fibers are stimulated reveal two types of all or nothing responses, whose time courses seem to vary with the diameters of the investigated fibers. In voltage clamp conditions the study of membrane ionic currents reveals the existence of (1) an inward current for depolarizations ranging from 20 mV to about 100 mV which can be divided into two components: one having fast kinetics, carried by sodium ions, the other having slow kinetics, mainly carried by calcium ions; (2) a delayed outward current in TXX-MnCl2 solutions, which can be divided into two components. A qualitative study of the conductances responsible for these currents has been made. F.R.L.

A74-16812 **The effect of certain cosmic and geophysical factors on the earth's biosphere (Vliianie nekotorykh kosmicheskikh i geofizicheskikh faktorov na biosferu zemli).** Edited by Iu. A. Kholodov. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 18), 1973. 210 p. In Russian.

Papers dealing with the biological effects of solar radiation and magnetic fields are included, covering the biosphere, mental and social effects, occurrences of epidemics, plant and bacterial life, and responses of man and animals to magnetic fields and solar activity. The relation between the geomagnetic field and solar radiation on the one hand and life on earth, on the other, is also studied. V.Z.

A74-16814 # **Some problems involving detailed diachronic investigation of processes in the psychic and social life of man (Nekotorye problemy uglublennogo diakhronicheskogo issledovaniia protsessov psikhicheskoi i sotsial'noi zhizni cheloveka).** N. K. Serov. In: The effect of certain cosmic and geophysical factors on the earth's biosphere. Moscow, Izdatel'stvo Nauka, 1973, p. 26-46. 41 refs. In Russian.

A74-16815 # **Heliogeophysical factors of the progress of an epidemic process (Geliogeofizicheskie faktory razvitiia epidemicheskogo protsessa).** V. N. Iagodinskii. In: The effect of certain cosmic and geophysical factors on the earth's biosphere. Moscow, Izdatel'stvo Nauka, 1973, p. 47-66. 80 refs. In Russian.

Evidence is given for the existence of correlative and causal relations between the solar activity level, the activity of microorganisms, the frequency and extent of pandemic diseases and epidemics, and living standards. The possibility of prediction of epidemics is discussed by an analysis of a large volume of pertinent data and studies worldwide. V.Z.

A74-16816 # **Characterization of a perturbed geomagnetic field as a stimulant (Kharakteristika vozmushchennogo geomagnitnogo polia kak razdrazhitelia).** N. I. Muzalevskaia. In: The effect of certain cosmic and geophysical factors on the earth's biosphere. Moscow, Izdatel'stvo Nauka, 1973, p. 123-142. 41 refs. In Russian.

An attempt is made to prove mathematically that a perturbed geomagnetic field can affect biological processes and life on earth. The energy characteristics of a perturbed geomagnetic field are discussed in an elementary unit volume as possible factors of biological stimulation. Expressions are given for local energy characteristics of the geomagnetic field, with attention to conditions under which the energy density and the magnetic flux of a perturbed geomagnetic field exceed their threshold levels. The biological activity of the geomagnetic field is plotted vs responses of a living organism to increasing stimuli. V.Z.

A74-16817 # **Reactions to magnetic fields in the organisms of animals and man (Reaktsii organizma zhivotnykh i cheloveka na magnitnye polia).** Iu. A. Kholodov. In: The effect of certain cosmic and geophysical factors on the earth's biosphere. Moscow, Izdatel'stvo Nauka, 1973, p. 143-163. 88 refs. In Russian.

Review of Soviet and non-Soviet papers concerning the biological effects of magnetic fields in humans and animals. Experiments on mice, Staphylococcus aureus, rats, chicken embryos, worms, mollusks, insects, fishes, reptiles, birds, rabbits, and humans are covered. Direct experimental evidence concerning the effects of fluctuations of the geomagnetic field on living organisms is noted. V.Z.

A74-16818 # **Level of spontaneous phage production in the lysogenic system E. coli K12 as a test of solar activity (Uroven' spontannoi produktsii faga v lizogennoi sisteme E. coli K12 kak test solnechnoi aktivnosti).** V. S. Levashev, M. M. Gorshkov, S. S. Belokrysenko, and M. G. Davydova. In: The effect of certain cosmic and geophysical factors on the earth's biosphere. Moscow, Izdatel'stvo Nauka, 1973, p. 189-194. 7 refs. In Russian.

A74-16819 # **Perturbations of the terrestrial electromagnetic field and the problem of heliobiological relations (Vozmushcheniia elektromagnitnogo polia zemli i problema geliobiologicheskikh sviazei).** B. M. Vladimirskii, Iu. N. Achkasova, and L. V. Monastyrskikh). In: The effect of certain cosmic and geophysical factors on the earth's biosphere. Moscow, Izdatel'stvo Nauka, 1973, p. 195-199. 15 refs. In Russian.

Cultures of various bacterial strains were exposed to electromagnetic fields at 0.1 to 10 Hz for 18 to 20 hr in a capacitor at constant temperature. Productivity, bactericide resistance, and genetic, morphological, fermentative and antigenic properties of exposed strains were compared with those of control strains. Stimulation of productivity was observed in exposed strains. An attempt is made to extend these observations to the biological effects of solar radiation during solar activity events. V.Z.

A74-16851 **Measurement errors of CO analyzers and their influence on the evaluation of the effect of CO in humans (Messfehler von CO-Analysegeräten und Einfluss auf die Beurteilung der CO-Wirkung beim Menschen).** G. Kleinhanss, G. Piekarski, and M. Holl (Institut für Wehrmedizin und Hygiene, Koblenz, West Germany). *Wehrmedizinische Monatsschrift*, vol. 17, Dec. 1973, p. 361-369. 10 refs. In German.

The degree of harmful effect of carbon monoxide in humans is determined by the duration of the effect and the concentration c in the inspired air. If certain conditions are observed, the product c & t correlates with the CO-Hb level in the blood. The product c & t, which is relatively easy to measure, can therefore be used as a parameter for the effect of CO. The information value of c & t depends on the accuracy of the determination of the CO concentration. Static and dynamic errors in measurement of two CO infrared absorption spectrometers were investigated, and results are used to provide guidelines for improved measurement accuracy. (Author)

A74-16852 **Training in aviation medicine for doctors and hospital personnel (Flugmedizinische Ausbildung für Ärzte und Sanitätspersonal).** J. Garbe (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Wehrmedizinische Monatsschrift*, vol. 17, Dec. 1973, p. 376-382. In German.

The nature and extent of courses taken by German Air Force doctors and medical staff personnel are outlined. The medical training program includes a 'Basic Course for Aviation Doctors,' an 'Introduction Course for Medical Officers to First-Aid and Aviation Medicine,' and training courses for assistants to medical doctors and for medical orderlies accompanying sick and wounded during air transportation. V.P.

A74-16853 **Medicine and technology (Medizin und Technik).** A. Pupato. *Schweizerische Technische Zeitschrift*, vol. 70, Dec. 20, 1973, p. 1029-1059. In German.

The advances in medical applications of modern technology since 1934 are reviewed, covering optical microscopy, electron microscopy, intensive care units, the artificial kidney and hemodialysis, the defibrillator, the rotating membrane kidney, open heart surgeries, the heart-lung machine, electrode implantation techniques, and the hypothermic machine. Some details are also given on angiographic techniques as these have been developed and are applied in Switzerland. The advances in this field are assessed as extremely beneficial to practical and scientific medicine. V.Z.

A74-17008 **A new catheter technique for His bundle recordings via the arm veins.** O. S. Narula, M. Runge, and P. Samet (Mount Sinai Medical Center of Greater Miami, Miami Beach; Miami, University, Miami, Fla.). *British Heart Journal*, vol. 35, Dec. 1973, p. 1226-1233. 17 refs.

A new technique for recording His bundle and right bundle-branch electrograms via the arm veins is described. In 25 patients, an ordinary bipolar pacing catheter was introduced into an arm vein and the tip positioned in the right atrium. The catheter tip was looped in a figure-of-6 shape in the right atrium. The new catheter technique provides an alternative route for catheter introduction in patients in whom femoral veins cannot be used, and may prove to be the method of choice in selected cases requiring long-term monitoring of His bundle potentials in view of the stability of the His bundle recordings. F.R.L.

A74-17009 **Use of bicycle ergometry and sustained handgrip exercise in the diagnosis of presence and extent of coronary heart disease.** R. H. Helfant, V. S. Banka, M. A. DeVilla, R. Pine, V. Kabde, and S. G. Meister (Pennsylvania, University, Philadelphia, Pa.). *British Heart Journal*, vol. 35, Dec. 1973, p. 1321-1325. 16 refs.

A74-17228 # **Study of the effect of machine and instrument vibrations on the arms of a human operator under variable initial loads (Issledovanie vliianiia vibratsii mashin i instrumenta na ruki cheloveka-operatora pri var'irovanii nachal'nykh usilii).** Z. M. Butkovskaia, E. N. Kadyskina, B. A. Potemkin, and K. V. Frolov. In: Vibrational insulation of machinery and protection of the human operator from vibrations. Moscow, Izdatel'stvo Nauka, 1973, p. 5-16. 37 refs. In Russian.

A74-17229 # **Construction of a dynamic model for the body of a human operator exposed to the action of random wideband vibrations (Postroenie dinamicheskoi modeli tela cheloveka-operatora, podverzhennogo deistviiu shirokopolosnykh sluchainykh vibratsii).** B. A. Potemkin and K. V. Frolov. In: Vibrational insulation of machinery and protection of the human operator from vibrations. Moscow, Izdatel'stvo Nauka, 1973, p. 17-30. 16 refs. In Russian.

A74-17230 # **Functional modeling in the biomechanical analysis of the human operator (Funktsional'noe modelirovanie v biomekhanicheskom analize cheloveka-operatora).** K. K. Glukharev and K. V. Frolov. In: Vibrational insulation of machinery and protection of the human operator from vibrations. Moscow, Izdatel'stvo Nauka, 1973, p. 31-38. 28 refs. In Russian.

The analytical approximation of the empirical frequency characteristics of the body of an operator subjected to random vibrations is discussed. A method for constructing dynamic models of such a system is proposed in which the mechanical system is represented in the form of a quadrupole. The method is applied to the construction of mechanical models for three positions of the human operator. V.P.

A74-17231 # **Technique for an experimental investigation of the dynamic characteristics of a human operator under random vibrational loads (Metodika eksperimental'nogo issledovaniia dinamicheskikh kharakteristik cheloveka-operatora pri sluchainom vibratsionnom vozdeistvii).** G. Ia. Panovko, B. A. Potemkin, and V. S. Solov'ev. In: Vibrational insulation of machinery and protection of the human operator from vibrations. Moscow, Izdatel'stvo Nauka, 1973, p. 38-40. In Russian.

A74-17256 **On studying the moon scientists.** I. Mitroff (Pittsburgh, University, Pittsburgh, Pa.). *New Scientist*, vol. 60, Dec. 27, 1973, p. 900, 901.

A philosophical inquiry into the psychology of the Apollo project scientists, based on interviews with 42 eminent Apollo scientists after Apollo 11 landing, suggests a deep permeation of science with subjective and even irrational ideas - a phenomenon which should be taken into account in shaping modern conceptions of science. The more significant statements of the interviewed scientists are as follows: an uninvolved, unemotional scientist is as fictitious as the mad scientist eager to destroy the world for knowledge; speculative scientists and data-bound scientists are the two contrasting extreme types of the modern scientists; and an open mind is a more likely property of a 'lesser' scientist than of a 'greater' one. V.Z.

A74-17291 **Theoretical approaches to human error /Ergonomic Research Society Lecture 1973/.** W. T. Singleton (Aston, University, Birmingham, England). *Ergonomics*, vol. 16, Nov. 1973, p. 727-737. 37 refs.

It is shown that errors or accidents are in no sense homogeneous. There are many kinds of errors, many different causation factors, and many relevant models or theories. The skill of the ergonomist lies in his ability to match the most relevant taxonomy and theory to the particular practical problem. For example, it is possible to speculate that at the present time problems of road accidents might best be approached by a psychopathological method, the design of process systems by the utilization of field theories, and the study of aircraft accidents by concentration on people-interaction aspects. Attention is given to the following theoretical approaches: psychoanalytic, stimulus-response, field, cybernetic, skill, statistical decision, arousal/stress, and social. F.R.L.

A74-17292 * **The effects of intermittent noise on human serial decoding performance and physiological response.** D. W. Conrad (North Carolina State University, Raleigh, N.C.). *Ergonomics*, vol. 16, Nov. 1973, p. 739-747. 24 refs. Grant No. NGL-34-002-055.

A74-17293 **Dials v counters - Effects of precision on quantitative reading.** W. E. Nason and C. A. Bennett (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). *Ergonomics*, vol. 16, Nov. 1973, p. 749-758. 16 refs.

An experiment was performed comparing dials and counters at three levels of precision (10, 100 and 1000 values). Fifteen students, instructed to accuracy, read 19 settings on each display in randomized order. No speed differences were found among counters, dial reading was successively slower for higher precision dials, and all counters were superior to all dials. Various subject interactions showed that some subjects read higher precision dials especially slowly. Errors were committed only with dials. It is concluded that counters are superior to dials for all quantitative reading tasks. Discussion of check reading and qualitative reading suggests that properly designed counters might also be superior for these tasks. There may be few, if any, situations, from the standpoint of performance, where dials should be employed. (Author)

A74-17294 **Dark adaptation recovery after pulsed light.** D. J. Florip and R. W. Bauer (U.S. Army, Human Engineering Laboratories, Aberdeen Proving Ground, Md.). *Ergonomics*, vol. 16, Nov. 1973, p. 759-764. Army-supported research.

Recovery of complete dark adaptation was observed after exposure to single pulses of light. Illuminances were measured at the subject's face and durations ranged from 0.01 to 1.0 second. Subjects recorded their own recovery by adjusting an adaptometer to the lowest luminance detectable. Recovery times were sensitive to both duration and illuminance but varied most predictably with total light flux as measured in lumen-seconds. (Author)

A74-17295 **Influence of after-movement on muscle memory following isometric muscle contraction.** J. Heide (Danmarks Tekniske Hojskoke, Copenhagen, Denmark) and S. Molbech (Danish National Association for Infantile Paralysis, Hellerup, Denmark). *Ergonomics*, vol. 16, Nov. 1973, p. 787-796. 21 refs. Research supported by the Danish Government Fund for Scientific and Industrial Research.

A74-17302 * **Systolic and diastolic time intervals in pulsus alternans - Significance of alternating isovolumic relaxation.** D. H. Spodick (Lemuel Shattuck Hospital; Boston University, Boston; Tufts University, Medford, Mass.), V. M. Quarry (Lemuel Shattuck Hospital, Boston, Mass.), and A. H. Khan. *American Heart Journal*, vol. 87, Jan. 1974, p. 5-10. 27 refs. Grant No. NGR-22-012-006.

Systolic and diastolic time intervals in 14 cardiac patients with pulsus alternans revealed significant alternation of preinjection period (PEP), isovolumic contraction time (IVCT), left ventricular ejection time (LVET), ejection time index (ETI), PEP/LVET, and carotid dD/dt with better functional values in the strong beats. Cycle length, duration of electromechanical systole (EMS) and total diastole, i.e., isovolumic relaxation period (IRP) and diastolic filling period (DFP) occurred in 7 out of 8 patients. These diastolic intervals alternated reciprocally such that the IRP of the strong beats encroached upon the DFP of the next (weak) beats. F.R.L.

A74-17500 **Automatic analysis and detection of EEG spikes.** J. R. Smith (Florida, University, Gainesville, Fla.). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Jan. 1974, p. 1-7. 12 refs. NSF Grant No. GK-15373; Grant No. AF-AFOSR-72-2171.

A method for detecting spikes in the EEG is described. A digital computer is used to perform a detailed analysis of abnormal spikes to obtain quantitative values for spike characteristics and to determine the parameter values to be used in a special-purpose spike detector. This detector is described together with application results. (Author)

A74-17794 **Communication with extraterrestrial intelligence.** Edited by C. Sagan (Cornell University, Ithaca, N.Y.). Cambridge, Mass., MIT Press, 1973. 464 p.

The proceedings this book represents for the first international conference on extraterrestrial civilizations and problems of contact with them, held in September 1971 in Soviet Armenia, shows this conference to have been a gathering of workers in a variety of fields including astronomy, physics, radio technology, computer science, chemistry, biology, linguistics, archaeology, anthropology, sociology, history, and cryptoanalysis, and to have brought together an international galaxy of scientists. The participants have revised and updated their contributions, and the results is an illuminating discussion, touching on many of the most critical questions in science and human affairs. Special attention is given to the plurality of planetary systems in the universe, the origin of life on earth, the possibility of life on other cosmic bodies, the origin and development of technological civilizations, problems in searching for intelligent signals or for evidence of astroengineering activities, and the problems and possible consequences of establishing contact with extraterrestrial civilizations. M.V.E.

A74-17846 * **On the dynamical realization of /M, R/-systems.** R. Rosen (New York, State University, Buffalo, N.Y.). *Bulletin of Mathematical Biology*, vol. 35, Apr. 1973, p. 1-9. Grants No. NGR-33-015-016; No. NIH-HO-05136-02.

A new manner of representing a class of abstract cell models previously developed by the author is presented. Some of the properties of this dynamical representation are explored, and their consequences discussed. (Author)

A74-17868 * **Implantable telemetry systems for use in animal monitoring.** H. Sandler, T. B. Fryer (NASA, Ames Research Center, Moffett Field, Calif.), and H. L. Stone (Marine Biomedical

Institute, Galveston, Tex.). *Biomaterials, Medical Devices, and Artificial Organs*, vol. 1, no. 2, 1973, p. 405-417. 30 refs.

A74-17869 * An integrated human thermal system and its unsteady-state simulation. F. T. Hsu, C. L. Hwang, S. A. Konz, and L. T. Fan (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). *International Journal of Biomedical Engineering*, vol. 1, no. 1, 1973, p. 55-78. 15 refs. Grant No. NGR-17-001-034; Contract No. F44620-68-0020. Project THEMIS.

Consideration of an integrated human thermal system consisting of a human thermal system proper and an external thermal device. A mathematical model of the integrated system has been used in a computer simulation, and the simulation results have been verified through comparison with the results of experiments carried out on nine human subjects. The comparison indicates that the model simulates the system reasonably well. M.V.E.

A74-17879 Quantitative videoangiocardiography, a method for measuring the heart's pumping function. R. P. van Wijk van Brievingh (Delft, Technische Hogeschool, Delft, Netherlands). *Delft Progress Report, Series B - Electrical, Electronic and Information Engineering*, vol. 1, Dec. 1973, p. 11-21. 21 refs.

Discussion of the progress of an assembly being developed for quantitative studies of the pumping function of the heart. One of the principal purposes of the assembly is quantitation of the pumping function in conjunction with catheterization procedures. Other objectives of the assembly include video signal recording on a magnetic drum, selective and fractional injection of contrast medium, valve and pupillary muscle locating from shadow images, and data processing. V.Z.

A74-17882 # Behavioral stress response related to passenger briefings and emergency warning systems /Commercial airlines/. M. A. Becker (California State University, Los Angeles; USAF, Van Nuys Air National Guard Base, Calif.). *SAFE Journal*, vol. 3, 2nd Quarter, 1973, p. 6-9. 11 refs.

A74-17907 * Separation of small circular DNA molecules from the blue-green alga Anacystis nidulans. Y. Asato (Southeastern Massachusetts University, North Dartmouth, Mass.) and H. S. Ginoza (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Nature New Biology*, vol. 244, Aug. 1, 1973, p. 132, 133. 9 refs.

A74-17910 A noninvasive pressure-pulse recorder - Development and rationale. J. K. Raines, M. Y. Jaffrin, and S. Rao (MIT, Cambridge, Mass.). *Association for the Advancement of Medical Instrumentation, Journal*, vol. 7, Sept.-Oct. 1973, p. 245-250. 9 refs. Grants No. NIH-HL-14-209; No. NIH-RR-88.

A new instrument has been built that permits accurate noninvasive recordings of the arterial pressure pulse. The instrument consists of a monitoring cuff with a measured air injection system and an electronic transducing circuit. A procedure has been developed to produce recordings that are reproducible and compatible from location to location. Comparison with intra-arterial measurements has shown that the instrument produces a faithful reproduction of the arterial pulse contour. The instrument, which is undergoing clinical evaluation, shows great promise for patient monitoring and detection of occlusive diseases. (Author)

A74-17931 * Cognitions and 'placebos' in behavioral research on ambient noise. E. R. Harcum and P. M. Monti (College of William and Mary, Williamsburg, Va.). *Perceptual and Motor Skills*, vol. 37, Monograph Supplement 1, 1973, p. 75-99. 49 refs. Contract No. NAS1-9461-2.

Investigation of the effects of noise on visual and psychomotor tasks, with special attention to influences of certain cognitive variables. The results include the finding that 100-dB ambient noise has no effects per se, though cognitive variables in the testing situation affect both performance and ratings of disturbance. M.V.E.

A74-17945 # Cross-correlation analysis of the tension rhythm in various cerebral formations during the formation of a functional system of defensive type (Kross-korreliatsionnyi analiz ritma napriazheniia razlichnykh obrazovanii golovnogo mozga pri formirovanii funktsional'noi sistemy oboronitel'nogo kharaktera). A. M. Mamedov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 212, Oct. 1, 1973, p. 1017-1020. In Russian.

A74-17946 # Information processing, a behavioral event, and cortical neurons (Obrabotka informatsii, povedencheskii akt i korkovye neirony). V. B. Shvyrkov and Iu. I. Aleksandrov (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 212, Oct. 1, 1973, p. 1021-1024. 14 refs. In Russian.

Experiments were conducted on 12 anesthetized rabbits receiving conditioned stimuli in the form of flash light signals synchronized with acoustic pulses, and unconditioned electric cutaneous stimuli. The purpose of the experiments was to identify those response phases of cortical somato-sensory neurons which represent the reactions to both conditioned and unconditioned stimuli and, consequently, correspond to a behavioral event. It is theorized that an afferent synthesis mechanism is active in information processing for an individual behavioral event. V.Z.

A74-17951 Lack of bacterial survival under Cythereana-oriented conditions. N. K. Ichinose and C. E. Folsome (Hawaii, University, Honolulu, Hawaii). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 332-334.

A74-17952 The influence of long-term intermittent exposures to hypoxia on gastric emptying time in rats. H. S. Fang and C. F. Chen (National Taiwan University, Taipei, Nationalist China). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 335-337. 9 refs. Research supported by the National Science Council of Nationalist China.

A74-17953 The influence of prolonged semi-starvation on the incidence of pulmonary hemorrhage following rapid decompression. J. D. Lin and H. S. Fang (National Taiwan University, Taipei, Nationalist China). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 338-340.

A74-17954 Iron-sulphur proteins - Their possible place in the origin of life and the development of early metabolic systems. R. H. Wickramasinghe (Edinburgh, University, Edinburgh, Scotland). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 341-352. 84 refs.

A74-17955 * Lipid composition of slash pine tissue cultures grown with lunar and earth soils. J. L. Laseter, J. D. Weete (Louisiana State University, New Orleans, La.; Lunar Science Institute, Houston, Tex.), P. S. Baur, and C. H. Walkinshaw (Louisiana State University, New Orleans, La.; Lunar Science Institute; NASA, Johnson Space Center, Lunar Receiving Laboratory, Houston, Tex.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 353-356. 12 refs. Contracts No. NAS9-12941; No. NSR-09-051-001.

Lipid analyses were conducted on slash pine tissues grown in culture in the presence of lunar (Apollo 15) and earth soils. Significant reductions in the total lipids, fatty acids, and sterol components were found in the tissues grown in contact with each of the soils employed when compared to the control. Tissues grown with lunar soil showed the greatest reductions. These results are discussed with respect to previous ultrastructural studies on similarly treated slash pine tissues and lipid analyses on tobacco tissue cultures. (Author)

A74-17956 * **An observation about the relative hardiness of bacterial spores and planetary quarantine.** C. A. Trauth, Jr. (Sandia Laboratories, Albuquerque, N. Mex.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 357-367. 9 refs. NASA-supported research. NASA Order W-12853.

Planetary quarantine objectives are shown to be critically dependent on the deviation in the actual decimal-reduction-time or D values (i.e., the time necessary to reduce the population to one-tenth of its original value) of organisms on spacecraft from the values chosen for spacecraft sterilization that have been selected conservatively relative to defined experimental procedures and bacterial spore stocks. New data indicate that these D values are not conservative when compared with those of naturally occurring organisms. The possible implications of these new data for planetary quarantine are analyzed. M.V.E.

A74-17957 * **The gravity reference response, the rotation sensation, and other illusory sensations experienced in aircraft and space flight.** G. L. Shillinger, Jr., R. J. von Baumgarten, and G. Baldrighi (NASA, Ames Research Center, Moffett Field, Calif.; Michigan, University, Ann Arbor, Mich.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 368-390. 26 refs. Contract No. NAS2-6057.

An analysis of the gravitational and inertial forces which act during aircraft flight upon the vestibular systems of the aircraft occupants reveals that in the absence of a visual horizon, certain illusory sensations are predictable for various acceleration environments. The 'inversion illusion' (Graybiel and Kellog, 1966) felt by some human subjects at 0 g seems to be different from the rotation sensation and could be caused by the diminished pressure forces of the otoliths on the maculae. The 'inversion illusion' of man correlates well with the blind fish diving behavior observed during aircraft parabolic flight (von Baumgarten et al., 1969, 1972). It is suggested that the fish low g diving response and the human inversion illusion are due to the substitution of a predominantly shearing force of low magnitude as a vestibular reference in place of a normal, predominantly pressure force. This hypothesis indicates that vestibular senses alone cannot provide meaningful postural orientation to simulated or actual gravity of a magnitude below that of earth's gravity. F.R.L.

A74-17958 # **A useful test in selecting motion-sick-prone individuals.** P. J. Dowd (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 391-401. 28 refs.

This test is a result of the past decade of studies investigating the vestibular sensitivity of individuals to Coriolis accelerations. A significant differentiation shown between the 'nonsick' (NS) and the 'sick' (S) subjects within each peer group (navigators, pilots, and nonflying personnel) indicates its value in testing the level of resistance an individual has to Coriolis accelerations; this supports its usefulness in determining an individual's resistance to motion sickness. The studies - conducted on experienced pilots (NS-299, S-51), navigators (NS-60, S-34), airman trainees (NS-91, S-19), and pentathlon athletes (NS-14, S-0) - demonstrate the usefulness of this test in the overall selection of personnel in preflight, postflight, and training programs. (Author)

A74-17959 **Filamentous fungi exposed to spaceflight stresses including known levels of ultraviolet irradiations.** P. A. Volz and M. Dublin (Eastern Michigan University, Ypsilanti, Mich.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 402-414. 67 refs.

A74-17960 * **The effect of bedrest on adrenal function.** C. S. Leach, S. B. Hulley, P. C. Rambaut, and L. F. Dietlein (NASA, Johnson Space Center, Houston, Tex.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 415-423. 22 refs.

Eight male subjects were subjected to continuous bedrest for 24-80 weeks for the purpose of studying metabolic responses. Three of the subjects did supine exercises daily during part of the study. Adrenal function was examined in relation to adrenal cortical and medullary excretions. The results reveal an increase in hydrocortisone throughout the test period, a decrease in norepinephrine and no change in epinephrine. These data suggest that exercise could decrease the severity of deconditioning caused by bedrest. (Author)

A74-17961 * **An environmental chamber system for prolonged metabolic studies on small animals.** J. P. Jordan, L. J. Huston, J. B. Simmons, II, D. P. Clarkson, W. W. Martz, and C. L. Schatte (Colorado State University, Fort Collins, Colo.). *Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 424-433. 9 refs. Grants No. NsG-300-63; No. NGR-06-002-075.

Measurement of metabolic adaptation to marginally stressful environments requires both precise regulation of a variety of atmospheric factors for extended periods of time and the capacity to employ sensitive parameters in an undisturbed subject. This paper describes a metabolic chamber system which can simultaneously maintain groups of small animals in two completely separate closed environments having different pressures, temperatures and gas compositions for an indefinite period. Oxygen consumption, carbon dioxide production, food and water consumption and animal activity cycles can be continuously monitored and quantified 24 h per day while the animals are in an unrestrained state. Each chamber can be serviced and the animals handled, injected and sacrificed without subjecting them to barometric stress. Several unique electrical and mechanical components allow semi-automated data collection on a continuous basis for indefinite periods of time. (Author)

A74-17963 **On evolution of the photosynthetic pigments.** V. B. Evstigneev (Academy of Sciences, Institute of Photosynthesis, Moscow, USSR). *(International Congress on Photobiology, 6th, Bochum, West Germany, Aug. 21-25, 1972.) Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 448-454. 13 refs.

Some considerations on the origin of the photosynthetic pigment apparatus in the period of transition of organisms from heterotrophic to phototrophic mode of life and further evolution of this apparatus are given in this paper. Some ideas about interrelation between 'major' and 'auxiliary' pigments and about different forms of the pigments in vivo are discussed from an evolutionary point of view. (Author)

A74-17964 **Ferredoxins in the evolution of photosynthetic systems from anaerobic bacteria to higher plants.** D. O. Hall, R. Cammack, and K. K. Rao (King's College, London, England). *(International Congress on Photobiology, 6th, Bochum, West Germany, Aug. 21-25, 1972.) Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 455-468. 77 refs.

Ferredoxins are present in a wide range of organisms, from the primitive anaerobic bacteria to higher plants and animals, where they function in diverse electron transfer processes. Anaerobic bacteria, like the clostridia, contain 8 Fe ferredoxins with a peptide chain of 55 amino acid residues which could be arranged in two similar halves suggesting the evolution of the molecule, from a prototype of 26 amino acid residues, by gene duplication. Since these ferredoxins contain a high predominance of certain amino acids detected in meteorites and lunar samples and synthesized under simulated prebiotic environment, and since iron and sulfur could be incorporated easily into the apoprotein in anaerobic conditions, the ferredoxin molecule could have been formed in the early periods of the origin of life. F.R.L.

A74-17965 **Thermodynamics of thermal radiation from stars photoautotrophs and biospheres.** A. Rueda (Cornell University, Ithaca, N.Y.). *(International Congress on Photobiology, 6th, Bochum, West Germany, Aug. 21-25, 1972.) Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 469-489. 75 refs. Navy-supported research.

Photoautotrophs are almost the exclusive providers of chemical free energy to the earth biosphere. Their importance in coadjuvating the evolutionary development of higher forms of life in other planets

is briefly discussed from this point of view. A simple analysis based on the nonequilibrium thermodynamics of thermal radiation fields is performed. The analysis relates well known standard parameters of stars of the main sequence to the thermodynamic bounds on the free energy acquisition of planetary photosynthetic processes activated by the star radiation. Upper bounds to permissible wavelengths, active in photosynthesis easily follow. Simple inferences can then be made about the possible types of main sequence stars with planetary systems where exobiological photoautotrophs might have evolved. As red dwarves constitute both the great majority of companions to the sun and the majority of main sequence stars in our Galaxy, emphasis is placed on discussing the case of planetary systems of stars with low photospheric temperatures. Bounds to the free energy intake per unit area by the biospheres of planets in planetary systems of late type main sequence stars are estimated and compared. Some simple conclusions are drawn. (Author)

A74-17966 **Cytochrome c and evolution of the energy acquiring system.** T. Yamanaka (Osaka University, Toyonaka, Osaka, Japan). *(International Congress on Photobiology, 6th, Bochum, West Germany, Aug. 21-25, 1972.) Space Life Sciences*, vol. 4, Sept.-Dec. 1973, p. 490-504. 83 refs.

Review of the results of an investigation on the reactivity of cytochrome c molecules derived from various organisms with Pseudomonas aeruginosa nitrite reductase and cow cytochrome oxidase. These results suggest that the evolution of the cytochrome c molecule may be causatively connected with the evolution of cytochrome oxidase, and that the latter may be intimately related to the genesis of molecular oxygen in the biosphere. M.V.E.

A74-18075 **Accentuation of the perceived velocity in intermittent illumination - Influence of the phase relationships (Accentuation de la vitesse perçue en éclairage intermittent - Influence du rapport de phases).** J. Chevrier and A. Delorme (Montreal, University, Montreal, Canada). *Canadian Journal of Psychology*, vol. 27, Dec. 1973, p. 391-399. 23 refs. In French. National Research Council of Canada Grant No. APA-274.

A study was made of the frequency and phase relationship of an intermittent illumination on the perception of velocity. The subject's task consisted of an adjustment of the velocity of a mobile arrangement illuminated continuously in comparison with an identical arrangement illuminated intermittently. The results obtained confirm previous studies in showing (1) an overestimation of the perceived velocity in intermittent illumination, and (2) an evolution of the effect according to a curve with a maximum (9 Hz/sec) as a function of frequency. F.R.L.

A74-18175 **Dissolution of blood clots, possibilities and problems (Auflösung von Blutgerinnseln, Möglichkeiten und Probleme).** R. Gottlob (Chirurgische Universität-Klinik, Vienna, Austria). *Naturwissenschaftliche Rundschau*, vol. 27, Jan. 1974, p. 16-23. 24 refs. In German.

The mechanisms of fibrinolysis are discussed together with details of enzymatic investigations. Morphological studies are considered, giving attention to studies conducted with the normal optical microscope, immunofluorescence studies, fibrin investigations, plasminogen studies, and plasmin inhibitors. New explanations are presented regarding the mechanisms involved in the dissolution of a thrombus. G.R.

A74-18192 **The two mechanisms of vision (Les deux mécanismes de la vision).** M. Jeannerod (Université Claude Bernard, Lyons, France). *La Recherche*, vol. 5, Jan. 1974, p. 23-32. 28 refs. In French.

Vision is shown to involve essentially two functions: (1) the location and identification of the shape and nature of objects, and (2) the tracking and assessment of the motion of objects observed. These two functions are implemented by two distinct eye and brain systems. Yet, however distinct, these systems cooperate intimately in providing ambient and focal vision. M.V.E.

A74-18193 **Origin of life (L'origine de la vie).** M. Calvin (California, University, Berkeley, Calif.). *La Recherche*, vol. 5, Jan. 1974, p. 44, 45, 47-50, 55-57. 17 refs. In French.

Review of the advances of recent years in the fields of biology, chemistry, geology, and astronomy that made possible an interdisciplinary approach to the problem of the origin of life. Special attention is given to possible origins of prebiological systems and to experiments of prebiological molecular evolution. Molecular asymmetry and autocatalytic properties are pointed out as the hallmarks of living matter. The various stages in the organization of living matter are examined, and the implications of their characteristics are discussed. M.V.E.

A74-18196 **Artificial lung - A breakthrough confirmed (Poumon artificiel - Une percée qui se confirme).** M. de Meuron-Landolt. *La Recherche*, vol. 5, Jan. 1974, p. 80-83. 7 refs. In French.

Review of the origin, development, and present state of the art of artificial blood oxygenators. Special attention is given to the latest French contributions to the development of membrane-using artificial blood oxygenators. In particular, the design, operation, and application range are described for the complete set of French equipment presented at the meeting of the American Society for Artificial Internal Organs in April 1973. M.V.E.

A74-18286 * **Survival of common bacteria in liquid culture under carbon dioxide at high temperatures.** K. A. Souza and L. P. Zill (NASA, Ames Research Center, Planetary Biology Div., Moffett Field, Calif.). *Nature*, vol. 247, Jan. 4, 1974, p. 67.

A74-18304 # **Interplanetary belt of life (Mezhplanetnyi poias zhizni).** I. D. Ivanov (Bolgarskaia Akademiia Nauk, Tsentral'naia Laboratoriia Obshchei Genetiki, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 26, no. 10, 1973, p. 1391-1394. 10 refs. In Russian.

The idea of the existence of an interplanetary zone about the sun, in which the conditions are favorable for the genesis and existence of live systems is discussed on the basis of biological data and physical and chemical data on planets. The analysis indicates that such a zone would be bounded by two orbits with a radius of 144 and 193 million km, respectively, from the sun. The definition of the small and large orbits of the 'belt of life' follows from the high-temperature and low-temperature resistivity zones of living organisms. It is shown that Mars is located within the belt of life, however, the low-temperature resistivity orbit falls short of the mean Martian orbit by some 35.2 million km. V.P.

A74-18401 **Optical function of human peripheral cones.** W. H. Miller (Yale University, New Haven, Conn.) and A. W. Snyder (Australian National University, Canberra, Australia). *Vision Research*, vol. 13, Dec. 1973, p. 2185-2194. 20 refs. Grant No. NIH-EY-00089.

Investigation of the effects of the shapes and packing patterns of human photoreceptor cells upon photoreception. In particular, the attempt is made to explain why only the peripheral-cone outer segments are conical. A method is shown for determining the refractive index of outer segments from electronmicrographs and predict on the basis of previously published anatomical data the refractive indices of various classes of human outer segments. The obtained refractive index data in combination with the results of analyses of shapes and packing patterns are shown to suggest that human cones serve a dual role. They enhance the sensitivity of the rod system at scotopic levels in addition to mediating color vision at photopic intensities. This occurs because the conical outer segments of peripheral cones radiate all the light that is not absorbed by the cone visual pigment. M.V.E.

A74-18402 **Visual effects of sinusoidal components of complex gratings - Independent or additive.** A. Pantle (Wright State University, Dayton, Ohio). *Vision Research*, vol. 13, Dec. 1973, p. 2195-2204. 16 refs.

Modulation (contrast) thresholds for complex gratings comprised of two sinusoidal components were measured. The spatial frequency of one component was twice that of the second component. By comparing the thresholds for complex gratings with those for simple sinusoidal gratings, it was possible to determine the degree of additivity of the visual effects of the sinusoidal components of the complex gratings. Different degrees of component summation were observed depending upon the spatial frequency of the components and their drift speed across the retina. Some implications of the results for models of spatial information processing are discussed. (Author)

A74-18403 **Spatial interactions between the red- and green-sensitive colour mechanisms of the human visual system.** B. G. Bender (Imperial College of Science and Technology, London, England). *Vision Research*, vol. 13, Dec. 1973, p. 2205-2218. 26 refs. Research supported by the Science Research Council.

Spatial interactions in the visual system were studied psychophysically by measuring the effects of (1) subliminal annuli on the increment threshold of a central test spot and (2) suprathreshold annuli on the flicker threshold of a central test. Because previous evidence indicates that interactions of type (1) occur at a level before the optic chiasma, while those of type (2) occur more centrally, the present investigation was designed to test interactions at two levels in the visual system. The visual stimuli were selected to stimulate individual spectral classes of color mechanisms, and in particular interactions between red- and green-sensitive channels of foveal vision were investigated. For both types of measurement interactions between center and surround regions of receptive fields occurred only between like spectral response mechanisms, whereas interactions within the center of receptive fields also occurred between the different spectral mechanisms. (Author)

A74-18404 **Latency functions in human vision.** R. J. W. Mansfield (Harvard University, Cambridge, Mass.). *Vision Research*, vol. 13, Dec. 1973, p. 2219-2234. 35 refs. Research supported by the National Research Council and Medical Research Council of Canada.

A series of experiments determined how the latency of a dark-adapted observer's response varies with flash luminance and flash duration. Upon receipt of a flash, observers responded by releasing a contact switch. Latency varied as a power function of luminance with simple fractional exponents: an exponent of -1/3 for extended sources and an exponent of -1/2 for a point source. To a first approximation, the exponents were independent of flash duration, spectral composition, or retinal location. Both photopic and scotopic processes gave rise to latency functions with similar exponents. For brief flashes under all stimulus conditions examined, latency was determined by the stimulus energy contained in the first 10 msec of the flash independent of flash luminance level. The invariance of the period of temporal dependence indicates a linear process in latency determination. (Author)

A74-18405 **Chromatic rod activity at mesopic intensities.** U. Stabell and B. Stabell (Oslo, Universitetet, Oslo, Norway). *Vision Research*, vol. 13, Dec. 1973, p. 2255-2260. 18 refs. Research supported by Norges Almenvitenskapelige Forskningsrad.

When a green-blue scotopic stimulus is superimposed upon a deep red test light, the hue of the test light changes toward blue. For this reason it is considered that both rods and cones contribute a chromatic component at mesopic intensity levels. At variance with the hypothesis of rods as the color receptors of blue, the present work suggests that rods, both at scotopic and mesopic intensity levels, may initiate every hue of the spectrum, depending on the relative sensitivity of the spectrally opponent cells produced by the selective chromatic stimulation of cones. (Author)

A74-18406 **Detection of short time delays between photic stimuli by means of pattern induced flicker colors /PIFCs/.** C. von Campenhausen (Köln, Universität, Cologne, West Germany). *Vision Research*, vol. 13, Dec. 1973, p. 2261-2272. 16 refs.

A74-18407 **Stereoscopic aftereffects - Evidence for disparity-specific neurones in the human visual system.** D. E. Mitchell and A. G. Baker (Dalhousie University, Halifax, Canada). *Vision Research*, vol. 13, Dec. 1973, p. 2273-2288. 27 refs. National Research Council of Canada Grant No. APA-7660.

Following adaptation to a target imaged with a certain disparity the apparent depth of targets imaged with nearby disparities is altered. With simple stimuli (single lines) the maximum displacement occurs with adapting disparities of about 5 min, but adapting disparities exceeding 15 to 20 have no effect. On the other hand, following adaptation to a vertical grating, the apparent depth of a test grating is altered in a cyclical fashion with increasing adapting disparity, being displaced first in one direction and then the opposite with a period equal to twice the spatial period of the grating stimulus itself. Such periodic adaptation curves are found only if both test and adapting gratings are vertical. These psychophysical results are compared with the properties of disparity-specific neurones in the cat and monkey visual cortex. (Author)

A74-18408 **Contributions of the primary chromatic mechanisms to the generation of visual evoked potentials.** J. Krauskopf (Bell Telephone Laboratories, Inc., Murray Hill, N.J.). *Vision Research*, vol. 13, Dec. 1973, p. 2289-2298. 17 refs.

A74-18409 **Spatial frequency phase effects in human vision.** C. F. Stromeyer, III, A. F. Lange, and L. Ganz (Stanford University, Stanford, Calif.). *Vision Research*, vol. 13, Dec. 1973, p. 2345-2359. 36 refs. NSF Grant No. GB-1592.

Color aftereffects (McCollough effects) were generated specific to each member of a pair of vertical gratings which had identical frequency spectra but which differed in the phase angles between their frequency components. The pairs of gratings were either left- and right-facing sawtooth gratings or gratings comprised of the sum of two harmonics - first and second, first and third, or first and fourth. Color aftereffects were readily obtained with sawtooth gratings (which had sharp edges) and with patterns comprised of first and second harmonics; the effects were very weak with the first and third harmonic patterns and almost absent with the first and fourth harmonic patterns. The results suggest that there are phase-sensitive broadband mechanisms within the visual system and that each 'spatial frequency channel' cannot be simply represented by a single, symmetric line spread function. (Author)

A74-18410 **Frequency spectrum of optokinetic nystagmus in the normal monkey.** J. A. Valciukas, P. Pasik, and T. Pasik (Mount Sinai School of Medicine, New York, N.Y.). *Vision Research*, vol. 13, Dec. 1973, p. 2361-2368. 16 refs. Grants No. PHS-MH-02261; No. NIH-K3-EY-16865.

A74-18411 **Some dynamic features of depth perception.** D. Regan and K. I. Beverley (Keele, University, Keele, Staffs., England). *Vision Research*, vol. 13, Dec. 1973, p. 2369-2379. 12 refs. Research supported by the Medical Research Council and Science Research Council.

Human ability of detecting the movements of an oscillating target was studied on a subject who used both eyes in viewing a fixation plane defined by a random dot pattern subtending a visual angle of 5 x 5 deg at a viewing distance of 75 cm. The upper half of the nonius line was seen by the left eye and the lower half by the right eye, both halves appearing as a single vertical line when both eyes converged correctly onto the fixation plane. When a stimulus was viewed with both eyes, two vertical black bars were seen aligned vertically one degree to either side of the central nonius line, the right hand bar oscillating in depth in front of, behind, or in the fixation plane, and the left hand bar standing in a static position in

depth in front of or behind the fixation plane. Disparity signals were found to affect the motion perception only when the oscillation frequency of a stimulus was below 1 Hz. V.Z.

A74-18412 Evoked potentials specific to spatial patterns of luminance and colour. D. Regan (Keele, University, Keele, Staffs., England). *Vision Research*, vol. 13, Dec. 1973, p. 2381-2402. 72 refs. Research supported by the Medical Research Council.

Description of an experiment in which an attempt was made to identify and characterize the human brain's electrical response to changes in the color difference across chromatic-contrast borders. The amplitudes of evoked potentials (EPs) elicited by repetitively exchanging the positions of red and green checks in a checkerboard pattern are plotted vs the luminance of the green checks. The relative timing of different stimulus colors is discussed, as well as the effect of stimulus repetition frequency, the topographical distributions of luminance contrast and chromatic contrast EPs, the effect of chromatic aberration of the eye, and the relation between contrast, EP amplitude, and psychophysical threshold. It is argued that the observed EPs were determined by changes in stimulus contrast rather than by local changes in stimulus luminance. A.B.K.

A74-18413 The dissociation of sideways movements from movements in depth - Psychophysics. D. Regan and K. I. Beverley (Keele, University, Keele, Staffs., England). *Vision Research*, vol. 13, Dec. 1973, p. 2403-2415. 17 refs. Research supported by the Medical Research Council and Science Research Council.

A74-18414 Perception of structure in flashes and in afterimages. R. W. Ditchburn and A. E. Drysdale (Reading, University, Reading, Berks., England). *Vision Research*, vol. 13, Dec. 1973, p. 2423-2433. 8 refs. Medical Research Council Grant No. G-968/392/C.

Experimental methods used and illustrative examples of results obtained in studies of structure perception in flashes and afterimages are reviewed, and some of the conclusions reached are discussed. The results obtained are in reasonably good agreement with recent measurements by other investigators. M.V.E.

A74-18415 Visual information obtained from flashes and from afterimages. R. W. Ditchburn and A. E. Drysdale (Reading, University, Reading, Berks., England). *Vision Research*, vol. 13, Dec. 1973, p. 2435-2447. 22 refs. Medical Research Council Grant No. G-968/392/C.

A method of calculating the information gain when a grating target is discriminated against a featureless background is developed. This is extended to more general types of structure. The variation of the amount of information available in normal vision, in flashes, and in afterimages following flashes has been measured. (Author)

A74-18416 Binocular masking level differences in sinusoidal grating detection. G. B. Henning (Physiological Laboratory, Cambridge, England) and B. G. Hertz (Pennsylvania, University, Philadelphia, Pa.). *Vision Research*, vol. 13, Dec. 1973, p. 2455-2463. 16 refs.

Observers were required to detect sinusoidal gratings in a background of noise composed of a narrow band of spatial frequencies centered on the frequency of the grating to be detected. The visual noise was identical in two fields, one for ech eye. The grating to be detected - the signal grating - was presented in one of two conditions: either the signal grating was identical in both fields or 180 deg out-of-phase; that is, with the dark bars in one field in locations corresponding to the locations for light bars in the other. Signal gratings of low spatial frequency presented out-of-phase were detected at much lower contrast than in-phase gratings. The difference is detectability with vertical gratings, approx. 0.6 log units of contrast, was at least as large with horizontal gratings. (Author)

A74-18417 Torsional eye movements and constancy of the visual field. A. P. Petrov and G. M. Zenkin (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Vision Research*, vol. 13, Dec. 1973, p. 2465-2477. 32 refs.

Results of a study in which an attempt is made to test the hypothesis that the torsion saccades of eyes are an important part of mechanisms providing constancy of orientation perception. A study was made of eye movements during lateral head tilting, using a suction cap technique developed by Yarbus (1967). It is found that smooth tilts of the head to the shoulder cause two kinds of eye movements. The first is a slow rotation of the eye in the direction opposite to that of the head. During this phase the attitude of the eye with reference to the gravity vertical does not vary. The second kind of eye movement is a saccadic rotation about the visual axis in the direction of the head tilt. These two types of eye rotations correspond to the two mechanisms of orientation constancy in the visual system. A.B.K.

A74-18418 * A centre for accommodative vergence motor control. D. Wilson (California, University, Berkeley, Calif.). *Vision Research*, vol. 13, Dec. 1973, p. 2491-2503. 18 refs. NIH-NASA-supported research.

Latencies in accommodation, accommodative-vergence, and pupil-diameter responses to changing accommodation stimuli, as well as latencies in pupil response to light-intensity changes were measured. From the information obtained, a block diagram has been derived that uses the least number of blocks for representing the accommodation, accommodative-vergence, and pupil systems. The signal transmission delays over the various circuits of the model have been determined and compared to known experimental physiological-delay data. The results suggest the existence of a motor center that controls the accommodative vergence and is completely independent of the accommodation system. M.V.E.

A74-18419 * Noise coupling between accommodation and accommodative vergence. D. Wilson (California, University, Berkeley, Calif.). *Vision Research*, vol. 13, Dec. 1973, p. 2505-2513. 7 refs. NIH-NASA-supported research.

For monocular viewing, the fluctuations in accommodative lens power in the frequency range from 0.5 to 3 Hz were found to be considerably greater than those in accommodative vergence movements of the covered eye. Considering the close synkinesis between these motor responses for step changes or slow variations in accommodative stimulus, this finding is unexpected. This apparent lack of synkinesis is found to result mainly from the fact that the decrease in small-signal linear gain with increasing frequency is more rapid in the case of the accommodative vergence system than in the case of the accommodation system, rather than from some nonlinear phenomenon. (Author)

A74-18420 Composite adaptation and spatial frequency interactions. S. Stecher (Lehigh University, Bethlehem, Pa.), C. Sigel (Pennsylvania, University, Philadelphia, Pa.), and R. V. Lange (Brandeis University, Waltham, Mass.). *Vision Research*, vol. 13, Dec. 1973, p. 2527-2531. 9 refs. Grant No. NIH-EY-00023.

Consideration of the hypothesis that there are channels in the human visual system which are sensitive to luminance variations in limited ranges of spatial frequency. Studies are reviewed that were performed in order to gain an understanding of what sort of channel mechanisms would be required to be consistent with the variety of experiments which support the channel hypothesis in general but give conflicting details about channel properties. An observed effect is described that calls for modification of the channel hypothesis. This effect is related to the threshold elevation due to adaptation. M.V.E.

A74-18421 The analysis of the drift rate of moving sinusoidal gratings. D. J. Tolhurst, C. R. Sharpe, and G. Hart (Physiological Laboratory, Cambridge, England). *Vision Research*, vol. 13, Dec. 1973, p. 2545-2555. 28 refs.

Evidence for velocity-specific channels in the human visual system was obtained by adapting to drifting sinusoidal gratings and determining the amount of threshold elevation at other drift rates.

The shape of the elevation curve depended on the adapting velocity but, surprisingly, it suggested that the channels had little high-velocity decline in sensitivity. Distinct thresholds for detecting the movement and the spatial structure of the stimulus were distinguished. These two thresholds were elevated independently by adaptation: the movement-threshold was affected only at velocities close to the adapting velocity, but the pattern-discrimination threshold was affected equally at all test velocities. It is suggested that there are two systems of channel: one analyses movement and is composed of velocity-specific units; the other analyses spatial structure and is not sub-divided into velocity-specific units. (Author)

A74-18422 **Equivalent-background transformation for spatially, temporally, and chromatically differing photopic stimuli.** E. J. Rinalducci, S. B. Lowenhaupt, and J. M. Martinez, II (Virginia, University, Charlottesville, Va.). *Vision Research*, vol. 13, Dec. 1973, p. 2557-2571. 36 refs. Grant No. NIH-EY-00353.

A74-18423 **A method of changing the time pattern of a light stimulus without a temporal change in spectral composition.** J. R. Jarvis (City University, London, England). *Vision Research*, vol. 13, Dec. 1973, p. 2575-2580. 8 refs.

A74-18424 **Motion aftereffects following inspection of contrarotating stimuli.** J. A. Woolsey and C. V. Newman (Birmingham, University, Birmingham, England). *Vision Research*, vol. 13, Dec. 1973, p. 2587-2589.

As a direct test of the hypothesis that counterbalancing mechanisms underwrite the aftereffect of movement, twenty subjects of both sexes were used for investigating the direction and duration of movement aftereffects following inspection of stimuli moving in opposite directions simultaneously. The results of this experiment confirm that a counterbalancing mechanism underwrites the after-effect of movement. M.V.E.

A74-18425 **Colour-specificity and monocularity in the visual cortex.** M. Coltheart (Reading, University, Reading, Berks., England). *Vision Research*, vol. 13, Dec. 1973, p. 2595-2598. 14 refs.

The association between monocularity and color specificity is considered in the light of the recently expanded knowledge about the visual cortex. It is suggested that this association may be viewed as a natural, though accidental, consequence of the fact that there exists a stage in the visual system that is low enough in the system to retain some degree of color specificity, yet high enough to possess orientation specificity, though not high enough for binocularity to have replaced monocularity. M.V.E.

A74-18426 **Waveguide modes and light absorption in photoreceptors.** A. W. Snyder and C. Pask (Australian National University, Canberra, Australia). *Vision Research*, vol. 13, Dec. 1973, p. 2605-2608. 10 refs.

Description of a simple and accurate method for determining the light absorbed from modes that propagate along photoreceptors or optical fibers of a cross section invariant throughout their length. This method avoids the necessity of solving the complex transcendental equation which Rohler and Fischer's (1971) approach involves. It also provides insight into the absorption process. Since many photoreceptors are not uniform throughout their length but are cone shaped, results for absorption in conical optical fibers are also presented. M.V.E.

A74-18427 **A figure of merit for visual colorimeters using spectral stimuli.** P. W. Trezona (City University, London, England). *Vision Research*, vol. 13, Dec. 1973, p. 2609-2613. 5 refs. Research supported by the Science Research Council.

A74-18451 * **Determination of left ventricular size and shape.** H. Sandler (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.) and E. Alderman (Stanford University, Stanford, Calif.). *Circulation Research*, vol. 34, Jan. 1974, p. 1-8. 87 refs.

Significant advances have occurred over the past 15 years in the ability to measure ventricular dimensions. Angiocardiography still remains the most reliable method for overall determination of chamber size and shape and serves as a standard for calibration or comparison for newer methods. Improvements in the use of radiographic methods over the next few years are anticipated with more extensive use of multiplane studies associated with repeated injections of improved contrast materials that produce fewer physiological effects or with substances that adhere to the endocardial surfaces. It is also anticipated that existing methods for automatically obtaining dimensional information from X rays will be continued and improved. F.R.L.

A74-18452 * **Role of the cerebellum and the vestibular apparatus in regulation of orthostatic reflexes in the cat.** N. Doba and D. J. Reis (Cornell University, New York, N.Y.). *Circulation Research*, vol. 34, Jan. 1974, p. 9-18. 28 refs. Grants No. NIH-NS-04876; No. NGR-33-010-179.

The contribution of the fastigial nucleus and the vestibular nerves (eighth cranial nerves) to the orthostatic reflexes in anesthetized, paralyzed cats was studied. Bilateral lesions of the rostral fastigial nucleus resulted in impairment of the reflex changes in blood pressure, femoral arterial flow, and resistance evoked by head-up tilting to 30 deg or 60 deg. The rostral fastigial nucleus, which might be triggered by the vestibular apparatus, appears to participate in concert with the baroreceptors in the initiation and possibly the maintenance of the orthostatic reflexes. F.R.L.

A74-18453 **Effective compliance of the total vascular bed and the intrathoracic compartment derived from changes in central venous pressure induced by volume changes in man.** M. Echt, J. Düweling, O. H. Gauer, and L. Lange (Berlin, Freie Universität, Berlin, West Germany). *Circulation Research*, vol. 34, Jan. 1974, p. 61-68. 23 refs. Contract No. F44620-71-C-0117.

A74-18557 **Mixed venous-arterial difference of molecular nitrogen in man.** H. Bachofen, H. P. Gurtner, and G. Paumgartner (Bern, Universität, Berne, Switzerland). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 791, 792. 12 refs. Research supported by the Clark Joller Foundation and Schweizerischer Nationalfonds zur Förderung der Wissenschaftlichen Forschung.

The mixed venous-arterial N2 difference was measured in 10 patients admitted to the hospital for cardiac catheterization. At rest, the average mixed venous-arterial N2 difference amounted to 2 plus or minus 4 mm Hg, and to 5 plus or minus 4 mm Hg during exercise. Additional measurements in five patients yielded mean mixed venous-arterial N2 difference of -1 plus or minus 3 mm Hg before, and 0 plus or minus 2 mm Hg after the infusion of a protein hydrolysate equivalent to 6 g of nitrogen. (Author)

A74-18558 **Adrenergic beta-receptor blockade and metabolic response to centrifugation stress.** M. H. Harrison (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 793-797. 25 refs.

The metabolic effects of three short exposures to radial acceleration have been examined following administration of either a beta-blocking drug (oxprenolol) or a placebo, in a group of male subjects. Associated emotional stress was assessed by use of a line-marker technique and from changes in heart rate. On placebo, centrifugation significantly increased nonesterified fatty acids (NEFA) and glycerol levels, but had little effect on blood glucose or lactate levels. The drug effectively abolished the increase in NEFA, but had no effect on glycerol levels. Oxprenolol abolished the emotionally induced tachycardia observed during the control period preceding centrifugation but only partially abolished the tachycardia produced by centrifugation. (Author)

A74-18559 * Competition between cutaneous vasodilator and vasoconstrictor reflexes in man. J. M. Johnson, M. Niederberger, L. B. Rowell, M. M. Eisman, and G. L. Brengelmann (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 798-803. 28 refs. Grants No. NIH-HL-05889; No. NGR-48-002-082; No. NIH-RR-37.

A two-part experiment was carried out on seven men to determine whether skin will respond to increased neurogenic vasoconstrictor activity during heating. The latter was induced by lower body negative pressure of -50 mm Hg applied for 5 of each 15 min in 12 studies with constant, neutral skin temperature (32.2-34.4 C) in a 40-min control period and with skin temperature held at 38 C for 40-70 min. We conclude that during heating, skin retains the ability to vasoconstrict but that this vasoconstriction cannot completely override heat-induced vasodilatation. (Author)

A74-18560 Pressure-flow relationships in the isolated canine trachea. R. J. Knudson (Arizona, University, Tucson, Ariz.) and D. E. Knudson (Tucson Veterans Administration Hospital, Tucson, Ariz.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 804-812. 20 refs. Grants No. NIH-1-R01-HL-13869-01; No. NIH-HL-14136.

In a mechanical model simulating pressure and flow relationships which would exist under isovolume conditions in vivo, the relationship of flow through excised canine tracheas to driving pressure was examined as pressure was increased and decreased. The resulting tracheal pressure-flow (TPF) curves exhibited hysteresis which was related to the pressure-volume hysteresis of the trachea undergoing dynamic compression. The configuration of the TPF curves varied and appeared to be related to the relative width of the pars membranacea of the particular trachea studied. By varying the maximum driving pressure on successive trials, the TPF hysteresis could be demonstrated to be dependent upon pressure history. (Author)

A74-18561 Influence of smoking and nicotine on cerebral blood flow and metabolic rate of oxygen in man. E. Skinhoj, J. Olesen, and O. B. Paulson (Bispebjerg Hospital, Copenhagen, Denmark). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 820-822. 8 refs. Research supported by the Council for Tobacco Research.

The effect of smoking and of comparative doses of nicotine applied intravenously upon cerebral hemodynamics and oxidative metabolism was studied in series of patients. Smoking as well as nicotine increased cerebral blood flow but decreased arterial-venous oxygen difference leaving the cerebral metabolic rate of oxygen unchanged. The conclusion is that smoking as well as nicotine has an effect upon cerebral vascular resistance either because of a direct action upon vascular smooth muscles or via the vegetative nervous system. Nicotine in the doses obtained by smoking does not change the rate of oxidative cerebral metabolism. (Author)

A74-18562 Pulmonary capillary blood flow during normal spontaneous breathing in man. H. R. Astrom, K.-H. Lin, and M. B. McIlroy (California, University, San Francisco, Calif.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 823-829. 27 refs. Grant No. NIH-HL-06285.

Pulmonary capillary blood flow was measured in man during normal spontaneous breathing by the N2O-body plethysmograph technique. Respiratory artifacts were minimized by rebreathing warmed and wetted gas and measurements throughout the respiratory cycle were made possible. The mean and peak systolic blood flow, stroke volume, and mean systolic acceleration, measured at the pulmonary capillary level, all were directly and approximately linearly related to intrapleural pressure. The range of variation in each of these related variables during a normal tidal breath was approximately plus or minus 25% around the mean level for one complete respiratory cycle. (Author)

A74-18563 Histamine-induced pulmonary vasodilatation in the calf - Relationship to hypoxia. E. D. Silove (Institute of Child Health, London, England) and A. J. Simcha (Haddassah Medical Centre, Jerusalem, Israel). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 830-836. 16 refs. Research supported by the British Heart Foundation.

The reactive pulmonary vasculature of the neonatal calf was utilized to assess whether histamine is important in mediating the pulmonary vasoconstrictive response to hypoxia. Hypoxia consistently produced pulmonary vasoconstriction. Histamine produced pulmonary vasodilatation both under control conditions and during hypoxia, and it prevented hypoxic vasoconstriction when infused slowly into the perfused pulmonary artery. (Author)

A74-18564 Dynamics of the respiratory controller during carotid body hypoxia. R. E. Dutton, E. J. Smith, P. K. Ghatak, and D. G. Davies (Union University, Albany; Rensselaer Polytechnic Institute, Troy, N.Y.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 844-850. 31 refs. Grant No. PHS-HL-12564.

Step, ramp, pulse, and pulse train hypoxic forcing functions were generated at the carotid bodies of 24 anesthetized dogs by means of carotid artery loops and a perfusion system. All perfusion patterns at mean arterial oxygen pressure between 32 and 44 mm Hg except ramp functions resulted in an abrupt increase in mean tidal volume within the 1st sec of perfusion, followed by an increased frequency of respiration and decrease from peak tidal volume over the next 4 sec. These initial large tidal volumes occur too rapidly to be accounted for by any known level of neural activity in the sinus nerves. The transient response of the respiratory controller to hypoxia contains linear dynamics, but also contains nonlinearities in the form of unidirectional rate sensitivity and a hold circuit. (Author)

A74-18565 Venous reactivity during static exercise /handgrip/ in man. R. G. Seaman, R. L. Wiley, F. W. Zechman, and J. A. Goldey (Miami University, Oxford, Ohio; Kentucky, University, Lexington, Ky.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 858-860. 15 refs.

Normal adult male volunteers in the supine position were studied to assess the effect of forearm static exercise on limb venomotor tone. Two methods were employed to measure venous tone. Volume changes of the calf were measured plethysmographically, and pressure changes in the nonexercising forearm were measured with the Wallace isolated limb technique. Venous filling decreased and venous pressure increased during static exercise as compared to control. The results from both methods showed that there is a statistically significant increase in limb venomotor tone during static exercise. (Author)

A74-18566 Accurate determination of O2 dissociation curve of human blood above 98.7% saturation with data on O2 solubility in unmodified human blood from 0 to 37 C. F. J. W. Roughton and J. W. Severinghaus (California, University, San Francisco, Calif.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 861-869. 31 refs. Grants No. PHS-HL-6285; No. PHS-GM-15571; No. PHS-5-K6-HL-19412.

A74-18567 Cardiopulmonary baroreflexes - Integrated responses to sine- and square-wave forcing. T. C. Lloyd, Jr. (Indiana University, Indianapolis, Ind.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 870-874. 10 refs. Grant No. PHS-06308.

Cardiopulmonary baroreflexes, in conjunction with secondary systemic baroreflexes, modulate systemic vascular resistance in response to left atrial pressure changes. In this multicomponent control system, feedback normally is provided through left ventricular end-diastolic pressure and/or systemic venous return. This baroreflex system was studied in dogs under open-loop conditions imposed by biventricular bypass perfusion. Square-wave and sinusoidal changes in left atrial pressure were used as the system forcing

functions. The effect of a single square-wave input pulse was to cause a transient fall of systemic resistance followed by a quasi-steady plateau. With sinusoidal forcing, the evoked change in systemic arterial pressure was directly related to cardiopulmonary forcing pressure amplitude and variably related to forcing frequency. (Author)

A74-18568 Predicting effects of heat acclimatization on heart rate and rectal temperature. B. Givoni and R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 875-879. 9 refs.

This paper develops a general model describing the changes in heart rate and rectal temperature, as a function of days of exposure to work in the heat, for any temperature and humidity combination. The model describes three components of the effects of heat acclimatization: (1) a decrease in the initial level of rectal temperature with acclimatization; (2) a decrease in the equilibrium level which rectal temperature and heart rate approach with work; and (3) a widening gap between nonacclimatized and fully acclimatized subjects with duration of work in heat with respect to both responses. (Author)

A74-18569 Resting metabolism and thermoregulation in the unrestrained rabbit. G. N. McEwen, Jr. and J. E. Heath (Illinois, University, Urbana, Ill.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 884-886. 11 refs. NSF Grant No. GB-13797.

Resting metabolism (M) was measured in New Zealand white rabbits at ambient temperatures of 0, 10, 20, and 30 C. In unrestrained and trained rabbits, values of M were lower than previously reported for restrained rabbits. Calculated heat loss coefficient and lower critical temperature were also lower than previously reported. Rabbits show three postures dependent on the ambient temperature: the relaxed/alert posture at 20 C, the ball posture at 0 and 10 C, and the spread posture at 30 C. (Author)

A74-18570 Effects of exercise on adrenocortical function. C. T. M. Davies and J. D. Few (London School of Hygiene and Tropical Medicine, London, England). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 887-891. 13 refs.

Ten subjects exercised on a motor-driven treadmill at work loads varying from 36 to 90% of their maximum aerobic power. Plasma cortisol (F), cardiac frequency, tympanic temperature, and oxygen intake were measured during rest, exercise, and recovery periods. Analysis of all the data suggests that at work levels below about 50% of maximum aerobic power, F usually decreased and that before F began to rise a critical level of about 60% of the subject's maximum aerobic power had to be exceeded. (Author)

A74-18571 Dynamic respiratory response to abrupt change of inspired CO2 at normal and high oxygen pressure. R. Gelfand and C. J. Lambertsen (Pennsylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 903-913. 46 refs. Grants No. NIH-HE-08184; No. NIH-HE-08899; Contract No. Nonr-551(14).

Breath-by-breath measurements of the respiratory tidal volume, frequency, and minute volume transients which resulted when 6% CO2 was abruptly added to and subsequently abruptly removed from inspired gas were obtained in 14 experiments on a single intensively studied human subject. Analysis of these measurements established that it is possible to identify and quantitatively characterize the dynamic response characteristics of two central nervous system respiratory receptor components in addition to that of peripheral chemoreceptors. The same three components of respiratory response to CO2 were found in studies on three additional men. (Author)

A74-18572 A simple, accurate technique for predicting maximal aerobic power. E. L. Fox (Ohio State University, Columbus, Ohio). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 914-916. 17 refs. Contract No. DA-49-193-MD-2741.

A technique for predicting maximal aerobic power was developed from data gathered on 87 healthy, untrained college males. Prediction is based on a linear equation relating maximal aerobic power (open-circuit spirometry) to submaximal heart rate recorded (via ECG) during the 5th min of bicycle exercise at 150 W. (Author)

A74-18573 End-tidal oxygen analysis using a synchronous pulse generator. V. O. Roberson, R. Harry, H. Hsiao, and T. Barnett (North Carolina, University, Chapel Hill, N.C.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 922-924. 10 refs.

A relatively simple method for the analysis of end-tidal oxygen has been developed using a synchronous pulse generator. Continuously monitored end-tidal CO2 is used as a signal to activate repetitively a sampling device which isolates and measures oxygen tension. One hundred-twenty observations were made in which steady state end-tidal O2 was compared to alveolar oxygen pressure calculated from a modification of the Bohr formula. There was close agreement between the calculated alveolar oxygen pressure and the measured end-tidal oxygen pressure and there was essentially no difference between end-tidal samples measured under normal conditions and conditions of increased airway resistance. The response time, limitations, and applications of this system are discussed. (Author)

A74-18574 Measuring body temperature by telemetry using a removable probe in an implanted cannula. B. W. Mitchell and H. S. Siegel (U.S. Department of Agriculture, Southeast Poultry Research Laboratory, Athens, Ga.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 925-927. 9 refs.

An FM radio telemetry transmitter for deep body temperature measurements accurate to within 0.1 C was developed by coupling an AM temperature transmitter to an FM biopotential transmitter. An implantable cannula, developed for use with the composite FM temperature transmitter, allowed the single transmitter and temperature probe to be used to monitor body temperature of chickens heated individually in stress tests. A cannula was implanted in each chicken. The probe was then inserted into the cannula of the individual chicken being tested. Use of the implanted cannula eliminated the necessity of implanting sensors in each chicken and the problem of body fluid leakage associated with implanted probes. (Author)

A74-18575 Water vapor corrections in oxygen consumption calculations. W. L. Beaver (Varian Associates, Palo Alto, Calif.). *Journal of Applied Physiology*, vol. 35, Dec. 1973, p. 928-931. 8 refs.

Calculations of oxygen consumption based on instantaneously measuring gas analyzers will be in error if the water vapor content of the expired gas is neglected. A method is derived and a nomogram is presented to permit water vapor to be taken into account. It is shown that water vapor in the measured sample of expirate has a significant effect on the oxygen consumption determination by the open circuit method. Neglecting to take this factor into account is shown to lead to a 25% error in a typical case. (Author)

A74-18594 # Possible adsorption analog systems for modeling the processes in a living organism (O vozmozhnykh adsorbtsionnykh analogovykh sistemakh, modeliruiushchikh protsessy v zhivom organizme). V. F. Kiselev (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 213, Nov. 1, 1973, p. 224-227. 16 refs. In Russian.

A74-18595 # Numerical computer data on functional connections and phase shifts in the tension rhythm of the cortical and hypothalamic zones during the formation of a pain stress (Dannye ETsVM o razlichnykh funktsional'nykh sviaziakh i fazovykh sdvigakh ritma napriazheniia proektsionnykh zon kory i gipotalamusa pri formirovanii bolevogo stressa). A. M. Mamedov (Aka-

demiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 213, Nov. 1, 1973, p. 242-245. In Russian.

A74-18621 Elevator illusion - Influences of otolith organ activity and neck proprioception. M. M. Cohen (U.S. Navy, Naval Air Development Center, Warminster, Pa.). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 401-406. 25 refs. Navy-supported research. Navy Project ZR0000101.

In the investigation reported it was tried to separate the effects of neck proprioception and otolith organ activity in the elevator illusion. The assumption is made that neck proprioception is altered when the head is pitched with respect to the trunk. It is also assumed that the activity of the otolith organs is altered either when the orientation of the otolith organs is changed with respect to the gravitational-inertial forces (GIFs) or, for most orientations of the head, when the magnitude of the GIFs is changed. A study is conducted of the illusion produced by four magnitudes of GIFs with the head oriented in each of three positions. G.R.

A74-18622 Visual imagery differences and eye movements in the recall of pictures. D. F. Marks (Otago, University, Dunedin, New Zealand). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 407-412. 42 refs.

Groups of vivid and poor visualizers were given a picture memory task, and horizontal and vertical components of the electro-oculogram were recorded. This allowed a detailed investigation of each S's eye movements in the perception, imagery, and recall phases of the task. The vivid visualizers gave a higher accuracy of recall. Eye movement rate was lower in visual imagery than it was in perception, especially in the group of vivid visualizers. There was some evidence of scanning activity prior to recall, but only if positional cues were provided or if recall was incorrect. No scanning occurred prior to accurate recall unprompted by a positional cue. These results provide no support to the theories of image construction proposed by Hebb (1949, 1968) and Neisser (1967). As suggested by Singer (1966), an absence of eye movement may be a necessary condition for vivid visual imagery. (Author)

A74-18623 The effects of stimulus structure and familiarity on same-different comparison. H. S. Hock (Florida Atlantic University, Boca Raton, Fla.). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 413-420. 15 refs. Navy-supported research.

The same-different comparison task involves the measurement of reaction times for 'same' and 'different' responses to pairs of simultaneously (or sequentially) presented stimuli. The possibility is explored that two fundamentally different processes underlie 'same' and 'different' comparison. It is predicted that symmetry would affect reaction times for 'same' but not for 'different' responses. This would support the hypothesis that 'same' comparison is based on structural processes, while 'different' comparison is based on analytic processes. G.R.

A74-18624 Bloch's law and a temporal integration model for simple reaction time to light. J. D. Hildreth. *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 421-432. 26 refs. NIH-supported research.

An investigation has been conducted to answer questions concerning the validity of Bloch's law (BL) in the case of reaction times (RTs) to suprathreshold light stimuli. It is pointed out that earlier research on this subject had been limited to three studies of which two had concluded that BL did not, in general hold for RTs. The new studies reported, on the other hand, indicate the opposite. For the limited range of luminances investigated, BL was valid to a very good approximation. The results of the experiments can be represented by a simple mathematical model. G.R.

A74-18625 Retention of time information in forced-choice duration discrimination. R. M. Carbotte (McMaster University, Hamilton, Ontario, Canada). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 440-444. 9 refs. National Research Council of Canada Grant No. A-7919.

The investigation conducted shows that a large improvement in performance occurs as the interstimulus interval (ISI) is increased from 0 to 1/2 sec. There is, however, relatively little further change in the performance as the ISI changes from 1/2 to 2 sec. In general, performance is disrupted when the ISI is made very short. Aspects of single-stimulus performance are also explored. G.R.

A74-18626 The role of gravitational cues in the judgment of visual orientation. W. B. Templeton (York University, Toronto, Canada). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 451-457. 30 refs. National Research Council Grant No. APA-299.

It is argued that, contrary to the views of some theorists, the role of gravitational cues is essentially one of maintaining orientation constancy. In support of this claim, it is shown that the loss of relevant gravitational information when the body is supine results in a significant increase in the disorienting effects of both a tilted visual frame and tilt of the head relative to the trunk. (Author)

A74-18627 The constancy of object orientation - Compensation for ocular rotation. S. M. Ebenholtz and K. R. Paap (Wisconsin, University, Madison, Wis.). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 458-470. 14 refs. Grant No. NIH-MH-13006.

When a thin horizontal line is displaced, either left or right of straight ahead, or when a vertical line is displaced up or down, systematic changes occur in the binocular disparity associated with the target. In three experiments, subjects matched the orientation of displaced targets with a variable comparison line. Estimates of apparent displacement with a pointing technique were also made. Since head position was fixed, apparent displacement was mediated by the angle of ocular rotation. Near perfect matches were made with vertical targets, but horizontal targets produced errors suggestive of underestimation of apparent displacement. However, the pointing data did not yield clear evidence for this view. Control data denied the possible role of the induced effect in matching the horizontal targets, and the results are discussed in the context of orientation constancy based upon compensation for displacement. (Author)

A74-18628 On energy-dependent cues in duration discrimination. R. M. Carbotte and A. B. Kristofferson (McMaster University, Hamilton, Ontario, Canada). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 501-505. 16 refs. National Research Council of Canada Grant No. A-7919.

The studies reported indicate that, although there is an improvement in performance as the marker intensity is increased over a fairly wide range, the change in performance is small. In the investigation, a low intensity was chosen to have signals which would be detected by the object on each presentation. It was intended to avoid problems regarding the detectability of the boundaries of the intervals. G.R.

A74-18629 Hand-eye coordination - The role of 'motor memory.' R. W. Angel (Stanford University, Stanford and Palo Alto, Calif.), M. Wesley (Stanford University, Palo Alto, Calif.), and M. Hollander. *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 506-510. 11 refs.

An investigation was conducted to obtain normative data concerning the effect of hand movement on subsequent oculomotor performance. It appears that the effect of hand movement on visual tracking may tend to decrease as a function of time. The experiment reported was an attempt to define the time course of that effect. The independent variable was the delay between hand and target movement, and the dependent variable was the relative frequency of saccades. G.R.

A74-18630 Brightness selectivity in the motion aftereffect. R. Over and J. Broerse (Queensland, University, St. Lucia, Australia). *Perception and Psychophysics*, vol. 14, Dec. 1973, p.

542-546. 21 refs.

Eighteen Ss were required to track the apparent motion of a stationary grating viewed after prolonged inspection of a moving grating. Measures were obtained with the inspection and test gratings identical in contrast but different in space-average luminance, or with luminance held constant and contrast varied. The aftereffect was reduced as 'the gratings differed in space-average luminance, but contrast exerted less uniform influence as a variable. Brightness-selectivity in the motion aftereffect is interpreted within the selective adaptation model of aftereffects as evidence that some detectors in human vision are conjointly tuned to space-average luminance and image motion. (Author)

A74-18631 Temporal summation related to the nature of the proximal stimulus for the warmth sense. L. E. Marks (John B. Pierce Foundation, New Haven, Conn.) and J. C. Stevens (Yale University, New Haven, Conn.). *Perception and Psychophysics*, vol. 14, Dec. 1973, p. 570-576. 16 refs. Grant No. AF-AFOSR-70-1950.

The psychophysical functions for warmth are considered together with aspects of warmth as a function of duration, the intensity time reciprocity in the warmth sense, and questions of temporal summation related to temperature changes at the skin surface and within the skin. Characteristics of the proximal stimulus for warmth sensation are also explored, giving attention to the significance of the difference between two temperatures and questions of the consistency of the test results with a hypothesis of adaptation. G.R.

A74-18678 # Medical progress from aerospace research. F. T. Wooten (Research Triangle Institute, Research Triangle Park, N.C.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-276.* 5 p. Members, $1.50; nonmembers, $2.00.

A program is discussed which is designed to find second applications in the field of medicine for the aerospace technology which was necessary to achieve the nation's space goals. Using a multidisciplinary team of engineers and scientists, medical research problems are identified by personal interaction between the team and scientists in medical centers throughout the country. The methodology used by the team is discussed, as well as specific examples of the success of this program. F.R.L.

A74-18854 * # Electrophoresis in space at zero gravity. M. Bier and R. S. Snyder (NASA, Marshall Space Flight Center, Astronautics Laboratory, Huntsville, Ala.). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 12th, Washington, D.C., Jan. 30-Feb. 1, 1974, Paper 74-210.* 6 p. 12 refs. Members, $1.50; nonmembers, $2.00. Contract No. NAS8-29566.

Early planning for manufacturing operations in space include the use of electrophoresis for purification and separation of biological materials. Greatly simplified electrophoresis apparatus have been flown in the Apollo 14 and 16 missions to test the possibility of stable liquid systems in orbit. Additionally, isoelectric focusing and isotachophoresis are of particular interest as they offer very high resolution and have self-sharpening boundaries. The value of possible space electrophoresis is substantial. For example, present technology permits large fractionation of only a few of blood proteins many fractions, and separated cell populations are needed for research. (Author)

A74-18930 Experimental investigation of visual image recognition characteristics. V. A. Avtonomova and Iu. M. Kholodilov. *(Avtomatika i Telemekhanika,* Aug. 1973, p. 161-165.) *Automation and Remote Control,* vol. 34, no. 8, Jan. 15, 1974, pt. 2, p. 1342-1346. 6 refs. Translation.

An experiment is described on human recognition of noise-blurred images. The obtained results indicate that the empirical probabilities of recognition differ from the potential probabilities arrived at by statistical analysis. M.V.E.

A74-18933 On one method of approximation of processes in uniform biological structures. V. M. Alekseev, A. V. Kochergin, and V. M. El'iasberg. *(Avtomatika i Telemekhanika,* Aug. 1973, p. 52-61.) *Automation and Remote Control,* vol. 34, no. 8, Jan. 1974, pt. 1, p. 1244-1253. 7 refs. Translation.

A mathematical model of a tonic muscle of a crustacean is considered. The dependence of the strain of each muscle fiber on the impulse inflow from motoneurons is described by a nonlinear differential operator containing parameters that vary from fiber to fiber. A formulation and solution are presented for the problem of approximating the operator that can describe the total muscle strain by means of an 'averaged-fiber' operator. M.V.E.

A74-19010 A computer simulation of the otolith membrane. W. J. Hudetz (California State College, Fullerton, Calif.). *Computers in Biology and Medicine,* vol. 3, Dec. 1973, p. 355-369. 19 refs.

A model of the otolith membrane of the macula utriculi is described. A thin elastic membrane with a fixed boundary closely matching the shape of the otolith membrane in man is used as the model. The distributed loading of the membrane reflects the characteristic otokonial ridge which together with the corresponding thickening of the otolith membrane (the striola) is believed to have special significance in otolith functions. The parameters of the membrane are the modulus of elasticity, Poisson's ratio, and the specific density of the otokonia. Finite difference methods were used to simulate the membrane model on the digital computer. The possible modes of deformation of the membrane were studied under static conditions. The parameters of the model were adjusted to obtain a response comparable with experimental findings. F.R.L.

A74-19011 Application of the 'Hopscotch' algorithm for solving the heat flow equation for the human body. A. R. Atkins (Chamber of Mines Research Organization, Johannesburg, Republic of South Africa). *Computers in Biology and Medicine,* vol. 3, Dec. 1973, p. 397-405. 18 refs.

A74-19012 Computer reduction and analysis of neurophysiological data with special emphasis on evoked potential frequency analysis. G. W. Lewis (U.S. Army, Medical Research Laboratory, Fort Knox, Ky.). *Computers in Biology and Medicine,* vol. 3, Dec. 1973, p. 427-436. 24 refs.

A hardware and software system is described for the acquisition, reduction and analysis of neurophysiological data. Application pertains to EEG and EEG-derived evoked potential records. Determination is made of frequency component information in the records using a Fast Fourier Transform algorithm. The frequency information is represented as power spectra estimates (PSE), which are later selected, averaged and input to a multivariate discriminant statistical package. Control of the software system is made via remote terminal and acoustic coupler, allowing the use of off-site computer support. Sample results are provided. (Author)

A74-19038 * Digital computer analysis of circulatory and respiratory pressures in water-immersed dogs breathing liquid in force environments of 1 and 7 Gy. D. J. Sass, A. C. Nolan, and E. H. Wood (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Aerospace Medicine,* vol. 45, Jan. 1974, p. 1-11. Research supported by the American Heart Association and U.S. Navy; Grants No. NGR-24-003-001; No. NIH-HL-3532; No. NIH-FR-7; Contract No. F41609-69-C-0058.

A74-19039 Inert gas washout in rats - Enhancement by fluorocarbon infusion. Y. Cassuto, S. A. Nunneley, and L. E. Farhi (New York, State University, Buffalo, N.Y.). *Aerospace Medicine,* vol. 45, Jan. 1974, p. 12-14. 6 refs. Contract No. N00014-68-A-0216. NR Project 101-722.

Fluorocarbon (FC) compounds are inert and show high N2 solubility. Experiments tested whether FC infusion would increase N2 removal (VN2) from subcutaneous air pockets in rats. FC

emulsion was injected so that FC constituted about 12% of blood volume in treated animals. VN2 was measured under three conditions: 20 hrs in air, and 20 hrs or 5 hrs in 100% O2. Infused rats showed VN2 increases over controls of 175%, 148%, and 124% under the three conditions, respectively. (Author)

A74-19040 # Forearm amino acid metabolism during chronic physical inactivity. J. P. Ellis, Jr., F. R. Lecocq, J. B. Garcia, Jr., and R. L. Lipman (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 15-18. 7 refs.

The effect of 14 days of physical inactivity on peripheral amino acid metabolism was determined on a group of five healthy male subjects ranging in age from 18 to 20 years. Blood samples were drawn from the right brachial artery and a left brachial vein during the control period of 2 weeks and on the 14th day of bed rest. None of the 19 amino acids analyzed showed a significant change, either in uptake or release, from the forearm muscles. However, a substantially higher level of alanine was found in both arterial and venous blood of the physically deconditioned subjects. (Author)

A74-19041 # Influence of ethanol on cardiovascular tolerance to +Gz acceleration. J. W. Burns (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 19-28. 34 refs.

The combined stresses of acceleration and alcohol were investigated in the closed-chest chloralose anesthetized dog. Control responses to 30-sec rapid onset (1 G/sec) +Gz acceleration profiles were established in each animal, followed by the intraperitoneal administration of 2 gm/kg of 95% ethanol in a 40% solution. The animals were then reexposed to the same acceleration profiles at 1 and 2 hrs after ethanol administration. The data demonstrate a significant decrease in +Gz acceleration tolerance at 1 and 2 hrs after ethanol resulting from peripheral vasodilation and a decrease in the effective blood volume. (Author)

A74-19042 Effect of disulfiram on oxygen toxicity in beagle dogs. M. D. Faiman, R. J. Nolan, and F. W. Oehme (Kansas, University, Lawrence, Kan.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 29-32. 16 refs. Grant No. NIH-NS-07797; Contract No. N00014-70-A-0357-0002.

The protection of beagle dogs with disulfiram from high oxygen pressure convulsions and lung damage was investigated. Disulfiram was administered in a dose of 200 mg/kg ip. to both male and female beagle dogs, and the dogs exposed to 4 atmospheres of 100% oxygen. Dogs not previously treated with disulfiram convulsed within 10 min, whereas disulfiram-treated beagle dogs experienced no convulsions or other signs of oxygen toxicity. Also, no oxygen-induced lung damage, such as atelectasis, edema or hemorrhage, was found in disulfiram-treated animals. Disulfiram appears to be an excellent agent for use as a protectant against oxygen toxicity in beagle dogs. (Author)

A74-19043 # Assessment of performance in a link GAT-1 flight simulator at three alcohol dose levels. P. H. Henry, J. A. Flueck, J. F. Sanford, H. N. Keiser, R. C. McNee, W. H. Walter, III, K. H. Webster, B. O. Hartman, and M. C. Lancaster (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 33-44. 20 refs.

To evaluate the effects of drugs and environmental stresses on pilot psychomotor performance, an automated system was developed around a Link GAT-1 flight trainer. Performance was electronically scored during 1-hr simulations of cross-country instrument flight, using special purpose analog and digital logic. The sensitivity of this system was assessed by observing the acute effects of three graded doses, 0.3, 0.6, and 0.9 gm/kg body weight, of ethyl alcohol on scored performance. Three separate experiments were conducted using a total of 22 nonrated men, ages 21 to 29. Statistically significant performance decrements were observed at all three dose levels. (Author)

A74-19044 Influence of fitness on the blood pressure control system in man. J. Stegemann, A. Busert, and D. Brock (Köln, Deutsche Sporthochschule, Cologne, West Germany). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 45-48. 15 refs. Research supported by the Deutsche Forschungsgemeinschaft.

In 25 endurance-trained athletes and a control group of 25 nonathletes, the blood pressure control system was tested. This was performed by changing the transmural pressure in the carotid artery using a sealed pressure chamber around the head while respiring air under atmospheric conditions. The pressure inside the chamber was altered from -60 to +60 mm Hg. Heart rate and peripheral blood pressure were recorded. The relationship between transmural pressure in the carotid artery and mean arterial blood pressure was significantly flatter in the athletes. The calculated gain factors were found to be remarkably smaller for athletes. Endurance training obviously reduces the effectiveness of the blood pressure control system. This is advantageous for the integrative control of the circulatory system during exercise and disadvantageous for orthostatic tolerance, especially after stress. (Author)

A74-19045 Changes in blood and plasma volumes in dogs during decompression sickness. A. A. Bove, J. M. Hallenbeck, and D. H. Elliott (National Naval Medical Center, Bethesda, Md.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 49-55. 29 refs. Navy-supported research.

Plasma and red cell volumes were measured using isotope labelling in 12 dogs given various types of decompression from 220 foot air dives. A 25- to 30-min dive produced a limb bend, and a 35- to 40-min dive produced a spinal cord lesion (paresis). A short dive to 70-90 ft following the 220-ft dive was used to prevent severe chokes and cardiopulmonary collapse. Four dogs making safe dives (no decompression sickness) and four dogs with limb bends showed no change in blood, RBC, or plasma volumes, while four dogs with paretic dives showed loss of plasma and elevated hematocrit. (Author)

A74-19046 Relationships between age, ATC experience, and job ratings of terminal area traffic controllers. J. J. Mathews and B. B. Cobb (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 56-60. 9 refs.

This study involved the collection of experimental ratings of job performance and other data for several hundred journeymen radar control specialists of 17 high-IFR-traffic density Terminal Area Traffic Control facilities. Significant inverse relationships were found between the job ratings and both chronological age and tenure in FAA-ATC work. Results of a comparative analysis of data for dichotomized groups aged 40 and younger and 41 and older within each of several length-of-experience groupings indicated that: (1) the younger subjects of every experience level tended to receive higher evaluations than those over 40 years old and (2) the greater mean differences pertained to the dichotomized age groups having more than 10 years experience. (Author)

A74-19047 # Asymptomatic sinus disease in aircrew members. H. H. Hanna (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 45, Jan. 1974, p. 77-81.

In 1963-64, Fascenelli et al. established that a routine Water's view on asymptomatic individuals will reveal a significant percentage (25%) of abnormal findings, usually in the maxillary sinus. From June, 1967, to March, 1973, a similar study was carried out to corroborate their findings, particularly the incidence and usual course of cystic lesions in flyers and nonflyers. In the study group of 1,284 asymptomatic flyers there were 200 abnormalities for an incidence of 15.6%; in the control group of 200 nonflyers there were

44 abnormal findings for an incidence of 22%. The maxillary sinus was the site in all but eight individuals and the retention cyst was the most common abnormality in both groups. (Author)

A74-19048 **Note regarding the high-altitude symptomatology of short-term residents at 1600m following transport to 4300m altitude.** D. A. Stamper, P. C. Weiser, and F. J. Sullivan (U.S. Army, Medical Research and Nutrition Laboratory, Denver, Colo.). *Aerospace Medicine,* vol. 45, Jan. 1974, p. 84, 85.

A74-19049 **Myocardial infarction - An in-flight problem.** R. B. Rayman (USAF, Air Force Inspection and Safety Center, North AFB, Calif.). *Aerospace Medicine,* vol. 45, Jan. 1974, p. 86-89.

During the 10-year period Jan. 1, 1962 to Dec. 31, 1971, only two cases of confirmed and five cases of suspected in-flight myocardial infarction were reported in the United States Air Force (USAF). One might next inquire about those accidents in which the primary cause was undetermined. Could the pilot possibly have suffered a myocardial infarction and subsequent incapacitation resulting in a fatal crash. In an attempt to answer this question, all accidents during the above time period in which the primary cause was undetermined were reviewed. The aircraft type, phase of flight of the accident, pilot age, and autopsy report were considered. It was concluded that in-flight myocardial infarction has been a rare event in the USAF. (Author)

A74-19050 # **Electroencephalogram and aerospace safety.** W. H. King and E. Liske (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *(International Congress of Aviation and Space Medicine, 21st, Munich, West Germany, Sept. 18, 1973.) Aerospace Medicine,* vol. 45, Jan. 1974, p. 90, 91. 5 refs.

The significance of abnormal EEG findings in asymptomatic individuals is not well defined. The USAF School of Aerospace Medicine has undertaken a followup study of 30 candidates for special aerospace missions, who were found to have abnormal EEG findings, during the period 1961-1965. Interest was generated by the report of an overt seizure disorder in one individual. The survey has disclosed the occurrence of two (probably three) fatal aircraft accidents, one fatal automobile accident, two nonfatal aircraft accidents, and three aircraft incidents, involving members of the group. Implications with regard to physical standards for aircrew members are discussed. (Author)

A74-19072 # **Feasibility of a 'gas exchange' method for detecting extraterrestrial life by identification of nitrogen-fixing microorganisms (O vozmozhnosti metoda 'gazoobmena' dlia obnaruzheniia zhizni vne zemli-identifikatsiia azotfiksiruiushchikh mikroorganizmov).** R. I. Fedorova, E. I. Milekhina, and N. I. Il'iukhina (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1973, p. 797-806. 32 refs. In Russian.

A74-19073 # ***Some results of the medico-biological investigations performed under the 'Gemini' and 'Apollo' programs. II - Changes in blood characteristics, bone apparatus, and mineral and electrolytic metabolisms of the astronauts (Nekotorye rezul'taty mediko-biologicheskikh issledovanii, vypolnennykh po programmam 'Dzhemini' i 'Apollon.' II - Izmenenie pokazatelei krovi, kostnogo apparata, mineral'nogo i elektrolitnogo obmenov u kosmonavtov).*** V. I. Kopanev and E. M. Iuganov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1973, p. 852-863. 24 refs. In Russian.

A74-19074 # **The neuroendocrine functional system - Organization, functioning principles (Neiroendokrinnaia funktsional'naia sistema - Organizatsiia, printsipy funktsionirovaniia).** I. I. Dedov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1973, p. 864-873. 19 refs. In Russian.

Formulation of the principles of functioning of the neuroendocrine system on the basis of experiments on rats under conditions of deficiency (with subsequent compensation) and excess of adrenal, thyroid, and sex gland hormones. The neuroendocrine system, including the hypothalamic nuclei, the hypophysis, and the peripheral endocrine target glands, is considered from the standpoint of Anokhin's theory of functional systems as a functional supersystem. A useful result of the action of the neuroendocrine system is the integrative action of various hormones - i.e., their combined action in the effectors. A change in the hormone level in even one of the glands results in a considerable reorganization of the entire system in order to achieve an adaptation effect. A.B.K.

A74-19075 # **Effect of previous exposure to a steady magnetic field on the histochemical characteristics of the functional state of the adrenal cortex in X-rayed animals (Vliianie predvaritel'nogo vozdeistviia postoiannym magnitnym polem na gistokhimicheskie pokazateli funktsional'nogo sostoianiia kory nadpochechnikov zhivotnykh, podvergnutykh Rentgenovskomu obliucheniiu).** G. V. Finakova, G. V Romanov, E. G. Bykov, and L. A. Piruzian (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Nov.-Dec. 1973, p. 913-916. 19 refs. In Russian.

A74-19190 # **Angioarchitectonics of the cerebellum cortex veins of man (Agioarkhitektonika ven kori mozochka liudini).** K. A. Diubenko (Kiivs'kii Medichnii Institut, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 35, Nov. 1973, p. 1038-1040. 7 refs. In Ukrainian.

Microscopic study of blood efflux pathways on 37 cerebellum cortex preparations from men 16 to 83 years old shows the presence of short and long veins in the cerebellum cortex. The former are formed from the postcapillary veins of the molecular layer, absorb more veins from the ganglionic and grained layers, and combine in a single outgoing vein. The latter form large stems which collect blood from all cortical layers and white substance. V.Z.

STAR ENTRIES

N74-13770# Translation Consultants, Ltd., Arlington, Va.
STUDIES OF SMOKE DAMAGE TO TREES. 1: ACUTE SO2 DAMAGE SYMPTOMS
Y. Nakashima, Y. Hagiura, S. Ogawa, and T. Kawashima [1973] 53 p refs Transl. into ENGLISH from Fukuoka Ken Kenkyujo jiho 21 Go (Japan), no. 21, 1970 p 23-50 Sponsored by EPA
(TR-389-73) Avail: NTIS HC $4.75

Acute SO2 damage symptoms in the principal forestation tree varieties are reported. 35 varieties were exposed to SO2 (0.1 ppm - 12 ppm) and surveys were made of damage symptoms and the subsequent growth state. Seedlings of the principal forestation trees (1-2 years) demonstrated considerable damage symptoms following exposure to 10 ppm of SO2 for 30 minutes. Of the four principal production species, Cryptomeria japonica and Pinus densiflora had least resistance to acute SO2 damage, Pinus thunbergii was the next strongest, while Chamaecyparis obtusa was the strongest. Acute SO2 damage symptoms varied with the type of tree and a number of systematic classifications for this damage are considered. Author

N74-13771# Joint Publications Research Service, Arlington, Va.
MAGNESTISM IN BIOLOGY
Yu. A. Kholodov 10 Dec. 1973 91 p refs Transl. into ENGLISH of the book "Magnetizm v Biologii" Moscow, Nauka, 1970 97 p
(JPRS-60737) Avail: NTIS HC $6.75

A study was made of magnetiobiology, specifically the effects of magnetic fields on biological entities were analyzed. Data are included on the history, current research, and future prospects for magnetobiology. Author

N74-13772*# Scientific Translation Service, Santa Barbara, Calif.
CLINICAL ASPECTS OF DRUG-INDUCED DISEASES OF THE LIVER
G. A. Martin Washington NASA Jan. 1974 15 p Transl. into ENGLISH from Z. fuer Gastroenterologie (West Ger.), v. 11, no. 5, 1973 p 343-350
(Contract NASw-2483)
(NASA-TT-F-15235) Avail: NTIS HC $3.00 CSCL 06E

Drug induced liver damage, examples of the different types of damage, and the medicines that cause such damage are reviewed. Author

N74-13773*# Techtran Corp., Glen Burnie, Md.
MORPHOLOGICAL CHANGES IN MUSCLES AND NERVES OF THE EXTREMITIES UNDER CONDITIONS OF OVER-TRAINING
P. Z. Gudz Washington NASA Jan. 1974 14 p refs Transl. into ENGLISH from Ark. Anat., Gistol. Embriol. (USSR), v. 45, no. 7, 1963 p 55-63
(Contract NASw-2485)
(NASA-TT-F-15251) Avail: NTIS HC $3.00 CSCL 06P

Models of trained and overtrained organisms were created in experiments on animals (dogs, goats and rats). A histological study revealed progressive changes in the muscles of animals subjected to moderate and submaximal loads. These changes reflect an adaptation of the organism to physical loads. Destructive and dystrophic alterations of part of muscle fibers were found in extermital muscles of the animals additionally subjected to the regime of prolonged maximum loads which produced a state of chronic fatigue. Trained motor nerve endings became considerably dilated and contained a large number of terminals and nuclei of Schwann's glia. Chronically fatigued motor nerve endings became distinctly reduced, as if compressed into a ball. Nuclei of Schwann's glia decrease number, parts of them were well impregnated. Author

N74-13774*# Kanner (Leo) Associates, Redwood City, Calif.
SENSITIZATION TO METABOLIC AND CARDIOVASCULAR EFFECTS OF CATECHOLAMINES
J. LeBlanc, J. Valliere, and C. Vachon Washington NASA Dec. 1973 4 p Transl. into ENGLISH from J. Physiol. (Paris), v. 65 (Suppl.), Oct. 1972 p 255 A
(Contract NASw-2481)
(NASA-TT-F-15220) Avail: NTIS HC $3.00 CSCL 06E

The mechanisms of sensitization to the cardiovascular and metabolic effects of catecholamine are studied. It is found that guanethidine increases the tensor response to noradrenaline by blocking its uptake, rather than by increasing the sensitivity of the alpha receptors. It is demonstrated that repeated injections of noradrenaline have no effect on the activity of the alpha receptors in response to a given stimulus. On the other hand, the sensitization of the beta receptors seems to be effected by other mechanisms: repeated injections of isoproterenol sharply increase the response to it: there is a 70% increase in oxygen, cardiac rhythm is elevated, and there is a strong increase in the contractile force of the ventricle. Repeated injections of isoproterenol increase the sensitivity of the beta receptors, possibly by means of the cyclic AMP, while the sensitization of the alpha receptors would seem to be due simply to a diminution in uptake. Author

N74-13775*# Techtran Corp., Glen Burnie, Md.
PSYCHOPHYSIOLOGY: RELATIONSHIPS IN RATS BETWEEN SPEED OF LEARNING AND DURATION OF PARADOXICAL SLEEP DURING THE NYCTHEMERIC CYCLE
Jean Delacour, Odile Houcine, and Jean Brenot Washington NASA Dec. 1973 7 p refs Transl. into ENGLISH from Compt. Rend. (France), ser. d, v. 275, 6 Dec. 1972 p 2725-2728
(Contract NASw-2485)
(NASA-TT-F-15222) Avail: NTIS HC $3.00 CSCL 06C

The relationships between paradoxical sleep and avoidance learning in rats were studied according to a procedure reducing the direct interactions between these two variables. The findings suggested the existence of a relationship between the speed of this learning and the value of the duration of paradoxical sleep/waking period ratio during the nycthemeral cycle. Author

N74-13776*# Techtran Corp., Glen Burnie, Md.
THE EFFECT OF DIPINE ON PHENOBARBITAL INDUCTION OF CYTOCHROME P-450 INDUCTION AND STIMULATION OF MITOTIC ACTIVITY IN THE HEPATIC CELLS OF THE RAT
V. V. Klimenko, L. Ye. Nemirovskiy, and G. R. Mutovin Washington NASA Dec. 1973 6 p refs Transl. into ENGLISH from farmakol. i Toksikol. (Moscow), v. 36, no. 5, 1973 p 597-599
(Contract NASw-2485)
(NASA-TT-F-15225) Avail: NTIS HC $3.00 CSCL 06C

The influence exerted by dipline on the induction with phenobarbital of cytochrome P sub 450 and on the stimulation of the mitotic activity in the rat's liver was studied. Both of them are shown to be inhibited even in the case when the phenobarbital induction is instituted 60 days after a single injection of a non-cytostatic dose of the mutagen. It is believed that changes occurring in the genetic system of the cell produced by dipline lie at the root of the cited phenomena. Author

N74-13777*# Scientific Translation Service, Santa Barbara, Calif.
X-RAY KYMOGRAPHIC INVESTIGATIONS OF THE CEN-

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TRAL CIRCULATORY ORGANS IN THERAPEUTIC BATHS AND IN HYDROSTATIC PRESSURE ELEVATION. THEIR TECHNOLOGY, RESULTS AND POTENTIAL DEVELOPMENTS: A REVIEW

Friedrich Ekert Washington NASA Jan. 1974 36 p refs Transl. into ENGLISH from Arch. Physik. Therapie (Leipzig), v. 8, 1956 p 66-82

(Contract NASw-2483)

(NASA-TT-F-15227) Avail: NTIS HC $4.00 CSCL 06P

X-ray kymographic investigations in therapeutic baths are reviewed. Findings are summarized, and suggestions are made for future work on luman central circulatory organs. Author

N74-13778*# Scientific Translation Service, Santa Barbara, Calif.

EFFERENT INNERVATION OF THE VESTIBULE

Andre Gribenski Washington NASA Jan. 1974 21 p refs Transl. into ENGLISH from Ann. Oto-Laryngol. (Paris), V. 87, no. 1-2, 1970 p 77-92

(Contract NASw-2483)

(NASA-TT-F-15232) Avail: NTIS HC $3.25 CSCL 06P

From an extensive review of the recent literature, it is attempted to clarify the following relationships: afferent and efferent vestibular innervations, and nerve connections involving the cortical, subcortical and cerebellar activities and their influence on vestibular nuclei. Author

N74-13779*# Techtran Corp., Glen Burnie, Md.

PROBLEMS OF SPACE BIOLOGY, VOLUME 19: PROBLEMS OF THE RESISTANCE OF BIOLOGICAL SYSTEMS

B. N. Tarusov, ed. Washington NASA Nov. 1973 284 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Tom 19, Problemy Ustoychivosti Biologicheskikh Sistem" Moscow, Nauka Press, 1971 p 1-285

(Contract NASw-2485)

(NASA-TT-F-761) Avail: NTIS HC $6.50 CSCL 06C

The resistance of biological systems is discussed in connection with creating artificial life support systems for manned space flight.

N74-13780* Techtran Corp., Glen Burnie, Md.

THE LIMITS OF THE ADAPTATION OF LIFE TO EXTREME CONDITIONS (IN CONNECTION WITH PROBLEMS OF EXOBIOLOGY)

S. I. Aksenov *In its* Probl. of Space Biol., Vol. 19 (NASA-TT-F-761) Nov. 1973 p 1-76 refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Tom 19, Problemy Ustoychivosti Biologicheskikh Sistem" Moscow, Nauka Press, 1971 p 7-89

CSCL 06C

Accommodation is discussed as a universal evolutionary principle which essentially will apply to all life forms, regardless of chemical base (carbon, silicon, etc.). Life forms must either adapt to extreme conditions or perish, and for any life form an extremum factor is any significant deviation in environmental parameters. The possibility of life forms existing in specific extraterrestrial environments is discussed, and a conclusion is drawn which unequivocally states that through many forms of accommodation life is possible in many different environments. Author

N74-13781* Techtran Corp., Glen Burnie, Md.

MASS-ENERGY METABOLIC CHARACTERISTICS OF ALGAE

I. V. Smirnov *In its* Probl. of Space Biol., Vol. 19 (NASA-TT-F-761) Nov. 1973 p 77-171 refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Tom 19, Problemy Ustoychivosti Biologicheskikh Sistem" Moscow, Nauka Press, 1971 p 90-180

CSCL 06F

A mathematical analysis is given for the mass energy characteristics of photosynthesizing algae. An engineering-biological approach to this allows for a detailed analysis of the characteristics for a broad spectrum of environmental situations in which such algae are used as a component of a life support system. Models of such systems are constructed and are employed to demonstrate actual and hypothetical situations. Computers are employed for this purpose. Author

N74-13782* Techtran Corp., Glen Burnie, Md.

KINETIC PRINCIPLES OF INTERACTION OF COMPONENTS IN COMPLEX BIOLOGICAL SYSTEMS

A. B. Rubin *In its* Probl. of Space Biol., Vol. 19 (NASA-TT-F-761) Nov. 1973 p 173-278 refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii, Tom 19, Problemy Ustoychivosti Biologicheskikh Sistem" Moscow, Nauka Press, 1971 p 181-285

CSCL 06F

A biomathematical analysis of component interaction in biological systems is given. Two primary types of systems are discussed - open systems and closed systems. The applicability of these systems to life support equipment in spacecraft is analyzed and formulae are provided to demonstrate the effect (theoretical) of closed and open systems in life support systems. Author

N74-13783*# Techtran Corp., Glen Burnie, Md.

THE EFFECT OF DEHYDRATION AND HYPERTHERMIA ON THE HOMEOSTASIS OF THE HEALTHY MAN

V. I. Pokrovskiy, V. V. Bulychev, T. Ye. Lisukova, V. V. Maleyev, V. A. Utekhin, T. Ye. Chernyayeva, Yu. M. Mayorov, S. S. Milovidova, and K. A. Kafarov Washington NASA Dec. 1973 11 p refs Transl. into ENGLISH from Sov. Med. (Moscow), no. 2, 1973 p 27-31

(Contract NASw-2485)

(NASA-TT-F-15250) Avail: NTIS HC $3.00 CSCL 06S

Clinico-physiological and biochemical changes of homeostasis in 16 healthy males undergoing dehydration of up to 3 to 4% of the body weight and in 8 normal males in whom the body temperature was raised to 38.1 to -40.3% were analyzed. Changes occurring in the physical and chemical properties of the blood, such as in its specific weight, viscosity, hematocrit (D.C.V.), protein, blood clotting system, acid-base balance, electrolytes and gas movement are described. Differences in the contractile activity and size of the heart, the state of the peripheral circulation following dehydration and hyperthermia and, in particular, the emergence of venous hyperoxemia in the last named cases were disclosed. Changes in the homeostasis following physiological dehydration were investigated with a view to giving substance to the method of water and electrolyte therapy used in treating dehydrated patients with acute gastrointestinal infections. Variations in hyperthermia are of interest in appraising the effect of therapy accorded to febrile infectious patients. Author

N74-13784# Advisory Group for Aerospace Research and Development, Paris (France).

PATHOPHYSIOLOGICAL CONDITIONS COMPATIBLE WITH FLYING

Heinz S. Fuchs, ed. (German Fed. Armed Forces, Bonn) Oct. 1973 152 p refs In ENGLISH and FRENCH Presented at AGARD Aerospace Med. Panel Specialist Meeting, Pensacola, Fla., 16-17 May 1973

(AGARD-CP-129) Avail: NTIS HC $9.75

Medical selection and maintenance procedures for aircrews are reported. The effects of ageing, flight stress, clinical and psychophysiological pathological factors on pilot flight fitness are considered.

N74-13785 German Federal Armed Forces, Bonn.

TECHNICAL EVALUATION REPORT, CONCLUSION AND RECOMMENDATIONS

Heinz S. Fuchs *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 10 p

In the past, physical standards have been overly conservative, because it was necessary to base aeromedical criteria on medical concepts derived from experience with diseased states in hospital

patients. Increasing experience with aircrew populations, based upon specific studies to disclose the relationships between the pathophysiology of early disease and the psychophysiological requirements of flight, allows a more subtilized interpretation of diagnostic and clinical findings and gives now a wider and safer prognostication. Therefore, it is believed that there is a justification to change these standards - based upon systematic and scientific reevaluation, taking advantage of newly developed knowledge and research techniques. Because of the unique nature of the ageing aircrew population, it is frequently necessary to accomplish this research directly upon the flyers themselves, rather than to extrapolate from general medical research. Author

N74-13786 Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE THOUSAND AVIATORS: AGING AND THE BLOOD PRESSURE
Robert E. Mitchell *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 3 p

Blood pressure patterns are discussed for the members of a research group over a 32 year period and the implications of the patterns. In contrast to what was previously thought to be the case, namely, that blood pressure levels not rise with increasing age, the latest survey indicates that there are many and important exceptions to this generality after 45 years of age. Since this is the period when most naval aviators enter the administrative phase of their careers, the finding has less significance than if it occurred at an earlier age but has greater operational significance in the case of commercial airline pilots inasmuch as these men continue to fly at age 60. It would appear that this late onset of increased blood pressure justifies the more liberal standards for admission to flight training. At the same time personnel in an active flight status can be allowed to continue active flying if no complications are noted and treatment is not indicated.
Author

N74-13787 Naval Aerospace Medical Research Lab., Pensacola, Fla.
ELEVATED BLOOD PRESSURE IN AIRCREW
D. R. Stoop, K. C. Stanton, and D. D. Brown *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 5 p

The evaluation, management, and disposition of the aircrew with elevated blood pressure are frequently difficult problems. Analysis of evaluations reveals an obvious reluctance on the part of the physician to establish a diagnosis of hypertension and a tendency to avoid drug therapy in spite of accepted evidence that early treatment reduces morbidity. The implications and potential problems in this approach have been discussed, and current practices and policies regarding the aircrew with hypertension have been presented and defended. Author

N74-13788 School of Aerospace Medicine, Brooks AFB, Tex. Internal Medicine Branch.
RETURNING AIRMEN WITH ABNORMAL EXERCISE TESTS AND NORMAL CORONARY ANGIOGRAMS TO FLYING STATUS
Victor F. Froelicher, Frank G. Yanowitz, A. J. Thompson, and Malcolm C. Lancaster *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 7 p refs

Individuals with ST segment changes during and/or after exercise are considered to have an increased risk of developing the manifestations of CAD (Coronary Artery Disease). However, it is also known that both the double Master's test and maximal treadmill testing yield false positive and negative results reactive to CAD. The results of coronary angiography are presented in 63 asymptomatic aircrewmen with resting repolarization abnormalities and exercise testing responses suggestive of coronary artery disease. Fifty-four per cent had angiographic coronary artery disease, and many had high risk lesions. Forty-six per cent had no angiographic lesions and were recommended for return to flying duties. The findings in this study, the lack of significant complications, the concern for public safety, and the economics of maintaining a flying force justify the continued use of elective coronary angiography in selected asymptomatic aircrewmen.
Author

N74-13789 School of Aerospace Medicine, Brooks AFB, Tex. Applied Physiology Branch.
MYOCARDIAL AND CEREBRAL FUNCTION DURING EXPOSURE TO CARBON MONOXIDE
Howard H. Erickson and Milton J. Hernandez-Perez *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 6 p refs

Aircrew members exposed to carbon monoxide may sustain an increase in coronary blood flow and a reduction in oxygen delivery to the heart and brain. These factors may result in a decrement in man's performance in strategic and tactical weapon systems in an enemy defense environment. Since many of the stresses -- such as physical exertion, altitude hypoxia, and acceleration -- are cumulative, carbon monoxide may affect the heart and cardiovascular system of man during operational flying by decreasing still further the oxygen supply and reserve in the heart and brain. Author

N74-13790 Hopital d'Instruction des Armees, Versailles (France).
CARDIAC VALVULOPATHIES AND FLIGHT TOLERENCE [CARDIOPATHIES VALVULAIRES ET TOLERANCE AU VOL]
G. Leguay *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 12 p refs In FRENCH

Due to exceptional circumstances 8 pilots suffering from aortic insufficiency, aortic stenosis, and mitralis stenosis have been on flying status, aeromedically monitored up to 15 and 20 years. The cardiac valvulopathies raise a twofold problem: they may potentially endanger flight safety by leading to a sudden cardiac syncope and they can be aggravated by flying, particularly by acceleration forces. Flight safety, however, has never been threatened by these aircrew in the light of experience over several years. The tolerance of flying pilots suffering from moderate aortic insufficiency seems satisfactory, in particular in fighter pilots exposed to high g-loads. Author

N74-13791 Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).
VALUE OF CARDIAC MECHANOGRAMS IN EVALUATING FLYING PERSONNEL [INTERET DES MECANOGRAMMES CARDIAQUES DANS L'EXPERTISE DU PERSONNEL NAVIGANT]
R. Carre, C. Nogues, and B. Raviart *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 14 p refs In FRENCH

Cardiac mechanograms provide useful information in the medical evaluation of aircrew and are obtained fast and easily by a noninvasive technique. The cardiogram itself provides an estimate of the elasticity of the arterial wall, and in that way gives criteria for atherosclerosis. The combined use of chronocardiographic methods (EGG, cardiogram) provides an opportunity of validating the contractibility of the cardiac muscle. These methods are important in the cardiologic survey of aircrew, both to detect atherosclerosis and monitor arterial hypertension.
Author

N74-13792 Hopital d'Instruction des Armees, Versailles (France). Service de Medecine Aeronautique.
ASTHMA IN MILITARY FLYING PERSONNEL [L'ASTHME DANS LE PERSONNEL NAVIGANT MILITAIRE]
R. Pannier *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 8 p refs In FRENCH

Detection of bronchial asthma is based mainly on actually observed acute episodes. That is the reason why applicants for flight training will not be accepted unless they aresubjected to an acetylcholin test. It is well known that patients with bronchial asthma benefit from flying. However, because of its serious

consequences if it occurrs in flight, bronchial asthma is considered to jeopardize flight safety. It is important to realize that treatments have to be adapted to the aircrew tasks since some medications may be contraindicated for flying activities in view of their secondary effects. Therefore, applicants for flying duties suffering from bronchial asthma must be rejected; aircrew who develop bronchial asthma during an established career might be considered for a waiver on an individual basis, but as a rule they will not be authorized for primary control of aircraft. Author

N74-13793 Hopital d'Instruction des Armees, Versailles (France).
IDIOPATHIC SPONTANEOUS PNEUMOTHORAX IN FLYING PERSONNEL [LE PNEUMOTHORAX SPONTANE IDIOPATHIQUE DANS LE PERSONNEL NAVIGANT]
Roger Pannier *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 6 p In FRENCH

Rupture of subpleural blebs is considered the most frequent cause of idiopathic spontaneous pneumothorax. Idiopathic spontaneous pneumothorax can occur in flight in the course of rapid decompression, by ascent to altitude both in flight and in an altitude chamber when trapped air within these blebs expands and ruptures the thin pleural layer, by an hydrostatic hemodynamic effect, or incidentally without any concomitant exertion or any physical stress. Applicants for flight training reporting one episode of idiopathic spontaneous pneumothorax must be rejected; aircrew on active duty and with an established flying career must be grounded unless they have undergone successful pulmonary surgery. Ten out of thirteen aircrew who suffered from idiopathic spontaneous pneumothorax were kept on flying status after successful pulmonary surgery. The time of grounding ranged from 3 to 14 months. Author

N74-13794 Centre d'Essais en Vol, Bretigny-sur-Orge (France).
AIRCREW'S FITNESS FOR FLYING DUTIES AFTER VERTEBRAL FRACTURES AND SPINAL SURGERY [APTITUDE AU VOL DU PERSONNEL NAVIGANT APRES FRACTURES DU RACHIS ET INTERVENTIONS CHIRURGICALES SUR LA COLONNE VERTEBRALE]
Roland-Paul Delahaye (Service de Sante pour l'Armee de l'Air, Paris), Robert Auffret, Jacques Mine (Hopital Begin, Saint-Mande), and Pierre-Jean Metges (Hopital Begin, Saint-Mande) *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 7 p refs In FRENCH

Some features of flying such as vibration and accelerations, may sensitize the spine; ejection seat bail-out and/or crash can result in more or less deleterious spine injuries and fractures. After every accident, spinal disorders, or spinal surgery aircrew must be reexamined for flying fitness. After fractures it is of the utmost importance to determine the degree of spinal stability or instability, such as after spinal disorders e.g. osteoarthrosis or arthrosis, or surgery (laminectomy), or surgery for disc hernias or spondylolisthesis. Special emphasis has been given to the evaluation of aircrew with repeated vertebral traumas on damaged spines and fractures after surgery for spinal conditions. Author

N74-13795 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
THE RISK OF MINOR SPINAL ABNORMALITIES IN AIRCREWS: EVALUATION OF EJECTION CASES
A. Beck *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 4 p refs

An attempt has been made to determine pre-existing spinal abnormalities in aircrew which may have had a detrimental effect on the traumatic events, retrospectively, i.e. after fracture of the vertibral body had occured. The collection of these findings was compared with cases of ejection seat bailouts without injuries or fractures in order to recognize morphological alterations which may possible be conducive to fracture. Author

N74-13796 Advisory Group for Aerospace Research and Development, Paris (France).
AERONAUTICAL REHABILITATION OF FLYING PERSONNEL SUFFERING FROM ACUTE PSYCHIATRIC DISTURBANCES [LA REHABILITATION AERONAUTIQUE DES MEMBRES DU PERSONNEL NAVIGANT AYANT PRESENTE DES TROUBLES PSYCHIATRIQUES AIGUS]
R. Gelly and J. C. Hadni *In its* Pathophysiol. Conditions Compatible with Flying Oct. 1973 9 p In FRENCH

Acute psychiatric symptoms combined with behavioral anomalies are normally aeromedical reasons for rejection both from flying and from regular military service. Based on an extensive case report survey, it can be demonstrated fairly clearly that such decisions are not always justified. Each case must be considered from an individual viewpoint, since in many cases psychiatric symptoms and behavioral anomalies cannot be diagnosed with absolute certainty. In particular, some obviously serious crises merely reflect individual difficulties in the course of adaptation. Any decision must therefore be based on a diagnosis of the personality structure and personality tests must be considered a major element of psychopathological diagnosis. Psychotherapy can bring to a satisfactory solution some psychiatric syndromes which have been in the past considered irreversible. However, psychotherapy in order to be successful, must be associated with concurrent actions both in the professional environment and in further flying training, etc.. Under these conditions the rehabilitation for flying duties of aircrew who had acute psychiatric troubles, possible. Author

N74-13797 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
IMPORTANCE OF THE 4 - 5 c/sec RHYTHM IN THE EEG TO DETERMINE MILITARY FLYING FITNESS
H. Oberholz *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 3 p refs

The 4 - 5 c/sec rhythm is probably a genetically determined variant of the normal EEG which may easily be misinterpreted as a fairly serious general alteration of the EEG. In order to differentiate between similar EEG patterns, the characteristics of this EEG-variant and the special mode of EEG registration were discussed and appropriate EEG's demonstrated. From the literature, the results of family examinations including possible causes of these EEG-variants were presented. Psychological peculiarities in persons showing this EEG variant were emphasized and criteria for the assessment of military flying fitness and preventive measures were proposed. Cases found were analyzed and the procedures applied to variant carriers presented. Author

N74-13798 Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).
OPHTHALMOLOGICAL SUPERVISION OF DIABETIC FLYING PERSONNEL [SURVEILLANCE OPHTALMOLOGIQUE DU PERSONNEL NAVIGANT DIABETIQUE]
J. P. Chevaleraud and G. Perdriel *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 5 p In FRENCH

With reference to diabetes mellitus, the ophthalmologist's role can be twofold; through his special examinations he can detect this disorder very early and he can monitor its different forms, its several steps of evolution, and its implications for flying fitness. Based on broad clinically and functionally oriented knowledge and electrophysiological experience, some interesting proposals for the evaluation of aircrews who suffer from different forms of diabetes mellitus are reported. Author

N74-13799 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
MANAGEMENT OF GLAUCOMA IN AN AGEING FLYING POPULATION
Thomas J. Tredici, James L. Mims, III, and James F. Culver *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 3 p refs

Ageing has definite and certain predictable effects on the visual apparatus. Loss of accommodation with age hampers important visual tasks in the cockpit. Disease processes that are common in any population will eventually also affect the flyer.

The occurrence of narrow angle glaucoma in the flying population is so small that it is insignificant; however, with relative maturation of a flying force a 2 to 3 percent figure does become significant. Glaucoma strikes a flyer after a great deal of time and money have been expended in his training and when his experience could be utilized to the maximum. Medical grounding of a significant number of experienced flyers can be considered a loss. Many flyers with increased intraocular pressure have been retained on flying status by a rationale of diagnosis and treatment. The visual effects of drugs utilized in the treatment of glaucoma have been evaluated. Presently, only intraocular tension lowering drugs that do not effect visual function are being used. Author

N74-13800 Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).
CURRENT ASPECTS OF COCHLEAR FUNCTION APPLIED TO FLYING PERSONNEL [ASPECT ACTUEL DE LA FONCTION COCHLEAIRE CHEZ LE PERSONNEL NAVIGANT]
P. Blanc and J. Bastien (DCSSA, Paris) *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 3 p In FRENCH

This 9-years survey is based upon 6,024 audiograms of flying personnel who have been rated for at least two years. The results of this investigation can be summarized as follows: (1) Any barotrauma on the middle ear may be neglected; an air passenger who has had stapedectomy for otosclerosis may travel by air without any risk; (2) occupational deafness was not found in flying personnel under investigation; (3) hearing discrimination deficits were found in some individuals since the aviation operational envrionment stresses aircrew by its considerable noise levels; and (4) 12 aircrew with intact ear drums were found to be suffering from moderate conduction deafness and presenting the classic otosclerotic syndrome. Two of them underwent cochlear surgery and have flown to date 1,000 flying hrs each. The audiometric results produced by surgery remained excellent.
Author

N74-13801 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
PURE TONE HEARING LOSSES IN PILOTS OF VARIOUS AIRCRAFT, AGE AND FLYING TIME AND ITS SIGNIFICANCE FOR INFLIGHT SPEECH COMMUNICATION
G. H. Froehlich *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 4 p

The punch cards of 2000 pilots investigated in 1971 have been separated into 4 groups of flying time respectively age, subdivided into pilots of jet aircraft, piston engined aircraft and helicopters. High tone hearing losses were increasing with age and flying time and in helicopter pilots more rapidly than in pilots of the other types of aircraft. A number of pilot's speech audiograms have been investigated. The intelligibility scores of hearing losses above 3000 Hz were excellent and there are no problems with inflight speech communications. Hearing losses above 2000 Hz resulted in intelligibility scores of 72% at low and 85% at medium speech levels. Less than 10% of the pilots above 45 years of age had hearing losses above 1500 Hz. At medium speech levels they obtained only a score of 70%, 100% are frequently not reached even with high speech levels. Together with the masking effect of inflight cabin noise, voice communication might be endangered, especially if the attenuation characteristics of headsets and flying helmets are poor. In these cases, the use of properly fitting headgar is especially important to insure a favorable noise to speech ratio. Author

N74-13802 Hopital d'Instruction des Armees, Versailles (France).
PROTEINURIAS IN FLYING PERSONNEL [PROTEINURIES ET PERSONNEL NAVIGANT]
G. Leguay *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 12 p In FRENCH

Proteinurias have been found much more frequently among air transport aircrew than in fighter pilots. More than 50% of all cases have been observed in aircrew between 20 and 25 years of age which is obviously caused by the age dependant incidence of the orthostatic proteinuria. Chronic proteinurias are in most instances caused by chronic glomerulopathies. If this condition is clinically stabilized, it may be considered compatible with flying. Clearance impairment, however, necessitates a special diet, and the existence of a marked hypertension as well as the incompatibility with vaccinations indicates grounding of these aircrew. To verify the interaction of proteinurias and flying, several individuals were exposed to acceleration forces on the human centrifuge. No significant changes of proteinuria were observed during or after the centrifuge rides. However, barometric stresses which occur when flying at different altitudes may be considered dangerous since these barometric pressure differences can exacerbate infectious lesions in ENT areas.
Author

N74-13803 School of Aerospace Medicine, Brooks AFB, Tex.
THE OCCURRENCE OF HYPERLIPIDEMIA IN FLYING AND NONFLYING SUBJECTS OF THE USAFSAM CARDIOVASCULAR DISEASE STUDY
Dale A. Clark, Kenneth A. Narahara, and Margaret F. Allen *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 6 p refs

The subjects of a cardiovascular disease study were separated into flying and non-flying groups, and the occurrence of elevated lipid levels in these groups was tabulated. The question of interest was whether the stresses of flight elevate serum cholesterol and predispose pilots to the development of atherosclerotic heart disease. None of the percentages obtained in this investigation differ significantly between the two groups. These data therefore indicate that the stresses associated with flying have no more effect on serum lipids than do the stresses experienced by a group of non-flying officers. A corollary inference is that the prognostic significance of a given serum lipid level is the same whether observed in a flying or a non-flying officer.
Author

N74-13804 Advisory Group for Aerospace Research and Development, Paris (France).
THE PROBLEM OF DIABETES MELLITUS IN AVIATION MEDICINE
Gerhard Renftle *In its* Pathophysiol. Conditions Compatible with Flying Oct. 1973 7 p refs

Problems in aviation medicine which diabetes mellitus raise regulations, waivers, diet, and hypoglycemic agents, are discussed. While the incidence rate is relatively low in student pilots, a higher number of cases is found during follow-up examinations among experienced senior or command pilots. Onset at age 20 to 40 may have the course of either juvenile or adult type. Annual evaluation of carbohydrate metabolism with a standard glucose tolerance test should be mandatory for every military or commercial pilot, and every private pilot after age 40. As sulfonylureas may cause hypoglycemia, any antidiabetic therapy should not be considered compatible with flying duties. Individuals with decreased carbohydrate metabolism tend to hypoglycemic reactions especially in hazardous situations or fasting periods. Waivers should be granted only for diabetic pilots whose carbohydrate metabolism is fully controlled with diet, confirmed by daily testing of urine and frequent postprandial blood sugar examinations. A case report illustrates the fluctuating and reversible course of an incipient diabetes and its effective management in a highly motivated and cooperative senior pilot.
Author

N74-13805 School of Aerospace Medicine, Brooks AFB, Tex.
THE REPEATABILITY OF AN ABNORMAL 2-HOUR GLUCOSE TOLERANCE TEST
J. F. Trabal, R. G. Troxler, and M. C. Lancaster *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 5 p refs

The diagnosis of diabetes mellitus not only implies a chronic

abnormality of carbohydrate metabolism and an increased risk of premature vascular disease, but in the flyer, this diagnosis implies an increased risk to flying safety by reason of physical performance degradation. The glucose tolerance test (GTT) is the accepted standard for the diagnosis of nonmanifest diabetes. A study of the repeatability of the 2-hour GTT was carried out in 162 flyers who had an initial GTT and a repeat GTT from 6 - 24 months later. Of those initial tests considered abnormal, 55 to 60% reverted to normal on the repeat test. The repeatability of the GTT varied with the criteria used and with the number of points on the GTT curve that was considered. The effects of stress on glucose metabolism and the results of the modification of the criteria for the diagnosis of diabetes are discussed. The results of this study illustrate the importance of basic definitions of diagnostic criteria for diseases which have a long term effect on the health of the flying population. Author

N74-13806 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
GERMAN AIR FORCE EXPERIENCES WITH CERTAIN CRITERIA FOR GRANTING A WAIVER
Guenther Schirrmann *In* AGARD Pathophysiol. Conditions Compatible with Flying Oct. 1973 4 p refs

During a period of 13 years there were 28,699 periodic physical examinations of aircrew with 602 granted waivers. These medical waivers were primarily granted in the disciplines of ophthalmology and internal medicine and seem to be justified even after a critical review. Prerequisite to this procedure is not only a profound medical knowledge and know-how, but also comprehensive flight surgeons' experience. A correlation of accidents/incidents caused by pilots with and without waivers indicates practically identical findings: while the aircraft accident rate was 3,76% for pilots flying without a waiver, it was 3,45% for pilots flying with a waiver and is therefore identical. An analysis of aircraft accidents involving the waiver group revealed no evidence indicating that waivers are a triggering or contributing factor in accidents. The procedure seems to be sufficient to eliminate all flying safety risks. Author

N74-13807*# Agricultural Research Service, Berkeley, Calif. Western Regional Research Lab.
ROTARY PLANT GROWTH ACCELERATING APPARATUS Patent Application
Richard R. Dedolph, inventor (to NASA) Filed 27 Dec. 1973 27 p Sponsored by NASA
(NASA-Case-ARC-10722-1; US-Patent-Appl-SN-428995) Avail: NTIS HC $3.50 CSCL 06C

A plant growth acceleration apparatus is reported wherein plants are grown in rotating beds driven in a planetary path about a primary axis so as to reduce the constraints of gravity upon the plants. NASA

N74-13808*# Techtran Corp., Glen Burnie, Md.
THE INFLUENCE OF THE UTRICLE AND THE EFFERENT VESTIBULAR ACTIVITY ON THE SPONTANEOUS AFFERENT ACTIVITY OF THE NERVES OF THE HORIZONTAL CANAL AND THE ANTERIOR VERTICAL CANAL IN THE FROG
J. Caston Washington NASA Jan. 1974 18 p refs Transl. into ENGLISH from J. Physiol. (Paris), v. 62, 1970 p 407-420
(Contract NASw-2485)
(NASA-TT-F-15253) Avail: NTIS HC $3.00 CSCL 06C

Spontaneous activity was studied in the horizontal and anterior semicircular canal nerves of the frog. Recordings were made with isolated heads (section being performed behind the medulla oblongata), in one group with the intact preparation, after section of the utricular nerve, and on the peripheral end of the cut ampullar nerve; in a second group with the intact preparation, after destruction of the encephalon, and with the peripheral end of the cut ampullar nerve. It was found that spontaneous activity decreases in most cases after section of the utricular nerve; decreases, increases, or remains the same after destruction of the encephalon; at the peripheral end of the cut nerve it always at least equals but mostly is greater than that recorded with the intact preparation and after the two previous tests. The ampullae of the horizontal and anterior canals are innervated by efferent fibers (some related to the utricle) and by collaterals from fibers of the utricular nerve. Author

N74-13809*# National Aeronautics and Space Administration, Washington, D.C.
THE DYNAMIC BEHAVIOR OF THE EAR IN SEPARATING THE SOUND SPECTRUM INTO FREQUENCY GROUPS
H. Scholl Dec. 1969 12 p refs Transl. into ENGLISH from Acustica (Stuttgart), v. 12, 1962 p 101-107
(NASA-TT-F-12719) Avail: NTIS HC $3.00 CSCL 06P

Together with the inherent persistence of the ear, the spectral separation of sound into frequency groups is an important factor in the formation of the masking thresholds of wideband pulses (white noise pulses, pressure pulses). The requisite high selectivity of the ear is not continuously present but is built up within a certain interval of time after incidence of the sound. Thus sounds of very short duration are not spectrally separated at all; their masking thresholds are determined by the total energy. On the other hand, with long pulses or continuous sounds, as a result of spectral separation, the intensity of only a single frequency group is fully effective. The time required for the ear to separate the sound spectrum into frequency groups, about 10 ms, is measured directly using a special scanning method. The masking thresholds of sound pulses as a function of pulse duration calculated from these data are in good overall agreement with measured masking thresholds. Author

N74-13810*# Techtran Corp., Glen Burnie, Md.
MACROMETRIC CHANGES IN THE MAKEUP OF THE HUMAN BODY IN HYPODYNAMIA
A. G. Zhdanova Washington NASA Jan. 1974 11 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. i Embriol. (Moscow), v. 29, no. 12, 1965 p 29-34
(Contract NASw-2485)
(NASA-TT-F-15252) Avail: NTIS HC $3.00 CSCL 06P

Changes were studied in human organism produced by 2-, 5-, 7- and 10-day long hypodynamia, affecting general weight of the body, its fat, nonfat components, and specific weight of the body. It is suggested that hypodynamia results in a relative atrophy of the skeletal muscles, which may be of a considerable hindrance for the organism, especially at the moment of landing, when the nervous-muscular activity begins to be activated, and later on with readaptation to the conditions of the ground existence. Consequently, preservation and maintenance of adaptive reactions of the muscular and other systems to the effect of gravity are an important prerequisite for a successful issue of durable flights connected with forced conditions of hypodynamia and weightlessness andfor return to earth gravitation. Author

N74-13811*# Linguistic Systems, Inc., Cambridge, Mass.
DEFICIENCY IN RETENTION OF CONDITIONING AFTER DEPRIVATION OF PARADOXICAL SLEEP IN RATS
Pierre Leconte and Vincent Bloch Washington NASA Jan. 1974 8 p refs Transl. into ENGLISH from Compt. Rend. (Paris), Ser. D, v. 271, 15 Jul. 1970 p 226-229
(Contract NASw-2482)
(NASA-TT-F-15223) Avail: NTIS HC $3.00 CSCL 06C

Forty-eight hours' elective and total deprivation of paradoxical sleep disturbed the retention of conditioning in the rat. There is less disturbance with partial deprivation (50%) of the same duration. However, after such privation, the capability of reacquiring the same learning does not seem altered. Thus paradoxical sleep would seem to play a part in the stabilization mechanisms of the memory trace. Author

N74-13812*# Linguistic Systems, Inc., Cambridge, Mass.
EFFECT OF ACQUISITION LEVEL ON INCREASED PARADOXICAL SLEEP DURATION DUE TO AVOIDANCE CONDITIONING IN THE RAT
Elisabeth Hennevin, M. M. Pierre Leconte, and Vincent Bloch Washington NASA Jan. 1974 8 p refs Transl. into ENGLISH from Compt. Rend. Acad. Sci., Ser. D (France), v. 273, 1971 p 2595-2598
(Contract NASw-2482)

(NASA-TT-F-15221) Avail: NTIS HC $3.00 CSCL 06C

The increase in the duration of paradoxical sleep after learning augments with the order of sessions up to the platform of the learning task where it stops. After each session the increase in paradoxical sleep is manifested only for 30 minutes after falling asleep. Author

N74-13813*# Techtran Corp., Glen Burnie, Md.
PROBLEMS OF SPACE BIOLOGY. VOLUME 22: METABOLISM UNDER THE EXTREME CONDITIONS OF SPACEFLIGHT AND DURING ITS SIMULATION
I. S. Balakhovskiy and Yu. V. Natochin Washington NASA Dec. 1973 195 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii. Tom 22: Obmen Veshchestv v Ekstremalnykh Usloviyaka Kosmicheskogo Poleta i Pri Yego Imitatsii" Moscow, Nauka, c. 1968 212 p
(Contract NASw-2485)
(NASA-TT-F-15163) Avail: NTIS HC $11.75 CSCL 06S

The book summarizes the experience of ten years of study of the metabolic processes in cosmonauts who have flown aboard Soviet spacecraft. The changes observed in them are compared with the results obtained in model experiments and data published by the American researchers. The excretion of water and salts directly during the flight and immediately after landing in analyzed in detail. The methodological section of the book deals with a detailed description of the methods of clinical biochemistry, specially devised and applied to problems of space medicine: the complex microchemical analysis of blood dried on pieces of paper, determination of the mass of hemoglobin, etc. General problems of water transport in osmoregulatory organs and the regulation of water-salt exchange are discussed. Author

N74-13814# Naval Postgraduate School, Monterey, Calif.
FLUID FLOW IN THE LUNG: A SURVEY. NUMERICAL SOLUTION FOR GAS MIXING IN A SIMPLE MODEL OF THE LUNG, AND EXPERIMENTAL STUDY OF FLOW IN A THIN WALLED COLLAPSIBLE TUBE M.S. Thesis
Jan David Janiec Jun. 1973 67 p refs
(AD-767638) Avail: NTIS CSCL 06/16

The range of fluid dynamics applications in the lung is vast, encompassing many interesting problems rarely touched in any other single engineering area. A survey of recent work in this field was a simple model of the lung was developed indicating its application to a wide range of similar problems. Finally, new parameters were experimentally investigated in flow through a thin-walled collapsible tube. Results indicated the effects of the parameters to be significant in the flow of blood in the pulmonary capillaries as controlled by the surrounding aveolar pressure. Author (GRA)

N74-13815# Payne, Inc., Annapolis, Md.
A STATISTICAL STUDY OF GRIP RETENTION FORCE Final Report, 30 Jun. 1971 - 2 Mar. 1973
Theodore W. Horner and Fred W. Hawker Wright-Patterson AFB, Ohio AMRL May 1973 48 p refs
(Contract F33615-71-C-1892; AF Proj. 7231)
(AD-767904; Working-Paper-101-11; AMRL-TR-72-110) Avail: NTIS CSCL 06/19

To assess an ejection seat occupant's ability to hold on to a handle the data from the two-handed force retention capability tests of Garrett, Alexander and Bennett are analyzed to produce curves of probability of letting go as a function of force. Two curves are produced; one for double grip handles, comprising a T-Bar and a Twin Grip; and one for Rings, comprising a flexible loop and the familiar, rigid D-Ring. It is concluded that, at the force levels experienced in most present-day ejections, which occur at low and moderate air speeds, the probability of letting go a ring is an order of magnitude greater than for a double grip handle. It is concluded that handle design strongly influences the probability of letting go, and therefore the probability of arm flail injury. Author (GRA)

N74-13816# Rochester Univ., N.Y.
EFFECT OF EXTREMELY LOW FREQUENCY ELECTRIC AND MAGNETIC FIELDS ON ROOTS OF 'VICIA FABA' Final Report
Morton W. Miller 2 Oct. 1973 10 p refs
(Contract N00014-67-A-0398-0011)
(AD-767387) Avail: NTIS CSCL 20/3

Roots of Vicia faba were exposed to electric and magnetic fields comparable to those of Project SANGUINE. There were no differences among control and exposed roots for growth or mitotic index. Also, there were no chromosomal anomalies. Author (GRA)

N74-13817*# BioTechnology, Inc., Los Altos, Calif.
SIMULATOR EVALUATION OF DISPLAY CONCEPTS FOR PILOT MONITORING AND CONTROL OF SPACE SHUTTLE APPROACH AND LANDING. PHASE 2: MANUAL FLIGHT CONTROL Final Report
Walter B. Gartner and Kenneth M. Baldwin Washington NASA Dec. 1973 83 p refs
(Contract NAS2-6460)
(NASA-CR-2359) Avail: NTIS HC $3.75 CSCL 05E

A study of the display requirements for final approach management of the space shuttle orbiter vehicle is presented. An experimental display concept, providing a more direct, pictorial representation of the vehicle's movement relative to the selected approach path and aiming points, was developed and assessed as an aid to manual flight path control. Both head-up, windshield projections and head-down, panel mounted presentations of the experimental display were evaluated in a series of simulated orbiter approach sequence. Data obtained indicate that the experimental display would enable orbiter pilots to exercise greater flexibility in implementing alternative final approach control strategies. Touchdown position and airspeed dispersion criteria were satisfied on 91 percent of the approach sequences, representing various profile and wind effect conditions. Flight path control and airspeed management satisfied operationally-relevant criteria for the two-segment, power-off orbiter approach and were consistently more accurate and less variable when the full set of experimental display elements was available to the pilot. Approach control tended to be more precise when the head-up display was used; however, the data also indicate that the head-down display would provide adequate support for the manual control task. Author

N74-13818*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REFERENCE APPARATUS FOR MEDICAL ULTRASONIC TRANSDUCER Patent Application
Robert D. Lee, Robert J. Hudock, and Dale I. Shute, inventors (to NASA) Filed 21 Dec. 1973 18 p
(NASA-Case-ARC-10753-1; US-Patent-Appl-SN-427395) Avail: NTIS HC $3.00 CSCL 06B

A portable miniature ultrasonic transducer positioning apparatus is described having a transducer receiving sleeve coupled to a pair of orthogonally orientated, independently pivotable yokes. The yokes are pivotably mounted to a base member the under surface of which is fitted with a non-skid rubber cap. A pair of potentiometers are coupled to the axes of the yokes and to a dual meter sleeve position indicator for indicating the angular position of a probe slidably fitted in the sleeves. An oscilloscope or similar signal display device is coupled to the probe for providing signal readout from the probe for use in ultrasonic cardiology oscilloscope studies. NASA

N74-13819*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METABOLIC ANALYZER
Cortes L. Perry 26 Dec. 1973 28 p
(NASA-TM-X-64797) Avail: NTIS HC $3.50 CSCL 06B

An apparatus is described for the measurement of metabolic rate and breathing dynamics in which inhaled and exhaled breath are sensed by sealed, piston-displacement type spirometers. These spirometers electrically measure the volume of inhaled and exhaled breath. A mass spectrometer analyzes simultaneously for oxygen, carbon dioxide, nitrogen, and water vapor. Circuits responsive to the outputs of the spirometers, mass spectrometer, temperature, pressure, and timing signals compute oxygen

consumption, carbon dioxide production, minute volume, and respiratory exchange ratio. A selective indicator provides for readout of these data at predetermined cyclic intervals. Author

N74-13820# Army Aviation Systems Test Activity, Edwards AFB, Calif.
STUDY: PILOT PERCEIVED JETTISON ENVELOPE Final Report
Albert L. Winn and James S. Kishi Jun. 1973 29 p refs
(AD-768171; USAASTA-71-03) Avail: NTIS CSCL 05/10

The OH-6A, OH-58A, and AH-56A helicopters were evaluated to determine pilot sensed sideslip cues with respect to their influence on the jettison of external stores. The data were necessary to confirm previous studies with the UH-1C and CH-47C helicopters, and to expand the data to other helicopters and operating conditions. Tests were conducted at the United States Army Aviation Systems Test Activity, Edwards Air Force Base, California and at Yuma Proving Ground, Arizona. Additionally, data previously obtained for other test helicopters were analyzed to determine variation in static lateral-directional stability with altitude, gross weight, rotor speed, and center-of-gravity location. Results confirm that side force is the most significant cue to pilot recognition of uncoordinated flight. The pilots evaluation of side force was consistent for all aircraft and all test cases. During this evaluation, the pilots recognized lower side force values than during the UH-1C and CH-47C evaluations. Data analysis shows helicopter side-force characteristics to be relatively independent of atmospheric or operating conditions other than airspeed and sideslip angle. Helicopter lateral-directional stability characteristics and pilot recognition of side force can be combined to predict a minimum required jettison envelope for theoretical or actual flight vehicles. This procedure can be used for early definition of problem areas and to reduce the cost and risk associated with establishing flight envelopes.
Author (GRA)

N74-13821# Dunlap and Associates, Inc., Inglewood, Calif. Western Div.
EFFECT OF A PREDICTOR DISPLAY ON CARRIER LANDING PERFORMANCE. PART 2: LABORATORY MECHANIZATION Final Report
Louis E. Ehrhardt, Frank R. Cavallero, and Robert S. Kennedy Jun. 1973 44 p refs 2 Vol.
(Contract N00014-71-C-0252; NR Proj. 196-106)
(AD-767983) Avail: NTIS CSCL 05/9

A three-phase program was conducted to determine the effect of a predictor display on carrier landing performance. Part 2 describes the laboratory mechanization for the experiment in detail. Pilot's night carrier landing approach performance was measured as altitude and lateral error from glideslope and centerline using the predictor display, the baseline display and a glideslope reference element of the predictor display. The predictor display proved to be superior to the baseline display. It reduced vertical and lateral error variability during approach, increased the number of approaches within a joint FLOLS/lateral error envelope, increased the number of acceptable approaches and produced approaches less variable than those observed in the fleet. The baseline display was found to be a valid simulation of the night carrier landing task. The glideslope reference element was found to contribute to the superiority of the predictor display but was judged inadequate as an independent display. Further development of the predictor display for introduction to the fleet is recommended. (Modified author abstract) GRA

N74-13822# Dunlap and Associates, Inc., Inglewood, Calif. Western Div.
EFFECT OF A PREDICTOR DISPLAY ON CARRIER LANDING PERFORMANCE. PART 1: EXPERIMENTAL EVALUATION Final Report
Joseph W. Wulfeck, Daniel J. Prosin, and William J. Burger Jun. 1973 93 p refs 2 Vol.
(Contract N00014-71-C-0252; NR Proj. 196-106)
(AD-767982) Avail: NTIS CSCL 05/9

A three-phase program was conducted to determine the effect of a predictor display on carrier landing performance. Phase A consisted of display development. Phase B consisted of display mechanization, informal preliminary experimentation and development of a detailed design for a formal experiment in Phase C to compare the predictor to a baseline display in a fixed-based F4 simulator with carrier qualified pilots as subjects. The report concludes the program. Part I presents the results of the experiment conducted in Phase C. (Modified author abstract) GRA

N74-13823# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
DEFINITION OF REVERSE OSMOSIS REQUIREMENTS FOR SPACECRAFT WASH WATER RECYCLING
David F. Putnam and George W. Wells Nov. 1972 165 p refs
(Contract DI-14-30-3062)
(PB-222943/3; MDC-G3780; Int-OSW-RDPR-73-861) Avail: NTIS HC $10.25 CSCL 06K

The report defines and evaluates a six-man, reverse osmosis wash water recovery system that offers the dual advantages of lower equivalent weight and lower cost than competing wash water recovery techniques. The system meets the basic requirements of the advanced Skylab, the MDAC six man modular space station, and the Space Station Prototype (SSP) program. This report contains in-depth discussions of these major design considerations: Wash water requirements: compatible cleansing agents; A theoretical estimate of the contaminants found in wash water; A standard procedure for producing used wash water; Wash water standards. (Modified author abstract) GRA

N74-14793*+ George Washington Univ., Washington, D.C. Medical Center.
BIOMAGNETISM: A ANNOTATED BIBLIOGRAPHY Biological Sciences Communication Project
Louise A. Manganelli Feb. 1972 193 p refs
(Contract NSR-09-010-027)
(NASA-CR-136616; GW-BSCP-72-04R) Avail: NTIS HC $11.75 CSCL 06P

The bibliography consists of 161 annotated references on the subject of the biological effects of magnetic fields. The publications cited cover a period from 1967 through 1971. The references include research on plants, animals and humans exposed to field strengths ranging from null through geomagnetic, low, and high intensities. Variations in field orientation, exposure time and field gradient are noted where possible. Applications relevant to spaceflight are included; clinical observations and therapeutic applications are also noted. Author

N74-14794# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND MEDICINE, VOLUME 7, NO. 6, 1973
18 Jan. 1974 127 p refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, vol. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 84 p
(JPRS-61020) Avail: NTIS

Biological and medical factors of the aerospace environment are considered with emphasis on radiation, acceleration, and hypokinetic effects on man.

N74-14795 Joint Publications Research Service, Arlington, Va.
ANALYSIS OF THE RESULTS OF AN INVESTIGATION OF THE BIOLOGICAL EFFECT OF HEAVY IONS WITH DIFFERENT LINEAR ENERGY LOSSES ON THE BASIS OF A THEORETICAL INACTIVATION MODEL (INTERPRETATION OF EXPERIMENTS WITH E. COLI)
K. Guenther, Ye. A. Krasavin, Ye. I. Kudryashov, N. I. Ryzhov, and W. Schultz *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 1-7 ref Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 3-8

The data obtained from experimental irradiation of E. coli with heavy ions having different linear energy losses, protons

and gamma rays are analyzed from the point of view of a theoretical model of cell inactivation. It is indicated that using the model it is possible to determine the relative biological effectiveness of any radiation, including mixed types, and radiation modified by various factors when limited experimental data are available. Author

N74-14796 Joint Publications Research Service, Arlington, Va.
PHOTOBIOLOGICAL PROCESSES AND CRITERIA OF EXISTENCE OF LIVING SYSTEMS
A. B. Rubin *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 8-14 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 8-13

The role of light in the formation and evolution of living systems is discussed. It is concluded that the light flux is necessary for the support and development of life on the planet. Photobiological criteria for the existence of life are suggested. Author

N74-14797 Joint Publications Research Service, Arlington, Va.
MATHEMATICAL EVALUATION OF RELIABILITY OF FUNCTIONING OF THE BIOLOGICAL LINK IN A BIOENGINEERING SYSTEM
I. A. Shvytov *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 15-20 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 13-17

Reliability of the biological link in a bioengineering system is discussed. The use of an artificially cultivated microbial population is described. A criterion for assessing the reliability of functioning of the biological link is proposed. A method for computing the value of the criterion is formulated. Numerical calculations of the value of the reliability criterion are presented in relation to certain regimes in functioning of the biological link. Author

N74-14798 Joint Publications Research Service, Arlington, Va.
RESPIRATION OF POIKILOTHERMIC ANIMALS IN A HELIUM-OXYGEN ATMOSPHERE
Ye. B. Kanevskaya, A. B. Zimin, and P. V. Matekin *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 21-23 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 17-19

The Warburg manometric method was used in determining the oxygen consumption of Chyronomus plumosus L. larvae in the air and in a helium-oxygen atmosphere. The use of helium instead of nitrogen did not affect the gas exchange of Chyronomus larvae. This may be accounted for by a low temperature gradient between poikilothermic animals and the surrounding medium. Author

N74-14799 Joint Publications Research Service, Arlington, Va.
INFLUENCE OF NATURE OF DISTRIBUTION OF ABSORBED DOSE ON RADIATION DAMAGE
G. M. Avetisov, V. N. Budylin, V. G. Gorlov, and V. S. Grammatikati *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 24-34 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 19-26

The effect of damage by bilateral X-radiation of 7-8 keV and 12 keV was studied using 260 rats. The distribution of absorbed dosages in the animal body and in different radiosensitive organs was investigated. The contribution of the hemopoietic syndrome, the gastrointestinal syndrome and skin injuries to the total biological effect is discussed on the basis of a comparative examination of clincial manifestations of radiation damage as related to the distribution of the absorbed doses in the tissues and organs. Author

N74-14800 Joint Publications Research Service, Arlington, Va.
CHANGE IN INTENSITY OF ULTRAVIOLET FLUORESCENCE OF BLOOD LEUKOCYTES IN DOGS SUBJECTED TO CHRONIC IRRADIATION
S. N. Aleksandrov, V. G. Safronova, and A. S. Yagunov *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 35-41 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 27-31

The intensity of ultraviolet fluorescence of lymphocytes and neutrophils of dogs exposed to chronic gamma irradiation (at dose rates of 0.06, 0.17 and 0.34 rad/day) was studied. The intensity of UV fluorescence increased gradually at doses of 0 to 70 rad. The intensity remained at a constant level that was significantly higher than the control at doses of 70 to 300 rad. The intensity decreased with a further dose increase. It is suggested that the decline in the fluorescence level of blood leukocytes is associated with the appearance in the bone marrow of radioresistant cells producing leukocytes with a normal fluorescence intensity. This parameter was high at every dose tested (up to 740 rad) in the case of a combined effect of chronic irradiation and acute irradiation. Author

N74-14801 Joint Publications Research Service, Arlington, Va.
CYTOGENETIC INVESTIGATIONS OF BLOOD LEUKOCYTES CARRIED OUT WITH CREW MEMBERS OF THE SOYUZ SPACE SHIPS
N. N. Bobkova and T. N. Krupina *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 42-47 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 31-35

The results of cytogenetic investigations of ten crew members of Soyuz spacecraft before and after spaceflights are presented. Chromosomes were studied in a culture of peripheral leukocytes. No cytogenetic changes were noted on the first postflight day in comparison with the preflight data. Another examination carried out after three weeks of the postflight period exhibited no statistically significant differences in the frequency of structural aberrations of chromosomes in three cosmonauts in comparison with the preflight data. An aneuploidic analysis revealed 15-25% hypoploidal cells in one of the cosmonauts subjected to four investigations during three years. A karyotype analysis did not confirm the occurrence of mosaicism. Author

N74-14802 Joint Publications Research Service, Arlington, Va.
STUDY OF REACTIVITY OF BLOOD LYMPHOID CELLS IN CREW MEMBERS OF THE SOYUZ-6, SOYUZ-7 AND SOYUZ-8 SPACESHIPS BEFORE AND AFTER FLIGHT
I. V. Konstantinova, Ye. N. Antropova, V. I. Legenkov, and V. D. Zazhirey *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 48-55 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 35-40

Postflight examinations of five spaceship crew members revealed a decline in the radioactivity of immunocompetent lymphocytes (T-cells) of four cosmonauts. They revealed a delay in blatogenesis at the stage of transformation of small lymphocytes into PHA-cells. As a rule, the transformation delay was accompanied by an inhibition of the rate of RNA synthesis. The relationship which may exist between these changes and disturbances in the hormonal balance and changes in potassium and calcium metabolism is discussed. The conclusion is drawn that the method of PHA blastoid transformation, which is a functional test indicating a state of the cell population that performs important functions in protecting the human body against infection, is very informative. Author

N74-14803 Joint Publications Research Service, Arlington, Va.
CHANGE IN IMMUNOLOGICAL REACTIONS IN HUMAN SUBJECTS UNDER THE INFLUENCE OF UNFAVORABLE MICROCLIMATIC CONDITIONS IN A PRESSURIZED CHAMBER

V. A. Kolotvin, R. Ye. Livshits, M. A. Nevstruyeva, S. I. Tarasov, and V. M. Shubik *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 56-60 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 40-43

Test subjects who lived in a pressurized chamber under conditions of an unfavorable climate, modified atmosphere and restricted diets were examined. Bactericidal activity, surface and deep skin automicroflora, titer of saliva lysozyme and the content of C-reactive protein were studied. The content of saliva lysozyme and skin bactericidal activity decreased or changed in a phaselike pattern. Humoral factors of nonspecific immunity changed insignificantly. Author

N74-14804 Joint Publications Research Service, Arlington, Va.
CHANGE IN THE EXTERNAL RESPIRATION FUNCTION DURING MOTION SICKNESS
V. K. Stepanov, I. A. Sidelnikov, and G. I. Pavlov *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 61-65 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 44-47

Changes in the external respiration function of subjects with various vestibular tolerances to Coriolis accelerations were studied. Among them there were 12 intolerant subjects (fourth degree), 14 with moderate vestibular tolerance (third-second degree) and five with a high tolerance (first degree). All the test subjects were exposed to Coriolis accelerations which were continuously accumulated. Persons with a high tolerance to Coriolis accelerations exhibited no significant changes in external respiration during the exposure. Intolerant subjects exhibited hyperventilation which led to a slight decrease in PACO2. Changes in external respiration parameters may serve as an additional index of the vestibular tolerance level. Author

N74-14805 Joint Publications Research Service, Arlington, Va.
INFLUENCE OF TRANSVERSE ACCELERATIONS ON THE ACTIVITY OF HUMAN SERUM CHOLINESTERASE
Ye. M. Semina and I. D. Vertanov *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 66-71 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 47-51

The activity of serum cholinesterase of man exposed to back-to-chest accelerations imparted at an angle of 78 to the longitudinal axis of the body was evaluated. Enzyme activity increased during an exposure up to 8 g (imparted for 60 sec), remained unchanged during an exposure to 10 g and 12 g (imparted for 60 and 35 sec respectively), and decreased during exposure to 14 g (imparted for 20 sec). The results obtained suggest that the effect of back-to-chest accelerations of 8 g for 60 sec enhances the liver proteosynthetic function. The reason for the decrease in cholinesterase activity during exposure to accelerations of 14 g for 20 sec remains obscure. Author

N74-14806 Joint Publications Research Service, Arlington, Va.
EFFECT OF VESTIBULAR TESTS ON ORIENTATION RELATIVE TO THE VERTICAL IN HEALTHY AND DEAF-MUTE SUBJECTS
B. B. Bokhov, I. Ya. Yakovlev, L. N. Kornilova, A. A. Guyev, A. A. Kravchenko, and V. A. Ryabichev *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 72-79 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 51-56

The influence of expert tests -- swinging in swings and rotation with tilts -- on the capability of healthy and deaf-mute subjects to determine position of the gravitational vertical was studied by using an instrument with a rotating luminescent line. The results of an investigation of healthy test subjects revealed that swinging causes more clearly expressed shifts in perception correlating with autonomic reactions than rotation with tilts, after which such correlation was not observed. In deaf-mute subjects after rotation with tilts there were no shifts in perception, even if rotation was accompained by autonomic reactions. Author

N74-14807 Joint Publications Research Service, Arlington, Va.
DETERMINING EXCESS PRESSURE ON THE LOWER PART OF THE BODY ENSURING PREVENTION OF ORTHOSTATIC IMPAIRMENTS
B. F. Asyamolov, V. S. Panchenko, I. D. Pestov, and M. A. Tikhonov *In its* space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 80-87 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 56-61

Lower body positive pressure applied by means of an antigravity suit decreased orthostatic reactions of test subjects exposed to simulated weightlessness (18-hour water immersion, 30-day bed rest). Lower body positive pressure of 50 and 35 mm Hg proved to be effective and well tolerated whereas that of 20 mm Hg proved to be inadequate for preventing orthostatic disturbances. The greatest effect in the prevention of orthostatic disturbances was achieved by a combination of different countermeasures. Author

N74-14808 Joint Publications Research Service, Arlington, Va.
ORTHOSTATIC STABILITY IN AN EXPERIMENT WITH 30-DAY HYPODYNAMIA
V. S. Georgiyevskiy, V. A. Gornago, L. Ya. Divina, N. D. Kalmykova, V. M. Mikhaylov, V. I. Plakhatnyuk, Yu. D. Pometov, V. V. Smyshlyayeva, N. D. Vikharev, and B. S. Katkovskiy *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 88-97 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 61-68

Nine test subjects were kept for 30 days in bed with their heads tilted 4 deg downwards. At the end of the experiment they exhibited a decrease in orthostatic stability. The use of different countermeasures, including physical exercises and lower body negative pressure (LBNP), considerably improved their orthostatic stability. Electric stimulation of the muscles also produced a preventive effect, although to a lesser extent. It should be expected that a combination of physical exercises, LBNP and electric stimulation of the muscles during prolonged space flight may exert a positive effect on orthostatic stability. Author

N74-14809 Joint Publications Research Service, Arlington, Va.
COMPARATIVE INVESTIGATIONS OF TEMPERATURE IN DIFFERENT REGIONS OF THE HUMAN BODY DURING BODY OVERHEATING
A. N. Azhayev and D. G. Maksimov *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 98-103 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 68-72

Comparative studies of body temperature in the rectum, mouth, armpits and on the head (behind the ears) revealed that at a high ambient temperature and with overheating of the human body temperature measurements of the thermally insulated area of the head surface clearly indicated overheating of the subject. The difference in the head and rectal temperatures decreased substantially (to 0.15-0.20 C) under these conditions. Accordingly, normal methods for evaluating head temperature are applicable. Temperature measurement in the head area has advantages over measurement in other parts of the body because it appears to be simple and reliable during occupational activities. Author

N74-14810 Joint Publications Research Service, Arlington, Va.
MINERALIZATION OF HUMAN BONE TISSUE UNDER WATER IMMERSION CONDITIONS (ROENTGENOPHOTOMETRIC INVESTIGATION)
K. I. Murakhovskiy and L. Z. Golod *In its* Space Biol. and

Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 104-108 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina; v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 72-75

The effect of five day water immersion on the mineral content of bones was studied in subjects when wearing and not wearing a prophylactic load suit. The bone mineral content was measured roentgenophotometrically in milligrams of Ca per 1 cu mm before and on the second day of immersion. The objects studied were the navicular bone, ankle bone, heel bone, distal metadiaphysis of the hip bone and proximal metadiaphysis of the tibia. In experiments without the suit the level of bone density in the studied areas decreased by 4-8%. Statistical analysis revealed that the decrease was significant with P = 0.95. A comparison of the significance of the differences between bone density changes in experiments with and without the suit demonstrated that they are statistically significant for the navicular bone, ankle bone and heel bone and not significant for the tubular bones.
Author

N74-14811 Joint Publications Research Service, Arlington, Va.
WAYS TO INCREASE THE NOISE IMMUNITY OF A SYSTEM FOR REGISTERING THE BIOELECTRIC POTENTIALS OF MAN UNDER THE INFLUENCE OF PROLONGED ACCELERATIONS
L. N. Nikolskiy *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 109-117 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 75-81

The nature of the specific interference arising under experimental conditions on acceleration stands during the registry of electric potentials of the heart, brain and skeletal muscles in man and the effectiveness of some protective measures are studied. Analysis of the conditions for registry of biopotentials and the results of special investigations of the nature of the interference and the experimental data (EKG, EEG, EMG), obtained in investigations with acceleration stands (centrifuges of different radii, vibration stands, stands for imparting sign-variable accelerations and angular accelerations), made it possible to detect the principal types of interference and described their characteristics.
Author

N74-14812 Joint Publications Research Service, Arlington, Va.
ROLE OF CEREBELLUM IN VESTIBULAR-CARDIAC REACTIONS DURING MOTION SICKNESS IN LOWER MONKEYS
A. S. Markin *In its* Space Biol. and Med., Vol. 7, No. 6, 1973 (JPRS-61020) 18 Jan. 1974 p 118-121 refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, v. 7, no. 6, 1973" Moscow, Med. Izd., Nov.-Dec. 1973 p 82-84

Changes in pulse rate at the time of motion sickness were studied with electric stimulation of some structural formations in the cerebellum in monkeys. Results show that stimulation of the cortex and nuclei of the cerebellum during prolonged swinging of the monkeys and at the time immediately following motion in swings, were in reciprocal relationships to the effect on cardiac reflex activity.
Author

N74-14813*# National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
REGULATORY BIOLOGY: DEPRESSED METABOLIC STATES
Emily Morey Holton, ed Aug. 1973 181 p refs Symp. held at Wallops Island, Va., 18-20 Oct. 1971
(NASA-TM-X-69354) Avail: NTIS HC $11.25 CSCL 06P

Exobiological aspects of depressed metabolism and thermoregulation are discussed for subsequent development of biological space flight experiments. Included is a brief description of differential hypothermia in cancer chemotherapy.

N74-14814* National Aeronautics and Space Administration, Washington, D.C.
THE ROLE OF DEPRESSED METABOLISM IN SPACE BIOLOGY: AN OVERVIEW
Joseph Saunders *In its* Regulatory Biol.: Depressed Metab. Aug. 1973 p 1-22
CSCL 06P

Organization and research activities of the entire NASA Space Biology Program are outlined. Various technical approaches are reported to study depressed metabolism particularly in the situation of 100% oxygen and reduced ambient pressures. These include hibernation and hypothermia, thermal regulation, and diluent gases.
G.G.

N74-14816* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECT OF ARTIFICIAL GRAVITY ON THERMOREGULATION, RESPIRATORY METABOLISM AND INTERMEDIARY METABOLISM OF ANIMALS
Jiro Oyama *In its* Regulatory Biol.: Depressed Metab. Aug. 1973 p 27-51 refs
CSCL 06P

Metabolic alterations in animals exposed to radial acceleration are reported. Temperatures in acutely stressed animals dropped profoundly in correlation with decreased food consumption. Repeated exposure of the acutely stressed animal caused a decrease in hypothermic response whereas deceleration or reduction of G load did not significantly change body temperatures. Adrenal corticosteroids affected signicantly the animal's recovery rate. No changes occured in body temperature patterns of chronically centrifuged animals after full adaptaion; their respiratory rate increased very significantly in terms of CO2 output as did their glucose uptake by muscle tissues and their insulin responsiveness or sensitivity.
G.G.

N74-14817* Colorado State Univ., Fort Collins.
METABOLIC EFFECTS OF ARTIFICIAL ENVIRONMENTS
John Patrick Jordan *In* NASA. Wallops Station Regulatory Biol.: Depressed Metab. Aug. 1973 p 52-72 refs

CSCL 06P

Effects of diluent gases on the metabolism of animals breathing nitrogen-oxygen, argon-oxygen, and helium-oxygen mixtures were studied. Results show that helium actually affected the mean free path of oxygen across the alveoli and increased metabolic rate. It is speculated that it might be necessary to keep an astronaut in a depressed metabolic state during prolonged space flight by using an argon-oxygen or a xenon-nitrogen mixture for breathing. Replacement of the depressant gases during periods requiring critical spacecraft maneuvers by neon-oxygen mixtures would insure maximal performance.
G.G.

N74-14818* Missouri Univ., Columbia. Space Sciences Research Center.
HIBERANATION, SLEEP, AND THERMOREGULATION
Frank E. South *In* NASA. Wallops Station Regulatory Biol.: Depressed Metab. Aug. 1973 p 73-90 refs

CSCL 06P

Nerve activity adaptation to hypothermia and the differences in CNS activity during hypothermia are studied on marmots. Thermoregulatory experiments on hibernating animals indicated a sympathetic response.
G.G.

N74-14819* Missouri Univ., Columbia. Space Sciences Research Center.
RADIOPROTECTION IN DEPRESSED METABOLIC STATES: THE PHYSIOLOGY OF HELIUM-COLD HYPOTHERMIA
X. J. Musacchia *In* NASA. Wallops Station Regulatory Biol.: Depressed Metab. Aug. 1973 p 91-118 refs

CSCL 06S

The use of hypothermia as a means of radiation protection was studied on a variety of mammals exposed to 80% helium-20% oxygen atmospheres at low ambient temperatures. Results show

that the LD for normothermic animals significantly increased compared with hypothermic animals; similar results were obtained for hibernating mammalians. Pre-exposure of animals to cold temperatures increased their ability to withstand radiation levels close to LD sub 50. G.G.

N74-14820* Institute for Lipid Research, Berkeley, Calif.
INTERMEDIARY METABOLISM DURING BRIEF AND PROLONGED LOW TISSUE TEMPERATURE
Cecil Enteman *In* NASA. Wallops Station Regulatory Biol.: Depressed Metab. Aug. 1973 p 119-138 refs

CSCL 06S

The intermediary metabolism of the depressed metabolic state in the hypothermic hamster and the hibernating ground squirrel was studied by observing acetate and palmitic acid metabolisms in their tissues. The oxidative metabolism seemed to be dominant in the depressed state although synthetic reactions such as fat synthesis proceeded in some cases at a faster rate than normothermic metabolism for the same tissues. Fat syntheses proceeded in all tissues with brown fat and liver especially active. Enzymes for the synthesis of cholesterol seemed to be more temperature sensitive than enzymes for fatty acid synthesis. It was concluded that there are no great differences between metabolisms in hypothermic and hibernating animals. Author

N74-14821* California Univ., Davis. School of Veterinary Medicine.
THE ROLE OF BROWN ADIPOSE TISSUE IN TEMPERATURE REGULATION
Robert Em. Smith *In* NASA. Wallops Station Regulatory Biol.: Depressed Metab. Aug. 1973 p 139-157 refs

CSCL 06P

The thermogenetic capacities of brown adipose tissue were studied on marmots, rats and monkeys in response to cold exposure. All experiments indicated that the brown fat produced heat and slowed the cooling of tissues. G.G.

N74-14822* Emory Univ., Atlanta, Ga. Medical School.
METHODS FOR STUDY OF CARDIOVASCULAR ADAPTATION OF SMALL LABORATORY ANIMALS DURING EXPOSURE TO ALTERED GRAVITY
Vojin Popovic *In* NASA. Wallops Station Regulatory Biol.: Depressed Metab. Aug. 1973 p 158-177 refs

CSCL 06P

Several new techniques are reported for studying cardiovascular circulation in small laboratory animals kept in metabolic chambers. Chronical cannulation, miniaturized membrane type heart-lung machines, a prototype walking chamber, and a fluorocarbon immersion method to simulate weightlessness are outlined. Differential hypothermia work on rat cancers provides localized embedding of radionuclides and other chemotherapeutical agents in tumors and increases at the same time blood circulation through the warmed tumor as compared to the rest of the cold body. Some successful clinical applications of combined chemotherapy and differential hypothermia in skin cancer, mammary tumors, and brain gliomas are described. G.G.

N74-14823*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 20. MATHEMATICAL MODELS OF BIOLOGICAL SYSTEMS
Yu. M. Svirezhev and Ye. Ya. Yelizarov Washington NASA Nov. 1973 185 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii. Tom 20: Matematicheskoye Modelirovaniye Biologicheskikh Sistem" Moscow, Nauka, 1972 160 p
(Contract NASw-2481)
(NASA-TT-F-780) Avail: NTIS HC $5.25 CSCL 06F

Well-known mathematical models are used to model population associations, biocoenoses, biogeocoenoses and artificial biological associations. The optimal yield concept is defined in relation to the optimal productivity of an association. The optimal productivity problem is solved for the simplest types of associations, such as a homogeneous population in a chemostat and also in more complex cases, for example, for an association of the predator-prey type. The simplest models are generalized to cases in which it is necessary to take into consideration the distribution of individuals in the population by age, size, etc. The models are described by systems of differential equations. The optimal policies are obtained using dynamic programming methods, nonlinear programming methods and the Pontryagin maximum principle. Optimal steady state strategies are also obtained. Author

N74-14824*# Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE VALUE OF EXERCISE AT ONE-HALF EARTH GRAVITY IN PREVENTING ADAPTATION TO SIMULATED WEIGHTLESSNESS
John Hoche and Ashton Graybiel 25 Jun. 1973 23 p refs
(NASA Order T-5904-B)
(NASA-CR-136569; AD-767646; NAMRL-1191) Avail: NTIS HC $3.25 CSCL 06/14

Twelve male subjects participated in two identical series to determine the value of exercising four hours daily at one-half earth gravity (simulated) to prevent loss of exercise capacity and orthostatic tolerance when exposed to 14 days of simulated weightlessness. In one series four subjects exercised at half-gravity (HGE subjects) on treadmills mounted in a human centrifuge and four exercised on treadmills mounted on inclined planes; in the other series the subjects switched exercise devices. Four subjects served as no-exercise controls throughout both series. Additional measurements included: plasma volume and red cell mass, urinary sodium and potassium, and peripheral renin activity. The results are discussed in terms of their significance for long-range plans involving the use of artificial gravity as a countermeasure on space missions. (Modified author abstract) GRA

N74-14825*# Scripta Publishing Corp., Washington, D.C.
THE EFFECT OF PHYSICAL EXERCISE ON BINDING OF CORTICOSTEROIDS BY TRANSCORTIN IN PLASMA
A. F. Bunyatyan and V. P. Erez NASA Jan. 1974 10 p refs Transl. into ENGLISH from Prob. Endok. (Moscow), v. 18, 1972 p 13-17
(Contract NASw-2484)
(NASA-TT-F-15258) Avail: NTIS HC $3.00 CSCL 06S

The content of protein-bound and free forms of 11-OCS, and also the binding capacity of transcortin were examined in 11 healthy highly-qualified athletes who were in condition of chronic physical overexertion during the examination; 12 healthy untrained men were also observed (control group). Determinations were made in the state of rest and during four-day veloergometric exercises. During rest the processes of steroid-protein interaction in healthy athletes coursed normally; this caused a considerable prevalence of transcortin-bound fraction over the free form of the hormones. During maximal physical exertion healthy athletes displayed a reduction of transcortin-binding capacity in vitro, to the level of protein-bound corticosteroids in the blood of persons investigated. Possible mechanisms involved in development of the mentioned changes are discussed. Author

N74-14826*# Kanner (Leo) Associates, Redwood City, Calif.
EFFECT OF PROLONGED HYPOKINESIA ON CERTAIN FUNCTIONS OF THE OTORHINOLARYNGOLOGICAL ORGANS
I. Ya. Yakovlev, V. P. Baranov, and E. I. Matsnev Washington NASA Jan. 1974 17 p refs Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), v. 6, no. 6, 1967 p 45-51
(Contract NASw-2481)
(NASA-TT-F-15275) Avail: NTIS HC $3.00 CSCL 06S

The functional state of otorhinolaryngological organs was studied in six persons in restricted mobility for a period of 62 days. The occurrence of otorhinolaryngological morbidity was noted on the second month of restricted mobility (tonsillitis, catarrh of the upper respiratory tract, acute pharyngitis, nasal bleeding). The subjects revealed circulatory disturbances in the

nasal mucous membrane, increased dystrophy of the mucous membranes of the upper respiratory tract, reduced auditory sensitivity, and vestibulo-autonomic resistance. All the changes have an undulant dynamics and a period of sequelae. It is concluded that they were caused, to a certain degree, by hemodynamic shifts and general asthenia. Author

N74-14827*# Kanner (Leo) Associates, Redwood City, Calif.
DRUG METABOLISM AND FOREIGN MATTER HYDROXYLASE (CYTOCHROME P-450) IN SEVERE HEPATIC DAMAGE IN MAN
H. F. VonOldershausen, B. Schoene, H. Held, H. P. Menz, R. A. Fleischmann, and H. Remmer Washington NASA Jan. 1974 11 p refs Transl. into ENGLISH from Z. Gastroenterol. (West Ger.), v. 11, 1973 p 403-410
(Contract NASw-2481)
(NASA-TT-F-15276) Avail: NTIS HC $3.00 CSCL 06E

In cases of severe hepatic damage (acute hepatitis, active hepatic cirrhosis), a significant reduction is found in the level of cytochrome P 450, in N and O demethylation, and in the activities of pseudocholinesterase and glucose-6-phosphate in human liver biopsy homogenates. Induction of cytochrome P 450, cytochrome C reductase and O demethylation is detected in liver homogenate after the administration of Rifampicin, Chlortritylimidazol or diphenylhydantoin and phenobarbital. The elimination of Rifampicin from the blood is markedly delayed in patients with acute hepatitis or hepatic cirrhosis. Half-life or tolbutamide significantly shortened in acute hepatitis; close correlation in vitro between bilirubin concentration and percentage of free tolbutamide. These findings illustrate the dependence of drug metabolism upon the concentration of microsomal enzyme systems in the liver. Author

N74-14828*# Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF VENOUS TONUS IN THE FOREARM DURING SIMULATED WEIGHTLESSNESS
D. Kaiser and O. H. Gauer Washington NASA Jan. 1974 3 p refs Transl. into ENGLISH from Pflugers Arch. (West Ger.), v. 289, 1966 p R76-77
(Contract NASw-2481)
(NASA-TT-F-15228) Avail: NTIS HC $3.00 CSCL 06P

A reduction in venous tonus, assumed to be partly a function of temperature, is observed directly after immersion in a thermally neutral bath. Several hours of immersion causes further relaxation of veins. Author

N74-14829*# Kanner (Leo) Associates, Redwood City, Calif.
WATER AND SALINE BALANCES DURING PROLONGED IMMERSION IN A WATER BATH
P. Eckert, C. Behn, O. H. Gauer, and K. Kirsch Washington NASA Jan. 1974 3 p refs Transl. into ENGLISH from Pflugers Arch. (West Ger.), v. 297, 1967 p R70-71
(Contract NASw-2481)
(NASA-TT-F-15229) Avail: NTIS HC $3.00 CSCL 06P

Water and electrolyte elimination were studied during 48 hours' immersion. Initial water diuresis, increased hematocrit values, and increased plasma protein were observed. Results show that these processes sometimes failed to return to the normal levels during the immersion period. Author

N74-14830*# Kanner (Leo) Associates, Redwood City, Calif.
THE EFFERENT INNERVATION OF THE VESTIBULAR RECEPTORS
G. Rossi Washington NASA Jan. 1974 15 p refs Transl. into ENGLISH from Acta Oto-Laryngol (Uppsala), V. 58, 1964 p 230-238
(Contract NASw-2481)
(NASA-TT-F-15231) Avail: NTIS HC $3.00 CSCL 06P

The efferent innervation of the vestibular receptors is discussed in the light of current literature and personal experimental findings. Recent studies are reviewed which have demonstrated that nerve fibers subject to actylcholine sterase activity exist in the acoustic crests and otolithic membranes and that these are efferent fibers. The research is based on the fact that the cochlear efferent fibers forming the intraganglionic spiral tract can be distinguished from the afferent fibers by the positivity of the former to an acetylcholine sterase reaction. Attempts are made to find whether this difference also applies to the vestibular efferent fibers and the afferent fibers. Author

N74-14831*# Exotech Systems, Inc., Falls Church, Va.
SCIENTIFIC AND TECHNICAL SERVICES DIRECTED TOWARD THE DEVELOPMENT OF PLANETARY QUARANTINE MEASURES FOR AUTOMATED SPACECRAFT
Quarterly Report, period ending 31 Dec. 1973
7 Jan. 1974 6 p
(Contract NASw-2503)
(NASA-CR-136613; QR-3) Avail: NTIS HC $3.00 CSCL 06M

The research is briefly reported for each task area of the planetary quarantine program. Author

N74-14832*# Techtran Corp., Glen Burnie, Md.
CERTAIN RESULTS OF THE MEDICO-BIOLOGICAL INVESTIGATION CONDUCTED IN THE GEMINI AND APOLLO PROGRAMS: CHANGE IN WEIGHT AND INDICES OF THE CARDIOVASCULAR SYSTEM IN ASTRONAUTS
V. I. Kopanev and Ye. M. Yuganov Washington NASA Jan. 1974 28 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 5, 1973 p 629-646
(Contract NASw-2037)
(NASA-TT-F-15261) Avail: NTIS HC $3.50 CSCL 06P

It was found that the weight of the astronauts decreased during flight and was rapidly restored afterward (1 to 2 days). The mechanism of these changes is governed primarily by phenomena associated with dehydration of the organism. During postflight examination of the astronauts, a decrease in the orthostatic stability was observed as the result of the action of weightlessness. Following flights on which astronauts landed on the moon, there was less evidence of orthostatic disturbances. The changes that were observed involving the cardiovascular system constituted accommodative reactions to unusual space-flight conditions. Author

N74-14833*# Techtran Corp., Glen Burnie, Md.
MEASUREMENT OF THE STROKE VOLUME BY AN INTEGRAL RHEOGRAM OF THE HUMAN BODY
M. I. Tishchenko Washington NASA Jan. 1974 16 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 59, no. 8, Aug. 1973 p 1216-1224
(Contract NASw-2485)
(NASA-TT-F-15268) Avail: NTIS HC $3.00

Two electrically short-circuited electrodes are applied to the distal areas of the forearm and two electrodes connected in the same fashion are applied to the distal areas of the shins. When the measuring arm of a bridge rheograph is connected between the paired electrodes of the upper and lower extremities, a curve is recorded which is the integral rheogram of the body. This curve reflects the total pulse variation of the electrical resistance of the vessels that are located between the electrodes and is caused primarily by the pulse variations in the volume of the large longitudinal arterial trunks. A formula was worked out to calculate the stroke volume of the left ventricle according to the anacrotic part of the integral rheogram. Data were obtained that are in agreement with the acetylene method, the method of thermodilution and the direct Fick method. The possibility of measuring the stroke volume for each cardiac contraction was established. Author

N74-14834*# Techtran Corp., Glen Burnie, Md.
SOME RESULTS OF BIOMEDICAL INVESTIGATIONS CONDUCTED DURING THE GEMINI AND APOLLO PROGRAMS (ALTERATIONS IN BLOOD AND SKELETAL APPARATUS, MINERAL AND ELECTROLYTE METABOLISM IN THE ASTRONAUTS)
V. I. Kopanev and Ye. M. Yuganov Washington NASA Jan 1974 18 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 6, Nov. - Dec. 1973 p 852-863
(Contract NASw-2485)
(NASA-TT-F-15270) Avail: NTIS HC $3.00 CSCL 06S

It was found that in the course of postflight examinations individual astronauts showed certain changes involving the blood (decrease in erythrocyte mass, leucocytosis and so forth), skeletal structure (decrease in bone density), and mineral and electrolyte metabolism (washing out of calcium, iron, potassium and chloride). Author

N74-14835# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

QUALITATIVE IDENTIFICATION OF ORAL EFFECTIVE ANTIDIABETICA IN BLOOD SERUM OF HUMANS [QUALITATIVER NACHWEIS ORAL WIRKSAMER ANTIDIABETICA IM BLUTSERUM DES MENSCHEN]

Gerhard Schaefer Porz, West Ger. 6 Jul. 1973 30 p refs In GERMAN; ENGLISH summary

(DLR-FB-73-88) Avail: NTIS HC $3.50; DFVLR, Porz, West Ger. 11.80 DM

For the medical evaluation of flying fitness in a latent diabetic and in order to control the observance of the regulation that no blood sugar depressing substances be taken by flying personnel, analytical procedures have to be developed by which all (known) oral effective antidiabetica in the blood (and, possibly, in the urine) can be estimated. The particular difficulty of a routine series analysis consists in the fact that these substances belong to different chemical classes of substances and, futhermore, are therapeutically active in extremely different doses. The pyrimidyl sulfonamide glycodiacine and the sulfoacid carbacide carbutamide, chlorpropamide and tolbutamide can be separated by thin layer chromatography to a great extent and can be estimated by their fluorescence or by their fluorescence quenching properties and by their color reactions. The identification of glibenclamide and glibornuride can probably be done spectrofluorometrically with a 5 ml sample of blood serum. The biguanides which can also fluorometrically be identified are rapidly eliminated in the urine so that spectrophotometrically the identification in urine seems suitable. Author (ESRO)

N74-14836# Human Factors Research, Inc., Goleta, Calif.

MOTION SICKNESS INCIDENCE AS A FUNCTION OF THE FREQUENCY AND ACCELERATION OF VERTICAL SINUSOIDAL MOTION Technical Report, 1 Jul. 1972 - 30 Jun. 1973

James F. Hanlon and Michael E. McCauley Sep. 1973 22 p refs

(Contract N00014-73-C-0040; NR Proj. 105-661)

(AD-768215; Rept-1733-1) Avail: NTIS CSCL 06/19

Fourteen experimental conditions of vertical sinusoidal motion were defined by combinations of wave frequency and acceleration level in a partial factorial design. The frequency range investigated was from 5 cycles per minute (CPM, or .083 Hz) to 30 CPM (.500 Hz), and the average acceleration over each half-wave cycle ranged from about .03 to .40 g. Independent groups of 20 or more male Ss were exposed for 2 hours or until they began to vomit, whichever came first. Motion sickness incidence (MSI), defined as the percentage of Ss experiencing vomiting, was greatest at a frequency of 10 CPM (.167 Hz). For all wave frequencies, MSI increased as a monotonic function of the acceleration level. A mathematical model was derived from the data, and the implications for underlying physiological mechanisms and for transportation vehicle design were discussed. Author (GRA)

N74-14837# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

DETECTION OF SHORT DURATION LIGHT SIGNALS PRESENTED IN THE PERIPHERY Progress Report

Robert M. Herrick 22 May 1973 26 p refs

(AD-767320; NADC-73115-40) Avail: NTIS CSCL 06/16

While viewing the terrain or some visual display device, naval personnel must attend to signals presented in the periphery. Whether such signals are detected depends upon the luminance of the signals, the duration of the signals, the interval of time separating successive signals, and the number of signals presented. These four visual variables were examined, in psychophysical experiments, and simple empirical laws were derived to describe the relations among the variables. (Modified author abstract) GRA

N74-14838# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

ANALYSIS OF HEAD IMPACT Interim Report

Stephen L. Gordon 1 May 1974 136 p refs

(AD-767319; NADC-73065-40) Avail: NTIS CSCL 06/19

A finite difference form of the governing equations of motion for one and two-dimensional wave propagation is utilized to solve the problem of non-penetrating impact to the human head. The layered plate one-dimensional analysis provides a method of predicting the influence of several material property and size modifications in a geometrically simplified head impact model. The spherical model with a layered energy absorbing skull yields highly attenuated and smoothed tensile pressure peaks in the brain as compared to the results with a single layered elastic skull. An elastic brain model (that includes an assumed high dynamic shear modulus) suggests that the combined shear-normal stress levels would be more likely to cause failure than the shear free stress condition in a hydrodynamic brain model. The generality of the solution techniques would readily permit extension of the analyses to investigate the significance of future modelling considerations. Author (GRA)

N74-14839# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

OPTICAL EFFECTS OF PIGMENTATION OF TEMPERATURE RISE IN A TWO-LAYER SKIN SIMULANT SYSTEM DURING IRRADIATION Interim Report

John R. Piergallini and Alice M. Stoll 31 Oct. 1972 51 p refs

(AD-767649; NADC-72225-CS) Avail: NTIS CSCL 06/16

It is demonstrated that from a knowledge of the thermal and optical properties of each layer of a two-layer system, together with the amplitude and distribution of the energy input, it is possible to predict temperature rises at depth in the second layer of a two-layer system. By varying the optical properties of the first layer and observing the temperature rises at depth in the second layer, the experimental results can be used to verify mathematical expressions for optical and heat transfer processes of the two layers. Such a system was devised to determine the thermal conductivity between a silicone rubber patch and the living skin irradiated. It may also be used in evaluations of other two-layer systems where reflectance, transmittance and heat transfer properties are known and must be accounted for in the mathematical model. Author (GRA)

N74-14840# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

FREQUENCY THRESHOLD FOR TWO FLASH FLICKER AND CRITICAL FLICKER: WHY THEY DIFFER Progress Report

Robert M. Herrick 8 Jun. 1973 22 p refs

(AD-767322; NADC-73131-40) Avail: NTIS CSCL 06/16

The minimum interval detectable between two successive light flashes is longer than the minimum interval detectable when many flashes are viewed. The probability summation hypothesis is suggested to explain the difference. For a given flash duration, the minimum interval detectable decreases as a function of the number of flashes n, until n equals about 8 or 10; further increases in n cause no further changes in this interval. Of the total decrease in the interval from 2 to 99 flashes, about 90% is explained by the probability summation hypothesis. Author (GRA)

N74-14841# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

PREDICTION OF NIPTS DUE TO CONTINUOUS NOISE EXPOSURE

Daniel L. Johnson Jul. 1973 68 p refs Prepared in cooperation with EPA

(AF Proj. 7231)

(AD-767205; AMRL-TR-73-91; EPA-550/9-73-001-B) Avail: NTIS CSCL 06/19

The report compares the relationship of noise exposure to noise induced permanent threshold shift (NIPTS) as predicted by the currently available works of Passchier-Vermeer, Robinson, Baughn and Kryter, and the yet unpublished work of the National Institute of Occupational Safety and Health. The works of Passchier-Vermeer, Robinson, and Baughn are selected since these are the only works that completely predict the relationship between NIPTS and noise exposure for various audiometric frequencies, sound pressure levels and population percentiles. The predictions of these three methodologies are averaged in order to provide one single relationship between continuous noise exposure and NIPTS. This relationship is presented in various ways so that the effect of noise exposure on hearing can be viewed in more than one way. Discussion concerning the type of frequency weighting, the equal energy rule, and long duration exposures is also provided. (Modified author abstract) GRA

N74-14842# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

FREE 17-OHCS LEVELS IN PAROTID FLUID AS INDICATORS OF HYPERTHERMIC STRESS

Marion T. Ulrich and Abbott T. Kissen May 1973 13 p refs Presented at the Aerospace Med. Assoc., Bal Harbour, Fla., May 1972

(AF Proj. 7222)

(AD-767207; AMRL-TR-73-3) Avail: NTIS CSCL 06/1

Physiologic parameters of rectal, skin, and body temperatures, body heat storage, heart rate, and parotid fluid 17-OHCS levels were obtained on human subjects during one hour hyperthermic exposures at 52C and 66C ambient air temperatures. Significant differences were noted between control and exposure values in all parameters (except parotid fluid 17-OHCS) where elevated responses correlated with duration and degree of thermal stress, reaching maximal values after 50 and 60 minutes of exposure. In the 17-OHCS response, fluctuations were observed for both the 66C and 52C exposures with primary peak elevations for each occurring at 20 minutes exposure and secondary peak elevations at 50 and 60 minutes, respectively. The parotid fluid corticosteroid level, with its shifting between normal and elevated values, is an unpredictable barometer of physiologic strain induced by heat stress. Author (GRA)

N74-14843 British Library Lending Div., Boston Spa (England).

HAZARDS OF MICROWAVE RADIATION AND PROPOSALS FOR SCREENING RADAR TECHNICIANS

M. Phlak, V. Servus, and J. Schubertova 5 Jul. 1973 10 p refs Transl. into ENGLISH from Vojenske Zdravot. Listy (Prague), v. 38, no. 1, 1969 p 7-9

(BLL-OA-Trans-1270-(6196.3)) Avail: British Library, Lending Div., Boston Spa, Engl.: 1 BLL photocopy coupon

An attempt was made to obtain information on the effects of microwave radiation on the body by screening radar technicians. Screening results show: (1) no organic damage could be detected by existing methods, and (2) subjective neurasthenic disorders found in technicians did not differ significantly from the control group. Author

N74-14844 British Library Lending Div., Boston Spa (England).

MODES OF CONTROL IN MANUAL CONTROL SYSTEMS

Hiroshi Tamura [1973] 19 p refs Transl. into ENGLISH from Keisoku Jidoseigyo Gakkai Ronbunshu (Japan), v. 8, no. 4, 1972 p 414-421 Presented at the 14th Meeting of the Autom. Control Federation, Nov. 1971

(BLL-RTS-7834) Avail: British Library Lending Div., Boston Spa, Engl.: £1.80 or 6 BLL photocopy coupons

A study was made of the adaptivity and learning function of a man in manual control systems. As an index of learning function, a numerical comparison of control results and changes in control mode were studied. Transfer functions, nonlinearity, and unsteadiness of human control actions were included. It was concluded that control mode changes are related to the experience and skill of subjects. Author

N74-14845* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

MODIFICATION OF ONE MAN LIFE RAFT Patent

Ernest J. Soter, inventor (to NASA) Issued 1 Jan. 1974 4 p Filed 29 Oct. 1971 Supersedes N72-21076 (10 - 12, p 1563) (NASA-Case-LAR-10241-1; US-Patent-3,781,933; US-Patent-Appl-SN-193672; US-Patent-Class-9-11A) Avail: US Patent Office CSCL 06K

A one man inflatable life raft is described. The raft has an inflatable tube perimetrically bounding the occupant receiving space with a flexible floor member. A zippered opening in the floor allows entry and facilitates the use of a constant diameter tube. An airtight fabric bulkhead divides the peripheral tube longitudinally into inflatable tube sections, where if either tube section were punctured, the bulkhead would move into the punctured section to substitute for the punctured wall portion and maintain the inflatable volume of the tube. The floor member is attached to the central portion of the tube wall so that either side of the raft can be the up side.

Official Gazette of the U.S. Patent Office

N74-14846*# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.

PHYSIOLOGICAL AND ENGINEERING STUDY OF ADVANCED THERMOREGULATORY SYSTEMS FOR EXTRAVEHICULAR SPACE SUITS Final Report

J. C. Chato and B. A. Hertig Aug. 1972 485 p refs (Grant NGR-14-005-103)

(NASA-CR-130811; ME-FR-400) Avail: NTIS HC $26.25 CSCL 06K

Investigations of thermal control for extravehicular space suits are reported. The characteristics of independent cooling of temperature and removal of excess heat from separate regions of the body, and the applications of heat pipes in protective suits are discussed along with modeling of the human thermal system. F.O.S.

N74-14847*# Northrop Corp., Beverly Hills, Calif. Electronics Div.

SKYLAB SO71/SO72 CIRCADIAN PERIODICITY EXPERIMENT Final Report

M. K. Fairchild and R. A. Hartmann Nov. 1973 99 p (Contract NAS2-6897)

(NASA-CR-114706; Nort-73-320) Avail: NTIS HC $7.00 CSCL 06B

The circadian rhythm hardware activities from 1965 through 1973 are considered. A brief history of the programs leading to the development of the combined Skylab SO71/SO72 Circadian Periodicity Experiment (CPE) is given. SO71 is the Skylab experiment number designating the pocket mouse circadian experiment, and SO72 designates the vinegar gnat circadian experiment. Final design modifications and checkout of the CPE, integration testing with the Apollo service module CSM 117 and the launch preparation and support tasks at Kennedy Space Center are reported. Author

N74-14848# Oak Ridge National Lab., Tenn. Thermonuclear Div.

SAFETY WITH HIGH MAGNETIC FIELD SYSTEMS

J. N. Luton, Jr. Sep. 1973 28 p refs Presented at the Southern Area Res. and Develop. Symp. Submitted for publication

(Contract W-7405-eng-26)

(ORNL-TM-4313) Avail: NTIS HC $3.50

Based on a consideration of the laboratory environment and on the physical characteristics of high field magnet coils and of humans, some hazards and safety precautions concerning steady state magnet systems are discussed. Author (NSA)

N74-14849# Calspan Corp., Buffalo, N.Y.

AN EVALUATION OF THE DYNAMIC PERFORMANCE CHARACTERISTICS OF ANTHROPOMORPHIC TEST DEVICES, VOLUME 3 Final Report, Jun. 1971 - Nov. 1972

James B. Walunas and J. Sam Miller May 1973 97 p refs

(Contract DOT-HS-053-1-129)
(PB-223106/6; CALSPAN-FA-5018-V-3-Vol-3;
DOT-HS-800-863-Vol-3) Avail: NTIS HC $3.75 CSCL 13F

The dynamic performance of a state-of-the-art 95th percentile anthropomorphic dummy was determined under conditions approximating those expected in vehicle compliance testing. GRA

N74-14850# Hughes Aircraft Co., Culver City, Calif.
ECONOMICAL MULTIFACTOR DESIGNS FOR HUMAN FACTORS ENGINEERING EXPERIMENTS
Charles W. Simon Jun. 1973 191 p refs
(Contract F44620-72-C-0086; AF Proj. 9778)
(AD-767739; HAC-P73-326; AFOSR-73-1702TR) Avail: NTIS CSCL 05/5

Experimental data collection plans are described that permit the study of from five to thirty experimental human factors. The reported plans were selected from those employed in physical science research and were suitable for human factors engineering research. The method of employing these designs is two phase. In the first phase, a large number of potentially critical factors are systematically screened in a way that identifies the more important ones. In the second, functions are obtained that relate the more important quantitative factors to operate performance. Five principles that enable economical miltifactor human factors experiments to be successfully conducted are stated. (Modified author abstract) GRA

N74-14851# School of Aerospace Medicine, Brooks AFB, Tex.
X-RAY FLUOROMETER AND SOLID STATE DETECTOR CALIBRATION FOR BIOLOGIC SPECIMEN ANALYSIS Final Report, Jun. - Dec. 1972
Ted D. Rupp and John L. Montet Aug. 1973 43 p refs
(AF Proj. 7757)
(AD-767585; SAM-TR-73-17) Avail: NTIS CSCL 06/18

Due to the recent demand for data concerning radiofrequency (RF) hazards to man, extensive information is now needed on the normal metabolites of experimental animals exposed to various RF fields. The metal content of blood plasma is known to respond to various thermal environments. This response is thought to be the primary means by which RF fields affect most biologic systems. X-ray fluorescence has recently been shown to be a feasible technique, by means of using lithium-drifted silicon or germanium solid-state detectors, for the simultaneous determination of several metals in biologic samples. This report describes the source arrangement and calibration of such a fluorometer, as well as the calibration of the solid-state detectors in the 3.5 Kev to 3.5 Mev energy region. Also included is the application of the completed apparatus to X-ray fluorescence analysis of biologic systems. (Modified author abstract) GRA

N74-14852# McDonnell-Douglas Astronautics Co., St. Louis, Mo. Engineering Psychology Dept.
PREDICTING MAINTENANCE TASK DIFFICULTY AND PERSONNEL SKILL REQUIREMENTS BASED ON DESIGN PARAMETERS OF AVIONICS SUBSYSTEMS
Larry M. Lintz, Susan L. Loy, Gerald R. Brock, and Kenneth W. Potempa Aug. 1973 135 p refs
(Contract F33615-71-C-1620; AF Proj. 1124)
(AD-768415; AFHRL-TR-72-75) Avail: NTIS CSCL 05/9

The relationships among subsystem design characteristics, personnel skill characteristics, and job performance were investigated for avionics subsystems. A list of design characteristics was established, and functional loops and line replaceable units were selected from ten subsystems representing navigation, flight control, communications, and fire control subsystems. Experienced supervisors identified high and low skill maintenance personnel. These supervisors associated performance times and error probabilities for three maintenance tasks - an easy task, a difficult task, and a complete functional checkout task. Supervisors also rated each task on a scale of difficulty. GRA

Subject Index

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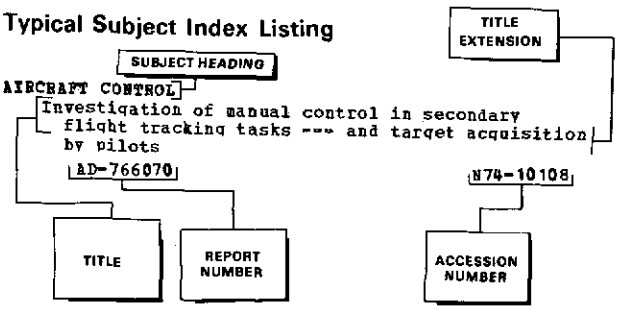

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Personal Author Index

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 127)* **APRIL 1974**

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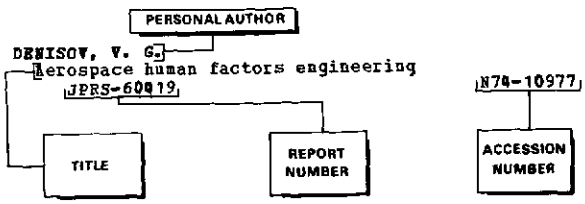

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