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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 105)

AUGUST 1972

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 105)

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 July 1972 in

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



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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 287 reports, articles, and other documents announced during July 1972 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, irregular supplements have been issued.

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 on 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.

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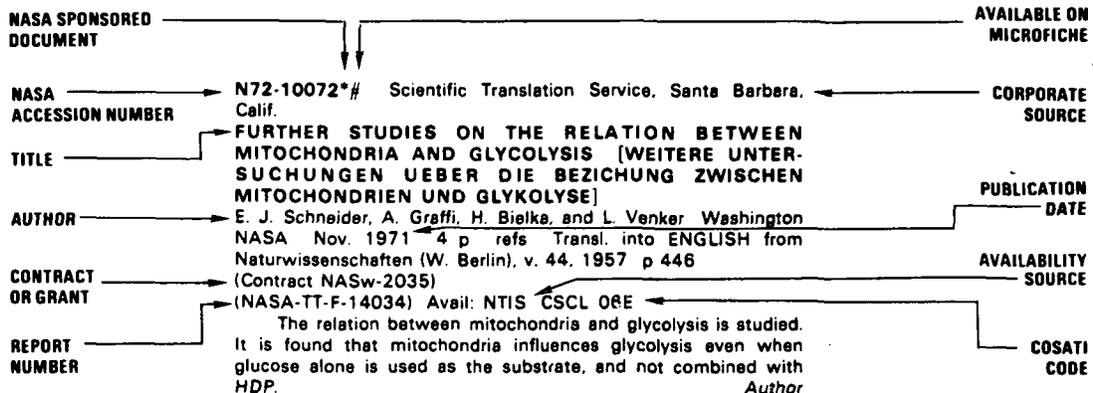
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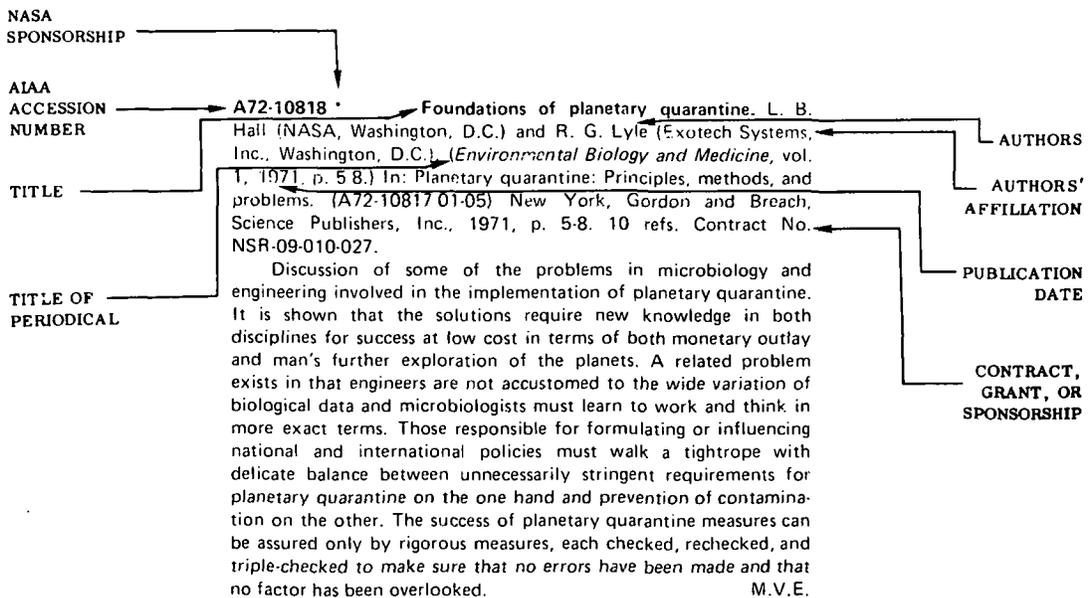
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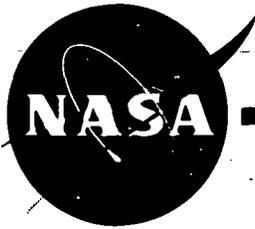
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TYPICAL CITATION AND ABSTRACT FROM IAA





AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 105)

AUGUST 1972

IAA ENTRIES

A72-28455 # Evolution mechanisms of biological resonances of interfering signal flows in neuron networks, based on a coherent brain model (K evoliutsionnym mekhanizmam biorezonansov interferiruiushchikh potokov signalov v neironnykh setiakh na osnove kogerentnoi modeli mozga). V. V. Chavchanidze (Akademiia Nauk Gruzinskoi SSR, Institut Kibernetiki, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 65, Feb. 1972, p. 293-296. 10 refs. In Russian.

On the basis of a coherent model of the brain, some of the biological aspects of convergence about in-phase coordinated signal flows in neuronal complexes are considered. It is shown that these convergence phenomena can be calculated by using described methods of superposition of quantum-wave switching functions. The described phenomena have no analogs in common control processes. M.V.E.

A72-28461 # Method for determining the electrical components of cardiac and skeletal muscle impedance (Metodika opredeleniia elektricheskikh sostavliaiushchikh impedansa serdechnoi i skeletnoi muskulatury). Z. V. Zaridze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 65, Feb. 1972, p. 441-444. In Russian.

A method is described for determining and calculating the electrical components of striated muscle impedance. An electrodynamic and mathematical description is also given of the rectangular stimulating current, and a formula for calculating the mean value of the current is presented. The relation of the absolute impedance value to the impulse duration of the stimulating current is discussed. M.V.E.

A72-28462 # Characteristics of the vascular-capillary network of the brain stem in man (K voprosu ob osobennostiakh sosudisto-kapilliarnoi seti stvola mozga cheloveka). L. P. Burdiladze (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Klinicheskoi i Eksperimental'noi Nevrologii, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 65, Feb. 1972, p. 477-480. In Russian.

A study of the vascular-capillary network of the human brain, using silver-impregnated preparations, is shown to indicate that: the smallest loop network is in the nuclei of cranium-brain nerves, in the lower olivary bodies, and in the red nucleus; medium size network is in nuclei of reticular formation, while the largest one is in conduction system ways. The highest capillary network density is

found in the nuclei of cranium-brain nerves, in olivary bodies, in the red nucleus, and in bridge nuclei; the lowest density is in white matter. M.V.E.

A72-28463 # Enzymatic activity of the cardiac muscle in experimental ischemia of the myocardium. E. A. Kutateladze, M. I. Dzhabua, and S. I. Tabagari. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 65, Feb. 1972, p. 489-491. 5 refs. In Georgian, with abstract in English.

Study of the enzymatic activity in various parts of the heart under experimental ischemia, induced in rabbits by ligation of the descending branch of the left coronary and checked by ECG. The activity of aspartate aminotransferase, alanine aminotransferase, and fructose diphosphate aldolase was determined in the blood, left ventricle, right ventricle, and in the atrium of the heart. Maximum enzymatic activity was observed in the left ventricle and minimum in the atrium. M.V.E.

A72-28521 # Physiological evaluation of the capacity of the diastole mechanism. F. Z. Meerson, V. I. Kapelko, and A. A. Nourmatov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Acta Cardiologica*, vol. 26, no. 6, 1971, p. 547-567.

Physiological methods for the quantitative evaluation of the potency of the calcium pump are described. The effect of various frequencies of heart beating is investigated together with the effects of various Ca-ion concentrations in the perfusate, and of the temperature upon the activity of the mechanism. On the basis of data obtained on the normal heart the state of the calcium pump in the hypertrophied myocardium of animals with a long existing experimental defect has been studied. G.R.

A72-28569 Diaphragmatic action potentials registered in the electrocardiogram - A clinical and experimental study. M. M. Aygen, M. Manoch, U. A. Liberman, U. Mintz, and H. Savransky (Beilinson Hospital, Petach Tigva; Tel Aviv University, Tel Aviv, Israel). *American Heart Journal*, vol. 83, May 1972, p. 630-634. 28 refs.

Observation of P-wave-like deflections followed by high frequency minute oscillations in the ECG of a 58-yr-old obese woman with fever and erysipelas of the left leg. The phenomenon was present in vertical leads and was most prominent in those recorded from the vicinity of the diaphragm. It disappeared when the signs of diffuse inflammation of the leg subsided, and reappeared when the patient rebreathed into a plastic bag. It was considered that the abnormal ventilatory load imposed by her obesity and the increased metabolic demand of the infectious disease may have caused an augmented electrical activity of the diaphragm and the appearance of this activity on the surface leads. In cats, strong diaphragmatic action potentials, which were produced by phrenic nerve stimulation, caused the appearance of similar P-wave-like deflections in the vertical leads of the ECG. F.R.L.

A72-28570 * Cardiovascular responses to glucagon - Physiological measurement by external recordings. M. J. Byrne, V. Pigott (Lemuel Shattuck Hospital, Boston, Mass.), and D. H. Spodick (Lemuel Shattuck Hospital; Tufts University; Boston University, Boston, Mass.). *American Heart Journal*, vol. 83, May 1972, p. 635-643. 27 refs. Grant No. NGR-22-012-006.

Assessment by noninvasive polygraphic techniques of the cardiovascular responses of normal subjects to intravenous injections of glucagon and glucagon diluent. A blinding procedure which eliminated observer bias was used during the reading of tracings. Analysis of group results showed that glucagon provoked uniformly significant changes, including increase in heart rate, blood pressure, pressure-rate product, and ejection time index, and decrease in prejection period, mechanical and electromechanical systole, left ventricular ejection time, and the ratio PEP/LVET. The principal results correlated well with those of previous studies of the hemodynamic effects of glucagon. F.R.L.

A72-28571 Quadrupole components of the human surface electrocardiogram. R. M. Arthur (Washington University, St. Louis, Mo.), D. B. Geselowitz (Pennsylvania State University, University Park, Pa.), S. A. Brillner, and R. F. Trost (Pennsylvania University, Philadelphia, Pa.). *American Heart Journal*, vol. 83, May 1972, p. 663-677. 20 refs. Grants No. PHS-HE-08805; No. PHS-HE-5239; No. PHS-5-T01-GM-00606; No. PHS-FR-15.

Determination of the equivalent heart dipole and quadrupole on a normal male subject for two origins in the heart region. Determinations were based on a detailed measurement of the torso surface geometry, a digital computer solution of transfer impedances relating unit dipole and quadrupole components to surface potentials they generate, and the measurement of 284 ECGs. Addition of the quadrupole contribution gave a better fit to the surface ECG. The RMS error during QRS was 0.091 mv for dipole alone and 0.054 mv for dipole plus quadrupole, representing respectively 23% and 14% of the total RMS value of the recorded ECGs. F.R.L.

A72-28615 Color adaptation of spatial frequency detectors in the human visual system. W. J. Lovegrove and R. Over (Queensland University, St. Lucia, Queensland, Australia). *Science*, vol. 176, May 5, 1972, p. 541-543. 15 refs.

Observers exposed alternately to a vertical grating of one spatial frequency in red light and a vertical grating of different spatial frequency in green light subsequently report frequency-specific color aftereffects when shown gratings in white light. Aftereffects occur, however, only when inspection gratings differ in spatial frequency by one octave or more and the frequency of at least one grating is above 3 cycles per degree. This spatial selectivity of the aftereffect is considered in terms of a neural adaptation model incorporating evidence on the tuning of spatial frequency detectors in the human visual system. (Author)

A72-28634 # Correlation between biopotentials of the deep brain structures during sleep development in man (Korrelatsiia mezhdu biopotentsialami glubokikh struktur mozga pri razvitii sna u cheloveka). N. I. Moiseeva and V. V. Beliaev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 3-8. 23 refs. In Russian.

Electrosubcorticograms of the optic-thalamus nuclei, caudate nucleus, putamen, globus pallidus, pedunculi cerebri, hippocampus, amygdala, hypothalamus and electrograms of the precentral cortex in patients with implanted electrodes were studied by means of correlation analyses. A considerable variability has been revealed in the correlations between these structures. The level of maximum correlation-function values is found to drop during both slow sleep and fast REM sleep as compared with wakefulness. M.V.E.

A72-28635 # Ion ratio changes in plasma and the electrokinetic potential of thrombocytes (Izmeneniia ionnykh sootnoshenii v plazme i elektrokineticheskii potentsial trombotsitov). R. A. Markosian (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 46-50. 6 refs. In Russian.

The effects of monovalent potassium and sodium ions and bivalent calcium and magnesium ions upon the electrokinetic potential of thrombocytes of adult rabbits were investigated at a constant (7.35) pH value, both in vivo and in vitro. The obtained results indicate that Na(+) and Ca(2+) ions raise the electrokinetic potential, while K(+) and Mg(2+) ions lower it. M.V.E.

A72-28636 # Supercellular regulators of the triggering mechanism of the regenerative reaction in erythropoietic tissue (Nadkletochnye regulatory zapuska mekhanizma regeneratsionnoi reaktzii v eritropoeticheskoi tkani). V. P. Nefedov, V. A. Samoilo, I. L. Iasnikov, V. N. Dubynin, V. I. Mikhailov, N. N. Kudiakova, and V. N. Petushkov (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 56-60. 17 refs. In Russian.

An investigation is attempted of the triggering mechanism of the regenerative reaction in the bone marrow tissue of an isolated perfused sternum. The kinetics of the medullary hemopoiesis and the intensity of cellular respiration indicate the presence of a triggering of the regenerative reaction, though several erythropoiesis-stimulating factors be absent. M.V.E.

A72-28637 # Autoregulation in the coronary system (Ob avtoregulatsii v koronarnoi sisteme). E. B. Novikova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 61-72. 24 refs. In Russian.

Experiments were conducted in dogs with the aim to obtain the characteristics of autoregulation in the coronary system and to utilize these data for the examination of the autoregulation mechanism of the heart. The autoregulation was found to be closely connected with the magnitude of the initial tonus of the coronary vessels. Intracoronary injection of pituitrin contributed to the recovery of autoregulation. A hysteresis in the coronary system was also found which is manifested by the fact that autoregulating reactions depend on the direction of the changes in the perfusion pressure. Some possible mechanisms of autoregulation in the coronary system are discussed. O.H.

A72-28638 # Influence of the polarizing current and of a sodium-free and calcium-free medium on the electrical and contractile activity of muscle cells of the vena porta (Vliianie poliari-zuiushchego toka, a takzhe beznatrievoi i beskal'tsievoi sredy na elektricheskuiu i sokratitel'nuu aktivnost' myshechnykh kletok vorotnoi veny). A. V. Gurkovskaia (Akademiia Nauk Ukrainkoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 83-90. 30 refs. In Russian.

Microelectrode investigations of the rat single muscle cells of the vena porta and of the contractile activity of this vessel have shown that a moderate depolarization of these cells by direct electric current caused an intensification of their spontaneous activity, whereas a hyperpolarization inhibited this activity. The removal of Na(+) and Cl(-) from Krebs solution was accompanied by an initial hyperpolarization and a transient intensification followed by the inhibition of the spontaneous electrical activity of these muscle cells. The contractile activity of the v. porta was not inhibited. The removal of Ca(++) from Krebs solution resulted in depolarization and inhibition of the spontaneous electrical activity and in a considerable relaxation of the v. porta. O.H.

A72-28639 # Effects of cold adaptation on temperature coefficients of oxidation, phosphorylation and ATP-ase activity in the rat skeletal muscle (Vliianie kholodovoi adaptatsii na temperaturnye koeffitsienty okisleniia, fosforilirovaniia i aktivnosti ATF-AZ v skeletnykh myshtsakh kry). V. V. Khaskin and I. N. Sindarovskaia (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 108-113. 17 refs. In Russian.

The Vant-Hoff coefficient (Q-10) of the rat skeletal muscle tissue respiration decreased during cold adaptation as a result of increase in the rate of nonphosphorylating oxidation in muscle mitochondria for which (Q-10) was lesser than for the phosphorylation rate. Adaptive changes of oxidative rate, P/O, and mitochondrial ATP-ase activity occurred mainly in the red (slow) muscle fibers. Thermoregulatory response of the muscle of cold-adapted animals to acute cooling was accompanied by a decrease in the (Q-10) of the phosphorylation rate, and in the dependence of the P/O upon mitochondrial temperature in vitro. Myofibrillar ATP-ase activity was unchanged during cold adaptation. The results suggest a decrease in energetical potential barriers of oxidative reactions in mitochondria, and a relative decrease in thermogenic role of ATP breakdown in the contractile apparatus of muscles. (Author)

A72-28640 # Energy metabolism characteristics during muscular activity as a function of the degree of the organism's adaptation to the activity (Osobennosti energeticheskogo obmena pri myshechnoi deiatel'nosti v zavisimosti ot adaptirovannosti organizma k nei). A. F. Krasnova, R. I. Lenkova, L. G. Leshkevich, L. V. Maksimova, N. R. Chagovets, and N. N. Iakovlev (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Jan. 1972, p. 114-121. 20 refs. In Russian.

Observations performed on athletes of various proficiency levels indicate that the greater the degree of the organism's adaptation to an intense muscular activity is, the higher are the levels of sugar and lactate in the blood compatible with a concurrent high-rate mobilization and use of fatty acids. This results in a more efficient supply of the working muscles with energy carriers and in lesser ATP-balance disturbances, and meets some major requirements of work capacity enhancement at any load level. M.V.E.

A72-28641 # Influence of pressure chamber training on chain motor conditioned reflexes in rats (Vliianie barokamernoi trenirovki na tsepnye dvigatel'nye uslovnye refleksy). N. A. Agadzhanian, G. P. Doronin, and A. I. Elfimov. *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 22, Jan.-Feb. 1972, p. 37-45. 16 refs. In Russian.

Adaptation to hypoxia in the process of a ten-day pressure chamber training at an altitude of 5000 m secured a reorganization of physiological reactions, providing for a more effective use of oxygen. The reorganization helped to reduce disturbances of the structural and temporal characteristics of chain motor reflexes and contributed to a more rapid recovery of complex behavior of the animals after an acute oxygen deficiency. The adaptive potentialities of the organism were lowered in animals devoid of sinocarotid receptive zones. This points to the important role of these chemoreceptors in the trigger compensatory-adaptive reactions of the organism and in maintaining an adequate level of functioning of the higher parts of the brain under conditions of acute hypoxia. (Author)

A72-28642 # Higher nervous activity in dogs reanimated after long periods of clinical death from drowning and loss of blood (Vysshiaia nervnaia deiatel'nost' sobak, ozhivlennykh posle dlitel'nykh srokov klinicheskoi smerti ot utopeniia i krovopuskaniia). N. V. Makarenko (Akademiia Nauk Ukrainkoi SSR, Institut Fiziologii,

Kiev, Ukrainian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 22, Jan.-Feb. 1972, p. 82-88. 20 refs. In Russian.

A study was made by the secretary-alimentary technique of the state of higher nervous activity in dogs reanimated after long periods of clinical death from drowning in fresh and salt water and from loss of blood. The reanimation was carried out by donor technique with the use of one Bruchanenko pump and of a parabiont donor. In two dogs the clinical death lasting 18 min 03 sec and 20 min 39 sec from the last inspiration (21 min 51 sec and 28 min 30 sec from the moment the heart stopped) to the beginning of reanimation was provoked by submerging the animal's head under water. Lethal bleeding was effected from the right carotid. Death lasted 17 min 15 sec (29 min 04 sec from the beginning of blood loss). The animals thus reanimated retained their capacity to form temporary connections to acoustic stimuli. Their higher nervous activity in these experiments corresponded to that of normal animals. (Author)

A72-28643 # Increase in regularity of neuronal activity in the neocortex and hippocampus during EEG activation (Ob uvelichenii uporiadochennosti neuronnoi aktivnosti novoi kory i gippokampa na fone aktivatsii EEG). G. I. Shul'gina, A. V. Korinevskii, and A. Kh. Liapkusova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 22, Jan.-Feb. 1972, p. 116-125. 44 refs. In Russian.

Study of changes in the pattern of spike activity of the units in the visual and sensorimotor neocortex and the hippocampus in alert rabbits during EEG activation. Regularity of spike activity increased in 20% of neocortical units and in 50% of hippocampal units during depression of polyrhythmic slow waves and the appearance of stress rhythm. This was manifested in the appearance of tonic patterns and (in the case of the hippocampus) of grouped pulsation patterns corresponding to the stress rhythm. The mechanisms contributing to their onset are discussed as well as the possible involvement of ordered pulsation in the prolongation of the aftereffect of the stimulus, in the fixation of excitation traces, and in the integration of neuronal systems for their reproduction. (Author)

A72-28644 # Role of the procedure used for presenting conditioned stimuli in their successive differentiation by monkeys (Rol' sposoba pred'avleniia uslovnykh razdrzhitel'ei pri posledovatel'nom ikh differentsirovaniu u obez'ian). Iu. Ia. Zakher (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 22, Jan.-Feb. 1972, p. 168-170. 10 refs. In Russian.

Results of experiments with monkeys indicate that the specific procedure used in the presentation of conditioned stimuli can play a decisive part in stimulus differentiation. It is felt that this applies not only to monkeys, and that it should be taken into account in studies of differentiating inhibition limits. M V F

A72-28645 # Device for the detection and measurement of evoked brain potentials (Ustroistvo dlia vydeleniia i izmereniia vyzvannykh potentsialov mozga). T. B. Shamsutdinov. *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 22, Jan.-Feb. 1972, p. 187-189. In Russian.

Description of a device implementing a digital method of statistical detection of evoked brain potentials. The device is based on the use of multichannel amplitude analyzers. A block diagram of the evoked-potential detector and a schematic circuit of the analog-digital converter that provides a digital pulse readout of the analog evoked-potential signals illustrate the makeup of the device. M.V.E.

A72-28702 # Physiological evaluation of passenger oxygen mask. E. B. McFadden (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *SAFE Engineering*, vol. 1, 4th Quarter, 1971, p. 12-17. 14 refs.

Altitude chamber experiments conducted with human subjects, using new disposable passenger oxygen masks, are described, and the evaluation results on the oxygen mask efficiency are discussed. These masks, applicable for emergency use up to 40,000-foot altitudes, are of the continuous-flow, phase-dilution type and employ a reservoir interposed between the delivery tube and the mask. The mask wearer receives 100% oxygen from the reservoir during an entire inspiration unless the bag is emptied; if this occurs, a spring-loaded valve in the mask opens, and ambient air is introduced to provide sufficient volume to meet the remainder of the inspiration. The flow of 100% oxygen is provided at the most advantageous point in the respiratory cycle, at the beginning of inspiration. M.V.E.

A72-28726 # Crashworthy personnel restraint systems for general aviation. R. A. Hughes (Pacific Scientific Co., Anaheim, Calif.). *SAFE Engineering*, vol. 2, 1st Quarter, 1972, p. 2-7, 20. 5 refs.

Basic types of active restraint systems are examined. Currently available strap take-up devices can be classified as inertia sensing or noninertia sensing. It is deduced that the poor acceptance of the currently available fixed shoulder harness in automotive systems stems from the failure to meet certain qualitative specifications relating to comfort, fit, ease of use, freedom to move, and the consequent lack of user confidence. One result has been increased demand for passive restraint systems which require no action on the part of the vehicle occupant. It is pointed out that effective cooperation between the restraint system designers and aircraft installation engineers will insure that the aircraft equipped with these systems will also meet the qualitative requirement of comfort, proper fit, and the ease of donning and removing. G.R.

A72-28727 # Behavioral inaction under stress conditions. D. A. Johnson (Douglas Aircraft Co., Long Beach, Calif.). *SAFE Engineering*, vol. 2, 1st Quarter, 1972, p. 13-19. 11 refs. Research sponsored by the McDonnell Douglas Independent Research and Development Program.

It is pointed out that behavioral inaction in survivable aircraft accidents has occurred in the past and can be expected to continue to occur unless measures are devised to counteract it. An investigation was conducted to determine the factors relevant to the occurrence of inaction. It was found that in a situation which requires novel responses inaction will occur independently of whether the individual is or is not physically threatened for failure. The prime factor in avoiding maladaptive behavior is probably a knowledge of the correct actions to be taken. Such knowledge can be provided by leadership and/or training. G.R.

A72-28749 # Accommodation biorhythm of operators performing strenuous visual work (O bioritmakh akkomodatsii u operatorov, vpolniaiushchikh napriazhennuiu zritel'nuu rabotu). S. L. Shapovalov. *Voenna-Meditsinskii Zhurnal*, Feb. 1972, p. 61-63. In Russian.

Nearest and farthest clear vision points were measured in 145 healthy professional machine operators with normal vision in a study of accommodation rhythm and reactions on an accommodator at 9 and 16 o'clock, showing a higher accommodation volume at the later hour. Irregularities in the accommodation rhythm during the day were observed in 386 tests on 18 subjects during the performance of hard physical work, or under visual stress, requiring 24 and 1.5 to 2 hr, respectively, for recovery of normal accommodation. Behavioral recommendations are given for stimulation of normal visual accommodation. V.Z.

A72-28750 # Treatment with medication and flight safety /Survey of the literature/ (Medikamentoznoe lechenie i bezopasnost' poletoev /Obzor literatury/). V. G. Terent'ev and S. D. Khoruzhaia. *Voenna-Meditsinskii Zhurnal*, Feb. 1972, p. 64-68. 9 refs. In Russian.

Review of published Soviet and foreign papers dealing with the effects of medication on the performance of pilots. Tranquilizers, sedatives, antibiotics, stimulants and pain-relieving, antihistamine and hypotension drugs are covered. Possible negative effects of medication on the professional capability of pilots are discussed. The impermissibility of any alcohol uptake is stressed. Further development of aviation pharmacology is suggested. V.Z.

A72-28762 # Depolarization of axon terminals of return corticothalamic neurons (Depoliarizatsiia aksonnykh terminalai vozvratnykh kortiko-talamicheskikh neuronov). V. L. Glants and A. G. Rabin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Jan. 21, 1972, p. 726-728. 19 refs. In Russian.

Investigation of the functional organization and neurophysiological mechanisms of the return corticothalamic system in anesthetized cats. The existence of a mechanism of presynaptic depolarization of the axon terminals of the corticofugal fibers in the posterior ventral nucleus of the thalamus is established. It is suggested that axon collaterals in the corticothalamic cells may participate in the mechanism of presynaptic inhibition of the corticofugal system monitoring the transfer of afferent signals at the thalamic level. A.B.K.

A72-28763 # Special features of the spectral sensitivity of the eye in persons with congenital color vision disorders (Osobennosti spektral'noi chuvstvitel'nosti glaza u lits s vrozhdennymi rasstroistvami tsvetovogo zreniia). E. B. Rabkin, E. G. Sokolova, E. I. Loseva, T. L. Sosnova, and Iu. V. Frid (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Jan. 21, 1972, p. 732, 733. 7 refs. In Russian.

Study of the spectral sensitivity of the eye in persons with normal vision and in persons with various types of congenital color vision disorders by determining the number of thresholds of color discrimination in various wavelength ranges. On the basis of examinations of subjects with normal vision and various types of congenital protanopes and deuteranopes it is found that the color distinguishing function in the subjects with visual disturbances is greatly reduced both in the entire visual spectrum and in individual sections of it. These results are regarded as confirmation of the conception of an interaction between the eye receivers and of the unreliability of hypotheses suggesting that one of these receivers can be malfunctioning while the others are functioning normally. A.B.K.

A72-28769 # A model of a biological membrane with tunnel chemical bonds (Model' biologicheskoi membrany s tunnel'nymi khimicheskimi svyaziami). S. P. Ionov and G. V. Ionova (Akademiia Nauk SSSR, Institut Elementoorganicheskikh Soedinenii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Feb. 1, 1972, p. 960-962. 13 refs. In Russian.

Development of a qualitative microscopic model of a postsynaptic membrane. The model is based on the assumption that the membrane is a uniaxial ferroelectric with the axis directed perpendicular to the surface of the membrane. In the proposed model excitation of a postsynaptic membrane is achieved by mediators acting through tunnel chemical bonds on receptor structures possessing stereo or charge specificity. The model is applied to a study of the formation of conductivity in a system resembling ice by a relay mechanism. A.B.K.

A72-28770 # Increase in the rate of formation and degree of retention of conditioned reflexes in animals adapted to high-altitude hypoxia (Uvelichenie skorosti vyrabotki i stepeni sokhraneniia uslovykh refleksov u zhivotnykh, adaptirovannykh k vysoznoi gipoksii). F. Z. Meerson, V. A. Isabaeva, and A. Z. Ivanshina (Akademiia Nauk SSSR, Institut Normal'noi i Patologicheskoi Fiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Feb. 1, 1972, p. 982-984. 11 refs. In Russian.

Experimental study of the dynamics of formation and retention of conditioned reflexes of active avoidance and elimination during the adaptation of two strains of mice to high-altitude hypoxia (1600 m). Two different types of conditioned reflex formation are employed - concentrated learning and extended learning - using mice strains of differing resistance to hypoxia. It is found that adaptation to the continuous action of moderate high-altitude hypoxia is accompanied by a considerable increase in the rate of formation and an increase in the degree of retention of conditioned reflexes in animals of both genetic strains. The increase in the rate of formation of conditioned reflexes for the less resistant strain in both types of learning is found to be comparable to the increase in the rate of formation for the more resistant strain in extended learning, while the increase in the degree of retention of conditioned reflexes for the less resistant strain in both types of learning is comparable to the degree of retention for the more resistant strain in concentrated learning. A.B.K.

A72-28779 # Regeneration of vagus nerves in humans (O regeneratsii bluzhdaiushchikh nervov u cheloveka). E. A. Pechatnikova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Feb. 11, 1972, p. 1223, 1224. 11 refs. In Russian.

Summary of some experimental findings concerning the regeneration of vagus nerves in humans who had undergone radical surgery for stomach cancer. On the basis of these investigations it is concluded that the main stems of the vagus nerves regenerate in humans after being cut. Selective vagotomy in dogs is also accompanied by the regeneration of cut nerve ramuli. A.B.K.

A72-28780 # Comparison of the efficiency of certain possible illumination codes in the impulse activity of neurons of the outer geniculate body of the visual system (Svrnenie effektivnosti nekotorykh vozmozhnykh kodov osveshchennosti v impul'snoi aktivnosti neironov naruzhnogo kolenchatogo tela zritel'noi sistemy). K. N. Dudkin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Feb. 11, 1972, p. 1233-1236. 10 refs. In Russian.

Determination of the most efficient of several possible illumination codes in the impulse activity of neurons of the outer geniculate body in immobilized and anesthetized cats. The experiments performed involved the transmission of two possible input signals - light flashes of given intensity and gaps of zero intensity (darkness) between them - using three possible codes - coding by the number of impulses during fixed successive intervals of time, coding by intervals between impulses, and coding by the number of impulses in groups (high-frequency packets). It is concluded that the most efficient illumination code in the impulse activity of neurons of the outer geniculate body is the number of impulses in groups. A.B.K.

A72-28781 # Characteristics of the reactions of individual neurons of the visual cortex to antidromic stimulation of the pyramidal tract (Kharakteristika reaktsii otdel'nykh neironov zritel'noi kory na antidromnoe razdrashenie piramidnogo trakta). V. A. Pravdivtsev (Smolenskii Gosudarstvennyi Meditsinskii Institut, Smolensk, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 202, Feb. 11, 1972, p. 1237-1239. In Russian.

Analysis of the processes occurring in the neurons of the visual cortex of field 17 (according to Brodmann) at the moment of propagation of an antidromically stimulated excitation along the pyramidal tract in immobilized cats. It is found that cutting the pyramidal tract has no effect on the pyramidal responses of the visual cortex during excitation below the point at which the tract is cut. This situation is regarded as an indication of the participation of the reticular stem formation in the realization of these responses. It is concluded that the activation of axons of the pyramidal tract is accompanied by a certain increase of the discrimination properties in the visual analyzer system. A.B.K.

A72-28787 # Countering the unfavorable influence of weightlessness (Protiv neblagopriiatnogo vlianiia nevesomosti). A. M. Genin and I. Pestov. *Aviatsiia i Kosmonavtika*, Mar. 1972, p. 30-33. In Russian.

Effects produced under weightlessness by (1) loss of hydrostatic pressure of the blood and tissue fluids, (2) lack of gravitational loading of the osteomuscular system, and (3) changes in the sensory organs are described, together with preventive and corrective measures which can be applied before, during, and after exposure to weightlessness. Topics considered include redistribution of blood flow toward the head, volumetric drop of circulation, desynchronization of the cardiovascular system, atrophy of specific muscles, changes in the coordinates of movements, and decalcification of bone tissue. T.M.

A72-28796 # Norm concepts, performance behavior, and personality variables (Normvorstellungen, Leistungsverhalten und Persönlichkeitsvariablen). I. M. Deusinger (Frankfurt, Universität, Frankfurt am Main, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 19, 1st Quarter, 1972, p. 27-63. 72 refs. In German.

The research considered deals with the concept which an individual has of the behavior of the majority of his own group members in certain situations. The concepts regarding this behavior were investigated in ten different studies involving a total of 520 subjects. The results of the various studies confirm the expected consonance of the individual's concept of the norm and the individual's own behavior. The degree of the 'norm-consonance' depended on the nature of the behavior, the characteristics of the group, and the personality of the subjects. G.R.

A72-28996 Mass-balance model of pulmonary oxygen transport. G. M. Saidel, T. C. Militano, and E. H. Chester (Case-Western-Reserve University; U.S. Veterans Administration Hospital, Cleveland, Ohio). *IEEE Transactions on Biomedical Engineering*, vol. BME-19, May 1972, p. 205-213. 11 refs. Research supported by the National Tuberculosis and Respiratory Disease Association; Grant No. NIH-GM-12302.

A dynamic lumped-parameter model for pulmonary gas transport has been developed to characterize the lung and predict the effect of various parameter changes. The gas side of the lung is modeled as a series and parallel arrangement of five perfectly mixed, variable-volume compartments that correspond roughly to airway and alveolar regions. The blood side of the lung is modeled as a series of perfectly mixed, constant-volume compartments that represent the pulmonary capillary bed. From nonsteady mass balances, equations are derived which yield the time course of concentration for each compartment. Model simulations indicate that the oxygen-hemoglobin reaction does not reach equilibrium in the pulmonary capillaries, an assumption commonly made in analyses of pulmonary oxygen transport. Simulations also show the extent to which breathing amplitude and rate can affect the oxygen level in the blood leaving the lung. A comparison of simulations for a normal state and chronic obstructive lung disease (COLD) with identical input

conditions demonstrates that the oxygen level in the blood leaving the lung is much lower in COLD. Also, the simulations are compared with experimental findings. (Author)

A72-28997 Test of an inverse electrocardiographic solution based on accurately determined model data. D. A. Brody and J. A. Hight (Tennessee University, Memphis, Tenn.). *IEEE Transactions on Biomedical Engineering*, vol. BME-19, May 1972, p. 221-228. 14 refs. Grants No. NIH-HE-01362; No. NIH-5-K6-HE-14032; No. NIH-HE-09495.

A multiple-dipole type of inverse electrocardiographic procedure is described which appears to be a useful means of extracting intrinsic electrophysiologic information from electrocardiographic signals. An attempt is made to evaluate this procedure by applying it to a series of accurately modeled situations. Generally acceptable results are obtained with the dipoles arrayed in 'favorable' configurations, with considerably less acceptable outcome likely under 'unfavorable' conditions. O.H.

A72-28998 Capability and limitations of electrocardiography and magnetocardiography. R. Plonsey (Case-Western-Reserve University, Cleveland, Ohio). *IEEE Transactions on Biomedical Engineering*, vol. BME-19, May 1972, p. 239-244. 19 refs. Grant No. PHS-HE-10417.

The capabilities and limitations of electrocardiography and magnetocardiography are discussed. Representing the electrical activity of the heart by an impressed current density, electrocardiography determines the spherical harmonic multipole expansion of its divergence (flux source), while magnetocardiography determines the spherical harmonic multipole expansion of the radial component of its curl (vortex source). (Author)

A72-29075 * # A remote manipulator system for the space shuttle. L. E. Livingston (NASA, Manned Spacecraft Center, Spacecraft Design Div., Houston, Tex.). *American Institute of Aeronautics and Astronautics, Man's Role in Space Conference, Cocoa Beach, Fla., Mar. 27, 28, 1972, Paper 72-238*. 5 p.

Shuttle mission objectives are examined. The outstanding characteristic of the payload handling system will be its versatility. A practical system is needed that combines man's adaptability, skill, and reflexes with the strength, endurance, and relative indestructibility of a machine. Systems that meet these standards, called teleoperators, have been in use for many years. The other half of the problem, the retention of man's natural manipulative skills, is solved by use of a 'master-slave' control system. Two independent, parallel preliminary design studies based on the requirements considered were conducted. G.R.

A72-29176 # Statistical studies of nerve network models (Statisticheskie issledovaniia modelei nervnykh setei). V. I. Lesis and K. P. Zhukauskas. In: Adaptive systems. Large Systems. Moscow, Izdatel'stvo Nauka, 1971, p. 332-337. 7 refs. In Russian.

Activity analysis procedure for a model of a random nerve network is described. A similarity matrix is used for determining the trajectory of a representative point of the nerve network in a phase space. It is shown that a characteristic property of nerve networks is their tendency to keep a state of dynamic equilibrium. V.Z.

A72-29300 * Sleep in the nocturnal primate, *Aotus trivirgatus*. A. A. Perachio (Emory University, Atlanta, Ga.). In: International Congress of Primatology, 3rd, Zurich, Switzerland, August 1970, Proceedings. Volume 2 - Neurobiology, Immunology,

Cytology. Basel, S. Karger AG, 1971, p. 54-60. 5 refs. Grants No. NGR-11-001-012; No. NIH-FR-00165.

Measurement of the cycles of wakefulness and stages of sleep in owl monkeys during 24-hr periods divided into half dark and half light segments. Recordings of electrophysiological activity were used. Reversal of the sequence of light and dark served to test the influence of environmental lighting on the sleep-wakefulness cycles. The sleep patterns of owl monkeys expressed in percentage of rapid eye movement (REM) and nonrapid eye movement (NREM) were compared with those of a closely related New World monkey species, *Saimiri sciureus*. F.R.L.

A72-29307 # Radiobiological effects after three-year gamma-irradiation of dogs (Radiobiologicheskie efekty posle trekhletnego gamma-oblucheniia sobak). Iu. G. Grigor'ev, B. A. Markelov, V. I. Popov, A. A. Akhunov, A. V. Iliukhin, T. P. Tsessarskaia, A. V. Sedov, and V. A. Korsakov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 3-7. In Russian.

The paper summarizes results of a three-year radiobiological experiment on dogs. In several experimental series, chronic irradiation with varied dose rates (21 to 150 rads per year) and chronic irradiation combined with acute exposures (total doses of 120 and 190 rads per year) were applied. Clinical hematological, physiological, and cytological examinations demonstrated that the animals maintained satisfactory clinical condition and had no serious organic radiation damage. However, a decline of their compensatory potentialities and a change of their reactivity were noted. (Author)

A72-29308 # Effect of radioprotectants on the functional state of histo-hematic barriers in restrained animals (Vliianie radioprotektorov na funktsional'nye sostoiianie gisto-gematicheskikh bar'erov pri ogranichenii podvizhnosti zhivotnykh). V. V. Sabaev, V. S. Shashkov, P. V. Sergeev, V. A. Chistiakov, and M. A. Seidametov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 7-10. 16 refs. In Russian.

The effect of mexamine and cystamine on the permeability of histo-hematic barriers of intact and restrained animals was studied. During the experiments, rats were kept under hypokinetic conditions for 10 days. Intraperitoneal injections of radioprotectants increased substantially the I-131/albumin permeability of tissue barriers of most organs and tissues. In response to an injection of radioprotectants during the 10-day hypokinetic experiment, the label transfer through the hemato-encephalic barrier and tissue barriers of the femur and back muscles, the thymus, and adrenals increased to a lesser extent. (Author)

A72-29309 # Changes of blood coagulation during gravity effects on the basis of thromboelastographic data (Izmenenie svertyvaemosti krovi pod vozdeistviem gravitatsionnykh peregruzok po dannym tromboelastografii). A. Z. Serikova, I. F. Konkin, and T. P. Glebushko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 10-14. 6 refs. In Russian.

Acceleration-induced changes of blood coagulation in cats were examined by thromboelastographic and coagulographic techniques. An exposure of animals to accelerations applied as a repeated (1st group) or a single (2nd group) stress-effect increased the anticoagulatory properties (activation of fibrinolysis, elevation and heparin content, decrease of the amount of procoagulants). Hemocoagulation disturbances in the 1st group of animals were more significant which may be suggestive of the effect of the gradient factor. Hemocoagulation parameters tended to return to the normal on the 6th day after the exposure. (Author)

A72-29310 # Morphology of the adrenal cortex after a 24-hour effect of transverse accelerations (Morfologiia kory

nadpochechnikov posle vozdeistviia poperechno napravlennykh uskorenii prodolzhitel'nost'iu do 24 chasov). E. A. Savina and V. K. Podymov. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 14-19. 14 refs. In Russian.

Morphological manifestations of the adrenal cortex responses were studied on white male rats (56 experimental and 28 control animals) exposed for 24 hours to transverse accelerations of 4 g. Variations in the content and distribution of lipids, ascorbic acid, RNA, acid phosphatase activity were demonstrated in relation to the duration of the exposure. (Author)

A72-29311 # Absorption of mineral substances from the nutrient medium by chlorella cells with respect to age (Vozrastnye osobennosti pogloshcheniia kletkami khlorelly mineral'nykh veshchestv iz pitatel'noi sredy). E. K. Lebedeva, A. A. Antonian, T. B. Galkina, and G. I. Meleshko. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 19-23. 15 refs. In Russian.

Age peculiarities of the mineral metabolism of chlorella SpK cells were investigated during intensive cultivation. The results confirm the fact that the age structure of the chlorella population and the nitrogen and phosphorus removal from the medium are correlated. This correlation also finds support in the data concerning the fractionation of nitrogen and phosphorus compounds in cells. This is mainly related to the protein form of nitrogen and the acid-soluble fraction of organic phosphate actively involved in the intracellular metabolism. These findings with respect to cell requirements varying with the age structure of the chlorella population should be taken into consideration when cultivating an intensive chlorella culture and determining the amount of minerals to be added. (Author)

A72-29312 # Studies of allergenic properties of chlorella (Issledovaniia allergennykh svoistv khlorelly). Ia. I. Pukhova, Iu. N. Okladnikov, and L. S. Liubetskaia. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 23-28. 8 refs. In Russian.

Study of the immunobiological status of man sustained for a long time by a bioregenerative life support system. The possibility cannot be excluded that under the conditions of a direct gas exchange between algal and bacterial biocenosis and human allergization, autoallergic processes may develop and specific and nonspecific resistivity of the human body may change. During the prolonged experiment, it was shown that the function of the hypophysis-adrenal cortex system accelerated and the level of humoral factors responsible for the specific and nonspecific immunity increased. The test subject exhibited no C-protein or autoantibodies to vital organs and tissues. Special tests conducted to examine sensitization gave evidence for human tolerance to chlorella and its gaseous metabolites, when contacting via direct gas exchange and reclaimed water. (Author)

A72-29313 # Studies concerning measurements of oxidability of reclaimed water (Issledovanie po opredeleniiu okisliamosti regenerirovannoi vody). V. A. Kriuchkov and N. S. Mareeva. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 28-32. 9 refs. In Russian.

Evaluation of the significance of data obtained by different techniques of measuring oxidability of surface, ground, and sewage waters. The kinetics of oxidation of admixtures occurring in the water condensate resulting from urine distillation by potassium bichromate was studied. The relationship between bichromate oxidative activity and reaction medium acidity was investigated. It is concluded that various methods of assaying oxidability may be employed for analysis of reclaimed water. (Author)

A72-29314 # The problem of latent desynchronization (Problemy skrytogo desinkhronoza). B. S. Aliakrinskii. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 32-37. 12 refs. In Russian.

The paper deals with the problem of adaptation of the human organism to physical and social timers. The response of the organism to the effect of physical timers is the so-called adequate circadian rhythm. In conditions of social life, the circadian rhythms of the human organism are regulated by constant social timers. In acute disturbances of the habitual system of timers, the organism is in a state of marked desynchronization, the elimination of which does not mean restoration of the well being of the organism. The diverse inertness of vital functions of the organism hinders perception of the state of the internal desynchronization by routine techniques. (Author)

A72-29315 # Encephalographic investigations of human adaptation to a changed diurnal cycle (Entsefalograficheskie issledovaniia protsessa prisposobleniia cheloveka k izmenennomu sutochnomu rezhimu). V. N. Cherniakova. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 38-42. 5 refs. In Russian.

The period of man's adaptation to an inverted work-rest cycle depends on his individual features. Test subjects with unstable circadian rhythms of brain bioelectric activity adapted themselves most rapidly. A 72-hour wakefulness used as a disturbing factor shortened the time of rearrangement only during an early period of exposure to an inverted cycle. The rearrangement period was characterized by a large scatter of factual data even during the periods when the middle curve showed a tendency of acquiring a new rhythm. This scatter decreased as the newly developed rhythm became more stable. (Author)

A72-29316 # Study of adaptive capabilities of man to a 16-hour day (Izuchenie vozmozhnosti adaptatsii cheloveka k sutkam 16-chasovoi prodolzhitel'nosti). S. I. Stepanova. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 42-49. 10 refs. In Russian.

Study of the pulse rate of seven test subjects (two men and five women) who for 16 astronomical days lived according to a 16-hour work-rest cycle (5-hour sleep and 11-hour wakefulness), their contacts with physical and social environments being normal. During the experiment, no adaptation of the pulse rate evolved; the 16-hour cycle failed to develop, and the 24-hour cycle persisted. (Author)

A72-29317 # Certain regularities of changes of the heart rate during inverted circadian rhythms of an isolated man (Nekotorye zakonomernosti izmenenii chastoty serdechnykh sokrashchenii pri inversii privychnogo sutochnogo ritma cheloveka v usloviakh izoliatsii). S. P. Kukishev. *Kosmicheskaiia Biologiiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 49-55. 9 refs. In Russian.

Three 45-day experiments were conducted to study diurnal variations of the heart rate during an inverted (a 12 hour shift) work-rest cycle under isolation conditions. The test subjects adjusted themselves to a new cycle using social time-givers, particularly a stereotyped and precisely followed day schedule. Changes in the heart rate as related to the circadian rhythm occurred immediately after inversion. However, four subjects exhibited a decrease of the range of heart rate diurnal variations (the difference between average values recorded during daytime and night hours) on account of a decline of daytime values. The range of the heart rate values returned to the reference level within 1 to 22 days. Five out of six test subjects displayed insignificant variations of the night heart rate. (Author)

A72-29318 # Diurnal changes of gas exchange indices in man (Sutochnye izmeneniia pokazatelei gazoobmena u cheloveka). V. M. Baranov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 55-58. In Russian.

A study was performed to investigate gas exchange and metabolic rate of test subjects enclosed in a small chamber. This was the first investigation conducted under the conditions of a normal and inverted day-night schedule. The purpose of the study was to determine absolute values of gas exchange and metabolic rate at different time intervals as well as to establish the duration of human adaptation to a shifted (by 12 hours) day-night schedule. (Author)

A72-29319 # Diurnal rhythms* of EEG during 72-hour insomnia (Sutochnye ritmy EEG pri 72-chasovoi bessonnitse). A. A. Koreshkov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 58-62. 7 refs. In Russian.

We have carried out investigations of EEG diurnal rhythms during 72-hour insomnia to which 10 healthy test subjects were subjected. These and further studies have shown that the test subjects with a stable rhythm of brain bioelectric activity adapt worse to altered work-rest cycles than those with an unstable rhythm of activity. (Author)

A72-29320 # Diurnal variations of urine potassium excretion in man during long-term wakefulness (Sutochnaia dinamika ekskretsii kaliiia s mochoi u cheloveka pri dlitel'nom bodrstvovanii). A. A. Zykova, L. A. Lugovoi, and V. P. Krotov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 62-66. 10 refs. In Russian.

Diurnal variations of urine potassium excretion were investigated in 10 test subjects kept in a surdichamber of a normal work-rest cycle with a 72-hour continuous wakefulness. Sleep deprivation brought about significant disturbances in diurnal potassium excretion which varied in their pattern and level from subject to subject. In some cases, a displacement of minimum and maximum points prevailed, in others - a decrease of the amplitude of diurnal variations predominated. The results obtained show an appreciable variability of the function of circadian periodic systems in different people. This may be utilized in space crew selection with respect to biorhythmological parameters. (Author)

A72-29321 # Psychophysiological aspects of habitable compartment layout (Psikhofiziologicheskie aspekty kompanovki obitaemykh otsekov). V. V. Zefel'd and L. P. Salmanov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 67-73. 5 refs. In Russian.

Discussion of approaches to the layout of habitable compartments in future spacecraft, based on space parameters of human visual and motor fields, as well as on the social needs of crew members. The efficiency of various designs, including some of U.S. spacecraft, is reviewed. M.V.E.

A72-29322 # Diurnal and seasonal rhythm simulation within spacecraft (Imitatsiia sutochnykh i sezonnykh ritmov v inter'ere kosmicheskogo korablia). L. N. Mel'nikov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 74-77. 7 refs. In Russian.

Discussion of approaches to the development of a meteorological-astronomical model of a year, reflecting the diurnal and seasonal events (i.e., sunrise and sunset, light-darkness alternation with intermediate twilights, rain- and snowfall, etc.) typical of midlatitudes of the Soviet Union, for use in the interior design of manned spacecraft. The model is to underlie the controlled alterations in illumination and color pictures on interior wall-covering, window-simulating screens, related to natural weather and sky

events, that are to facilitate the adaptation of the crew to the unusual psychological factors (isolation, monotony, etc.) of long space missions. M.V.E.

A72-29323 # Alteration of intestinal microflora in long-term stay of man in a hermetic chamber (Izmenenie kishechnoi mikroflory pri dlitel'nom prebyvanii cheloveka v germokamere). V. M. Shilov, N. N. Liz'ko, and O. K. Borisova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 78-81. 19 refs. In Russian.

The paper gives the results of studying intestinal microflora of men during a one-year medico-engineering experiment. The long-term isolation induces substantial shifts in the composition of intestinal microflora which include a drastic reduction of the population of different microbial groups and even a complete disappearance of certain representatives of microorganisms. Simulations of emergency situations which cause an increased physiological load upon the human body bring about more specific changes in the intestinal microflora composition. (Author)

A72-29324 # Alteration of the tissue oxygen metabolism in the initial period of hypokinesia (Izmenenie tkanevogo kislorodnogo obmena v nachal'nom periode gipokinezii). L. A. Ivanov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 82-86. 14 refs. In Russian.

The effect of a 6-day bed rest experiment on external respiration and oxygen metabolism in the subcutaneous connective tissue was studied in healthy test subjects, aged 24-35. During a post-experiment oxygen inhalation test the time in the course of which arterial oxygen saturation attained maximum tended to increase. This was indicative of certain limitations of functional capabilities of external respiration: oxygen consumption decreased, spirographic oxygen deficiency increased and the respiration level of the subcutaneous connective tissue slightly declined. After the 6-day bed rest experiment oxygen supply and the level of oxygen tension in the subcutaneous connective tissue remained practically unchanged. (Author)

A72-29325 # Urea determination by N-dimethylamino-benzaldehyde in water-containing wastes (Opredelenie mocheviny v vodosoderzhashchikh otkhodakh s N-dimetilaminobenzal'degidom). V. A. Uspenskaia and V. B. Gaidadymov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 86-88. 9 refs. In Russian.

Testing of the applicability of the colorimetric method using this compound in the determination of urea in urine and water wastes in a water recycling process. The method is shown to be practical and accurate enough for such applications. V.Z.

A72-29326 # Determination of water-soluble volatile organic compounds in closed airtight objects (Opredelenie letuchikh vodorastvorimykh organicheskikh soedinenii v zamknytykh germob'ektakh). L. N. Stepanov and A. P. Tereshchenko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Jan.-Feb. 1972, p. 88-91. 6 refs. In Russian.

A sealed airtight circulatory system was used for sampling and analysis of equilibrium vapor-liquid phase mixtures of water-soluble volatile organic compounds by chromatography. Numerical results are given for phase mixtures of acetaldehyde, acetone, methanol, isopropanol, ethanol and propanol. This technique is designed for analysis of phase equilibria in closed volumes. V.Z.

A72-29327 # The participation of relatively high-threshold afferents in the formation of the dorsal surface potential of the spinal cord (Ob uchastii otositel'no vysokoporogovykh afferentov v formirovanii potentsiala dorsal'noi poverkhnosti spinnogo mozga). E. M. Tolkacheva (Dnepropetrovskii Gosudarstvennyi Universitet, Dnepropetrovsk, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 3-5. 10 refs. In Russian.

In experiments on spinal cats and on cats subjected to a weak hexenal anesthesia, the conduction of nerve impulses in thick afferent fibers was blocked by constant current. It is shown that the N2-component of the dorsal surface potential of the spinal cord reflects the total postsynaptic potential of segmental interneurons of the dorsal horn activated by relatively high-threshold afferent fibers, referred to the group A-gamma-delta. (Author)

A72-29328 # An analysis of different regimes of work of supplementary respiratory muscles (Analiz razlichnykh rezhimov raboty dopolnitel'noi dykhatel'noi muskulatury). L. S. Romanova, L. E. Sapuntsov, and L. L. Shik (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 9-11. In Russian.

Cross-correlation analysis of interference electromyograms of supplementary respiratory muscles (major pectoral muscles and abdominal rectal muscles) has shown an absence of correlation in their spontaneous contraction and its presence during work in conditions of forced breathing. The synchronous or accidental regime of work of respiratory units of the supplementary respiratory muscles depends on the character of supraspinal effects. (Author)

A72-29329 # The pain sensitivity of cardiac membranes under the sensitizing influence of acetylcholine (Boleviaia chuvstvitel'nost' obolochek serdtsa pri sensibiliziruiushchem vliianii atsetilkholina). Iu. E. Maliarenko and L. V. Chanturiia (Rostovskii-na-Donu Meditsinskii Institut, Rostov, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 11-15. 14 refs. In Russian.

In experiments on vagotomized and urethan anesthetized cats, it was found that painless concentrations of ions of potassium introduced in the pericardial cavity under the effect of acetylcholine (0.001 microgram/nul) become algogenic. Physostigmin inhibition of the cholinesterase activity with subsequent stimulation of the cardiac branch of the vagus nerve causes a decrease of the threshold of pain sensitivity from 23.4-46.8 to 11.7-23.4 mmol/l KCL (chloralose 80 mg/kg). An assumption is made that the development of cardiac pain may depend on the accumulation of acetylcholine during reduced activity of cholinesterase or an excessive activity of cholinergic structures. (Author)

A72-29330 # The role of mast cells in the peroxidase activity of the thyroid gland in experimental burns (Rol' tuchnykh kletok v peroksidaznoi aktivnosti shchitovidnoi zhelezy pri eksperimental'noi ozhogovoi bolezni). L. M. Burman and G. K. Sakhnovskaia (L'vovskii Nauchno-Issledovatel'skii Institut Gematologii i Perelivaniia Krovi, Lvov, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 33-35. 12 refs. In Russian.

Studies of the morphofunctional state of the thyroid gland during the development of an experimental burn show phased changes in peroxidase content in epithelial cells of follicles and a persistently high enzymatic activity in the mast cells. The parallelism observed between the localization and functional activity of mast cells and the presence of peroxidase in follicles gives ground to state that mast cells play a transmissional role in the transport of peroxidase to follicular cells of the thyroid gland. (Author)

A72-29331 # Changes in tissue respiration of various organs subjected to the action of a high-temperature medium (Izmenenie tkanevogo dykhanii razlichnykh organov pri vozdeistvii na organizm vysokoi temperatury sredy). R. Akhmedov (Akademiia Nauk Uzbekskoi SSR, Otdel Fiziologii, Tashkent, Uzbek SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 50, 51. 10 refs. In Russian.

The participation of various organs and skeletal muscles in sustaining temperature homeostasis in the organism during the action of a high temperature of the surrounding medium has been investigated in rats. The experimentally determined volumes of oxygen required by the principal body organs at different temperatures are tabulated and discussed. O.H.

A72-29332 # The dynamics of the impedance level of a tissue area between active electromyograph electrodes in the regimen of skeletal muscle fatigue (Dinamika urovnia impedansa uchastka tkani mezhdru aktivnymi elektromiograficheskimi /EMG/ elektrodami v rezhime utomleniia skeletnoi myshitsy). I. F. Golovko (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Khirurgicheskoi Apparatury i Instrumentov; Ministerstvo Meditsinskoi Promyshlennosti SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskoi Promyshlennosti, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 58-60. 10 refs. In Russian.

Results of preliminary studies of the dynamic character of manifestation of bioelectric passive properties (impedance level of Zm-e tissue area between active skin EMG electrodes) under the influence of intensive muscular work. The experiments were conducted in normal conditions on 11 apparently healthy men aged 18-35 years. The right musculus biceps brachii was investigated. In an isometric regime (standing, the right elbow is bent at 90 deg, a wide band with weight is suspended over the right carpus), 60% of cases show a relation between the impedance level of the tissue area between active EMG electrodes (Zm-e) and changes of the physiological state of the muscle (fatigue). The effect was manifested by a temporal reduction of the cellular permeability of the skin (mainly of epidermal cells) and by an associated intensive avalanche-like rise of the initial level of Zm-e, followed by more or less smooth restoration of the initial level after the weight is removed. (Author)

A72-29333 # A study of changes in the brain and eyes under the effect of laser rays (Izuchenie izmenenii golovnogo mozga i glaz pod vlianiem lucheii lazera). B. V. Ognev, A. A. Vishnevskii, R. A. Troitskii, and N. I. Timokhina (Akademiia Meditsinskikh Nauk SSSR; Tsentral'nyi Institut Uovershenstvovaniia Vrachei, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 103-105. 18 refs. In Russian.

The eyes of chinchilla rabbits were irradiated by a 1.06-micron neodymium laser providing 3-msec, 80-160 J pulses in a 3-mm diameter beam. At periods from 2 hours to 30 days the animals were sacrificed and the eyes were investigated histologically. There were extensive destructive changes of eye membranes, a marked stasis in cerebral vessels, and vacuolization of the cytoplasm of cells of the visual analyzer. (Author)

A72-29334 # Structural changes in the thyroid gland subjected to repeated action of radial accelerations (Strukturnye izmeneniia v shchitovidnoi zheleze pri mnogokratnom deistvii radial'nykh uskorenii). N. S. Shenkman and E. D. Klimenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Feb. 1972, p. 106-108. 20 refs. In Russian.

A histochemical and morphometric investigation has been conducted of the thyroid gland of dogs subjected to repeated radial acceleration. The results reveal evidence of the development of an atrophic process in the gland. It is suggested that autonomous reactions may play a significant role in the genesis of this process.

O.H.

A72-29374 * A model describing vestibular detection of body sway motion. L. M. Nashner (MIT, Cambridge, Mass.). *Acta Oto-Laryngologica*, vol. 72, 1971, p. 429-436. 13 refs. Grant No. NGR-22-009-156.

An experimental technique was developed which facilitated the formulation of a quantitative model describing vestibular detection of body sway motion in a postural response mode. All cues, except vestibular ones, which gave a subject an indication that he was beginning to sway, were eliminated using a specially designed two-degree-of-freedom platform; body sway was then induced and resulting compensatory responses at the ankle joints measured. Hybrid simulation compared the experimental results with models of the semicircular canals and utricular otolith receptors. Dynamic characteristics of the resulting canal model compared closely with characteristics of models which describe eye movement and subjective responses to body rotational motions. The average threshold level, in the postural response mode, however, was considerably lower. Analysis indicated that the otoliths probably play no role in the initial detection of body sway motion. (Author)

A72-29558 Active vibration isolation for personnel seating. P. C. Calcaterra (Barry Wright Corp., Watertown, Mass.). In: Noise and vibration control engineering; Proceedings of the Purdue Noise Control Conference, Lafayette, Ind., July 14-16, 1971. Lafayette, Ind., Purdue University, 1972, p. 209-217. 23 refs.

Real world experience and laboratory experiments indicate that seated personnel are particularly susceptible to vibration excitation in the 4 to 20 Hz region, which encompasses the fundamental whole body resonance as well as eyeball and head-on-shoulder resonances of the human body. It has been determined that active vibration isolation mechanisms are particularly suitable in cases where protection from vibration is required at relatively low frequencies. One such example is the protection of aircraft pilots from either the high-level vibrations experienced on board helicopters, or from the severe vibration environment associated with jet aircraft turbulence encounters and low-altitude high-speed flight. This paper discusses the general nature of human vibration factors and describes the application of active vibration isolators for protecting aircraft pilots from severe dynamic environments. (Author)

A72-29559 Hand impedance measurements on human subjects and interpretations with respect to the hand-arm system. D. D. Reynolds and W. Soedel (Purdue University, Lafayette, Ind.). In: Noise and vibration control engineering; Proceedings of the Purdue Noise Control Conference, Lafayette, Ind., July 14-16, 1971. Lafayette, Ind., Purdue University, 1972, p. 218-225. 13 refs. Research supported by the Roper Corp.

Attempt to gain a greater understanding of the vibration characteristics of the hand and arm, which is necessary to establish meaningful hand vibration standards, and to develop a mathematical model of the vibration characteristics of the hand-arm system. The mechanical impedance measurement technique was used to examine the hand response to sinusoidal force inputs and to obtain data necessary to identify the numerical values of the masses, springs, and dampers. It appears that when considering a standard for hand vibration limits the effects of tightness of grip and the firmness of handle pressure should be taken into account. F.R.L.

A72-29560 Physiological effects of mechanical vibration. W. E. Collins, E. C. Keller, Jr., and F. C. Kosmakos (West Virginia University, Morgantown, W. Va.). In: Noise and vibration control engineering; Proceedings of the Purdue Noise Control Conference, Lafayette, Ind., July 14-16, 1971. Lafayette, Ind., Purdue University, 1972, p. 226-233. 24 refs.

Results of experiments with rats, showing that specific G-levels can induce physiological changes in plasma, calcium, magnesium inorganic phosphate, and xanthine oxidase levels. It is also shown that factors involved in performing the experiments are likewise able to induce physiological changes in plasma calcium concentration and xanthine oxidase activity. F.R.L.

A72-29749 * Interval scanning photomicrography of microbial cell populations. L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Applied Microbiology*, vol. 23, Jan. 1972, p. 190-192. NSF Grant No. GB-14487; Grant No. NGR-39-009-180.

A single reproducible area of the preparation in a fixed focal plane is photographically scanned at intervals during incubation. The procedure can be used for evaluating the aerobic or anaerobic growth of many microbial cells simultaneously within a population. In addition, the microscope is not restricted to the viewing of any one microculture preparation, since the slide cultures are incubated separately from the microscope. G.R.

A72-29818 Respiratory and circulatory response to added air flow resistance during exercise. L. Hermansen, Z. Vokac, and P. Lereim (Institute of Work Physiology, Oslo, Norway). *Ergonomics*, vol. 15, Jan. 1972, p. 15-24. 19 refs.

The response to submaximal and maximal exercise in ten healthy subjects was studied. The results of experiments with a gas mask are compared with the results of experiments in which a conventional respiratory valve was used. Oxygen uptake was the same for a given work load in both series of experiments, as long as the work load corresponded to no more than 75% of the maximal work capacity of the subjects. However, a significant decrease in oxygen uptake under conditions of maximal work was observed when the mask was used. Pulmonary ventilation was always lower with the mask than with the valve and the difference increased with increased work load. G.R.

A72-29819 Acquiring a target with an unlagged acceleration control system and with 3 lagged rate control systems. A. H. Tickner and E. C. Poulton (Medical Research Council, Cambridge, England). *Ergonomics*, vol. 15, Jan. 1972, p. 49-56. Research supported by the Medical Research Council.

Separate groups of from 5 to 15 men acquired targets using either an unlagged acceleration control system, or else a rate control system with an exponential time lag of 0.5, 2 or 4 sec. After practice, acquisition took reliably longer with the unlagged acceleration control system than with any of the lagged rate control systems. Detailed analyses indicated that the men did not use rates as large as they could have done. The first approach movement was less accurate with the unlagged acceleration control system, and more control stick movements were required to hold the response marker within the target circle for the criterion time of 2 sec. The rate control system with the exponential time lag of 4 sec resembled the unlagged acceleration control system in these 2 respects. (Author)

A72-29820 Recovery strategy during temporary obscuration of a tracked target. P. D. McLeod (Medical Research Council, Cambridge, England). *Ergonomics*, vol. 15, Jan. 1972, p. 57-64.

Separate groups of 11 or 12 subjects performed a 2-dimensional

continuous pursuit tracking task, with one of three orders of control. The target was obscured for the middle 2 sec of a 10 sec run. The trackers' tactics during this blank period were studied. It was found that in both horizontal and vertical dimensions the subjects continued to move the pursuing spot with the average velocity at which it had moved while the target was visible. It appears from an analysis of the control stick movements that they achieved this strategy by sampling from their previous behavior. (Author)

A72-29821 **Alpha-numeric for raster displays.** B. J. Giddings (Elliott Flight Automation, Ltd., Rochester, Kent, England). *Ergonomics*, vol. 15, Jan. 1972, p. 65-72. 9 refs.

The possibility of using small TV type raster displays in airborne applications raises many problems. One of these is the size of alpha-numeric characters. A legibility experiment is described which suggests that under particular conditions there is an optimum height for characters. This optimum height was found to be different for six-letter words and single digits. (Author)

A72-29832 **Human performance in contingent information-processing tasks. I.** Biederman (New York, State University, Buffalo, N.Y.). *Journal of Experimental Psychology*, vol. 93, May 1972, p. 219-238. 34 refs. Contract No. AF 49(628)-1235.

Theoretical accounts of complex human information-processing behavior have emphasized the utilization of contingencies whereby the processing of some information directs the processing requirements of the remaining sources of uncertainty. The present investigation sought to determine how such flexible processing might be accomplished in a speeded recognition task where the relevancy of a given stimulus dimension was contingent upon the value of the stimulus on some other dimension. These contingent tasks, in which only two of the three dimensions were relevant on any one trial, were performed faster and more accurately than tasks where all three dimensions were relevant on each trial. Moreover, the speed at which a given contingent task could be performed was related to the discriminability of the dimensions that were relevant on that trial. These results provide strong support for a self-terminating, feature-testing, contingent mode of processing. The error data and repetition effects also supported the hypothesis that Ss were employing the contingent relations to achieve a classification of the stimulus. The lack of interactions between discriminability of the relevant dimensions in the contingent tasks and variations in S-R compatibility were consistent with the hypothesis that the contingencies were utilized at some stage prior to response selection. (Author)

A72-29833 * **Acute changes in the central nervous system of monkeys exposed to protons.** W. Haymaker, M. Z. M. Ibrahim, J. Miquel, N. Call, P. Noden, W. Ashley (NASA, Ames Research Center, Moffett Field, Calif.), E. R. Ballinger, J. Ghidoni, I. R. Lindsay (USAF, School of Aerospace Medicine, San Antonio, Tex.), and A. J. Behar (Hebrew University, Jerusalem, Israel). *Journal of Neuro-pathology and Experimental Neurology*, vol. 31, Jan. 1972, p. 72-101. 29 refs.

Study of the changes occurring in simian brain exposed to protons of varied energy, given in wide dose and dose-rate ranges. Results show that inflammatory reaction and glycogen accumulation in astrocytes occurred practically in all animals. Cerebral cortical necrosis, granule cell pyknosis, and inflammatory reaction occurred at doses far lower than effective for high-energy gamma radiation given other series of monkeys at comparable dose rates. Metallic impregnation, carried out in virtually all the animals tested, revealed a wide variation in glial response even at equal doses and dose rates in the same proton energy series. Proton energy effect, dose effect, dose-time effect, and dose-rate effect were evident in the various morphological categories investigated, but inconsistencies were encountered. O.H.

A72-29834 * **Aliphatic hydrocarbons of the fungi.** J. D. Weete (Lunar Science Institute, Houston, Tex.). *Phytochemistry*, vol. 11, 1972, p. 1201-1205. 34 refs. Research supported by the Universities Space Research Association; Contract No. NSR-09-051-001.

Review of studies of aliphatic hydrocarbons which have been recently detected in the spores of phytopathogenic fungi, and are found to be structurally very similar to the alkanes of higher plants. It appears that the hydrocarbon components of the few mycelial and yeast forms reported resemble the distribution found in bacteria. The occurrence and distribution of these compounds in the fungi is discussed. Suggested functional roles of fungal spore alkanes are presented. F.R.L.

A72-29844 **Effects of selected illumination levels on circadian periodicity in the Rhesus monkey /Macaca mulatta/.** J. L. Martinez, Jr. (Worcester Foundation for Experimental Biology, Shrewsbury, Mass.). *Journal of Interdisciplinary Cycle Research*, vol. 3, Mar. 1972, p. 47-59. 9 refs.

The effects of light intensity on circadian activity rhythms of nonhuman primates have been determined. This was accomplished by subjecting four male Rhesus monkeys to a light-dark cycle (L/D 12/12), six different levels of constant illumination and constant darkness. The results clearly demonstrate that the Rhesus monkey is an exception to Aschoff's Circadian Rule (1960) which describes the effect of light intensity on circadian activity rhythms. The period of the activity rhythm increased with increasing illumination and a behavioral threshold was evident at about 5.0 footcandles. Gross activity and the ratio of active to rest did not vary as a function of light intensity. It is concluded that the mediation of circadian rhythms in nonhuman primates probably differs from lower vertebrates. O.H.

A72-29845 **Analysis of perceptual-motor performance in terms of periodic activity.** M. A. Tainsh (Aston, University, Birmingham, England). *Journal of Interdisciplinary Cycle Research*, vol. 3, Mar. 1972, p. 73-76. 6 refs.

The application of statistical periodic analysis of Fisher (1929) has made it possible to detect cyclic activity in human perceptual-motor performance. Cyclic activity is shown to be an integrated part of the individual's total activity on a perceptual-motor task. O.H.

A72-29846 # **Increased ventilatory response to CO₂ by rebreathing in consecutive daily trials.** Y. Honda and M. Miyamura (Kanazawa University, Kanazawa, Japan). *Japanese Journal of Physiology*, vol. 22, Feb. 1972, p. 13-23. 21 refs. Research supported by the Ministry of Education of Japan.

Alveolar carbon dioxide pressure-ventilation response curves were measured on 5-6 consecutive days by the rebreathing method of Campbell and his associates. The slopes of the response curves progressively increased until the third day and then leveled off. The ventilatory response evaluated by breath-by-breath recording after a single large breath of hypercapnic and/or hypoxic test gases also increased in the same manner when studied at the same time. This phenomenon was thought to be related to the altered neurogenic activity in the ventilatory control system. The slope of the response curve obtained by the conventional steady state method did not show the consistent increase observed with the rebreathing method. (Author)

A72-29851 **Luminous targets - Visibility fluctuations modified by similar verbal responses.** D. Donderi and B. Miller (McGill University, Montreal, Canada). *Perception and Psychophysics*, vol. 11, Apr. 1972, p. 299, 300. 12 refs. Research supported

by the National Research Council of Canada; Defence Research Board of Canada Grant No. 9401-11.

Subjects reported visibility fluctuations in a luminous target consisting of small, medium, and large circles. Each subject had previously learned a response to each of the three circles. The experimental group learned two words which were free associates of each other and a third unrelated word. The control group learned three unrelated words. Concurrent visibility for the pair of circles associated with related words was greater than for the pairs associated with unrelated words. Thus word associations influence perception of stimuli for which the words are responses. (Author)

A72-29852 # On the locus of the divided-attention effects. G. E. Briggs, G. L. Peters, and R. P. Fisher (Ohio State University, Columbus, Ohio). *Perception and Psychophysics*, vol. 11, Apr. 1972, p. 315-320. 18 refs. Contract No. F33615-69-C-1663.

Reaction times in a choice reaction task were used to localize the divided-attention effect (less proficient performance under dual than under single-task conditions) in a sequential-stage model of human information processing. Experiment 1 eliminated a central (memory-dependent) processing stage, while experiment 2 suggested that a stimulus sampling process within the initial encoding stage was the locus of the effect. Thus, the effect was localized in the input, not the central or an output stage of processing. A slower stimulus sampling rate was indicated under dual than under single-task conditions. (Author)

A72-29857 # The importance of electrocardiograms recorded during hypoxia for determining piloting aptitude (L'importanza dell'elettrocardiogramma eseguito in ipossia ai fini dell'idoneita' al pilotaggio). F. Rossanigo (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Italy) and G. Ruggieri. *Rivista di Medicina Aeronautica e Spaziale*, vol. 24, Oct.-Dec. 1971, p. 283-288. In Italian.

Results of an examination of a large number (1543) of electrocardiograms of healthy subjects under normoxia and hypoxia conditions. A study was made of the behavior, with respect to age group, of disturbances of the right intraventricular conduction, excitation disturbances, and minor anomalies of the ventricular repolarization. In addition, the importance of these factors in determining piloting aptitude is evaluated. The subjects examined were divided into two age groups - one ranging from 17 to 22, and the other from 18 to 62. During hypoxia tests no qualitative or numerical increase in disturbances of intraventricular conduction were noted, but a significant increase in disturbances of ventricular repolarization occurred. In the subjects examined both disturbances of right intraventricular conduction and disturbances of ventricular repolarization occur more frequently, whether in normoxia or hypoxia, in the younger age group. A.B.K.

A72-29858 # Flight psychiatry in NATO countries (La psichiatria aeronautica nei paesi N.A.T.O.). L. Longo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 24, Oct.-Dec. 1971, p. 289-310. 5 refs. In Italian.

Review of the position currently occupied by flight psychiatry in the NATO countries. The role played within the various nations (Belgium, Canada, Denmark, France, West Germany, Greece, Great Britain, Italy, Norway, Holland, Portugal, the United States, and Turkey) belonging to NATO by this discipline on the organizational plane with respect to both military aviation and civil aviation is examined. The need for a major harmonization of the flight psychiatry facilities in the various countries is stressed. A.B.K.

A72-29861 * Tissue enzyme studies in *Macaca nemestrina* monkeys. R. W. Hubbard, R. A. Hoffman, and D. Jenkins (NASA, Ames Research Center, Moffett Field, Calif.). *Folia Primatologica*, vol. 16, 1971, p. 282-293. 17 refs.

Total enzyme activities in fresh tissue specimens from major organs of *Macaca nemestrina* were analyzed for lactic dehydrogenase (LDH), creatine phosphokinase (CPK), and aldolase. The concentration of these enzymes varied among the different tissue with skeletal muscle, heart, and brain having the highest activities. LDH isozymes determinations for the various tissues were also made. The spectrum of LDH isozyme distribution appears to be quite specific and characteristic for at least some of the tissues analyzed. (Author)

A72-29867 # Laser beams and vascularization (Laser-Strahlen und Vaskularisation). F. A. Kiss, E. Mester, St. Krompecher, J. G. Tota, and L. Kalabay (Szemmelweis Orvostudományi Egyetem, Budapest; Debreceni Orvostudományi Egyetem, Debrecen, Hungary). *Radiobiologia-Radiotherapia*, vol. 13, no. 1, 1972, p. 123-132. 35 refs. In German.

The effect of laser radiation on the vascularization of the cornea of rabbits after the treatment with suprarenal total extract of white rats is investigated. It is found that laser irradiations with 3.5 and 5.9 J per sq cm have an inhibitory influence on the vascularization-favoring effect of the suprarenal total extract. An increase in the vascularization-favoring effect of the suprarenal total extract can be observed for a radiation energy of 6.3 J per sq cm. G.R.

A72-29929 Turbulent velocity in undisturbed and active photosphere. O. G. Badalian (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and M. A. Livshits (Akademiia Nauk SSSR, Institut Zemnogo Magnetizma, Ionosfery i Rasprostraneniia Radiovoln, Moscow, USSR). *Solar Physics*, vol. 22, Feb. 1972, p. 297-306. 21 refs.

Profiles of weak Fraunhofer lines have been recorded photoelectrically in both the faculae and the undisturbed photosphere. Turbulent velocities were found by comparing half-widths of the observed profiles with those of model calculations. These latter were carried out with aid of an electronic computer for the Bilderberg Continuum Atmosphere (BCA) under the assumption of true absorption and depth independent turbulent velocities. Line-formation levels were derived from the contribution curves computed by the method of weighting functions. For the undisturbed photosphere a turbulent velocity of about 2.6 km/sec was found with no appreciable increase with the depth. (Author)

A72-29966 Photoproducts of retinal photopigments and visual adaptation. M. A. Mainster and T. J. White (Technology, Inc., San Antonio, Tex.). *Vision Research*, vol. 12, May 1972, p. 805-823. 32 refs. Contract No. DASA01-70-C-0008.

A five-component cyclic model of photopigment kinetics has been used to compute photochemical changes corresponding to experimental studies of rod adaptation in the rat and in man. It is found that a simple relationship between rhodopsin photoproducts and visual thresholds makes possible a consistent description of rod adaptation with or without a background field. The five-component model is shown to offer a more general foundation for the analysis of visual phenomena than earlier two-component models of photopigment kinetics. M.V.E.

A72-29967 Selective chromatic adaptation in primate photoreceptors. R. M. Boynton (Rochester, University, Rochester, N.Y.) and D. N. Whitten (San Francisco Medical Center, San Francisco, Calif.). *Vision Research*, vol. 12, May 1972, p. 855-874. 33 refs. Grants No. NIH-EY-00187; No. NIH-EY-00468.

The size of a late receptor potential is used as a response index to investigate selective chromatic adaptation in the cone photoreceptors of cynomolgous macaque monkeys. Large effects, consistent with the classical trichromatic view, are found. The responses to light pulses of red and green cones are of exactly the same shape; those from blue cones appear to have a longer time constant. The results indicate that the relative contributions of potentials of the three kinds of cones to the measured late receptor potential are unequal. M.V.E.

A72-29968 Intensity versus adaptation and the Pulfrich stereophenomenon. B. J. Rogers and S. M. Anstis (Bristol, University, Bristol, England). *Vision Research*, vol. 12, May 1972, p. 909-928. 30 refs. Science Research Council Grant No. B/H/182.

A stereoscopic null method was used to measure visual latencies as a function of stimulus luminance and state of adaptation over a 6 log unit range. The results are presented in three dimensions, with intensity, adaptation level, and latency as the coordinates. The relationship between latency and luminance is found to be characterized by an inverse power function, as predicted by the Fourtes-Hodgkin (1964) model of visual response. M.V.E.

A72-29969 Adaptation of the pupil light reflex. N. Ohba and M. Alpern (Michigan, University, Ann Arbor, Mich.). *Vision Research*, vol. 12, May 1972, p. 953-967. 32 refs. Grant No. NIH-EY-00197-13.

The consensual photopupil responses to light flashes presented in uniform illumination to the entire visual field were recorded in full dark adaptation over a gamut of intensities of ganzfeld backgrounds and in the dark after full bleach of all visual pigment in the retina. The equivalent background of such bleaching was found to be valid, not only at the photopupillomotor threshold, but also for flashes several log units suprathreshold. M.V.E.

A72-29970 Spatio-temporal integration in the human peripheral retina. W. G. Owen (Imperial College of Science and Technology, London, England). *Vision Research*, vol. 12, May 1972, p. 1011-1026. 29 refs. Research supported by the National Illumination Committee of Great Britain.

Experiments are described in which the spatial summation and temporal summation characteristics of the human eye were investigated for stimuli viewed at an eccentricity of 10 deg against backgrounds of luminance 0 and 9.8 ft-L. A relation was found between the measured value of the summation area and the duration of the stimulus used in the determination. M.V.E.

A72-29971 Eye movements and the after-image. II - The effect of foveal and non-foveal after-images on saccadic behaviour. S. Heywood and J. Churcher (Oxford University, Oxford, England). *Vision Research*, vol. 12, May 1972, p. 1033-1043. 14 refs.

Investigation of the effects of nonfoveal afterimages on saccadic behavior, and comparison of these effects with those of foveal afterimages and with saccadic behavior with no afterimages. It is found that foveal afterimages inhibit saccades and facilitate smooth eye movements whether or not instructions to track the afterimage are given. Parafoveal afterimages are effective stimuli for eliciting consistent eye movement patterns, but these patterns change when instructions are given. Peripheral afterimages have little effect on eye movements. M.V.E.

A72-29981 # Neuronal mechanisms of motor activity control (Neironal'nye mekhanizmy upravleniia dvizheniem). A. I. Shapovalov. *Akademiia Nauk SSSR, Vestnik*, Apr. 1972, p. 43-54. In Russian.

Review of recent studies of the role of neurons in the motor activity of muscles. An assembly for studying the functional connections between the cerebrum and motoneurons, the mono-synaptic, rubrospinal and corticospinal potentials of motoneurons, and the interaction between monosynaptic responses and background depolarization in motoneurons are covered. V.Z.

A72-29996 Origin of plastids and the phylogeny of algae. R. E. Lee (Witwatersrand, University, Johannesburg, Republic of South Africa). *Nature*, vol. 237, May 5, 1972, p. 44-46. 36 refs.

A hypothesis is presented of the origin of plastids from a Cyanophycean alga involved in an endosymbiosis with a colorless Cryptophyte. It is suggested that the development of the eukaryotic algae from the cyanomes of the Cryptophyceae probably occurred along three separate phylogenetic lines - i.e., the first to the Chlorophyta, the second to the Chromophyta, and the third to the Rhodophyta. O.H.

A72-30015 # Spatial orientation of bats under the action of hypergravity (Prostranstvennaia orientatsiia letuchikh myshei pod vliianiem povyshennoi gravitatsii). E. Sh. Airapet'iants, V. N. Zvorykin, and B. M. Savin (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 203, Mar. 21, 1972, p. 723-725. In Russian.

Detailed study of the effect of hypergravity on the spatial analysis ability of two types of bats (*Myotis oxygnathus* and *Pipistrellus pipistrellus*). The exceptionally high resistance of bats to hypergravity is established, the resistance of *Pipistrellus* being considerably greater than that of *Myotis* (120 g as against 70 g). The difference in the resistance to head-pelvis and pelvis-head accelerations is less pronounced in bats than in other mammals. It is found that sudden changes in the functional state of the acceleration system cause disturbances (generally of short duration) in the activity of the echo radar mechanism, thus attesting to the presence of certain functional interactions between these systems, which apparently play an important role in spatial analysis. A.B.K.

A72-30016 # Effect of 5-oxytryptophan on the hypothalamic-hypophysial-adrenal complex under conditions of complete deafferentation of the medial-basal hypothalamus (Vliianie 5-oksitriptofana na gipotalamo-gipofizarno-nadpochechnikovyi kompleks v usloviakh polnoi deafferentatsii medial'no-bazal'nogo gipotalamusa). N. K. Popova, L. N. Maslova, L. A. Koriakina, V. D. Bertogaeva, and E. V. Naumenko (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 203, Mar. 21, 1972, p. 726-728. 11 refs. In Russian.

Study of the effect of 5-oxytryptophan (a precursor of the biological synthesis of serotonin) on the functional state of a completely deafferentated portion of the hypothalamus in albino rats. It is shown that the introduction of 5-oxytryptophan has a pronounced stimulating effect on the hypothalamic-hypophysial-adrenal system after complete deafferentation of the medial-basal hypothalamus and that the reaction of this system in deafferentated animals does not differ substantially from the reaction to 5-oxytryptophan of rats with an intact brain. It is concluded that the effect of serotonin on the hypophysial zone of the hypothalamus is not mediated through the periphery and that overlying sections of the brain are not involved in this reaction. It is also concluded that the medial-basal zone of the hypothalamus contains serotonin-reactive structures which are apparently related to the secretion of the corticotrophin-liberating factor and participate in the regulation of the adrenocorticotrophic function of the hypophysis. A.B.K.

A72-30042 Visual resolution as measured by dynamic and static tests. V. M. Reading (Institute of Ophthalmology, London, England). *Pflügers Archiv*, vol. 333, no. 1, 1972, p. 17-26. 12 refs. Research supported by the Medical Research Council.

Static visual acuity has been measured as a function of target exposure time; dynamic visual acuity as a function of target velocity. The ranges were 6-120 msec for flash exposures and 22-167 deg/sec for angular velocities. Frequency of seeing curves were used to determine thresholds for two groups of observers, aged 20-30 years and 40-50 years. Visual acuity is found to deteriorate rapidly with angular velocity. The product-moment correlation and the correlation ratio were calculated in order to reveal any relation between static and dynamic visual acuity. There is no statistically significant relationship between these two types of visual discrimination abilities either in a linear or a curvilinear fashion. A senile decline in acuity was observed. (Author)

A72-30043 Analysis of eye movement responses and dynamic visual acuity. V. M. Reading (Institute of Ophthalmology, London, England). *Pflügers Archiv*, vol. 333, no. 1, 1972, p. 27-34. 23 refs. Research supported by the Medical Research Council.

Horizontal eye movements were recorded during measurements on dynamic visual acuity to determine whether the deterioration in visual acuity during tracking is due to imperfect pursuit movements. The electrical method of eye movement recording (electro-oculography) was employed. Analysis of these recordings indicates that at low velocities (22 and 43 deg/sec) accurate and synchronous pursuit is possible but at higher speeds (83 and 167 deg/sec) saccadic movements persist owing to fixation failure. Above 60-70 deg/sec the oculomotor co-ordination system breaks down and saccadic movements replace the pursuit movements as the dominant mechanism. (Author)

A72-30044 Comparative force-frequency relationships in human and other mammalian ventricular myocardium. N. M. Buckley, Z. J. Penefsky, and R. S. Litwak (Albert Einstein College of Medicine; Mount Sinai School of Medicine, New York, N.Y.). *Pflügers Archiv*, vol. 332, no. 4, 1972, p. 259-270. 28 refs. Research supported by the City University of New York.

Contractile responses to increased stimulation frequency were analyzed in isolated papillary and ventricular muscle bundles from human, guinea pig and rat hearts. Contractile tension and velocity of tension development and release were recorded while changes in frequency were made. The following were calculated for each frequency; duration of the phases of accelerating (I) and decelerating (II) contraction, and accelerating (III) and decelerating (IV) relaxation; tension at end of phases I, II and III; and instantaneous velocities at the midpoint of phase I, and at the end of phases I and III. Increasing frequency was accompanied by decreased contractile tension and velocities to a limit in rat and markedly hypertrophied adult human myocardium; but by increased contractile tension and velocities to a limit in guinea pig, late fetal human, and minimally hypertrophied adult human myocardium. The observations support the hypothesis that peak contractile tension development depends on phase I velocity and phase II duration. (Author)

A72-30045 Effect of temperature and calcium on force-frequency relationships in mammalian ventricular myocardium. Z. J. Penefsky, N. M. Buckley, and R. S. Litwak (Mount Sinai School of Medicine; Albert Einstein College of Medicine, New York, N.Y.). *Pflügers Archiv*, vol. 332, no. 4, 1972, p. 271-282. 19 refs. Research supported by the City University of New York.

The effects of temperature and calcium on force-frequency relationships in mammalian ventricular myocardium were studied in isolated papillary and ventricular muscle bundles. Tensions,

velocities, and phase durations were determined from the isometric tension record and its first derivative. Decreasing bath temperature from 34-36 C to 27-31 C increased contractile tension and prolonged the phases of contraction in rat, guinea pig, and adult and fetal human tissues without altering the force-frequency relationship. Doubling extracellular Ca(++) beyond the 2.7 mM control for human tissue increased contractile tension and shortened phase I, and made the force-frequency relationship less steep or biphasic. These results suggest that the negative force-frequency relationship in the failing human heart cannot be explained merely on the basis of unavailability of Ca(++) to the contractile proteins. (Author)

A72-30097 A rescue hoist for the light transport helicopter Bell UH 1-D (Eine Rettungswinde für den leichten Transporthubschrauber Bell UH 1-D). K. Göwecke. *AEG-Telefunken, Technische Mitteilungen*, vol. 62, no. 2, 1972, p. 54-56. In German.

Description of a new electrically driven, internally mounted helicopter hoist that has been developed specifically for rescue operations under special conditions. Detailed attention is given to the hoist structural design and the electrical drive mechanism. Technical data are presented. O.H.

A72-30255 # Motor preconditioning in man under conditions of water immersion (Kharakter dvigatel'noi prednastroiki u cheloveka v usloviakh vodnoi immersii). A. V. Ovsianikov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Mar. 1972, p. 305-310. 15 refs. In Russian.

The functional state of the segmental apparatus before voluntary movement was investigated in man during water immersion. H-reflex was used for the evaluation of excitability of spinal cord motoneurons. On the 3-d, 4-th and 5-th days of water immersion, the increase of antagonist motoneuron pool excitability began 30 msec before EMG, instead of the normal 60 msec. The absence of excitability increase in the interval 60-30 msec prior to movement is considered to be the consequence of disuse of the suprasegmental nervous structure, involved in the spinal mechanisms of postural readjustments. (Author)

A72-30256 # Responses of the receptive fields of the cat's visual cortex to complex stimuli (Otvety retseptivnykh polei zritel'noi kory koshki na slozhnye stimuly). V. D. Glezer, V. A. Ivanov, and T. A. Shcherbach (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Mar. 1972, p. 311-320. 6 refs. In Russian.

The responses of the complex and hypercomplex cortical receptive fields were evoked with the aid of light bands of different width and intervals between them. The stimuli moved through the receptive field at the speed corresponding to flicks of the eye. The data indicate that the complex fields of the visual cortex cannot be regarded as a detector extracting the segment of the contour of definite orientation invariant to its displacement in the field. Receptive fields perform more complex analysis of the image. This is also testified by the fact that each receptive field has a stimulus giving the maximal response. Such stimuli may be an edge or a slit or several slits. The cortical receptive fields seem to be filters serving for series expansion of the part of the image on two-dimensional basis functions. (Author)

A72-30257 # Specific features of heat metabolism in man under conditions of high temperatures of the surrounding medium (Osobennosti teplovogo obmena cheloveka v usloviakh vysokikh temperatur okruzhaiushchei sredy). A. N. Azhaev. *Fiziologicheskii Zhurnal SSSR*, vol. 58, Mar. 1972, p. 463-468. 12 refs. In Russian.

It is shown that during the action of a high-temperature environment, the character of the changes observed in several physiological functions depends on the hyperthermia levels. From the point of view of the magnitude and the character of variations in physiological functions, four degrees of organism overheating can be distinguished. Under conditions of high temperatures and during a low humidity of the surrounding air and in the absence of physical work, the limiting value of accumulated heat in a human organism is shown to be 80 kcal per sq m of body surface, or 2 kcal per kg of body weight. O.H.

A72-30267 Wavelength effect on visual latency. F. S. Weingarten (Chicago, City Colleges, Chicago, Ill.). *Science*, vol. 176, May 12, 1972, p. 692-694. 10 refs. Grants No. PHS-EY-0523-09; No. PHS-EY-00277-05.

Chromatic stimuli were matched in luminance to a homogeneous white background field. The relative visual latency, as measured by subjective simultaneity, of 621-nanometer (red) light was 20 to 25 milliseconds less than that for 549-nanometer (green) light. When the chromatic stimuli were different in luminance from the background field, no differences in visual latency related to the wavelength of light were observed. The procedure of matching the luminance of test fields to that of a background field appears to be crucial for observing a visual latency difference related to wavelength. (Author)

A72-30376 # Working capacity, methods for its evaluation and pharmacological stimulation (Rabotosposobnost', metody ee otsenki i farmakologicheskaya stimulatsiya). V. S. Shashkov and N. V. Gordeicheva. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 3-13. 78 refs. In Russian.

One approach concerning the evaluation of the working capacity is based on the time the organism can perform a certain type of work without showing signs of fatigue. Another approach makes use of the determination of the maximum oxygen consumption of the organism. Changes in biological rhythm and studies of tissue respiration are also considered. The possibility of raising the working capacity with the aid of pharmacological effects is discussed, giving attention to various stimulants such as amphetamine, phenylethyl amines, and caffeine. Effects of the changed conditions for the biological activity of man in a space environment are briefly examined. G.R.

A72-30377 # Dynamics of the carbon monoxide content in the chlorella reclaimed atmosphere (Dinamika sodержaniya okisi ugleroda v atmosfere regeneriruemoi khlorelloi). A. I. Kazakov, G. I. Meleshko, and Iu. V. Pepeliaev. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 13-16. 14 refs. In Russian.

The paper presents experimental results indicating that carbon monoxide can be accumulated in an enclosed environment of the chlorella reactor and in the man-chlorella system at a relatively constant level. The stabilized level of the carbon monoxide content in an enclosed atmosphere may vary. It is likely to be associated with the photosynthetic activity of chlorella cells which, as was shown previously, may absorb carbon monoxide from the atmosphere. (Author)

A72-30378 # Some growth indices of rats and their skeletal muscles during prolonged hypokinesia (Nekotorye pokazateli rosta krysa i ikh skeletnykh myshts pri dlitel'nom ogranichenii podvizhnosti). A. N. Potapov. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 16-20. 22 refs. In Russian.

An exposure of rats to prolonged hypokinesia of four months resulted in a delayed growth of animals, their carcasses, and skeletal muscles. The inhibitory effect of hypokinesia on the development of animals and their muscles was most distinct during the second experimental month. The exposure produced a greater effect on the growth of flexor muscles than extensors of the ankle joint. (Author)

A72-30379 # On the reserve of red blood cells in healthy and chronically irradiated dogs (K voprosu o rezerve eritrotsitov u zdorovykh i khronicheskii obлучennykh sobak). A. V. Iliukhin, L. L. Semashko, A. G. Izergina, and B. A. Markelov. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 21-23. 6 refs. In Russian.

The paper gives experimental data which help to quantify the degree at which the reserve of red blood cells of healthy and irradiated dogs is mobilized after a physical load. Following a 15-min. running in the treadmill at a speed of 5.2 km/hour, healthy dogs release into the blood flow 2.5% of red blood cells from the total amount of the cells circulating in the blood. The most distinct index showing the state of the red blood cell reserve is reticulocytosis which develops in response to an assigned physical load. The authors suggest that the reserve of red blood cells originates in the bone marrow. No significant differences in the quantitative reserve of red blood cells of healthy and irradiated dogs have been found. (Author)

A72-30380 # The state of natural immunity of dogs during chronic gamma-irradiation under the influence of amitetravite (Sostoianie estestvennogo immuniteta u sobak pri khronicheskoy gamma-obлучenii pod vliyaniem amitetravita). S. I. Pal'mina, V. A. Zueva, N. I. Gvozdeva, M. F. Sbitneva, A. A. Akhunov, and E. S. Zubenkova. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 24-29. 13 refs. In Russian.

The effect of amitetravite, a biological protectant, on the state of natural immunity was investigated in experiments on dogs exposed to a three-year chronic gamma-irradiation simulating the dose value and rate of the space flight environment. A long-term irradiation of dogs with low dosages of CO-60 gamma-rays induced wave-like changes in natural immunity of test animals. A regular administration of amitetravite produced a normalizing effect on the state of skin autoflora, favored a relative stability of indices of the blood phagocytic activity and restrained the development of autoimmune reactions. (Author)

A72-30381 # Effect of synthetic carbohydrates on lysosomes of rat liver (Deistvie sinteticheskikh uglevodov na lizosomy pecheni krysa). G. F. Shermanova, Iu. E. Siniak, and V. I. Gorshkova. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 29-31. 11 refs. In Russian.

The toxicity of synthetic carbohydrates was studied on lysosomes of rat liver with the aim to examine whether carbohydrates could be considered as potential food source for astronauts. Results show that if carbohydrates are purified from contaminants, they lose their toxicity. O.H.

A72-30382 # Cardiac changes during acute overheating and prognostic significance of electrocardiographic data in dogs (Izmenenie serdechnoi deiatel'nosti u sobak pri ostrom peregrevani i prognosticheskoe znachenie elektrokardiograficheskikh dannykh). B. M. Fedorov, E. A. Musinov, V. V. Zhuravlev, and V. P. Krotov. *Kosmicheskaya Biologiya i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 32-38. 20 refs. In Russian.

Anesthetized dogs were exposed to acute overheating and their cardiovascular changes were examined in comparison with respira-

tory variations. The prognostic significance of EKG ventricular spikes was found during the period of time preceding the development of a heat-induced collapse. The changes in the voltage of EKG spikes during acute overheating were shown to be associated with several factors, the most important of which being adrenergic effects during early heating and hypoxia in late heating periods. The paper gives periods of overheating, describes cardiac arrhythmias and discusses cardiovascular disturbances during hyperthermia. (Author)

A72-30383 # Cardiac electric activity during various levels of decompression of the lower body (Elektricheskaia aktivnost' serdtsa pri razlichnykh stepeniakh dekompressii nizhnei poloviny tela). V. G. Voloshin and L. Ia. Divina. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 38-43. 15 refs. In Russian.

The cardiac electric activity during applications of lower body negative pressure of -40 and -80 mm Hg was investigated. The examinations showed a significant increase of the heart rate, an elevation of the R amplitude and a decrease of the T amplitude, as well as displacement of the heart electric axis towards the vertical which is related to the decompression level. During the first minutes of exposure, changes in the R and T voltage and the electric position of the heart developed simultaneously and later occurred independently: R variations were most distinct whereas T changes were least pronounced. The above changes seem to be associated not only with an impeded venous return to the heart and its reduced blood filling but also with a redistribution of the specific weight of components of the cardiac autonomic innervation, the sympathetic innervation being predominant. (Author)

A72-30384 # Ultrasonic Doppler-cardiography in medical monitoring (Ul'trazvukovaia Doppler-kardiografiia v sisteme meditsinskogo kontroliia). A. N. Kozlov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 43-46. In Russian.

Due to its high information content, stability and comfortable conditions of signal monitoring, ultrasonic Doppler-cardiography seems to be promising when used in medical evaluations of enclosed men. An employment of narrow-banded filters, threshold limitations, and a selection of a proper site of the sensor fixation make it possible to isolate a single complex from the ultrasonic Doppler-cardiographic signal per every cardiac cycle to determine the heart rate in the medical monitoring system. (Author)

A72-30385 # The vascular tone in different body compartments during prolonged restriction of muscular activity (Sosudisty tonus v razlichnykh uchastkakh tela pri dlitel'nom ogranichenii myshechnoi deiatel'nosti). N. E. Panferova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 47-50. 13 refs. In Russian.

During a 120-day bed rest experiment, four test subjects were examined for the arterial tone by the method of the pulse wave propagation, the venous tone by the method of occlusion plethysmography and skin temperature. The above indices recorded in different body areas varied in a dissimilar manner. The tone of veins and arteries of legs, including skin arterioles, increased. The tone of head and hand veins remained unchanged. The tone of head and foot arteries decreased. The tone of large vessels of the elastic type - aorta, carotid artery, arm artery - did not change. It is probable that variation of the vascular tone is one of the mechanisms (supplementing endocrine regulation) which is responsible for the regulation of the circulating blood volume during restriction of muscular activity. (Author)

A72-30386 # An increase of the functional capability of the human cardiovascular system by controlled cooling (K voprosu povysheniia funktsional'noi sposobnosti serdechno-sosudistoi sistemy cheloveka metodom dozirovannogo okhlazhdeniia). A. A. Stikharev.

Kosmicheskaiia Biologiia i Meditsina, vol. 6, Mar.-Apr. 1972, p. 50-55. 17 refs. In Russian.

Hemodynamic changes were studied in four test subjects during cooling experiments at -20 C for 20, 40, 60, 90, or 120 min. The heat deficit was 0.9, 1.3, 1.6, 2.0 and 2.4 Cal/kg, respectively. In the experiments, the pulse rate decreased and the maximal, minimal and pulse pressure increased. The Kwaas endurance coefficient dropped. The EKG showed changes typical of cholinergic reactions. The horizontal to vertical transition brought about a lower heart rate increase and a smaller change of the minimal and pulse pressure in the test subjects than in the controls. After warming, the cardiovascular function reached the pretest values in all 5 experimental runs. These findings suggest that moderate cooling may be used to elevate the functional state of the cardiovascular system for a certain period of time. (Author)

A72-30387 # The role of autonomic centres in the mechanisms of vestibular-autonomic reflexes (Rol' vysshikh vegetativnykh tsentrov v mekhanizmax vestibulo-vegetativnykh reflektsov). M. D. Emel'ianov and A. N. Razumeev. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 55-61. 24 refs. In Russian.

The paper gives experimental data describing the functional relationship of the vestibular system to respiratory and vasculomotor centres that were accumulated during adequate (shaking) and electric stimulation of the labyrinth. It shows the relations between the responses of the above neurons and the functional state of the centres. Mechanisms of the vestibulo-autonomic reactions are discussed with respect to peculiarities in the cerebellar function. (Author)

A72-30388 # Changes in the reflex reactions of human muscles during adequate vestibular stimulation (Izmenenie reflektornoi reaktsii myshts cheloveka pri adekvatnom vestibuliarnom razdrazhenii). E. I. Pal'tsev and A. M. El'ner. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 61-66. 16 refs. In Russian.

The paper gives experimental data on changes of the reflex excitability of human leg muscles in response to an adequate vestibular stimulation (body rotation in the sagittal plane with an angular acceleration). Functional changes in the segmentary apparatus developed 15-20 msec after the onset of rotation. Variations of reflex excitability of different muscles in response to the same vestibular stimulation (direction of the body rotation) were dissimilar. Changes in the reflex excitability of the same muscle were also different in response to various vestibular stimuli. It is concluded that the vestibular apparatus may perform the coordinating function not only during quasi-static control of movements but also during dynamic control. It is therefore believed that even short, latent spinal muscular reactions which emerge in response to body movements may be governed by the vestibular apparatus. (Author)

A72-30389 # Study of the fluid and electrolyte balance during hypokinesia (Issledovanie vodno-solevogo obmena pri ogranichenii dvigatel'noi aktivnosti). V. P. Krotov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 66-74. 11 refs. In Russian.

The hypokinetic effect on the pattern of changes in the fluid and electrolyte metabolism was studied in rabbits. On the first hypokinetic day, plasma liquefaction was noted and a decrease of the erythrocyte number and the hemoglobin concentration was seen. The plasma volume as calculated according to Strauss was found to increase 5.1%. During the three subsequent hypokinetic weeks, fluid redistributions between the plasma and red blood cells occurred. The potassium and sodium concentration in the plasma decreased with the hypokinetic exposure. The pattern of changes in the calcium concentration in the plasma correlated with the variations of total protein in the blood serum. These changes seem to be one of the factors that were responsible for the pronounced disturbances of the calcium concentration in the plasma of hypokinetic animals. (Author)

A72-30390 # Diurnal periodicity of the respiration rate of men during inverted work-rest cycles (Sutochnaia periodika chastoty dykhanii u cheloveka v eksperimentakh s invertirovaniem rezhima truda i otdykha). A. A. Lugovoi. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 75-81. 14 refs. In Russian.

Experiments were carried out on eight male test subjects who lived for 25 to 45 days in isolated chambers with controlled comfortable atmospheres. An exposure to an inverted (a 12-hour shift) work-rest cycle, the effect of ecologic time-givers being excluded, brought about a gradual rearrangement of the diurnal rhythm of the respiration rate in accordance with the altered cycle. A study of different patterns of an adjustment to a new cycle indicated that the rearrangement developed the faster, the greater being the sleep deficit during the transition. Endogenous and exogenous components of the diurnal rhythm of the respiration rate were revealed. The endogenous component, which is related to the biological clock of the organism, is characterized by inertia, a relatively low rate of rearrangement, whereas the exogenous component depends on diurnal variations of psycho-physiological activity of man and changes simultaneously with alterations in his work-rest cycles. (Author)

A72-30391 # Pulse rate adaptation during changed work-rest cycles (Adaptatsiia chastoty pul'sa pri izmenenii ritma snabodstvovaniia). S. I. Stepanova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 81-86. In Russian.

Data are given to demonstrate that during habituation to a new work-rest cycle the diurnal rhythm of the heart rate develops gradually. The idea that the heart rate has adapted to an unusual mode of life may occur if the diurnal curve is built using the parameters recorded in the recumbent and sitting position. A comparison of the data recorded throughout the whole day in the same position helps to reveal the true time of the heart rate adaptation to a new work-rest cycle. (Author)

A72-30392 # Peculiar features of time perception in simulated and real flight (Osobennosti vospriiatiia vremeni v model'nykh usloviakh i v real'nom polete). S. S. Al'miashev, E. A. Derevianko, and V. F. Zhernavkov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 86-89. 5 refs. In Russian.

The paper presents experimental data accumulated with respect to the peculiar features of time perception in simulated and real flights. The level of distortion and accuracy in the reproduction of assigned time periods can be attributed to a different degree of the nervous and emotional stress of the pilot (space pilot). This, in turn, depends on the complexity and hazard of the task to be performed. During a real flight in a normal meteorological environment as well as during a simulated flight, the assigned time intervals are reproduced in an extended form. This is due to the presence of the working dominant foci in the cortex of the large hemispheres. During flights in a complicated environment and at extremely low altitudes in a turbulent atmosphere, the processes in the brain cortex are depressed by a generalized excitation induced by an emotional stress. (Author)

A72-30393 # A new method of electrode implantation in chronic experiments (Novyi sposob vzhivleniia elektrodov v khronicheskikh eksperimentakh). N. T. Svistunov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 6, Mar.-Apr. 1972, p. 90, 91. 6 refs. In Russian.

The drawbacks of currently used implanted electrodes are briefly considered, giving attention to various factors which may be responsible for the loss of information. These drawbacks are to be eliminated by a new electrode design in the form of a spiral. A new method of electrode implantation was developed in tests with dogs and rats. Specific design details regarding the implantation method depend on the size of the animal. G.R.

A72-30423 Absence of electromagnetic pulse effects on monkeys and dogs. F. G. Hirsch and A. Bruner (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.). *Annual Meeting, 56th, Atlanta, Ga., Apr. 19-22, 1971.* *Journal of Occupational Medicine*, vol. 14, May 1972, p. 380-386. Grant No. NIH-PH-05531.

Possible biologic hazards associated with exposure of living organisms to electromagnetic pulsed fields were studied in monkeys and dogs. Results show that no behavioral alterations were observed in either the monkeys or the dogs following exposure to these fields. The absence of any electromagnetic pulse effects implies that the pulses are more innocuous than dangerous. Possible effects of chronic exposure to high repetition rates received daily by such persons as the pulser maintenance staff are discussed. O.H.

A72-30469 # Study of the biological effect of a fine lunar soil fraction returned to earth by the 'Luna 16' automatic station (Issledovanie biologicheskogo deistviia tonkoi fraktsii lunnoogo grunta, dostavlennoho na zemliu avtomaticheskoi stantsiei 'Luna-16'). V. V. Kustov, O. F. Ostapenko, and V. G. Petrukhin. *Kosmicheskii Issledovaniia*, vol. 10, Mar.-Apr. 1972, p. 286-289. 6 refs. In Russian.

A series of experiments was carried out in mice exposed to the action of a specimen of a fine lunar soil fraction from the Sea of Fertility to investigate the specimen's potential harmful effects on living organisms. Results show that the lunar material examined is biologically inert. O.H.

A72-30594 # Formation and polymorphic properties of the lysosomes (O stanovlenii i polimorfnosti lizosom). A. A. Voitkevich and I. I. Dedov (Akademii Meditsinskikh Nauk SSSR, Obninsk, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaiia*, Mar.-Apr. 1972, p. 213-219. 36 refs. In Russian.

The fine organization of the lysosomes is studied in cells of various organs. It is shown that the lysosomes are formed by the Golgi complex. Gamma-irradiation activates their action and causes the formation of autographic vacuoles. While removing the destructively altered organoids, the lysosomes enhance the postirradiation restitution of the fine neurocyte structure. Some aspects of the sources of lysosome formation, causes of their structural heterogeneity, and their participation in various functional activities and some pathological states of cells are discussed. O.H.

A72-30595 # The role of noncovalent interactions in the process of membrane stabilization of *Micrococcus lysodeikticus* (Rol' nekovalentnykh vzaimodeistvii v stabilizatsii membran *Micrococcus lysodeikticus*). M. A. Lukoianova, I. M. Simakova, G. V. Tikhonova, V. I. Biriuzova, Kh. N. Mikel'saar, and N. S. Gel'man (Akademii Nauk SSSR, Institut Biokhimii i Institut Molekuliarnoi Biologii, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaiia*, Mar.-Apr. 1972, p. 220-231. 78 refs. In Russian.

The effect of ionic and hydrophobic interactions on the process of membrane stabilization of *Micrococcus lysodeikticus* is evaluated. Results show that ionic bands retain 15-20% of the membrane protein which includes the membrane adenosinetriphosphatase and a part of malatedehydrogenase. Due to hydrophobic interactions, 80% of protein is retained in the membrane. The cytochromes are connected with the membrane exclusively due to hydrophobic interactions. O.H.

A72-30596 # Phenomenon of habituation in the rabbit visual cortex in ontogenesis and after septal lesion (Fenomen privykanii v zritel'noi kore krolika v ontogeneze i posle razrusheniia prozrachnoi peregorodki). A. G. Koreli (Akademii Nauk Gruzinskoi

SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Neirofiziologija*, vol. 4, Mar.-Apr. 1972, p. 123-129. 24 refs. In Russian.

Changes in primary responses evoked by repetitive photic stimulation in adult rabbits with ablated septum pellucidum and normal young rabbits of early post-natal age were studied in chronic experiments. The experimental blocking of hippocampal theta rhythm due to electrolytic lesion of medial septal region was accompanied by a pronounced facilitation of primary response habituation. A very fast habituation of primary responses was observed in normal young rabbits till 15-17 days of post-natal life. The habituation occurred after 10-20 presentations of stimuli. After this age, habituation requires nearly as many stimuli as it does in adult animals. The role of hippocampal theta rhythm in the process of habituation is discussed. (Author)

A72-30597 # Analysis of impulse conduction mechanisms during the relative refractory period made on a mathematical model of a myelinated nerve fiber (Analiz mekhanizmov provedeniia nervnykh impul'sov vo vremia otositel'noi refrakternosti na matematicheskoi modeli mielinizirovannogo nervnogo volokna). B. I. Khodorov, E. N. Timin, and R. I. Grilikhes (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Neirofiziologija*, vol. 4, Mar.-Apr. 1972, p. 201-207. 17 refs. In Russian.

On the mathematical model of the myelinated nerve fiber (Frankenhaeuser-Huxley) it was shown that the threshold increase and action potential (AP) decrease in the relative refractory phase are determined mainly by sodium inactivation. At the beginning of the relative refractory phase, AP induced by a strong electrical shock is conducted only to the neighboring node but not to more distant ones. At a later refractory period, the propagation exhibits an increment, but the threshold for the propagated AP is higher than the threshold for AP initiation in the stimulated node. The delay in AP transmission between refractory nodes causes a retrograde wave of depolarization. The differences in the mechanisms of AP propagation in myelinated and unmyelinated refractory fibers are discussed. (Author)

A72-30600 # Current state and prospects for development of research on protein biosynthesis (Stan i perspektivi rozvitku doslidzhen' z biosintezu bilka). M. F. Gulii. *Akademiia Nauk Ukrain's'koi RSR, Visnik*, vol. 36, Mar. 1972, p. 87-95. 15 refs. In Ukrainian.

Research on protein biosynthesis and attempts at practical utilization of results obtained in the laboratory are reviewed, with emphasis on possibilities of (1) controlling the rate (accelerating and decelerating) of protein synthesis in the organism and (2) affecting the structure of synthesized proteins. Mechanisms participating in protein biosynthesis are delineated, and practical problems which require solution in medical and nutritional applications are identified. T.M.

A72-30668 # Systemic character of emotional responses of limbic origin (Pro sistemii kharakter emotsional'nikh reaktsii limbichnogo pokhodzhennia). F. P. Vediaev (Kharkivs'kii Medichnii Institut, Kharkov, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 18, Mar.-Apr. 1972, p. 147-153. 17 refs. In Ukrainian.

Data are presented on the effect of electric stimulation of brain limbic formations (claustrum, amygdala, hippocampus) on motor and vegetative components of emotional responses. It is shown that electric stimulation of these formations induces a definite complex of behavioral effects which are accompanied by regular shifts in cardiac activity, blood coagulating system, dynamics of stomach secretion, and dynamics of 11-OCS content in blood plasma of rabbits. These responses are considered as components of a single functional system of emotional behaviour. (Author)

A72-30669 # Interaction of evoked responses in the cerebellum cortex when stimulating the hypothalamus and peripheral nerves (Vzaemodiia viklikanikh vidpovidei u kori mozochka pri podraznenni gipotalamusa ta periferichnikh nerviv). G. V. Ianchik (Vinnits'kii Medichnii Institut, Vinnitsa, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 18, Mar.-Apr. 1972, p. 154-158. 19 refs. In Ukrainian.

Study of the interaction between evoked responses (ER) in the cerebellum cortex during conditioning stimulation of the corpus mammillaris (MM) and testing stimulation of one of the nerves. Phenomena of partial occlusion were observed during simultaneous stimulation. The period of absolute refractivity in various regions of the cerebellum cortex lasted for 20-40 msec. The duration of the subnormality period was more variable (40 to 260 msec). The highest degree of interaction was observed in the anterior lobe and the simple one. These regions represent projectional zones of peripheral receptor fields. The most intensive interaction of the impulses in all the regions of the cerebellum cortex took place on stimulation of MM in pair with the splanchnic nerve. (Author)

A72-30670 # State of potassium, sodium and calcium ions in subcellular structures of skeletal muscles (Stan ioniv kaliuu, natriuu i kal'tsiuu v subkhitinnikh strukturakh skeletnikh m'iaziv). Z. O. Sorokina and Iu. D. Kholodova (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 18, Mar.-Apr. 1972, p. 196-206. 50 refs. In Ukrainian.

The quantity of ions isolated from subcellular organoids of skeletal muscles together with proteins, lipids, and nucleic acids as well as of those extracted from lyophilized preparations by absolutized nonpolar solvents with a low dielectric constant was determined. Specificity in ion distribution between compounds localized in subcellular organoids was found. The bulk of sodium is bound with lipids and proteins. Calcium is found in lipids, proteins, and nucleic acids. As to potassium, it might be distributed (as distinct from sodium and calcium) more uniformly between various intracellular compounds. (Author)

A72-30671 # Change in indices of red blood in dogs in the process of stepwise acclimatization to high altitudes and subsequent reanimation after long clinical death (Zmina pokaznikiv chervonoii krovi sobak u protsesi stupinchastoi visokogirnoi aklimatizatsii ta nastupnoii reanimatsii pislia trivaloi klinichnoi smerti). I. I. Lanovenko and L. O. Savel'eva (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 18, Mar.-Apr. 1972, p. 223-230. 17 refs. In Ukrainian.

Changes were studied in some indices of peripheral red blood (quantity of erythrocytes and reticulocytes, blood hemoglobin, hematocrit, and mathematical indices) in the process of stepwise acclimatization to levels of 2100, 3700, and 4200 m, and with subsequent reanimation after long clinical death from acute blood loss. As a result of 32-day acclimatization, a trustworthy change occurred in a number of erythrocytes, reticulocytes, hemoglobin, and hematocrit value as well as in the average content of hemoglobin in a separate erythrocyte and average volume of a single erythrocyte. On the basis of the investigations, the authors made a conclusion that the Alpine acclimatization is a factor favourably affecting restoration of important functions of the organism during reanimation after long clinical death. (Author)

A72-30672 # Some peculiarities in the physiology of the human diaphoretic system (Deiaki osoblivosti fiziologii potovidil'noi sistemi liudini). P. P. Slin'ko (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 18, Mar.-Apr. 1972, p. 252-258. In Ukrainian.

Observations were carried out with 35 patients. The regularities observed are of uniform character in all cases. Excretion of sweat onto the skin surface with different intensities of diaphoresis occurs

in separate portions of different magnitude. During diaphoresis an alternation is observed of rhythmic increases and decreases in a number and power of separate sweat ejections connected, probably, with balancing the diaphoretic process about some optimal level under given conditions of organism thermoregulation. Inhibition of diaphoresis, under the effect of a sharply cooling factor takes place practically simultaneously with the beginning of this factor action. Excitability of the diaphoresis centres is likely to vary depending on the body average temperature and temperature of its cutaneous covering. At continuous diaphoresis, water solutions of chemical substances from the environment do not penetrate inside the organism by the excretory ducts. (Author)

A72-30677 **The reliability of man in space.** T. Nicholson (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) and G. Pardoe (Hawker Siddeley Dynamics, Ltd., Stevenage, Herts., England). *New Scientist*, vol. 54, Apr. 27, 1972, p. 210, 211.

Reappraisal of man's role in space. Apart from their allotted tasks, astronauts on several occasions have worked with ground control to save the success of missions. In the case of the spacecraft atmosphere for prolonged missions to other planets, it is considered to be essential that it approximate the terrestrial atmosphere. So far it has worked well to have the crews in absolute control of the spacecraft. Nevertheless, the relationship between mission control and the spacecrew needs exploration and more detailed examination before confident plans can be made for interplanetary flights lasting several years. F.R.L.

A72-30694 * **In the search for extraterrestrial life (A la recherche de la vie extra-terrestre).** C. Ponnampuruma (NASA, Washington, D.C.). *Sciences* (Paris), vol. 12, Jan.-Feb. 1972, p. 48-55. In French.

The study of stellar, planetary and galactic evolution leads to the conclusion that the phenomenon of life must be coursing through the universe. It is estimated, by means of telescopic sampling, that there are billions of stars capable of having those photochemical reactions necessary for the origin of life. One approach in the search for other life would be to deploy men and instruments in spacecraft. Radio contact with other civilizations is another approach. Finally, the question might be approached by considering life as an inevitable consequence of the evolution of matter. A survey of Martian characteristics shows the possibility of life there to be dubious. The possibility of life in other parts of the galaxy is supported by a fundamental conclusion of living matter that all organisms have a common chemical ancestry. The experiment of Urey and Miller, wherein four amino acids were obtained by subjecting a mixture of methane, ammonia, and water to an electric arc, is believed to duplicate the initial organic syntheses which led to the emergence of life on earth. D.F.L.

A72-30696 **The somatic effects of noise (Effets somatiques des bruits).** M.-V. Strumza (Paris V, Université, Laboratoire de Biologie Aérospatiale, Paris, France). *Sciences* (Paris), vol. 12, Jan.-Feb. 1972, p. 58-63. 24 refs. In French.

It is shown that loud noises can have an effect upon the physical and psychological equilibrium of the individual. Recent studies on this topic show the effects of sonic vibrations on the organism in general, and on the endocrine glands and the neurovegetative system. It was observed that for continuous noises at less than 80 dB intensity, respiration is short and frequent, similar to that observed during fatigue. The circulatory apparatus is even more vulnerable to sound. With pure sounds of 2000 Hz at an intensity of 96 dB, a human heartbeat was accelerated to more than 70 or 80 beats per minute. This cardiac acceleration is known to provoke an increase in arterial pressure. Radioscopic examinations of the stomachs of

aviators who have been exposed to 90 dB noises show the existence of pyloric spasms. The dangers of such sound harassment are indicated in the cases of the aged or sick people, and in particular professions, such as aviators. D.F.L.

A72-30701 **Stroke volume during recovery from supine bicycle exercise.** G. R. Cumming (Winnipeg, Children's Hospital; Manitoba, University, Winnipeg, Manitoba, Canada). *Journal of Applied Physiology*, vol. 32, May 1972, p. 575-578. 14 refs.

Cardiac output was measured during exercise and for 2 min of recovery from exercise in 19 males and 10 females, aged 6 to 54 years. These patients had innocent heart murmurs of mild pulmonary stenosis and were considered to have essentially normal hemodynamics. In all subjects, the highest stroke volume occurred during the first 2 min of recovery from the supine bicycle exercise. For the males, the mean stroke volume index in milliliters per beat per square meter increased from 49 at rest to 58 during exercise to 67 for the peak recovery value, and corresponding values for the females were 47, 54, and 67. Medium intensity exercise (heart rates 120-150) produced as high recovery stroke volumes as high intensity (150-195), and there was no consistent pattern for the largest stroke volume to occur at any specific recovery heart rate or time. (Author)

A72-30702 **Body temperatures and sweating during exhaustive exercise.** B. Saltin, A. P. Gagge, U. Bergh, and J. A. J. Stolwijk (Yale University, New Haven, Conn.). *Journal of Applied Physiology*, vol. 32, May 1972, p. 635-643. 26 refs. Research supported by the Swedish Medical Research Council; Grant No. NIH-ES-00354-04. SMRC Project B70-14R, 2949.

Four normal healthy unclothed subjects exercised to exhaustion on a bicycle ergometer at 90, 100, and 115% of their maximal oxygen uptake at ambient temperatures (T_a) of 10 to 40 C. Basic observations were oxygen uptake, body weight, mean skin, rectal, esophageal, and quadriceps muscle temperature. Significant correlations between sweating and various body temperatures occurred after 2 min of exercise. With increasing T_a , the time to exhaustion was reduced at 90%, slightly reduced at 100% and unaffected at 115% work loads. Preheating the body by exercise at a 50% work load significantly lowered maximum oxygen uptake and time to exhaustion at 40 C. Heart rate and blood lactate at exhaustion tended to increase with both T_a and work level. (Author)

A72-30703 **Emptying pattern of lung compartments in normal man.** S. Tsunoda (Firland Hospital, Seattle, Wash.), A. C. Young (Virginia Mason Research Center, Seattle, Wash.), and C. J. Martin (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 32, May 1972, p. 644-649. 16 refs. Research supported by the Seattle Foundation; Grant No. NIH-HE-01892.

We describe a lung model made up of four well-mixed compartments, whose alveolar dilution ratio (W) and whose rate of emptying during expiration can be determined from the data obtained in an 18-breath nitrogen washout. Model compartments are defined in terms of their W determined from end-tidal nitrogen concentrations. Using these W's and nitrogen concentrations measured at specific volumes expired earlier in each breath, we can calculate the fraction of total flow at that volume from each compartment. From this analysis the distribution of ventilation, the initial lung volume, the dead-space volume, and the pattern of lung emptying can be estimated. A well-ventilated compartment contributes more to early expiration in the young than in the elderly. The more poorly ventilated compartments increase their contribution throughout expiration. (Author)

A72-30704 **Cerebral arteriovenous oxygen difference in man native to high altitude.** J. S. Milledge (California, University, San Francisco, Calif.) and S. C. Sorensen (San Francisco Medical Center,

San Francisco, Calif.). *Journal of Applied Physiology*, vol. 32, May 1972, p. 687-689. 13 refs.

The cerebral arterial-venous oxygen difference (A-V)O₂ was measured in eight subjects native to high altitude at an elevation of 4,300 m in the Peruvian Andes while the subjects breathed ambient air and 100% oxygen. The (A-V) O₂ was 8.89 vol% with the subjects breathing ambient air and was increased to 9.58 vol% with them breathing oxygen. There was no significant change in arterial carbon dioxide tension. If we assume a normal cerebral oxygen consumption in these subjects, the results indicate a cerebral blood flow which is less than normal for sea-level man. Cerebral blood flow decreased further on raising the arterial oxygen tension, indicating that the vascular response to hypoxia is maintained even after lifelong exposure to hypoxia. (Author)

A72-30705 Muscle, metabolites and oxygen uptake in short-term submaximal exercise in man. H. G. Knuttgen and B. Saltin (Gymnastik- och Idrottshogskolan, Stockholm, Sweden). *Journal of Applied Physiology*, vol. 32, May 1972, p. 690-694. 15 refs. Research supported by the Swedish Medical Research Council. SMRC Project 40X-2203.

Muscle metabolite changes and the relationship of these changes to oxygen uptake during exercise and recovery were studied through a wide range of submaximal exercise (19-95% aerobic capacity). Six male subjects engaged in exercise on a cycle ergometer for 4 min duration. Muscle biopsies (m. vastus lateralis) and fingertip blood samples were taken at rest and during the recovery period. Oxygen uptake was determined throughout exercise and recovery. Both adenosine triphosphate (ATP) and creatine phosphate (CP) concentrations in muscle became reduced during exercise throughout the entire range studied, with greater reductions occurring at the higher intensities. Resting levels after the higher intensity exercise bouts were not attained by 6 min of recovery. Close relationships were observed between reduction in ATP and CP concentrations and both oxygen deficit and the fast component of the oxygen debt. (Author)

A72-30706 Terrain coefficients for energy cost prediction. R. G. Soule and R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology*, vol. 32, May 1972, p. 706-708. 10 refs.

The energy cost of walking at two speeds for eight men, carrying three different loads, was measured for six different level terrains. The measured energy cost for each terrain was compared to predicted treadmill costs for the same loads and speeds. The loads (including clothing, gasometer and pack) totaled 8, 20, or 30 kg and were carried at speeds of 0.66 and 1.1 m/sec for heavy brush, swampy bog, and loose sand and at speeds of 1.1 and 1.55 m/sec for blacktop road, dirt road, and light brush terrains. Analysis of data supports the use of a single prediction equation with derived terrain coefficients, for prediction of the energy cost (oxygen consumption) of walking on any of these level terrains with a moderate pack load (10-40 kg) with reasonable precision. (Author)

A72-30707 Precision digital heart rate meter. G. W. James, M. H. Paul, and H. U. Wessel (Northwestern University, Evanston; Children's Memorial Hospital, Chicago, Ill.). *Journal of Applied Physiology*, vol. 32, May 1972, p. 718-723. 13 refs. Research supported by the Chicago Heart Association, Helen Fay Hunter Cardiology Fund, and Park Ridge Cardiology Fund; Grants No. NIH-GM-00874-09; No. NIH-GM-15418-09; No. NIH-HE-05770.

An ECG amplifier and precision heart rate meter was designed for use in exercise studies. The instrument meets the following requirements. Beat-to-beat determination of heart rate accurate to within one-tenth of a beat over a range from 30 to 300 beats/min; fail-safe triggering in the presence of motion artifacts, muscle noise,

and respiratory QRS amplitude fluctuations as seen with severe exercise; digital display of instantaneous rate; and binary-coded decimal output of rate and elapsed time for on-line digital printout. Evaluation in over 100 exercise studies has shown extremely reliable operation, without requiring adjustments. (Author)

A72-30745 # Readaptation of the human organism after experiencing states of long-term hypokinesia and weightlessness (O readaptatsii organizma cheloveka posle prebyvaniia v sostoianiiakh dlitel'noi gipokinezii i nevesomosti). V. G. Terent'ev. *Voenna-Meditsinskii Zhurnal*, Mar. 1972, p. 53-56. In Russian.

Survey of research on observed phases in the readaptation of the human organism to normal conditions after prolonged hypokinesia (confinement in a small chamber or bed rest for periods of 70 and 100 days, respectively) and after exposure to weightlessness in an 18-day space flight. Three individual stages of recovery after both hypokinesia and weightlessness are described for the observed disturbances of coordination, instabilities of the vegetative and vascular systems, reduced orthostatic stability, and asthenia. T.M.

A72-30746 # Methodology for conducting microwave irradiation experiments on animals (K metodike provedeniia SVCh oblucheniia zhivotnykh). V. A. Zhuravlev and V. V. Sevast'ianov. *Voenna-Meditsinskii Zhurnal*, Mar. 1972, p. 61, 62. In Russian.

Apparent contradictions in published studies of the effects of microwave irradiation on animal body functions are attributed to a lack of prevalent standards for conducting experiments and to erroneous evaluation of microwave power levels at the target point. A table lists microwave power density levels available at various distances from a specific microwave source. The effects of local irradiation as opposed to whole-body irradiation are discussed, along with the importance of accounting for the type of radiating element used in the experiment. T.M.

A72-30747 # Psychophysiological features of low-altitude flights (Psikhofiziologicheskie osobennosti poletov na malykh vysotakh). P. K. Isakov. *Voenna-Meditsinskii Zhurnal*, Mar. 1972, p. 63-65. In Russian.

Low-level flights (altitude restricted by a dual requirement of avoiding enemy radar and minimizing the danger of collision with ground obstacles) impose physical and psychological stresses arising from the difficulty of observing surface features for navigational purposes, the discomfort of air turbulence, and the vibration of instrument dials. Proposed recommendations for training inexperienced pilots include the teaching of specific features that facilitate recognition of ground-based navigational objects and the use of films to gain proficiency in ground orientation. T.M.

A72-30748 # Disqualification of flight personnel on the basis of the state of sight organs (Diskvalifikatsiia letnogo sostava po sostoianiiu organa zreniia). E. D. Avksent'ev. *Voenna-Meditsinskii Zhurnal*, Mar. 1972, p. 66, 67. In Russian.

An analysis of the causes of partial and total disqualification of flight personnel for reasons of sight impairment over the past decade made it possible to establish the structure of diseases and conditions leading to sight damage and to delineate some inadequacies in ophthalmological practice. Recommendations are given for improved medical examinations designed to discover particular types of sight impairment. T.M.

A72-30787 # Comparative study of the accuracy of some methods for measuring hemoglobin (Sraŭnitelni izsledvaniia v'rkhu tochnostta na niakoi metodi za opredeliane na khemoglobin). St. Antonov. *B'lgarska Akademiia na Naukite, Fizicheski Institut s ANEB, Izvestiia*, vol. 21, 1971, p. 341-345. 9 refs. In Bulgarian.

It is shown that the determination of hemoglobin in whole blood (such as oxyhemoglobin or reduced hemoglobin) provides results which coincide with standard cyanmethemoglobin measurements. The Specol-Zeiss spectrophotometer used to determine oxyhemoglobin or reduced hemoglobin will provide results with sufficient accuracy for clinical purposes. T.M.

A72-30816 # Problems regarding the psychological selection procedure concerning personnel for flight crews in civil aviation (Probleme der psychologischen Ausleseverfahren für Cockpit-Personal der zivilen Luftfahrt). H. Kaspras (Medizinischer Dienst der Verkehrswesen, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 8, no. 3, 1972, p. 126-134. 12 refs. In German.

It has been recognized that psychic factors play an important part in the performance of the functions of a pilot. For the development of a suitable procedure regarding the selection of applicants for the career of a pilot an analysis of the various functions to be performed in flying an aircraft has to be conducted. Questions of the evaluation of a verification of the validity of the selection criteria proposed. G.R.

A72-30819 # The examination in the low-pressure chamber as a special method of aerospace medicine functional diagnostics (Die Unterdruckkammer-Untersuchung als spezielle Methode der luftfahrtmedizinischen Funktionsdiagnostik). P. Thierfeldt (Medizinischer Dienst des Verkehrswesens, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 8, no. 1, 1972, p. 15-22, 31. 7 refs. In German.

The historical development of altitude physiology is discussed together with the design and the principles of operation of the low-pressure chamber, basic approaches for examinations in low-pressure chambers, and investigations for determining the ability of the subject to tolerate conditions of oxygen deficiency. Other investigations considered are related to the determination of the tolerance of conditions of low air pressure and air pressure fluctuations. The significance of the test results obtained in the low-pressure chamber for the evaluation of the prospective pilot is also explored. G.R.

A72-30842 Effects of stimulation of the cerebral cortex on the activity of the phrenic nerve (Effets de la stimulation du cortex cérébral sur l'activité du nerf phrénique). D. Planche (Aix-Marseille, Université, Marseille, France). *Journal de Physiologie*, vol. 64, Apr. 30, 1972, p. 31-56. 24 refs. In French. Délégation Générale à la Recherche Scientifique et Technique Contract No. 68-01-218.

Study of the modifications of the discharge of the phrenic nerve produced in bivagotomized and curarized cats by stimulation of the cerebral cortex by means of acute electric shocks. The whole of the convexity of the cerebral cortex was explored. Reactions were only obtained from certain points of the primary sensorial areas (areas SI, SII, orbital, auditory, and visual) and from motor areas. The most complex modification on the phrenic discharge is obtained from an excitatory point. The simplest phrenic response is obtained from an inhibitory point. Between these two extreme types of modifications there were an infinite number of complex phrenic responses obtained from transition points. F.R.L.

A72-30843 Modification of the activity of bulbar respiratory neurons induced by cortical stimulation (Modification de l'activité des neurones respiratoires bulbaires provoquée par stimulation corticale). D. Planche and A. L. Bianchi (Aix-Marseille, Université, Marseille, France). *Journal de Physiologie*, vol. 64, Apr. 30, 1972, p. 69-76. 5 refs. In French. Délégation Générale à la Recherche Scientifique et Technique Contract No. 68-01-218.

Study in anesthetized and bivagotomized cats of the modification in the discharge of bulbar respiratory neurons produced by stimulation of the cerebral cortex by means of single shocks. The study was carried out on 64 neurons (54 inspiratory, 10 expiratory). Under certain circumstances the cerebral cortex does not modify respiration while modulating the activity of the respiratory centers: it inhibits them and directly controls either the bulbospinal neurons (exit level of the bulbar centers), or the spinal region. F.R.L.

A72-30964 Vigilance effects for duration judgments with two levels of task demand. G. R. Hawkes and S. J. Sherman (Virginia Commonwealth University, Richmond, Va.). *Perceptual and Motor Skills*, vol. 34, Apr. 1972, p. 351-356. 9 refs. Grant No. DADA17-69-C-9063.

Vigilance effects were investigated with a duration judgment task, with or without a requirement also to perform mental arithmetic problems. Judged duration values were larger when only vigilance was performed; addition of the arithmetic task served to improve efficiency. Habituation processes thus are involved in a wide variety of behaviors. (Author)

A72-30965 Perceptual style and detection of motion in depth. W. H. Ton (Human Resources Research Organization, Alexandria, Va.). *Perceptual and Motor Skills*, vol. 34, Apr. 1972, p. 423-428. 5 refs. Grant No. DAHC19-70-C-0012.

Examination of data collected in laboratory investigations indicated persistent individual differences in the detection of motion in depth, i.e., whether or not an object is approaching or receding. This finding stimulated the hypothesis that perceptual style might be the source of at least some of this variance, particularly as regards the detection of slowly moving or distant objects. Accordingly, an experiment was devised to test this hypothesis. The findings did not yield a significant interaction of perceptual style with rate of movement. However, there was a difference in detection times between the two groups who differed with regard to perceptual style. It was hypothesized that this was due to a cautious, slow approach to detection tasks on the part of field-dependent individuals. (Author)

A72-30966 Effect of non-target stimuli upon length of voluntary saccades. S. Coren and P. Hoenig (New School for Social Research, New York, N.Y.). *Perceptual and Motor Skills*, vol. 34, Apr. 1972, p. 499-508. 14 refs. NSF Grant No. GB-8178; Grant No. NIH-16327.

The length of initial voluntary saccades to a target were measured in three experiments. It was found that saccade length varied as a function of the number, locus and distance of non-target stimuli present in the visual field. Eye movements tended to be directed toward the center of gravity of the stimuli close to the target. These systematic changes seem to be independent of task requirements for acuity. Some implications are discussed. (Author)

A72-30967 Day-to-day variation of the normal orthogonal electrocardiogram and vectorcardiogram. J. L. Willems, P. F. Poblete, and H. V. Pipberger (U.S. Veterans Administration Hospital; George Washington University, Washington, D.C.). *Circulation*, vol. 45, May

1972, p. 1057-1064. 16 refs. Grant No. NIH-HE-09696.

Day-to-day variation of the corrected orthogonal electrocardiogram was investigated in 20 normal subjects. Ten recordings were made in each individual with chest electrode positions left unmarked first, after which 10 subjects underwent another series of 10 consecutive daily recordings with marked electrode locations. Mean and maximal day-to-day variations of durations and amplitudes of different deflections of scalar leads as well as variations of directions and magnitudes of several QRS and T spatial vectors have been studied using computer technics for measurement and analysis. Repeat variability in the unmarked recordings was relatively large. For example, the maximum (96%) variability in QRS spatial maximum and in R-wave amplitudes in leads X and Z were, respectively, 0.50, 0.61, and 0.35 mv. Marking of the chest did reduce variability of amplitude and angular measurements by approximately 25%, but even then a substantial variation from day-to-day remained. Relative changes in T-wave amplitude and direction were greater than those of the QRS complex. The results presented can be used as standards to assess ECG changes observed in serial electrocardiography. (Author)

A72-30968 Quantitative angiocardiology in ischemic heart disease - The spectrum of abnormal left ventricular function and the role of abnormally contracting segments. G. W. Hamilton, J. A. Murray, and J. W. Kennedy (Washington, University, Hospital; U.S. Veterans Administration Hospital, Seattle, Wash.). *Circulation*, vol. 45, May 1972, p. 1065-1080. 16 refs. Research supported by the University of Washington; Grant No. NIH-HE-05281.

Survey of the spectrum of abnormalities in ventricular function found in 66 patients with documented coronary artery lesions. Derangements found ranged from virtually normal function in 18 patients with angina alone to severe dysfunction in 18 patients with myocardial infarction, mitral regurgitation, or heart failure. M.V.E.

A72-30971 # Separation and some properties of coronary active substances of blood (Vydeleniia i nekotorye svoistva nakhodiaschchikhsia v krovi koronaroktivnykh veshchestv). A. A. Galoian, M. V. Oganian; and G. G. Gevorkian (Akademiia Nauk Armianskoi SSR, Institut Biokhimi, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 53, no. 4, 1971, p. 254-256. 6 refs. In Russian.

Low-molecular coronary active hormones were isolated from the blood of anesthetized cats after histamine injections. Eluates were obtained with a pH 7.4 phosphate buffer from the isolated hormones after fractionalization by chromatography. The optical density and the biological activity of the eluates were determined. V.Z.

A72-30972 # Detection of acetyl derivatives of ethanol amine in the organism (K voprosu vyavleniia atsetilproizvodnykh etanolamina v organizme). G. V. Kamalian, M. G. Gasparian, N. G. Vartanian, and E. Ia. Babina (Erevanskii Zootehnicheskoi Veterinarnyi Institut, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 53, no. 5, 1971, p. 293-296. 18 refs. In Russian.

Description of aluminum-oxide chromatographic procedure for detection and separation of ethanol-amine acetyl derivatives in extracts from animal tissues. A 5:4 water-butanol solution is used as the best solvent for fractionalization of chromatograms for individual derivatives. Good agreement is obtained with reference standards of high purity grade. V.Z.

A72-30973 # Insular apparatus biosynthesis of substances which participate in neurohumoral mechanisms controlling the discharges of coronary ectasia neurohormones from brain into blood

(O biosinteze v insuliiarnom aparate veshchestv, primaiushchikh uchastie v neuro-gumoral'nykh mekhanizmkh reguliatsii vydeleniia koronarorasshiriaiuushchikh neurogormonov iz mozga v krov'). A. A. Galoian, R. A. Aleksanian, and M. V. Oganian (Akademiia Nauk Armianskoi SSR, Institut Biokhimi, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 53, no. 5, 1971, p. 297-301. 8 refs. In Russian.

Experiments on cats with alloxan diabetes show that the insular apparatus of the pancreas produces compounds which stimulate the discharge of coronary ectasia hormones K and C from brain into blood by a neurohumoral mechanism. Details on the experimental technique and data supporting this conclusion are given. V.Z.

A72-30996 # Functional morphology in the presence of extremal effects (Funktional'naia morfologiya pri ekstremal'nykh vozdeistviakh). E. F. Kotovskii and L. L. Shimkevich. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 15), 1971. 389 p. 800 refs. In Russian.

The functional morphology of various organs and tissues under the action of overloads, hypoxia, and hyperoxia on the organism is examined. The state of basic functional systems (the central nervous system and the respiratory, cardiovascular, digestive, secretory, and endocrine systems) is studied in detail. Correlations between physiological and histological indices are established. Particular attention is given to processes occurring at the cellular level. Changes in the fine-structure and metabolism of cells, tissues, and organs are analyzed. The mechanisms of the action of extremal factors on cells are studied. V.P.

A72-31082 Toxicology of dichlorvos at operational aircraft cabin altitudes. P. W. Smith, H. Mertens, M. F. Lewis, G. E. Funkhouser, E. A. Higgins, C. R. Crane, D. C. Sanders, B. R. Endecott, and M. Flux (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 43, May 1972, p. 473-478. 9 refs.

Eight human subjects were exposed twice each to a series of three experimental conditions in an CAMI altitude chamber: (A) ground level, no chemical; (B) 8000 ft, no chemical; (C) 8000 ft, dichlorvos vapor at a Ct product 5 to 10 times that prescribed for disinsection. Dichlorvos vapor concentration in C runs was measured by gas-liquid chromatography. Cholinesterase activity in plasma and RBCs of each individual was assayed before and after each chamber run. Dark adaptation and evaporative water loss were measured during each experiment. Bronchiolar resistance was measured by timed expiration volume before and after each experiment. No changes which could be attributed to dichlorvos were observed in any measured biochemical or physiological parameter. (Author)

A72-31083 # Combined effects of noise and vibration on mental performance as a function of time of day. H. C. Sommer and C. S. Harris (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). (*Aerospace Medical Association, Annual Scientific Meeting, 42nd, Houston, Tex., Apr. 26-29, 1971.*) *Aerospace Medicine*, vol. 43, May 1972, p. 479-482.

To determine the combined effects of noise and vibration on mental performance as a function of time of day, 10 subjects were randomly exposed to each of the following conditions: (1) stress (5 Hz vibration, 110 dB noise) at 6:00 a.m., (2) no stress (no vibration, 85 dB noise) at 6:00 a.m., (3) stress at 3:00 p.m., and (4) no stress at 3:00 p.m. Subjects' performance on a mental arithmetic task was measured during each of these exposures on consecutive days. There was a slight improvement in performance at 3:00 p.m. relative to 6:00 a.m. for the no stress conditions, which is consistent with several previous studies. Stress had a differential effect on performance as a function of time of day of presentation. The results suggest that phase of the circadian cycle may be a variable to be considered in studies on the effects of stress on human performance. (Author)

A72-31084 # Prediction of pilot performance during initial carrier landing qualification. C. A. Britson, W. J. Burger, and T. Gallagher (Dunlap and Associates, Inc., Santa Monica, Calif.; U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *Aerospace Medicine*, vol. 43, May 1972, p. 483-487. 9 refs. Navy-supported research.

Several different levels of carrier-landing performance criteria based on initial day and night carrier landing qualification trials were developed for inexperienced Navy F4 pilots. The performance criteria were used to estimate the relative proficiency of pilots during landing trials. Selection tests along with basic, advanced flight and RAG training measures were then used to predict the landing performance of each pilot, with emphasis on night carrier recovery. The results indicate that a composite night performance score can be predicted from training measures. Implications of the results for developing objective fleet landing performance standards as well as for their use in the secondary selection and training of naval aviators are discussed. (Author)

A72-31085 Efficiency and effectiveness of different water cooled suits - A review. E. Shvartz (Negev Institute for Arid Zone Research, Beersheba, Israel). *Aerospace Medicine*, vol. 43, May 1972, p. 488-491. 13 refs.

Eleven studies using different water cooled suits under various conditions were reviewed with respect to the efficiency and effectiveness of the suits in reducing heat strain. These studies indicate that the head is the most efficient and effective body area for heat removal. Indirect evidence suggests that in this respect the arms are next most important, and that the legs are the least. For maximum removal of heat, the entire body must be cooled with emphasis on the upper part. On the basis of these findings, tubing distribution for a whole body cooling suit is suggested. (Author)

A72-31086 Human error in the seventies. A. F. Zeller (USAF, Directorate of Aerospace Safety, Morton AFB, Calif.). *Aerospace Medicine*, vol. 43, May 1972, p. 492-497.

A study of the accident experience during the 1960s, supported by statistics from previous years, was used to develop trends which could be extrapolated into the decade of the seventies. These statistical projections, together with analytical interpretations based on a detailed review of human errors committed in selected years, provide the base for suggesting not only the direction accident experience will take, but also the kinds of errors which can be expected to be most prevalent. It appears that there will be a continuing decline in accidents, with a higher probability of fatality in those accidents which do occur. While accidents and human error have been and will continue to be synonymous, there is every indication that relative frequency of occurrence can be greatly diminished. Because of his relationship with the operating equipment, the most frequently assessed human error remain pilot error. (Author)

A72-31087 Changes in the hemostatic system and in blood and urine chemistry of human subjects following decompression from a hyperbaric environment. R. B. Philp, K. N. Ackles, M. J. Inwood, S. D. Livingstone, A. Achimastos, M. Binns-Smith, and M. W. Radomski (Western Ontario, University, London, Ontario; Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aerospace Medicine*, vol. 43, May 1972, p. 498-505. 70 refs. Defence Research Board of Canada Grant No. 9310-102.

Sixteen human subjects were exposed to a total pressure of 10 ATA for 10 min breathing air and were then decompressed according to a continuous profile. Blood and urine parameters before and after the dive were compared for each subject. Four persons were asymptomatic and 12 reported symptoms including pruritis in all 12,

Type I bends requiring recompression in three, swollen axillary lymph nodes in two and joint pain several hours later in one. The following statistically significant changes were noted in all divers: increased packed-cell volume, hemoglobin concentration, plasma free fatty acids and prothrombin time; decreased platelet counts, plasma cortisol, complement activity, serum lactate, euglobulin lysis time and prothrombin consumption time. (Author)

A72-31088 * # Cold sea survival. J. H. Veghte (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aerospace Medicine*, vol. 43, May 1972, p. 506-511. 36 refs. NASA-supported research. NASA Order T-80489.

Two prototype three-man life rafts were evaluated during the winter months in Arctic waters off Kodiak Island, Alaska, to assess potential survival problems and determine tolerance limits. Each raft incorporated thermal characteristics specifically designed for cold water. Water and air temperatures varied from 0 to +2 C and -5 to +4 C respectively. All subjects were removed upon reaching subjective tolerance. The results showed that none of the clothing assemblies was adequate to maintain a person in comfort even with dry boarding. No significant biochemical shifts in the blood or urine were found. The TUL raft was found to be superior in its thermal characteristics and afforded better subject protection. General tolerance for cold water immersion, wet and dry, and cold water raft exposures are depicted graphically, based on previously reported data. (Author)

A72-31089 Medical factors in unlimited class air racing accidents. R. G. Snyder (Michigan, University, Ann Arbor, Mich.) and A. W. Davis, Jr. (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). (*Aerospace Medical Association, Annual Scientific Meeting, 42nd, Houston, Tex., Apr. 26-29, 1971.*) *Aerospace Medicine*, vol. 43, May 1972, p. 512-519. 13 refs.

This paper presents results of investigation of seven fatal crashes involving probable medical factors implicated in this unique type of highly stressful competitive flying, including one case of probable myocardial infarction. The extent to which the effects of sedation, drug and alcohol use, fatigue, and gastrointestinal symptoms may lower the pilot's G tolerance as well as impair his ability to react successfully in an emergency situation, are apparently not well understood by many race pilots. It is concluded that improved education of pilots is necessary in this specialized area of aviation and that there is sufficient evidence to recommend that pilots participating in an unlimited racing event be required to pass a physical examination immediately prior to the race to qualify. (Author)

A72-31090 Vestibular response to angular accelerations and to Coriolis stimulation following alcohol ingestion. R. J. Hill, D. J. Schroeder, and W. E. Collins (FAA, Civil Aeromedical Institute; Oklahoma, University, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 43, May 1972, p. 525-532. 20 refs. Grant No. NIH-NB-05418-07.

Thirty young men were randomly assigned to three groups of 10 subjects each. One group received 100-proof vodka, another received 101-proof bourbon, and the third (control) was given no alcohol. Dosages were 2.5 ml of liquor per kg of body weight. Ocular nystagmus and subjective responses to angular accelerations in total darkness were obtained before and after drinking. Alcohol served mainly to depress vestibular responses in darkness. Decreases in turning sensations and in nystagmic responses to angular accelerations were most evident during the first hour or two after drinking. In general, alcohol produced no consistent effects in either the vertical nystagmus or the vertigo produced by Coriolis stimulation. Coriolis responses 24-30 hours after the ingestion of alcohol showed a reduction in both duration and frequency of nystagmus from pre-drinking response levels. (Author)

A72-31091 Protection against the chronic effects of hyperbaric oxygen toxicity by succinate and reduced glutathione. A. P. Sanders, R. M. Gelien, Jr., R. S. Kramer, and W. D. Currie (Duke University, Durham, N.C.). *Aerospace Medicine*, vol. 43, May 1972, p. 533-536. 11 refs. Contract No. N00014-67-A-0251-02; Grant No. PHS-HE-13850-06.

A comparison of data from control and experimental animals injected with succinate or GSH and chronically exposed to 5 ATA of 100% O₂ was plotted as cumulative % convulsed, cumulative % paralyzed, and cumulative % dead. The statistical analyses indicated that the succinate and GSH curves has a probability of less than 0.01 of being the same as the control curves for each of the observations. Kowalski et al. (1971) reported in this journal that sodium succinate failed to protect rats from the chronic effects of hyperbaric oxygen. The results of the statistical analyses of the data of Kowalski et al. and the data in this report indicate that succinate and GSH protect rats from the chronic effects of hyperbaric oxygen toxicity. (Author)

A72-31092 High-performance exercise cardiometer. R. S. Luce and J. M. Lagerwerff (Lockheed-Missiles and Space Co., Sunnyvale, Calif.). *Aerospace Medicine*, vol. 43, May 1972, p. 537-540. 18 refs.

An exercise cardiometer has been developed for the purpose of accurately deriving the heart rate from vigorously exercising normal subjects. The instrument exhibits extremely high rejection of muscular motion artifacts through the use of R-wave recognition circuits, combined with effective noise filtering. The heart rate is displayed on a linear scale front panel meter on a beat-to-beat basis, although the displayed and recorded rates may also be smoothed with a time-constant of either 10 or 30 seconds to facilitate slope and trend analysis, if desired. Used in the beat-to-beat mode the R-wave recognition circuits permit instantaneous detection of extrasystoles, missed beats, and other R-wave abnormalities. An R-wave event recognition indicator and a push-button operated 100 BPM calibrator are included in the instrument. (Author)

A72-31093 Longitudinal study on physical performance of ten pilots over a ten-year period. S. A. Nunneley, S. Finkelstein, and U. C. Luft (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.). *Aerospace Medicine*, vol. 43, May 1972, p. 541-544. 13 refs.

A longitudinal study is under way on a group of test pilots who report annually for comprehensive clinical and physiological evaluation at the Lovelace Foundation. Results are reported for 10 of these pilots who were measured for body composition, pulmonary function and work capacity repeatedly over a 10-year period. Mean age on initial evaluation was 31.6 years (range 28-38). During the 10 years these men showed changes usually associated with aging, such as greater fat content and increased ratio of residual volume to total lung capacity. However, aerobic work capacity increased significantly as revealed by a larger maximal oxygen consumption. It is noteworthy that several of the pilots in the study undertook voluntary physical fitness programs, probably motivated in part by the annual tests. (Author)

A72-31094 Stapedectomy - A threat to flying safety. R. B. Rayman (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, May 1972, p. 545-550. 18 refs.

Otosclerosis is a disease which can cause progressive loss of auditory acuity by a bony dystrophy of the footplate of the stapes. The treatment in vogue today is stapedectomy utilizing a prosthesis, wire or polyethylene, and a gelfoam or tissue graft over the oval window. A post-operative complication of profound aeromedical significance is perilymph fistula, which can cause vertigo and sudden incapacitation. Can such a catastrophic event happen to a pilot while flying a high performance aircraft which is capable of subjecting its

crew to violent pressure changes of the middle ear in a rapid climb, steep dive, or rapid decompression. In an attempt to answer this question, the literature has been reviewed, animal experiments have been conducted, the opinions of eminent otolaryngologists have been solicited, and airmen of the U.S. Air Force who have had a stapedectomy procedure have been identified and studied. Although some of the evidence uncovered is unfavorable, there is enough favorable evidence to suggest that flying after stapedectomy may not be as hazardous as heretofore believed as long as certain criteria are met. (Author)

A72-31095 Psychosocial reconstruction inventory - A postdictal instrument in aircraft accident investigation. R. E. Yanowitch (New York, State University, Buffalo, N.Y.), S. R. Mohler (FAA, Office of Aviation Medicine, Washington, D.C.), and E. A. Nichols. *Aerospace Medicine*, vol. 43, May 1972, p. 551-554. 5 refs.

A new approach to the investigation of aviation accidents has recently been initiated, utilizing a follow-on to the psychological autopsy. This approach, the psychosocial reconstruction inventory, enables the development of a dynamic, retrospective portrait of the pilot-in-command subsequent to an accident. Twelve fatal general aviation accidents were studied in this way in 1971. When routine accident investigation data are supplemented by a psychosocial or 'lifestyle' reconstruction, a much deeper understanding of the cause of the accident often emerges. In addition to the traditional detailed explanation of what happened, it is often possible to determine why the pilot-in-command behaved in a fashion to produce the accident. By increasing pilot insight into the role of emotions and situational stress in accident causation, more effective accident prevention programs should result. (Author)

A72-31096 # Pupillotonia /Adie's pupil/ - Diagnosis and significance in fliers. D. L. Epstein and T. J. Tredici (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, May 1972, p. 555-559. 16 refs.

Pupillotonia is a benign, usually unilateral, pupillary syndrome in which a larger than normal pupil responds minimally, if at all, to light, but constricts slowly and tonically to a near stimulus (light-near dissociation) and is supersensitive to 2.5% Methacholine Chloride (Mecholyl). Since the condition is benign, the flier with pupillotonia should be maintained on flying status with a waiver for loss of normal pupillary reflexes. Two cases of pupillotonia are reported and the methods used in diagnosis are demonstrated. These cases illustrate that pupillotonia may be preceded by a stage in which a dilated pupil shows little or no light-near dissociation, tonic pupillary movements, or supersensitivity to Mecholyl. A knowledge of the evolution of the signs of pupillotonia is useful in understanding the pathogenesis. (Author)

A72-31097 Continuous ECG recording of helicopter instructor pilots. W. P. Schane (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). *Aerospace Medicine*, vol. 43, May 1972, p. 560-563. 5 refs.

Fifty-three instructor pilots were studied with one lead of ECG for a full work day. Mean heart rates were tabulated from the record during administrative work, automobile driving, eating, and flying. Using Tukey's multiple comparison of means, significant differences were found between heart rates during flying and heart rates noted while driving, and while performing administrative duties. Means of 'lowest heart rate recorded' and 'highest heart rate recorded' for each subject were reported (means of 71.8 and 140.4 respectively). The activities in which the subjects were engaged at the time are reported. Seventy-one and seven tenths per cent of the subjects engaged in no regular schedules of physical training or sports participation. An 11 x 11 correlation matrix indicates only that subjects who have high heart rates during one activity will have comparably high heart rates during all activities, and vice versa. (Author)

A72-31098 # Characteristics of the functional state of the thyroid gland during hyperthermia (K kharakteristike funktsional'nogo sostoiانيا shchitovidnoi zhelezy pri gipertermii). Z. Ia. Dolgova and F. D. Raziapova (Semipalatinskii Meditsinskii Institut, Semipalatinsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Mar. 1972, p. 29-32. 16 refs. In Russian.

Biochemical and histochemical methods were used to study the functional activity of thyroid tissue in albino rats during acute overheating of the organism. Enzymatic activity and C-vitamin levels were used as indices of the functional state of the thyroid gland. Overheating is shown to reduce ascorbic acid concentration and to depress dehydrogenase, cytochromoxidase, and phosphatase activity of the thyroid gland. T.M.

A72-31099 # The effect of the hypothalamus on the activity of succinic dehydrogenase in the ciliary epithelium of a rabbit eye (Vliianie gipotalamusa na aktivnost' suksinatdegidrogenazy v tseliarnom epitelii glaza krolika). N. S. Shaposhnikova and N. D. Skuba (Zaporozhskii Meditsinskii Institut, Zaporozhe, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Mar. 1972, p. 47-51. 18 refs. In Russian.

A histochemical method was applied to the study of distribution and level of succinic dehydrogenase activity (SDH-activity) in the ciliary epithelium in the eye of a rabbit under normal conditions and during electric stimulation of the anterior and the middle parts of the hypothalamus. Quantitative cytochemical analysis of diphormazan depositions in the cells was carried out. The enzymes localize selectively and in great amounts in the epithelial cells. Electrical stimulation of the anterior part of the hypothalamus was followed by a fall of SDH-activity in the ciliary epithelium. An insignificant augmentation of this activity followed the action upon the middle part of the hypothalamus. Comparison of the results of visual study of the preparations and of cytophotometry with the ophthalmotone under the same conditions demonstrates that hypothalamic effects on intraocular pressure could be realized through respiratory chain of mitochondria, particularly, through the SDH-activity of cells secreting the chamber fluid. (Author)

A72-31100 # Repair processes in the central nervous system during disturbances of the motor function (Reparativnye protsessy v tsentral'noi nervnoi sisteme pri narusheniakh dvigatel'noi funktsii). G. N. Krivitskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Mar. 1972, p. 88-90. 7 refs. In Russian.

Studies of humans and animals with different areas of brain damage show that destructive changes in the central nervous system are accompanied by repair processes that attempt to restore the disturbed functions. The repair processes are manifested by hypertrophy of individual neurons of gliomatous elements, the formation of nerve-fiber growth bulbs, and new growth of nerve conductors. T.M.

A72-31151 What moves, the airplane or the world. S. L. Johnson and S. N. Roscoe (Illinois, University, Urbana, Ill.). *Human Factors*, vol. 14, Apr. 1972, p. 107-129. 45 refs. Contract No. N00014-6F-A-0305-0014.

The literature pertaining to motion-relationship variables in the display of airplane flight attitude and steering commands and their effects upon pilot performance is reviewed. Factors considered include: (1) figure and ground relationships, (2) control-display relationships, (3) whether the airplane or the horizon is the moving element of the display, and (4) whether the presentation of steering commands results in pursuit or compensatory tracking. The frequency-separation principle is an unexplored approach to the solution of display motion relationship problems. A concluding set of requirements for future research is based on problems encountered in previous investigations of display motion relationships. (Author)

A72-31152 Tracking performance with visual, auditory, or electrocutaneous displays. M. A. Hofmann and N. W. Heimstra (South Dakota, University, Vermillion, S. Dak.). *Human Factors*, vol. 14, Apr. 1972, p. 131-138. 19 refs. Research supported by the South Dakota Department of Highways and U.S. Department of Transportation.

Three groups of ten subjects each performed a unidimensional compensatory tracking task for 30 minutes. Each group received continuous error information feedback either visually, auditorally, or cutaneously. Performance was measured by time on target, constant error, absolute error, and root-mean-square error. Analyses of variance for these measures yielded significant differences between display types on all but the root-mean-square measure. A multiple discriminate analysis was performed on these measures and provided two significantly independent dimensions of discrimination. The first dimension was defined as speed of response, the second goodness of performance. It was concluded that for the particular task used, the auditory and cutaneous displays proved more effective than the visual display. (Author)

A72-31153 Visual search in complex fields - Size differences between target disc and surrounding discs. J. R. Bloomfield (Nottingham University, Nottingham, England). *Human Factors*, vol. 14, Apr. 1972, p. 139-148. 18 refs. Research supported by the Ministry of Aviation Supply and Nottingham University.

An adaptable technique for performing search experiments, enabling extensive studies to be undertaken with well-practiced observers, is described. In each trial a single target disk was presented. Cumulative distributions of the times taken to locate 6 solid disk targets of varying size in a display containing 99 larger standard disks arranged in a regular fashion, and 3 disk targets in a display of 107 larger disks arranged irregularly, are presented. Three practiced observers were used with each display. Sixty readings per observer, per target, per display were obtained. It is suggested that for the targets most different in size from the background disks, the distributions of times to locate are largely dependent on response time factors; and for the targets closest in size the distributions are largely dependent on search factors. Some support is lent to theoretical work that suggests search times are exponentially distributed. (Author)

A72-31154 The effect of heat stress on reaction time to centrally and peripherally presented stimuli. H. W. Leibowitz, E. R. Buskirk, R. T. Hennessy (Pennsylvania State University, University Park, Pa.), C. N. Abernethy (Department of Transportation, Cambridge, Mass.), and O. Bar-Or (Wingate Institute for Physical Education and Sport, Israel). *Human Factors*, vol. 14, Apr. 1972, p. 155-160. 9 refs. Research supported by the Pennsylvania State University; Grant No. NIH-MH-08061.

The effect of heat stress on reaction time to centrally and to peripherally presented stimuli was determined for lean and obese subjects whose work levels on a treadmill in a heat chamber produced either a 2.5 or 5% loss of body weight in six hours. Peripheral reaction time improved with practice, but central reaction time was not affected. Obesity, eccentricity of the peripheral stimulus, and the level of dehydration did not have significant effects on reaction time. It was concluded that, for short periods of time, the effects of heat stress can be overcome for highly motivated and experienced subjects. (Author)

A72-31155 Combined effects of altitude and high temperature on complex performance. W. D. Chiles, P. F. Iampietro, and E. A. Higgins (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Human Factors*, vol. 14, Apr. 1972, p. 161-172.

Nine well-trained subjects were tested on a complex-performance device involving tracking, monitoring, and mental

A72-31156

arithmetic during exposure to altitude (14,000 ft.) and heat (60 C) both singly and in a combination. Several physiological measures were taken. Exposure durations were 30 min for each condition with both pre- and posttesting. The only clear-cut effects of the conditions were significant differences across the environmental conditions on the tracking task. Altitude was clearly a more powerful variable than temperature in this study. This was evidenced by the fact that performance under the temperature-plus-altitude and the altitude-only conditions were approximately the same; performance under the temperature-only condition was significantly better than performance for either of the other two conditions. (Author)

A72-31156 **Effects of noise intensity on visual target-detection performance.** H. D. Warner and N. W. Heimstra (South Dakota, University, Vermillion, S. Dak.). *Human Factors*, vol. 14, Apr. 1972, p. 181-185. 5 refs. Grant No. AF-AFOSR-69-1822.

The purpose of the present study was to determine the effects of continuous white noise on visual target-detection performance. The variables manipulated were noise-intensity level, display-difficulty level, and target location. Four noise levels were utilized: 0, 80, 90, and 100 dB. The 0-dB level served as the control condition. Display difficulty was defined in terms of the number of nontarget, or background, display elements. Three levels of difficulty were used: 8, 16, and 32 background letter characters. The target locations examined were the central and peripheral regions of the visual display. Both detection time and detection error were recorded. The results indicated that noise-intensity and display-difficulty level were significantly interrelated with respect to detection speed but not to detection error. (Author)

STAR ENTRIES

N72-22051*# National Aeronautics and Space Administration, Washington, D.C.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 99

Feb. 1972 109 p refs
(NASA-SP-7011(99)) Avail: NTIS CSCL 06C

Subject coverage 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 on 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. Each entry consists of a standard citation accompanied by its abstract.

Author

N72-22052*+ National Aeronautics and Space Administration, Washington, D.C.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 100)

Mar. 1972 105 p refs
(NASA-SP-7011(100)) Avail: NTIS CSCL 06E

Subject coverage 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. Reference describing similar effects on 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. Each entry consists of a standard citation accompanied by its abstract.

Author

N72-22053# Joint Publications Research Service, Arlington, Va.
BIOLOGICAL EFFECT OF EXTREME ENVIRONMENTAL FACTORS

6 Mar. 1972 167 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. Embriol. (Leningrad), v. 61, no. 11, Nov. 1971 (JPRS-55341) Avail: NTIS

Experimental research on changes and effects of extreme environments on body systems is reported. Detailed summaries are given for the effects on nerve cells, liver functions, spleen functions, and various blood circulation systems. Other related material on muscle systems and joints is included.

N72-22054# Joint Publications Research Service, Arlington, Va.
SOME OF THE RESULTS AND PROSPECTS IN SPACE ANATOMY OF THE VASCULAR SYSTEM

M. G. Prives *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 1-16 refs

Avail: NTIS

An investigation of the effects of high altitude and space flight stress factors on the vascular system is discussed. Results show: (1) The vascular bed decreases, and all its elements change (arteries, veins, capillaries, and lymphatic vessels); these elements become tortuous, irregularly constricted or dilated. (2)

The permeability of the vascular wall increases. (3) There is slower formation of blood and lymph collaterals, which is indicative of weakening of the regeneration process. In the future it was recommended that patterns of separate hypokinesia and hypodynamia effects on vessels and all organs be determined as well as the difference between generalized and partial hypokinesia. It was also recommended that methods be developed for preventing the adverse consequences of limited mobility and control. The combined effects of these stress factors are investigated.

Author

N72-22055# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF G FORCES ON THE MICROCIRCULATORY SYSTEM

V. V. Kupriyanov and V. G. Petrukhin *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 17-33 refs

Avail: NTIS

The effects of gravitational stress, of varying intensity and direction, on the microcirculatory system of dogs and albino rats are investigated. Major efforts were made to: (1) determine and analyze the dynamics of morphological changes in the microcirculatory bed and its components; (2) investigate the condition of organic tissular structures under the same gravitational conditions; and (3) determine the significance of conditioning to increase the range of tolerable accelerations and prevent signs of morphological disorganization in the vascular system and the parenchyma of organs.

Author

N72-22056# Joint Publications Research Service, Arlington, Va.
THE CONDITION OF NEURONS IN THE AUTONOMOUS NERVOUS SYSTEM GANGLIA FOLLOWING EXPOSURE TO G FORCES

Ye. A. Dyskin and L. P. Tikhonova *In its Biol. Effect of Extreme Environ. Factors* 24 Mar. 1972 p 34-41 refs

Avail: NTIS

The effects of hypergravitation on morphological changes in the components of the autonomous nervous system are investigated. Special attention was given to the neurons and ganglia. Results indicate that the nodose ganglion of the vagus shows swelling of neurons, pericellular and perinuclear edema, irregular distribution of chromatophilic substance, and irregular shaped or no nucleus. It was also noted that vacuolization occurred in some of the nerve cells. In the ganglia of the splanchnic plexus, redistribution of the chromatophil substance occurred, some vacuolization is present, the nucleus is markedly enlarged, and in some cases completely dissolved. These ganglia show less changes than the others observed. The most severe morphological reaction was observed in the ganglia of the pelvic plexus. Almost all of the nerve cells of this region undergo vacuolization, edema, neuron wrinkles, and neuronophagia.

E.H.W.

N72-22057# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF TRANSVERSE G FORCES ON ATRIAL NERVE CELLS (EXPERIMENTAL MORPHOLOGICAL INVESTIGATION)

S. S. Mikhaylov, V. M. Klebanov, and S. I. Yevloyev *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 42-54 refs

Avail: NTIS

The morphological changes in the atrial nerve cells under the influence of transverse gravitational stress are investigated. Results show that the heart neurons react more to acceleration than other nerve components. Experimental results also indicate that the atrial nerve system has a certain tolerance to gravitational stress. However, the neurons show reversible reactions at small accelerations, but return to normal in a short period after exposure. Under multiple accelerations some neurons perish. These changes can be reversed after one or two months due to compensatory changes.

E.H.W.

N72-22058# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF TRANSVERSE G FORCES ON NERVE ELEMENTS OF THE RAT'S PHARYNGEAL AND ESOPHAGEAL NERVE ELEMENTS FOLLOWING PRELIMINARY EXPOSURE TO A CONSTANT MAGNETIC FIELD

V. P. Golev and G. V. Chepelenko *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 55-58 refs

Avail: NTIS

The nature of morphological changes in the intramural nerves of the pharynx and esophagus was investigated on 30 rats with single and fractional exposure to transverse accelerations lasting 5 to 10 minutes. The animals were rotated in a special centrifuge container with accelerations up to 12 g. Experimental animals were first exposed for one hour to a constant magnetic field with a force of up to 1000 H. Some rats were exposed once to the combined effect of the physical factors. Results show that after the second day, under magnetic field and transverse accelerations, 38.2% of the neurons were hyperargyrophilic. In addition, there were changes in quantitative indices of ratio between argyrophilic and argyophobic neurons. It was also determined that changes occur in relation to force, duration, and prior excitation of the nervous system. Author

N72-22059# Joint Publications Research Service, Arlington, Va.
CHANGES IN TROPHIC FUNCTIONS OF THE EMBRYONIC LIVER UNDER THE INFLUENCE OF TRANSVERSE G FORCES (PLUS G SUB X)

S. K. Konshina, V. I. Stepanov, and A. V. Yeregin *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 59-65 refs

Avail: NTIS

An experimental investigation of the effects of transverse acceleration on the trophic function of the liver is presented. Control and experimental pregnant mice, at varying stages of their pregnancy, were used for the study. Particular attention was given to the glycogen synthesizing functions, the process of replenishment of the glycogen content after exposure, and the time related parameters of the replenishment process. Histochemical examination of the control group revealed large and small clumps of glycogen in all lobes of the liver. The experimental group revealed that the hepatic vessels were dilated, plethoric, most hepatocyte nuclei were enlarged, and the glycogen decreased. In the control embryos, there were moderate amounts of glycogen present as compared to the adult specimens. In experimental embryos, very high or high glycogen content was observed in all hepatic lobules. It was concluded that increased glycogen breakdown in the mother is associated with increased glycogenesis in the embryo liver, thus insuring life and normal liver function of developing progeny. E.H.W.

N72-22060# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF CHEST-BACK G FORCES ON TELENCEPHALIC VESSELS

N. I. Zotova *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 66-71 refs

Avail: NTIS

The influence of chest-back gravitational stress on morphological changes in the telencephalic vessels is examined. Male rabbits were subjected to constant gravitational forces lasting from a few seconds to several minutes. Experimental results show that such forces lead to constriction of the arterial and dilation of the venous part of the brain's vascular bed. During brief exposure some of the arteries were constricted. Most arteries either did not change in diameter or became larger. Under maximum tolerable and intolerable forces, more severe changes in the vessels were noted. It was concluded that the degree to which changes take place depend upon the length and magnitude of force. E.H.W.

N72-22061# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF BACK-CHEST G FORCES ON METENCEPHALIC AND MESENCEPHALIC BLOOD VESSELS

I. N. Preobrazhenskaya *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 72-77 refs

Avail: NTIS

The changes in blood vessel structure of the medulla, pons, and mesencephalon of rabbits exposed to dorsoventral gravitational forces are demonstrated. The rabbits were subjected to a single tolerable force of 8 units for 3 to 10 minutes. After 3 minutes results show negligible constriction; no changes occurred in the veins. Ten minutes exposure results show considerable artery and capillary constrictions. A second series of tests using 8 to 10 units for 30 minutes revealed severely constricted arteries, tortuous and dilated veins, and changes in the diameter of the medulla and pons veins. Dilations were also present in these veins. E.H.W.

N72-22062# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF ACCELERATOR TRAINING ON THE RABBIT'S RETINAL VESSELS

L. I. Savinova *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 78-84 refs

Avail: NTIS

The effect of repeated exposure to gravitational stress, for training purposes, on the retinal vessels of rabbits is examined. Efforts were made to determine improved efficiency, if any, in the physiological regulatory mechanism as a result of training, vascular architectonic changes, signs of stasis, and presence of adequate arterial tonus. Results show that in trained rabbits some retinal vessels were changed, some had ruptured, and the primary arteries were not changed or only slightly changed. In untrained rabbits considerable changes occurred in all retinal vessels. As compared to untrained rabbits, trained rabbits tolerated the gravitational stress for a longer period of time and survived where the untrained died. It was concluded that rabbits can be conditioned to tolerate accelerations, and that tolerance depends upon the individual reactions of each animal. E.H.W.

N72-22063# Joint Publications Research Service, Arlington, Va.
THE EFFECT OF ACCELERATOR TRAINING ON SPLENIC RETICULAR TISSUE

S. G. Guseynova *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 85-89 refs

Avail: NTIS

The reticular base of the spleen, following exposure to prolonged gravitational stress for training purposes, is investigated. Male rats were used for the study. Autopsy results show dimensional reductions in the spleen after exposure. Other conclusions indicate: (1) The reticular spleen tissue changes depend on the magnitude, direction, and duration of gravitational exposure. (2) Under longitudinal accelerations architectonic reticular tissue increased in network density, and in new formation and tortuosity of fibers with degenerative areas. (3) Under transverse accelerations the architectonics do not differ markedly from normal. (4) Training increases resistance of the tissues to gravitational stress. E.H.W.

N72-22064# Joint Publications Research Service, Arlington, Va.
CHANGES IN SKELETAL MUSCLES ASSOCIATED WITH INACTIVITY

G. S. Katinas and A. N. Potapov *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 90-99 refs

Avail: NTIS

Experiments, under simulated space flight, were made to determine the effects of inactivity on skeletal muscles. The tests were made on male mongrel albino rats. Some of the animals

limbs were amputated. Determinations were made of body weight, body weight after skin removal, subcutaneous cellular tissue weight, weight of internal organs, and muscular weight. Results show: (1) Slow weight gain occurs during inactivity. (2) Some muscle retardation was present in all muscles. (3) Muscle weight varies according to test duration. In the amputated animals muscle weight and muscle size increased on the amputated side. It was concluded that muscular weight and size are determined by biomechanical conditions. E.H.W.

N72-22065# Joint Publications Research Service, Arlington, Va. STRUCTURAL AND CYTOCHEMICAL CHANGES IN THE RAT'S SKELETAL MUSCLES ASSOCIATED WITH RESTRICTED MOBILITY

V. V. Portugalov, Ye. I. Ilina-Kakuyeva, V. I. Starostin, K. R. Rokhlenko, and Z. F. Savik *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 100-111 refs

Avail: NTIS

An investigation was made to determine the nature of structural and cytochemical changes in some skeletal muscles of the hind legs as related to different durations of hypokinesia and hypodynamia. Mongrel male rats were used as subjects. The rats maintained under hypodynamic and hypokinetic conditions show marked delay in weight gain as compared to the control group. These changes were noted as early as the first day of the experiment. Observations also revealed muscular edema, dilated muscular fibers, destruction of contractile elements, enlarged muscle fibers, and atrophy and muscle disintegration. Changes in the size of muscle fiber were associated with altered enzyme activity. Cytochemical changes were also noted. Author

N72-22066# Joint Publications Research Service, Arlington, Va. THE EFFECT OF HYPOKINESIA AND HYPODYNAMIA ON INTRAORGANIC CARDIAC ARTERIES

L. A. Aleksina *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 112-116 refs

Avail: NTIS

The effects of prolonged restricted motor activity on the morphology of intraorganic cardiac arteries in rabbits are reported. Changes include myocardial capillary constrictions, dilation of arterioles, impairment of myocardial architectonics, and uneven filling and tortuous appearance of vessels. It was determined that the degree of change depends on the duration of restricted activity. E.H.W.

N72-22067# Joint Publications Research Service, Arlington, Va. MORPHOLOGICAL CHANGES IN BRONCHIAL VESSELS ASSOCIATED WITH EXPERIMENTAL HYPODYNAMIA AND HYPOKINESIA

V. S. Baybara *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 117-121 ref

Avail: NTIS

The effects of experimental hypodynamia and hypokinesia on the structure of intraorganic bronchial vessels of rabbits are studied. Observational results show marked dynamic changes in the vessels and extremely deformed nuclei in the endothelial cells. Changes were also noted in diapedesis of erythrocytes, occurrence of microvaricosities, prevalence of edema, arteriole constriction, venule and capillary hemorrhages, vascular wall breaks, and occlusion of the capillaries. E.H.W.

N72-22068# Joint Publications Research Service, Arlington, Va. THE EFFECT OF GENERALIZED HYPODYNAMIA AND HYPOKINESIA ON THE PORTAL SYSTEM OF THE LIVER

A. V. Drozdova *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 122-127 refs

Avail: NTIS

The changes occurring in the hepatic portal system caused by general hypokinesia and hypodynamia conditions are examined. Albino rats and rabbits were used as subjects. Morphological changes include constriction of small branches of segmentary and interlobular veins in the marginal segments or in the form of foci in different lobes. The segmentary and main branches of the portal vein dilated slightly or not at all. These changes progressively increased up to the 4th through 6th week, then became stabilized followed by regression. This suggests that the cardiovascular system has some adaptability to unusual conditions. E.H.W.

N72-22089# Joint Publications Research Service, Arlington, Va. THE EFFECT OF HYPODYNAMIA AND HYPOKINESIA ON THE ARTERIAL BED OF THE RABBIT'S HIND LEGS

Z. A. Saryyeva *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 128-134 refs

Avail: NTIS

Changes occurring in the arterial bed of a rabbit's hind legs under the influence of restricted movement are studied. The most marked change was noted in the leg muscles. After one week of restricted activity critical atrophy occurred becoming progressively severe as time passed. These extreme conditions also caused body weight loss, and changes in the architectonics of the arterial bed as seen in the constriction of secondary and tertiary branches of major vessels in the anterior and posterior femoral muscles. The arteries become straighter and extended as the intramuscular network constricts. Studies show the vessels are enlarged, anastomoses are poorly demonstrable between branches, the intramuscular network is more scant, and the fine vessels are constricted. E.H.W.

N72-22070# Joint Publications Research Service, Arlington, Va. THE EFFECT OF HYPODYNAMIA AND HYPOKINESIA AND SUBSEQUENT HYPERGRAVITATION OF THE BLOOD VESSELS OF THE CAPSULE OF THE RABBIT'S KNEE JOINT

A. G. Lubeyev *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 135-141 refs

Avail: NTIS

Experimental data on the effects of hypodynamia, hypokinesia, and hypergravitation on knee joint blood vessels are presented. It was demonstrated that hypodynamia and hypokinesia stresses led to vascular dystonia, hypoostasis, and, later on, to onset of hypertensive forms of hemodynamic disorders. Hypergravitation following hypokinesia leads to destructive changes in the vascular system of the knee joint capsule. Author

N72-22071# Joint Publications Research Service, Arlington, Va. AGE-RELATED CHANGES IN VASCULARIZATION OF THE RAT'S SKELETAL MUSCLES AS RELATED TO NATURE OF EXERCISE

G. N. Lenskaya *In its Biol. Effect of Extreme Environ. Factors* 6 Mar. 1972 p 142-150 refs

Avail: NTIS

Albino mongrel rats were observed to determine the effect of age, moderate exercise, and increased or heavy exercise on vascularization in skeletal muscles. Results show that in rats exposed to moderate loads, little change is noted in muscular blood supply, whereas a considerable blood increase occurred in rats exposed to increased or heavy loads. Heavy exercise also induces an increase in the number of capillaries, increased capillary diameter, and an increase in the total capillary area. Moderate exercise opens up reserve capillaries. For the age factor, it was noted that in skeletal muscle the mean diameter of the fibers increased with age, but less variability of muscle fiber diameter occurs under physical loads. E.H.W.

N72-22072# Joint Publications Research Service, Arlington, Va.
**SYMPOSIUM DEALING WITH THE INFLUENCE OF STRESS
 FACTORS ON STRUCTURE OF ORGANS AND TISSUES
 AT THE 9TH INTERNATIONAL CONGRESS OF ANAT-
 OMISTS**

N. I. Zotova *In its Biol. Effect of Extreme Environ. Factors*
 6 Mar. 1972 p 151-159 Conf. held at Leningrad, 20-21 Aug
 1970 ;

Avail: NTIS

A review of information presented at the International
 Conference held in the Soviet Union is presented. Data cover the
 influence of stress factors on changes in the morphological
 processes of organs and tissues. A brief summary is given of
 each paper presented. E.H.W.

N72-22073*# Scripta Technica, Inc., Washington, D.C.
**INFLUENCE OF MICROWAVE RADIATION ON THE
 ORGANISM OF MAN AND ANIMALS**

I. R. Petrov, ed. NASA Feb. 1972 229 p refs Transl. into
 ENGLISH of the book "Vliyaniye SVCh-Izlucheniya na Organizm
 Cheloveka i Zhivotnykh" Leningrad, Meditsina Press, 1970
 (Contract NASw-2036)

(NASA-TT-F-708) Avail: NTIS CSCL 06R

The effect of the microwave field on the organism were
 studied. The biological bases of the action of microwave
 electromagnetic radiation on the organism are considered with
 experimental material on the influence of high and low microwave
 intensities on the animal organism, characterizing the functional
 changes of the organism's basic systems and its metabolism.
 Also considered is the question of damage due to microwaves
 combined with other factors and changes in the organism's
 immunological reactivity, the properties of bacteria, viruses, and
 simple animals. The influence of microwaves on the human
 organism and data acquired as a result of observations on
 volunteers as to the influence of low microwave intensities on
 the healthy human organism are studied along with the
 symptomatology, stages, reversibility of changes, and a
 classification for the pathological processes that arise under the
 influence of microwaves in persons working with microwave
 generators. Author

N72-22074# Defence Standards Labs., Maribyrnong (Australia).
**FUNGI AT JOINT TROPICAL RESEARCH UNIT, INNISFAIL,
 QUEENSLAND. PART 1: GENERA OF MICROFUNGI
 GROWING ON MATERIALS**

F. J. Upsher Jan. 1972 11 p refs

(TN-233) Avail: NTIS

The examination and classification of microfungi found
 growing on a variety of materials at Innisfail, Queensland,
 Australia are reported. Thirty-five genera of fungi are listed and
 their occurrence on the materials recorded. Author

N72-22075*# Scientific Translation Service, Santa Barbara,
 Calif.

GROWING PLANTS IN SPACE

V. P. Dadykin Washington NASA Apr. 1972 80 p refs
 Transl. into ENGLISH of the book "Kosmicheskoye Rasteniye-
 odstvo" Moscow, Znaniye Press, 1968

(Contract NASw-2035)

(NASA-TT-F-704) Avail: NTIS CSCL 06C

The possible ways to solve the problems connected with life
 support systems for cosmonauts on prolonged space flights by
 using plants from earth are examined. The cycle of nature on
 earth is examined, and methods are proposed for modeling this
 cycle within a spacecraft. The danger of radiation in space and
 ways to eliminate it are studied. It is found that in closed,

pressurized areas higher plants are quite sensitive to increased
 oxygen in the air. A 25% concentration of oxygen greatly
 reduces the intensity of photosynthesis, whereas a concentration
 below normal stimulates plant growth and intensifies photo-
 synthesis. Author

N72-22076*# Exotech, Inc., Washington, D.C.

**QUARANTINE DOCUMENT SYSTEM INDEXING PRO-
 CEDURE Interim Report**

Mar. 1972 180 p refs

(Contract NASw-2062)

(NASA-CR-126215; TR72-09) Avail: NTIS CSCL 06M

The Quarantine Document System (QDS) is described
 including the indexing procedures and thesaurus of indexing
 terms. The QDS consists of these functional elements: acquisition,
 cataloging, indexing, storage, and retrieval. A complete listing of
 the collection, and the thesaurus are included. F.O.S.

N72-22077*# Technology, Inc., San Antonio, Tex. Life
 Sciences Div.

**THE INVESTIGATION OF VERTEBRAL INJURY SUSTAINED
 DURING AIRCREW EJECTION Annual Technical Report,
 28 Jun. 1970 - 15 Jan. 1972**

James V. Benedict 15 Jan. 1972 48 p refs

(Contract NAS2-5062)

(NASA-CR-114452) Avail: NTIS CSCL 06S

A series of tests were performed on excised human
 vertebral segments to determine the static and dynamic response
 of the thoraco-lumbar spine when loaded in flexion. A total of
 fifteen tests were performed on eleven specimens. Specimens
 were obtained from male donors ranging in age from 34 to 60
 years. Demographic data pertinent to each specimen and the
 elapsed time between death of the donor and testing of each
 corresponding specimen are presented. Only spinal segments
 comprised of lower thoracic and upper lumbar vertebrae were
 tested because in aircraft ejection injuries clinical complications
 in this anatomical region predominate. A complex continuum
 mathematical model describing the dynamic response of the
 human spine was formulated, solved, and verified experimentally.
 Detailed results are presented in figures, tables, and equations.

Author

N72-22078*# Techtran Corp., Glen Burnie, Md.

**COMPARATIVE EVALUATION OF THE INFLUENCE
 EXERTED ON THE ORGANISM BY BORIDES AND
 CARBIDES OF TRANSITION METALS WITH CONSIDERA-
 TION OF THE CHARACTERISTICS OF THEIR ELECTRON
 STRUCTURE**

I. T. Brakhnova Washington NASA Apr. 1972 10 p refs
 Transl. into ENGLISH from Gigena Truda i Prof. Zabolevaniya
 (Moscow), v. 13, 1969 p 26-31

(Contract NASw-2037)

(NASA-TT-F-14255) Avail: NTIS CSCL 06C

Experiments were carried out on animals for a comparative
 study of the effect produced on the organism by titanium
 boride, zirconium boride and chromium boride in comparison
 with amorphous boron and metallic components of these
 borides. Similarly, the effect of boron carbide, titanium carbide,
 zirconium carbide and chromium carbide were studied. An
 increased fibrogenic effect and a more pronounced dystrophy of
 the liver, kidneys and sometimes of the myocardium were
 observed under the influence of borides to a greater extent than
 under that of carbides. The toxic properties of these materials
 increased with a decrease in the statistical weight of stable d(s)
 and sp(2) electron configurations, developing after interaction of
 the metallic and nonmetallic components and an increase in the
 proportion of electrons in the nonlocalized state. Author

N72-22079# Public Health Service, Phoenix, Ariz. Applied Microbiology and Planetary Quarantine Section.

SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS Quarterly Report, Jan. - Mar. 1972

Martin S. Favero Mar. 1972 25 p refs

(NASA Order-W-13062)

(NASA-CR-126213; Rept-37) Avail: NTIS CSCL 06M

Results are presented of laboratory experiments conducted on the thermal resistance of naturally occurring airborne spores and microbiological examinations of space hardware using long-term slit samplers and rodac plate and swab-rinse methods of sampling environmental surfaces. A.L.

N72-22080# University Central Hospital, Helsinki (Finland). Radiotherapy Clinic.

EXPERIMENTS ON THE INTERACTION OF IONIZING RADIATION AND TISSUES IN DIAGNOSTICS, THERAPY AND PROTECTION

Aaro Ryttilae 1971 26 p refs

(NP-19051) Avail: AEC Depository Libraries

Brief summaries are presented of eight publications that discuss: dose distribution during electron beam therapy; scintigraphic studies of the prostate gland and placenta localization; the radiation dose to radiologists during various diagnostic radiographic studies; the effects of electrons on mitotic activity in normal and neoplastic tissues of rats; and methods for the reduction of the radiation dose to medical personnel during the insertion of radium applicators in patients. NSA

N72-22081# Federation of American Societies for Experimental Biology, Bethesda, Md.

A REVIEW OF ADVERSE BIOMEDICAL EFFECTS OF SOUND IN THE MILITARY ENVIRONMENT

C. Jelleff Carr and Kenneth D. Fisher Dec. 1971 113 p refs

(Contract DAHC19-71-C-0011)

(AD-734932) Avail: NTIS CSCL 06/19

The report provides a comprehensive review of the adverse effects of sound on man in the military environment. The diversity and complexity of Army systems that overexpose the soldier to noise have caused concern for his health and his capability to perform efficiently. Despite the recognition of the deleterious effects of noise exposure, problems with noise-induced hearing loss and human performance decrement continue to enlarge. It is generally recognized that overexposure to high-intensity noise during a lifetime will result in progressive hearing loss. There is no way to correct permanent threshold shift; permanent hearing loss is irreversible. It is not possible at the present time to identify audiometrically individuals with increased susceptibility or resistance to injury from noise exposure. Protection by sound attenuating devices, such as earplugs or earmuffs, has proved to be the most practical way to protect and to conserve the hearing of men required to work in a noisy environment. Effective hearing conservation and reduction of noise-induced hearing loss are compromised by lack of adherence to existing Army regulations and frequent waiving of equipment design standards. Work should be directed toward reduction of noise at its source and, emphasis should be placed on increased support for Army Hearing Conservation Programs. The report identifies research opportunities that are related to Army needs. Author (GRA)

N72-22082# American Inst. for Research, Pittsburgh, Pa. **DEVELOPMENT OF A TAXONOMY OF HUMAN PERFORMANCE: EVALUATION OF A TASK CLASSIFICATION SYSTEM FOR GENERALIZING RESEARCH FINDINGS FROM A DATA BASE** Interim Technical Report

Warren H. Teichner and Joan Whitehead Apr. 1971 44 p refs

(Contract F44620-67-C-0116; DAHC19-71-C-0004; ARPA Order 1032; ARPA Order 1623)

(AD-736192; AIR-726/2035-4/71-TR8; AIR-R71-11) Avail: NTIS CSCL 05/10

The paper reports on a research effort to assess the feasibility of constructing a data base for improving generalization of research results about human performance. A criterion measure task classification system was applied to a portion of the existing literature on learning and environmental variables. Optimum distribution of practice and knowledge of results were the two learning variables investigated. The environmental factor investigated was the effects of different noise intensities. It was shown that for certain variables and certain task conditions the categorization system was effective in predicting human performance across a variety of tasks. Implications for developing a data base are described. Author (GRA)

N72-22083# Naval Aerospace Medical Research Lab., Pensacola, Fla.

WALK ON FLOOR EYES CLOSED (WOFEC): A NEW ADDITION TO AN ATAXIA TEST BATTERY

Alfred R. Fregly, Ashton Graybiel, and Margaret J. Smith 1 Oct. 1971 17 p refs

(AD-735455; NAMRL-1144; NAVMED-MR41.01.0120B8FG-7)

Avail: NTIS CSCL 06/16

The problem of quantifying a simple, often-used clinical ataxia test (tandem-walking) for inclusion in an ataxia test battery was overcome by adopting the method of counting the number of heel-to-toe steps (1 to 10) a person can take without sidestepping with eyes closed and arms folded against chest. Standardization under these rigid conditions was based on testing 287 normal men and 100 normal women. Validation was based on testing 22 individuals having labyrinthine defects of varying severity and origin. This newly quantified test was found to be as valid an indicator of vestibular ataxia as other subtests of a multidimensional quantitative ataxia test battery with which it was compared, and it has the advantages that, it appears to be free of age influences, and nearly all the normal and none of the abnormal individuals obtained a perfect score. GRA

N72-22084# Naval Aerospace Medical Research Lab., Pensacola, Fla.

EXPOSURE OF SQUIRREL MONKEYS FOR LONG PERIODS TO EXTREMELY LOW-FREQUENCY MAGNETIC FIELDS: CENTRAL NERVOUS SYSTEM EFFECTS AS MEASURED BY REACTION TIME

James D. Grisset 21 Oct. 1971 14 p refs

(AD-735456; NAMRL-1146;

NAVMED-MF12.524.015-0013BOX-2) Avail: NTIS CSCL 06/18

The present experiment was designed to detect cumulative central-nervous-system effects resulting from exposure to ELF magnetic fields. Three squirrel monkeys were exposed continuously for 42 days to a 10-gauss magnetic field at 45 Hz. Reaction-time measurements were taken daily for 23 days prior to exposure, during the exposure period, and for 9 days after exposure. No significant changes in these measurements were observed between control sessions and exposure or postexposure sessions. Two other indices of performance, reinforcement ratio and efficiency ratio, were also unchanged. These results indicate that if a psychophysiological significant effect exists, it is probably quite subtle and will therefore require a broad range of very sensitive experiments to evaluate properly the long-term effects of the ELF environment. Author (GRA)

N72-22085# School of Aerospace Medicine, Brooks AFB, Tex. **EFFECT OF CONSTANT DIET ON MICROBIAL POPULATIONS OF HUMAN DENTAL PLAQUE** Technical Report.

Mar. 1969 - Oct. 1970

Carl J. Andres, Joseph T. Cordaro, Cecil E. Brown, Jr., and Bernard F. Podlin Nov. 1971 18 p refs
(AF Proj. 7753)

(AD-735275; SAM-TR-71-38) Avail: NTIS CSCL 06/13

Constant diet, minimal oral hygiene, and simulated weightlessness appeared to have no statistically significant effect on selected microbial populations of human dental plaque. Subjects were eight airmen participating in a concurrently conducted bed rest - exercise study. Oral prophylaxis and restoration of various teeth preceded the 16-week study, and minimal oral hygiene procedures were imposed. Samples were collected twice during the first week and once weekly thereafter. Standard bacteriologic plate count procedures were used to enumerate selected organisms. Total aerobes, total anaerobes, and populations of Actinomyces, Fusobacterium, Neisseria, Nocardia, and Veillonella generally tended to decrease throughout the study. Aerobic and facultative streptococci and populations of S. salivarius, Bacteroides melanogenicus, and Lactobacillus generally showed little change other than normal fluctuation. Only the weekly means for S. salivarius were significantly different for supra- and subgingival plaque. Correlation of bacterial count data with clinical observations indicate that the minimal oral hygiene procedures imposed during this study were sufficient to remove bacterial plaque and prevent shifts in predominant organisms in developing plaque, thereby maintaining the oral health status of the individual subjects. Author (GRA)

N72-22086# Army Medical Research and Nutrition Lab., Denver, Colo.

DEVELOPMENT AND APPLICATION OF A WHOLE-BODY RADIATION SYSTEM

Charles C. Scaief, III and Harry J. Krzywicki 12 Nov. 1971 41 p refs

(DA Proj. 3A0-14501-B-71R)

(AD-735649; AMRNL-330) Avail: NTIS CSCL 06/18

An instrument for detecting natural body burdens of radionuclides has been constructed at USAMRNL. The counting system uses a NaI(Tl) scintillation crystal and a lead shadow-shield. The subject passes beneath the detector on a padded sled at a speed proportional to the live time of the multichannel analyzer. Data is analyzed using the RCA 301/355 computer and punched paper tape. The detector was calibrated for measuring body potassium using six subjects with weight/height ratios varying from 0.368 Kg/cm to 0.620 Kg/cm. The calibration factor was found to be a linear function of weight/height for the range of body sizes considered. The counter has been used for measuring potassium, for body composition studies, and for tracer isotope retention measurements. GRA

N72-22087# California Univ., Los Angeles.

NEUROPHYSIOLOGICAL ESTIMATES OF HUMAN PERFORMANCE CAPABILITIES IN AEROSPACE SYSTEMS

Progress Report, 1 Oct. 1970 - 30 Sep. 1971

W. Ross Adey 30 Nov. 1971 17 p refs

(Contract F44620-70-C-0017; AF Proj. 9777)

(AD-735178; AFOSR-72-0072TR) Avail: NTIS CSCL 06/19

The report is a multiphase research effort which involves a number of very distinct and separate projects, some of which are listed. Neurophysiological correlates of tasks at the limit of operator capability; Totally implanted telemetry devices; Underwater telemetry; Telephone telemetry; Theory and methods of fuzzy clustering techniques; Investigations of CNS and endocrine system in the chimpanzee; Patterns of diurnal rhythms in urinary metabolites and electrolytes in men with spinal cord injury; Fluorescence spectroscopy and biological labelling; Effects of modulated VHF field on brain and behavior; Computer studies of EEG in normals and children with reading difficulties. GRA

N72-22088# Zaret Foundation, Inc., Scarsdale, N.Y.

INVESTIGATION OF PERSONNEL HAZARD ASSOCIATED WITH RADIO-FREQUENCY FIELDS ENCOUNTERED IN NAVAL OPERATIONS Final Report

Milton M. Zaret Jul. 1971 27 p refs

(Contract N00014-69-C-0358; NR Proj. 101-765)

(AD-735513) Avail: NTIS CSCL 06/18

A pragmatic, bio-assay experimental method was developed whereby meaningful radio-frequency hazard data can be obtained. The technique can be applied to any type of pure or mixed radio-frequency field from the simplest to the most complex. The animal, itself, serves as the cumulative dosimeter for registering psycho-physical effects. By utilizing two primates for each intensity duration function tested, the probability of a spurious radiation field effect is rendered negligible. By selecting the animals as a pair, one male and the other female, the entire spectrum of potential sex-related delayed effects, including mating, fertility, gestation and progeny, may be investigated. In addition to the search for specific, radiation induced signature pathology such as thermal cataracts, other types of pathology and functional disorders including behavioral and psycho-physical abnormalities may also be investigated simultaneously. The concept of developing health-safety data by the technique pioneered in this program represents one of the most meaningful state-of-the-art advances for determining radio-frequency hazards developed during the past decade. Author (GRA)

N72-22089# Walter Reed Army Medical Center, Washington, D.C. Army Medical Biomedical Research Lab.

[BIOMECHANICAL MEDICAL RESEARCH] Quarterly Progress Report, Apr. - Jun. 1971

1971 29 p refs

(AD-736375) Avail: NTIS CSCL 06/12

Contents: Antithrombotic surfaces; Biodegradable polymers; Bracing: Lower extremity exercise equipment; Wound dressings; Calcification; Hemostatic agents; Piezoelectric properties of bone; Viable and necrotic tissue differentiation; Externally powered prostheses; Cosmetic glove material; Eye lens calcification. GRA

N72-22090# Armed Forces Radiobiology Research Inst., Bethesda, Md.

REACTOR DOSIMETRY WITH PAIRED MINIATURE IONIZATION CHAMBERS

D. W. Shosa Dec. 1971 17 p refs

(AD-736177; AFRRRI-TN71-7) Avail: NTIS CSCL 06/18

Paired ionization chambers with nominal volumes of 0.05 cc are in use at the Armed Forces Radiobiology Research Institute to measure neutron and gamma components of depth doses in steady-state and pulsed TRIGA fields. Cavity chamber theory is employed to obtain quantitative estimates of neutron and gamma dose sensitivities of a chamber with a tissue-equivalent plastic wall filled with a tissue-equivalent gas and magnesium chamber filled with CO₂. The uncertainties in these estimates have been propagated through the paired chamber equations and result in the following uncertainties in measured dose components in a field where the neutron to gamma dose ratio varies from 0.1 to 15. Author (GRA)

N72-22091# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

RADIOFREQUENCY AND MICROWAVE RADIATION LEVELS RESULTING FROM MAN-MADE SOURCES IN THE WASHINGTON, D. C. AREA

Stephen W. Smith and David G. Brown Nov. 1971 75 p refs
Prepared in cooperation with White Electromagnetics, Inc., Bethesda, Md.

(Contract CPE-R-22)
(PB-206216; BRH-DEP-72-5; FDA-72-8015) Avail: NTIS; DOD \$0.75 CSCL 06R

In order to determine the typical levels of radiofrequency and microwave radiation that result from man-made sources in an urban environment, measurements were made of peak power densities in the Washington, D.C., area during the summer of 1969. The highest levels measured (approximately 0.1 mW/sq cm) originated primarily from AM broadcast towers and airport radar installations. Author (GRA)

N72-22092* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
SPACE SUIT HAVING IMPROVED WAIST AND TORSO MOVEMENT Patent
Hubert C. Vykukal, inventor (to NASA) Issued 25 Jan. 1972
7 p Filed 23 Mar. 1970

(NASA-Case-ARC-10275-1; US-Patent-3,636,564;
US-Patent-Appl-SN-21644; US-Patent-Class-2-2.1A) Avail: US Patent Office CSCL 06K

A space suit is described with improved torso and waist movement. The space suit includes a canted rotary joint near the middle of the torso. The joint being set at an angle of about 30 deg to horizontal and tilting upwardly from the front. The space suit also preferably includes a double bellows for improved waist action. Official Gazette of the U.S. Patent Office

N72-22093* National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.
OPEN TYPE URINE RECEPTACLE Patent
Anthony S. Giralda, inventor (to NASA) Issued 7 Sep. 1971
5 p Filed 13 Aug. 1970

(NASA-Case-MS-C-12324-1; US-Patent-3,602,923;
US-Patent-Appl-SN-63384; US-Patent-Class-4-110;
US-Patent-Class-4-99; US-Patent-Class-128-295) Avail: US Patent Office CSCL 06I

An open-type urine receptacle is described, comprising a tubular housing having inlet end and outlet ends. Within the housing is a honeycomb insert for polarizing the urine stream in order to eliminate splashback. Supported on the honeycomb insert and at one end thereof is a fine mesh screen insert adapted to serve as a wicking means upon completion of micturition. A receptacle cover is also provided for covering the open end of the housing and a vacuum removal tube is connected to the other end and in fluid communication with the interior. Official Gazette of the U.S. Patent Office

N72-22094*# Hamilton Standard, Windsor Locks, Conn.
INVESTIGATIONS TO IMPROVE CARBON DIOXIDE CONTROL WITH AMINE AND MOLECULAR SIEVE TYPE SORBERS

John F. Bertrand, Harlan F. Brose, Frank L. Kester, and Peter J. Lunde. Mar. 1972 310 p refs
(Contract NAS1-8944)
(NASA-CR-112021; SVHSER-5966) Avail: NTIS HC \$6.00/MF, \$0.95 CSCL 06K

The optimization trends and operating parameters of an integral molecular sieve bed heat exchanger were investigated. The optimum combination of substrate and coating for the HS-B porous polymer was determined based on the CO₂ dynamic capacity in the presence of water vapor. Full size HS-B canister performance was evaluated. An Amine CO₂ Concentrator utilizing IR-45 sorber material and available Manned Orbiting Laboratory hardware was designed, fabricated and tested for use as an experiment in the NASA 90-day space simulator test of 1970. It supported four men in the simulator for 71 days out of the 90-day test duration. Author

N72-22095# Joint Publications Research Service, Arlington, Va.
MEASURES AGAINST THE UNFAVORABLE EFFECT OF WEIGHTLESSNESS

A. Genin and I. Pestov 14 Apr. 1972 12 p Transl. into ENGLISH from *Aviatsiya i Kosmonavtika* (Moscow), no. 3, 1972 p 30-33
(JPRS-55714) Avail: NTIS

Methods designed to control or prevent the problems associated with weightlessness (sensation of increased body weight, decreased physical performance, deterioration in vertical posture tolerance, and gait changes) are investigated. The most promising methods are removal of hydrostatic blood pressure and the gravitational load on the muscular-skeletal system. Results revealed that these measures did not prevent the full development of unfavorable side effects, but did modify the disorders. It was also noted that for prolonged weightlessness such methods are ineffective. Descriptions are given of the instruments, machinery, and the training used in the experiments. E.H.W.

N72-22096*# Texas Technological Univ., Lubbock, Biomedical Instrumentation Lab.

THE DEVELOPMENT OF INSULATED ELECTROCARDIOGRAM ELECTRODES Final Report, 1 Jul. 1970 - 31 Dec. 1971

William M. Portnoy and Robert M. David 31 Dec. 1971 70 p refs

(Contract NAS9-11162)

(NASA-CR-115530) Avail: NTIS CSCL 06B

An integrated system was developed, consisting of an insulated electrode and an impedance transformer, which can be used for the acquisition of electrocardiographic data. The electrode consists of a thin layer of dielectric material deposited onto a silicon substrate. The impedance transformer is an operational amplifier used in the unity gain configuration. Both electrode and impedance transformer are contained in a plastic housing identical to that used with the NASA Apollo-type electrode. The lower cut off frequency of the electrode system is between 0.01 and 1.0 Hz, depending on the dielectric used and its thickness. Clinical quality electrocardiograms were obtained with these electrodes. Author

N72-22097# Flying Personnel Research Committee, London (England).

REVERSE FLOW PERSONAL VENTILATION

J. R. Allan, J. Morrison, and D. G. Robertson Jan. 1971 20 p refs

(FPRC/Memo-250) Avail: NTIS

The potential contribution of reverse flow personal ventilation for the relief of thermal stress in the aviation field is reviewed. Current evidence is discussed and recommendations are made for further research. Author

N72-22098*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

CARDIOTACHOMETER Patent Application

Hubert E. Smith, John R. Rasquin, and Roy A. Taylor, inventors (to NASA) Filed 7 Apr. 1972 16 p

(NASA-Case-MFS-20284; US-Patent-Appl-SN-242027) Avail: NTIS CSCL 06B

A device for accurate instantaneous measuring of the heart rate is described. The device measures the interval between two succeeding heart beats by counting cycles from a fixed frequency source occurring between the two beats. The heart rate is computed during the interval between the next two beats by counting the number of times that the interval count must be counted to zero in order to equal a total count of 60 times (to convert to beats per minute) the frequency of the fixed frequency source. NASA

N72-22099*# Systems Technology, Inc., Hawthorne, Calif.
DEVELOPMENT OF A CATEGORY 2 APPROACH SYSTEM MODEL

Walter A. Johnson and Duane T. McRuer Washington NASA
 May 1972 92 p refs
 (Contract NAS2-4892)
 (NASA-CR-2022; TR-182-2) Avail: NTIS CSCL 01B

An analytical model is presented which provides, as its primary output, the probability of a successful Category II approach. Typical applications are included using several example systems (manual and automatic) which are subjected to random gusts and deterministic wind shear. The primary purpose of the approach system model is to establish a structure containing the system elements, command inputs, disturbances, and their interactions in an analytical framework so that the relative effects of changes in the various system elements on precision of control and available margins of safety can be estimated. The model is intended to provide insight for the design and integration of suitable autopilot, display, and navigation elements; and to assess the interaction of such elements with the pilot/copilot. Author

N72-22100# Brookhaven National Lab., Upton, N.Y. Health Physics Div.

STANDARDS, STATISTICS AND STERNGLOSS: GUILT BY ASSOCIATION

Andrew P. Hull and Ferdinand J. Shore (Queens Coll., N. Y.)
 1971 54 p refs Presented at 6th Ann. Topical Symp. on Radiation Protect. Standards, Richland, Wash., 2-5 Nov. 1971
 Sponsored by AEC
 (BNL-16255; Conf-711119-2) Avail: NTIS

Existing radiation protection standards have been criticized on the grounds that radiation effects have been under-evaluated by the standards setting bodies. It has been postulated that the added risk at the presently permitted maximum exposure rate (500 mR/yr) will lead to an additional 61,880 deaths per million children born, and that concurrent increases in effluent releases from several nuclear facilities and in infant mortality in adjacent counties and/or states provides evidence that low-level radiation may have already produced more serious effects than believed possible when radiation standards were formulated. It is concluded that the above argument uses an extreme interpretation of data from studies by Stewart and Kneale and ignores data from other contrary studies. When examined in the context of the actual or calculated average effluent doses to be populations at risk and of other sources of exposure, the claimed effects cannot reasonably be related to effluent releases. Author (NSA)

N72-22101# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.

ECOLOGICAL ASPECTS OF PLUTONIUM DISSEMINATION IN TERRESTRIAL ENVIRONMENTS

J. J. Davis 1971 17 p refs Prepared in cooperation with AEC, Las Vegas, Nev.
 (Contract AT-04-1-GEN-12)
 (UCLA-12-848) Avail: NTIS

A research program to investigate the long range effects of plutonium disseminated into the desert ecosystem is outlined. Emphasis is placed on standardization of analytical methods, delineation of contaminated areas, problems of resuspension and redistribution, food chain transport, and ecological effects. Forty-seven references are contained in the report. Author (NSA)

N72-22102# California Univ., Berkeley. Lawrence Berkeley Lab.

ABSORBED DOSE: AN UNFORTUNATE RED HERRING IN RADIATION PROTECTION

Alessandro Rindi and Ralph H. Thomas 25 Oct. 1971 27 p refs Presented at the 6th Ann. Topical Symp. on Radiation Protection Standards, Richland, Wash., 2-5 Nov. 1971
 (Contract W-7405-eng-48)

(LBL-379; Conf-711119-5) Avail: NTIS

Man's uses of ionizing radiations are increasing rapidly, and larger numbers of people are being exposed to high linear energy transfer (LET) radiations. These radiations present interesting problems of dosimetry which are discussed in the light of experience at high energy accelerators. It is suggested that two aspects of our present scale for numerical expression in radiation protection need clarification. Firstly, the physical dimensions of dose equivalent (DE) should be defined and secondly, the precision with which DE estimates are to be made should be stated. The practical evaluation of DE in mixed radiation fields is discussed and it is suggested that this quantity is better obtained via measurements of particle flux density and energy spectra than by LET spectrometry. The advantages of the former technique over the latter are discussed briefly. Author (NSA)

N72-22103# Harry Diamond Labs., Washington, D.C.
ENGINEERING PERFORMANCE EVALUATION OF ARMY FLUIDIC VOLUME-CYCLED RESPIRATOR, MODEL 4

Leland R. Jones Dec. 1971 35 p refs
 (HDL Proj. 31033; DA Proj. 3AO-62110-A-816)
 (AD-736353; HDL-TM-71-32) Avail: NTIS CSCL 06/11

The overall performance of the previous Army volume-cycled respirator models was satisfactory; however, the flow consumption (61 lmbda/min) was determined to be undesirably high. The Model 4 volume-cycled respirator was designed to reduce the required amount of flow while retaining the functions (volume- and pressure-cycling capabilities, assist and control) of the previous models by using low-power fluoric components and combining the patient and power circuits. The maximum flow consumption of a breadboard model of this respirator was 21 percent of that required by the previous models, and general performance of this respirator exceeds that of the previous models. Author (GRA)

N72-22104# Naval Underwater Systems Center, Newport, R.I.
VISUAL SAMPLING ON A SIMULATED PPI DISPLAY

Richard L. Mason 30 Nov. 1971 28 p refs
 (AD-736175; NUSC-4201) Avail: NTIS CSCL 05/10

Much effort has been spent in studying the sonar operator as a target detector. In general, it is assumed that the operator samples all the data available to him. This study discusses the operator's sampling procedure on a simulated plan position indicator (PPI) display. In visual sampling, information is obtained by an operator from a display by fixating points on the display with his eyes. The area near these points contains most of the information that the operator uses from the display to make a decision of 'target' or 'no target'. The use of the Electro-oculargram (EOG) in obtaining the operator's fixation points is discussed, along with the drift problems and a method to decrease drift by using feedback to the electrodes. Experimental results of an operator's sampling of a simulated PPI display are reported for two types of CRTs: storage and nonstorage. Author (GRA)

N72-22105# Martin Marietta Corp., Orlando, Fla.
TARGET ACQUISITION STUDIES: (1) TRANSITION FROM DIRECT TO TV MEDIATED VIEWING. (2) TARGET ACQUISITION PERFORMANCE: COLOR VS MONOCHROME TV DISPLAYS Final Report, 1 Jan. - 31 Dec. 1970

Frank D. Fowler and Daniel B. Jones Jan. 1972 40 p refs
 (Contract N00014-67-C-0340; NR Proj. 196-071)
 (AD-736244; OR-11768) Avail: NTIS CSCL 17/2

Two aspects of air-to-ground daylight target acquisition were investigated. Study 1 examined the task of finding a target displayed on a cockpit-mounted CRT after the pilot had acquired it visually through the cockpit canopy. The effect of three different TV camera fields-of-view on the subject's ability to transition from outside to inside conditions was studied. The second experiment evaluated the differences in acquisition performance elicited by color and monochrome TV display presentations of ground targets. Author (GRA)

N72-22106# Harry Diamond Labs., Washington, D.C.
ARMY CO₂/O₂ CONCENTRATION MONITOR (MODEL 1)
 Fernando Villarroel and Charles W. Ragsdale Dec. 1971 72 p refs
 (DA Proj. 3A0-62110-A-816)
 (AD-737003; HDL-TM-71-31) Avail: NTIS CSCL 06/2

A fluoric-electronic system has been developed to continuously monitor the concentration of carbon dioxide and periodically measure the concentration of oxygen in respiratory gases. The sensor consists of two miniature fluoric oscillators whose acoustic frequency depends on CO₂ concentration; the sensor is coupled to a pressure transducer. The signal is electronically processed, and the gas concentration is indicated by a calibrated dial. The signal may also be recorded. The system has a low sampling rate (7 cc/sec) induced by a fluoric suction unit operated by low-pressure gas. The humidity and temperature of the sampled gas are controlled by a humidity control unit operated by a fluoric vortex tube. The system has been calibrated and is accurate to better than 0.3 percent carbon dioxide and 1 percent oxygen. Author (GRA)

N72-22622# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Flight Deck Development Branch.
THE STATUS OF HUMAN PERCEPTUAL CHARACTERISTIC DATA FOR ELECTRONIC FLIGHT DISPLAY DESIGN
 Keith T. Burnett *In* AGARD Guidance and Control Displays Feb. 1972 10 p refs
 Avail: NTIS

The human factors literature was searched and analyzed for human perceptual characteristic data relating to the design of individual electronic flight displays. Some of the more interesting data obtained are summarized and include flicker, visual acuity, display resolution, luminance, alphanumeric legibility, scale legibility, information coding, display size, and the effect of environmental variables on these quantities. Wherever possible the data are analyzed and presented so as to point out significant variables and data trends not specifically discussed in the original works. Author

N72-22624# Human Engineering Labs., Aberdeen Proving Ground, Md.
WHAT COLOR DISPLAY ELEMENT
 John A. Barnes *In* AGARD Guidance and Control Displays Feb. 1972 11 p refs
 Avail: NTIS
 (Contract NASw-2247)
 (NASA-CR-126157; QPR-3) Avail: NTIS CSCL 17G

Applications of wide range broadcast procedures to improve air traffic control and make more airspace available are discussed. A combination of the Omega navigation system and the very high frequency omnirange (VOR) is recommended as a means for accomplishing improved air traffic control. The benefits to be derived by commercial and general aviation are described. The air/ground communications aspects of the improved air traffic control system are explained. Research and development

at either of two illumination levels for each background color and was available, with this control, as a red lighting system or as a blue-white lighting system. These results provide the instrument manufacturers with twenty pointer and background combinations which can be expected to produce less than a one percent instrument scale reading error, regardless of the lighting system used and at illumination levels as low as 0.1 foot-Lamberts.

Author

N72-22625# Litton Systems, Inc., Van Nuys, Calif. Data Systems Div.

THE INTEGRATED COCKPIT PROCEDURE FOR IDENTIFYING CONTROL AND DISPLAY REQUIREMENTS OF AIRCRAFT IN ADVANCED TIME PERIODS

John V. Murphy and Bernard S. Gurman (ECOM, Fort Monmouth, N. J.) *In* AGARD Guidance and Control Displays Feb. 1972 7 p refs

Avail: NTIS

An adaptation of the integrated cockpit research procedure was used to define control and display requirements for the next generation utility transport helicopter under consideration by the U.S. Army. A control and display requirements analysis was conducted based upon the derivation of specific functions necessary for accomplishing four specified missions. Control/display mechanization was derived from specific mission functions. A time-based load analysis was performed utilizing computer processing techniques to make task adjustments in real time and provide a printout of how the tasks in each mission segment could be adjusted to meet the mission requirement. The technique also provided an analysis of contingency situations and denoted overload conditions that occurred. The hard copy mock-up was a full-scale cockpit shell in which the alternative mission control/display configurations could be illustrated. The mock-up contained realistic flight controls and audiovisual projector units that simulated vertical and horizontal situation display formats. Author

N72-22626# Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.

DESIGN IMPLICATIONS OF A BETTER VIEW OF THE MULTICHANNEL CAPACITY OF A PILOT

O. H. Lindquist *In* AGARD Guidance and Control Displays Feb. 1972 6 p refs

Avail: NTIS

A major result of a recently completed study is the prediction and measurement of multichannel-pilot performance, which significantly increases his information-handling capability beyond that predicted by today's techniques. Current techniques of predicting man/machine interactions were shown to be in error by an order of magnitude in some measurements related to human channel capacity. The results of this experimental work are presented and system design implications for pilot capability and limitations are discussed. Author

N72-22629# Messerschmitt-Boelkow-Blom G.m.b.H., Munich (West Germany).

A METHOD OF MAN-DISPLAY/CONTROL SYSTEM EVALUATION

Ruediger Seifert (British Aircraft Corp., Preston, England), Alan F. Daniels (British Aircraft Corp., Preston, England), and Klaus Schmidt *In* AGARD Guidance and Control Displays Feb. 1972 9 p refs

Avail: NTIS

A method of evaluating the design and assessing the layout of an aircraft cockpit is described. Factors significantly affecting the design, such as scenario, operational, and equipment requirements are introduced and a description of the rig facility provided. The use of the Cooper-Harper rating system, semantic

differentials, and guided interviews in the analysis of subject performance and opinion is described. It is concluded that complex man-display/control systems can only be optimized by the adoption of a comprehensive approach to experimental studies. Author

N72-23065*# Research Triangle Inst., Durham, N.C.
APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Semiannual Report, 1 April - 31 Dec. 1971

Dec. 1971 106 p refs
(Contracts NASw-1950; NASw-2273)
(NASA-CR-126404) Avail: NTIS HC \$7.50 CSCL 06C

The medically related activities of the NASA Application Team Program at the Research Triangle Institute between April 1, 1971, and December 31, 1971 are reported. Relevant aerospace technology utilization is illustrated in various bioinstrumentation systems for detection and monitoring of clinical and rehabilitation problems.

N72-23066*# Research Triangle Inst., Durham, N.C.
[MEDICALLY RELATED ACTIVITIES OF APPLICATION TEAM PROGRAM]

In its Appl. of Aerospace Tech. in Biol. and Med. Dec. 1971 53 p
Avail: NTIS HC \$7.50 CSCL 06E

Application team methodology identifies and specifies problems in technology transfer programs to biomedical areas through direct contact with users of aerospace technology. The availability of reengineering sources increases impact of the program on the medical community and results in broad scale application of some bioinstrumentation systems. Examples are given that include devices adapted to the rehabilitation of neuromuscular disorders, power sources for artificial organs, and automated monitoring and detection equipment in clinical medicine. G.G.

N72-23067*# Research Triangle Inst., Durham, N.C.
FUTURE NEEDS FOR BIOMEDICAL TRANSDUCERS c05
F. Thomas Wooten *In its Appl. of Aerospace Tech. in Biol. and Med.* Dec. 1971 9 p refs Presented at Inst. of Elec. and Electron. Engr. Transducer Conf., Washington, D. C., 6 Oct. 1971

Avail: NTIS HC \$7.50 CSCL 06B

In summary there are three major classes of transducer improvements required: improvements in existing transducers, needs for unexploited physical science phenomena in transducer design, and needs for unutilized physiological phenomena in transducer design. During the next decade, increasing emphasis will be placed on noninvasive measurement in all of these areas. Patient safety, patient comfort, and the need for efficient utilization of the time of both patient and physician requires that noninvasive methods of monitoring be developed. Author

N72-23068*# Research Triangle Inst., Durham, N.C.
INTERDISCIPLINARY BARRIERS: AN IMPEDIMENT TO THE EFFECTIVE APPLICATION OF SYSTEMS ENGINEERING c34

Ernest Harrison, Jr. *In its Appl. of Aerospace Tech. in Biol. and Med.* Dec. 1971 29 p refs Presented at 1971 Ann. Conf. of the Am. Occupational Therapy Assoc., Cleveland, 1 Nov. 1971

Avail: NTIS HC \$7.50 CSCL 06B

Interdisciplinary transfer of information and technology does not occur very readily, even for system planners, because of the existence of some very real barriers. These barriers to flow of information and technology between disciplines represent one of the important difficulties associated with the application of systems analysis to many problems. The nature and characteristics of some of these barriers are enumerated and discussed in detail. A number of methodologies and techniques which have been specifically developed to aid in the transfer of technology and information across these interdisciplinary barriers is examined. Author

N72-23069*# Research Triangle Inst., Durham, N.C.
ADVANCEMENTS IN MEDICINE FROM AEROSPACE RESEARCH

F. Thomas Wooten *In its Appl. of Aerospace Tech. in Biol. and Med.* Dec. 1971 10 p Presented at Conf. on Space for Mankind's Benefit, Huntsville, Ala., 16-19 Nov. 1971
Avail: NTIS HC \$7.50 CSCL 06E

NASA has taken the lead in implementing the concept of technology utilization, and the Technology Utilization Program is the first vital step in the goal of a technological society to insure maximum benefit from the costs of technology. Experience has shown that the active approach to technology transfer is unique and is well received in the medical profession when appropriate problems are tackled. The problem solving approach is a useful one at the precise time when medicine is recognizing the need for new technology. Author

N72-23070*# West Virginia Univ., Morgantown.
THE EFFECT OF CHANGING GRAVITY AND WEIGHTLESSNESS OF VASOPRESSIN CONTROL SYSTEMS Progress Report, 16 Feb. 1971 - 15 Feb. 1972

Walter H. Moran 15 Feb. 1972 12 p ref
(Grant NGR-49-001-019)
(NASA-CR-126395) Avail: NTIS HC \$3.00 CSCL 06P

An immunoassay to determine the effects of changing gravity and weightlessness on vasopressin control system is discussed. Seven extracts from persons known to have inappropriate ADH syndrome secondary to pulmonary oat cell cancer were examined. The extracts had previously been subject to bioassay in rats. The intent of the examination was to determine if the vasopressin content could be confirmed immunologically. The results compared favorably with the values obtained by biological assay. Author

N72-23071*# Scripta Technica, Inc., Washington, D.C.

THE BRAIN OF HIBERNATING ANIMALS
M. B. Shtark NASA May 1972 230 p refs Transl. into ENGLISH of the book "Mozg Zimnespyashchikh" Novosibirsk, Nauka Press, 1970 p 1-240
(Contract NASw-2036)

(NASA-TT-F-619; F-619) Avail: NTIS HC \$3.00 CSCL 06C
Based on an analysis of the bioelectrical, histochemical and electron microscopic changes in the hibernating brain, a neurophysiological concept of hibernation is formulated. Attempts were made to establish the basic laws of functional organization of the cooled hibernant brain. A detailed description is given of the electrical changes in the brain of hibernating animals during all stages of natural adaptation: from active wakefulness to incipient hibernation, torpor, and first tentative and then definitive arousal. The data obtained show that the conservation of cerebral activity at extremely low temperatures is not only a consequence of the genetically determined resistance of the tissues of the hibernant brain, but also of the characteristic organization of the interneuronal and systemic interaction between the cortical and subcortical structures. Author

**N72-23072# Lockheed Missiles and Space Co., Palo Alto, Calif.
RESULTS OF BIOLOGICAL INVESTIGATIONS PERFORMED
ON THE ZOND-5, ZOND-6 AND ZOND-7**

O. G. Gakenko, V. V. Antipov, and G. P. Parfenov [1972] 11 p refs Transl. into ENGLISH from Kosmich. issled. (Moscow), v. 9, no. 4, 1971 p 601-609 Presented at the 21st Intern. Astronaut. Congr., West Ger., 4-10 Oct. 1970

Avail: NTIS HC \$3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

The fundamental results of several biological experiments performed onboard Zond 5, Zond 6, and Zond 7 are analyzed. The experiments were made to determine changes in structure and functions of biological objects subjected to weightlessness, ionizing radiation, and other flight factors on the earth-moon-earth track. Turtles, drosophylla, spiderwort, turnip-like onion bulbs, dry wheat seeds, different strains of chlorella, and Escherichia coli were used as subjects. The analysis revealed that physiological shifts in turtles were caused by factors not associated with flight conditions. Other results show chromosome rearrangements for the seeds; mutations, increased death rate, and developmental delays for bacteria. Detailed results are given in tables. E.H.W.

**N72-23073*# North Carolina State Univ., Raleigh.
THE RELATION BETWEEN TIME OF PRESENTATION
AND THE SLEEP DISTURBING EFFECTS OF NOCTURNALLY
OCCURRING JET AIRCRAFT FLYOVERS**

T. E. LeVere, Raymond T. Bartus, and F. D. Hart Washington NASA May 1972 24 p refs

(Grant NGL-34-002-095)

(NASA-CR-2036) Avail: NTIS HC \$3.00 CSCL 06P

The research describes the sleep disturbing effects of jet aircraft flyover noise as it occurs at different times during the night. The results indicate that individuals respond statistically more, in terms of greater cortical desynchronization, during the first and last thirds of the night. During the middle third, while there is still a significant amount of cortical desynchronization in response to the jet aircraft noise, this is always less than that which occurs earlier or later in the night. The implications of this data are that it might be possible to reduce the disruptive effects of at least certain extrinsic sonic stimulation by appropriate scheduling. Author

**N72-23074# California Univ., Berkeley, Lawrence Radiation
Lab.**

RADIATION AND RISK: THE SOURCE DATA

H. Wade Patterson and Ralph H. Thomas Jul. 1971 52 p refs Presented at 6th Symp. on Mathematical Statistics and Probability, Berkeley, Calif., 19 Jul. 1971

(Contract W-7405-eng-48)

(LBL-331; Conf-710716-2) Avail: NTIS

It is perhaps true that more is known of man's response to ionizing radiations than to any other self-inflicted pollutant of his environment. From early X-ray radiation injury experiences and from studies on certain other groups of individuals subjected to high radiation exposures as a result of radiotherapy, nuclear weapons attack, or radiation accidents, a limited amount of information has been pieced together. Such information is almost entirely about the effects of large exposures and high dose-rates. If we are to make any progress in the difficult task of understanding the possible deleterious effects on the health of the population due to small exposures to ionizing radiation at low dose rates it is clear that much greater efforts at interdisciplinary studies are needed. Man's natural radiation environment results in whole-body exposures that vary from about 100 mrem/y to an upper limit of a few rem/y. Man-made radiation levels are, with one exception, small compared even with the fluctuations in these natural levels due to geography and personal habits. The one exception is due to exposure during medical radiology. Author (NSA)

**N72-23075# Los Alamos Scientific Lab., N.Mex.
BIOLOGICAL IMPLICATIONS OF THE TRANSURANIUM
ELEMENTS FOR MAN**

Wright H. Langham 1971 32 p refs Presented at 11th Symp. on Biol. Implications of the Transuranium Elements, Richland, Wash., 27 Sep. 1971 Sponsored by AEC (LA-DC-13083; Conf-710919-4) Avail: NTIS

Data on the annual production rate of Pu(238) and Pu(239) for use in medical and space programs are projected to the year 2000. The biological implications of Pu accumulation in man and his environment are considered. The Pu protection programs initiated by the USAEC, Canada, and the UK in 1949 are reviewed. Recommendations of the ICRP (1951) of 0.04 micro-Ci as the maximum permissible amount of Pu(239) fixed in the human body, with maximum air and water concentrations derived accordingly, are reported. Data accumulated since 1950 from studies on the long-term chronic toxicity of inhaled, injected, and ingested Pu in animals are discussed. Recommendations for research studies on Pu inhalation and Pu transport through soil-plant-man food chains to ensure continued protection of man against the hazards from environmental Pu are included. Author (NSA)

**N72-23076# Billings and Gussman, Inc., Waltham, Mass.
HANDBOOK OF AEROSOL BEHAVIOR IN SATURATION
DIVING ENVIRONMENTS Final Report**

Robert A. Gussman, Anthony M. Sacco, John Beeckmans, Charles E. Billings, and Robert Abilock 1 Oct. 1971 226 p refs

(Contract N00014-71-M-0006; NR Proj. 108-948;

PRO41-06-01)

(AD-735960; OC-108) Avail: NTIS CSCL 06/11

The project which forms the basis for this handbook was an investigation of aerosol behavior in high pressure environments. Deep submergence saturation diving habitats utilize synthetic respirable atmospheres at hydrostatic pressures equivalent to the depth, and allow free diver excursions to the surrounding sea for tasks such as marine research, salvage and mining. During extended submerged operations, recycled respiration gas atmospheres may become contaminated by emissions from construction materials, protective coatings, instruments, control system components, and from occupants and their operations and activities associated with prolonged habitation in a closed environment. The specific environment considered was the helium-oxygen atmosphere used in saturation diving environments for depths to 1,000 feet. In order to proceed in as logical a fashion as possible and yet deal with the several interrelated aspects of the problem simultaneously, a clear statement of goals was necessary. (1) Investigate and extrapolate the possibly altered behavior of aerosols in the helium-oxygen environment. (2) Determine methods for removing potentially harmful aerosols from the environment. (3) Determine possible altered toxicological behavior of aerosols. GRA

**N72-23077# Stanford Univ., Calif. Information Systems Lab.
A REPRESENTATIONAL MODEL FOR THE ARTERIAL
PRESSURE RECEPTORS OF THE CARDIOVASCULAR
SYSTEM**

V. Scott Borison Dec. 1971 122 p refs

(Contracts N00014-67-A-0112-0044; Grants PR-5353-09; HE-08696-07)

(AD-735961; SU-SEL-71-060) Avail: NTIS CSCL 06/16

Baroreceptors in the cardiovascular system are pressure transducers that provide a series of nerve impulses used by the central nervous system for control of blood pressure, distribution of blood flow, and body fluid balance. The study described in this thesis incorporates known facts and hypotheses about the receptor mechanism to develop a nonlinear mathematical model, based on physical principles, relating the pressure to the impulse activity. GRA

N72-23078# Army Medical Research Lab., Fort Knox, Ky.
MILLISECOND EXPOSURE OF PORCINE SKIN TO SIMULATED CO2 LASER RADIATION Final Report
 Arnold S. Brownell, David K. Hysell, and Wordie H. Parr
 22 Oct. 1971 20 p refs
 (DA Proj. 3A0-61102-B-71-R)
 (AD-735714; USAMRL-953) Avail: NTIS CSCL 06/18

To approximate the absorption of CO₂ laser radiant energy by skin and the subsequent distribution of thermal energy in this tissue, the skin was painted with a thin layer of India ink and exposed to ruby laser radiation. The resulting lesions were examined and graded both visually and histologically. The median effective dose for minimal erythema was determined to be 0.8 joules/sq cm for an exposure time of 3.5 msec. Histologically measured depth of damage was determined for doses up to 2.8 joules/sq cm. It is concluded that the simulated experimental conditions are valid only for doses less than 1.4 joules/sq cm. GRA

N72-23079# Eye Research Foundation of Bethesda, Md.
THRESHOLD FOR PERMANENT FUNCTIONAL AND MORPHOLOGICAL VISIBLE DAMAGE IN HUMAN RETINAS USING VISIBLE RADIATION Final Report.
 6 Jan. 1969 - 31 Dec. 1970
 Stephen Elgin, David O. Robbins, and Carl R. Cavonius May 1971 45 p refs
 (Contract F41609-69-C-0027; AF Proj. 6301)
 (AD-735802; SAM-CR-71-2) Avail: NTIS CSCL 06/18

The energy densities required to produce ophthalmoscopically visible retinal burns in the periphery of the fundus were determined for six human Caucasian subjects. The thresholds for retinal burns in humans were significantly higher than those required to produce similar lesions in monkey or rabbit eyes and is probably related to the differential pigmentation and image size in the retinas of these species. Using a 3 degree spot size, the theoretical energy necessary to produce a visible burn in brown-eyed subjects was 4.5 cal/sq cm for a 1 sec. exposure. Exposure durations shorter than 1 sec. required less overall energy while those over 1 sec. required more. Threshold energies for two blue-eyed patients were significantly higher than those for brown-eyed patients and may also be related to the degree of pigmentation of the RPE. Functional studies of a macular burn case is reported. Author (GRA)

N72-23080# Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATIONS OF LASER SKIN HAZARDS Final Report, 16 Mar. 1970 - 11 Jan. 1971
 John P. G. Williams, Stanley D. Carter, Kenneth J. Pavkov, and J. B. Boatman Jan. 1971 70 p refs
 (Contract F41609-70-C-0024)
 (AD-735794) Avail: NTIS CSCL 06/18

The report considers the effect of four lasers, the argon, the Q-switched neodymium, the carbon dioxide and the Q-switched ruby laser on human skin. Two Negro and two Caucasian volunteers were exposed to each laser. Each subject received 3 or 4 different dose levels of irradiation. These dose levels were preselected by the sponsor to explore the threshold of effect to produce minimal erythema and discomfort. After irradiation skin biopsies were taken in the first experiment - the argon laser - no change was seen immediately after exposure but some changes were evident 24 hours after the exposure. In subsequent experiments samples were taken 24 and 48 hours postirradiation. In general, changes in the skin structure were observed at 24 hours but these changes had generally disappeared at 48 hours postirradiation. Negro and Caucasian subjects were examined because the darker skin reflects less light and therefore absorbs more of the laser's energy. The degree of pigmentation was measured as reflectance prior to exposure to the laser. Author (GRA)

N72-23081# Stanford Research Inst., Menlo Park, Calif.
SOIL AS A SINK FOR ATMOSPHERIC CARBON MONOXIDE Final Report
 R. B. Ingersoll Oct. 1971 47 p refs
 (Contract CRC-APRAC-CAPA-4-68-(1-69))
 (PB-205890; SRI-SCU-8799-F; CRC-APRAC-CAPA-4-68-3)
 Avail: NTIS HC \$3.00 CSCL 06F

Because of the increased production of carbon monoxide from man's activities, it was considered important to study the biosphere's sink for it. The report describes studies conducted to determine if soils and vegetation could serve as a sink for atmospheric carbon monoxide. This was accomplished by exposing various soils and plant samples to experimental atmospheres containing carbon monoxide. The results show that higher plants tested had no detectable capacity for decreasing carbon monoxide, soils from a wide range of ecotypes depleted carbon monoxide, prolonged exposure of soil to carbon monoxide reduced the soil's capacity to deplete carbon monoxide, soils oxidize carbon monoxide to carbon dioxide, and carbon monoxide depleting microorganisms were identified. GRA

N72-23082# Texas Univ., Austin, Dept. of Psychology.
AUDITORY SIGNAL DETECTION AND RECOGNITION Final Scientific Report
 James P. Egan 1 Dec. 1971 13 p
 (Grant AF-AFOSR-1987-71; AF Proj. 9769)
 (AD-736046; AFOSR-72-0183TR) Avail: NTIS CSCL 05/10

The research efforts were concerned with intensity discrimination, signal detection, and Type II receiver operating characteristics. Author (GRA)

N72-23083# Oregon Univ., Portland, Biophysics Lab.
APPLICATION OF ELECTRICAL CURRENT IN DENTAL ANESTHESIA AND ITS EFFECT UPON BONE FORMATION Annual Summary Report
 Bhim S. Savara and R. Wayne Fields 27 Dec. 1971 27 p refs
 (Contract DADA17-70-C-0075)
 (AD-736391) Avail: NTIS CSCL 06/5

The investigations are concerned with the use of applied electrical currents to instigate particular therapeutic effects. Major emphasis is being devoted to studies of the feasibility of using electrical currents as an agent to control orofacial pain. It has been tentatively demonstrated that electrical currents can interfere with cortical activity deemed of perceptual dependence in a manner similar to the attenuation of cortical responses induced by the analgesic agent nitrous oxide. In addition, an experimental series is being conducted to survey the currents, polarities, and field geometries of significance in the constructive modulation of tissue reparative processes. The work to date has demonstrated that artificial fields can modulate the architecture in both the fibrin clot and fibrous callus stages of initial healing. These results from both the orofacial electroanesthesia and fracture electrotherapeutics are encouraging and the studies are being extended. Author (GRA)

N72-23084# National Inst. for Occupational Safety and Health, Rockville, Md.
HEALTH ASPECTS OF SMOKING IN TRANSPORT AIRCRAFT
 Dec. 1971 93 p Prepared jointly with FAA and Dept. of Transportation
 (AD-736097) Avail: NTIS CSCL 06/5

The purpose of the study was to define the levels of certain combustion by-products of tobacco produced by passengers' smoking, to determine passengers' subjective reaction to tobacco smoke, and to obtain passenger opinion on the need for regulatory change regarding the control of smoking in commercial passenger airplanes. The study involved: (1) the

collection of samples to determine the environmental exposure levels to carbon monoxide, particulate matter, polynuclear hydrocarbons, ammonia, and ozone, and (2) the use of a questionnaire during twenty Military Airlift Command (MAC) international flights and eight domestic flights. The results of environmental sampling revealed very low levels of each contaminant measured, much lower than those recommended in occupational and environmental air quality standards.

Author (GRA)

N72-23085* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

ONE HAND BACKPACK HARNESS Patent

David F. Thomas, inventor (to NASA) Issued 14 Mar. 1972
7 p Filed 20 Feb. 1970

(NASA-Case-LAR-10102-1; US-Patent-3,649,921;

US-Patent-Appl-SN-13266; US-Patent-Class-324-25A) Avail:

US Patent Office CSCL 06K

A quick one handed device for donning and doffing gear carried in a backpack is described.

Official Gazette of the U.S. Patent Office

N72-23086*# Worcester Polytechnic Inst., Mass. Dept. of Chemical Engineering.

STUDY OF THE TECHNIQUES FEASIBLE FOR FOOD SYNTHESIS ABOARD A SPACECRAFT Final Report

Alvin H. Weiss 15 Mar. 1972 40 p refs

(Grant NGR-22-017-008)

(NASA-CR-126397) Avail: NTIS HC \$4.00 CSCL 06H

Synthesis of sugars by Ca(OH)₂ catalyzed formaldehyde condensation (the formose reaction) has produced branched carbohydrates that do not occur in nature. The kinetics and mechanisms of the homogeneously catalyzed autocatalytic condensation were studied and analogies between homogeneous and heterogeneous rate laws have been found. Aldol condensations proceed simultaneously with Cannizzaro and crossed-Cannizzaro reactions and Lobry de Bruyn-Van Eckenstein rearrangements. The separate steps as well as the interactions of this highly complex reaction system were elucidated. The system exhibits instabilities, competitive catalytic, mass action, and equilibrium phenomena, complexing, and parallel and consecutive reactions. Specific findings that have been made on the problem will be of interest for synthesizing sugars, both for sustained space flight and for large scale food manufacture. A contribution to methodology for studying complex catalyzed reactions and to understanding control of reaction selectivity was a broad goal of the project.

Author

N72-23087# Joint Publications Research Service, Arlington, Va. **DEVELOPMENT OF A CYBERNETIC MODEL OF AN ANIMAL-ENVIRONMENT SYSTEM**

K. K. Beer 4 May 1972 16 p refs Transl. into ENGLISH from Selskokhoz. Biol. (Moscow), v. 7, no. 1, 1972 p 25-32

(JPRS-55887) Avail: NTIS HC \$3.00

An animal-environmental model, based upon the compliance of the organism to conditions of the environment according to the principle of bioecosis, is described. The concept of relocations in a biological model is used as well as equations of regression, which characterize the effect of different factors on cow milking, and which are of interest for plotting the entire mathematical apparatus of the model.

Author

N72-23088# Ohio State Univ. Research Foundation, Columbus. Dept. of Psychology.

STUDIES OF PERFORMANCE IN COMPLEX AIRCREW TASKS Final Report

Harvey G. Shulman and George E. Briggs Dec. 1971 47 p refs

(Grant AF-AFOSR-1669-69; AF Proj. 9778; OSURF Proj. 2718) (AD-735762; AFOSR-72-0156TR) Avail: NTIS CSCL 05/9

The basic objective of the research was the investigation of human performance under conditions of divided attention growing out of the requirement to divide attention between multiple information sources which is placed on operators of many modern man-machine systems. For example, performance under such conditions is normally required in the operation of an aircraft or in the process of controlling air traffic from the ground. The research is focused on performance in two types of divided attention paradigm designs, sequential and simultaneous. In a simultaneous demand situation, the operator is required to process at least two sources of information simultaneously. The sequential demand situation requires rapid alternation between at least two sources of information.

GRA

N72-23089# Human Engineering Labs., Aberdeen Proving Ground, Md.

EXPERIMENTS UTILIZING COMMAND/CONTROL SIMULATOR. 1: ON-LINE PARTIAL DATA REDUCTION IN REACTION TIME EXPERIMENTS

C. Jane Davis Dec. 1971 32 p

(AD-736868; HEL-TN-5-71) Avail: NTIS CSCL 05/10

Reaction time experiments were conducted on a command/control simulator system. The system consists of three computer-driven displays with peripheral control devices. A program for on-line partial data reduction during experimental runs was developed. This program was written for the Varian 6201 and is adaptable to similar mini-computers.

Author

N72-23090# Fabric Research Labs., Inc., Dedham, Mass. **DEVELOPMENT OF THERMALLY DURABLE COATED FABRICS FOR USE IN FLIGHT GLOVES Final Report, Jul. 1969 - Dec. 1970**

John Skelton and Ernest R. Kaswell Sep. 1971 86 p refs

(Contract F33657-70-C-0152)

(AD-737099; ASD-TR-71-47) Avail: NTIS CSCL 15/5

The flight gloves currently supplied to Air Force flight crew members provide softness, tactile response, gripping power and durability, but in contact with flame or in heated environments, their leather burns, shrinks violently, and becomes stiff and brittle. Because of potential danger, an effort is reported to develop materials with mechanical performance characteristics similar to those of leather, but which are flameproof and thermally stable.

GRA

N72-23091# Naval Aerospace Medical Inst., Pensacola, Fla.

A SWEAT SENSOR FOR QUALITATIVE MEASUREMENTS

Joseph A. McClure, Efrain A. Molina, and Alfred R. Fregly 15 Nov. 1971 24 p refs

(AD-736922; NAMRL-1148;

NAVMED-MR-041.01.01-0120B8FG-8) Avail: NTIS CSCL 06/2

To study objectively the sweat response during motion sickness, a need existed for a small sweat-sensing device with a short latency of response, a fast response time, and the ability to follow the time course of the sweat response. The design and function of a sweat-sensing device for continuous monitoring of the sweat response are described. A lithium chloride-aluminum chloride sensing element, which changes resistance depending on the uptake or release of moisture, is used in this sensor. The sensing element is enclosed in a housing that is designed to circulate air from the skin surface to the sensing element. Air is supplied from a compressed-air cylinder and is controlled with a needle valve flowmeter assembly. With an air-flow rate of 15 cc/min and in response to a step change in moisture content on

the skin surface, the sensor has a latency of 1.5 seconds and a rise time to reach 90 percent of the saturation level of about 28 seconds. A major disadvantage of the sensor is that with heavy sweat rates, the sensing element saturates, resulting in relatively long 'drying out' times. This can be partially offset by using higher air-flow rates, but at the expense of reduced sensitivity. The application of this sensor has shown that it is capable of responding to the cyclic sweat activity commonly seen when skin-resistance measurement techniques are used to monitor the sweat response. Author (GRA)

N72-23092# Naval Medical Field Research Lab., Camp Lejeune, N.C.

DEVELOPMENT OF THE NMFRL TELEMETRY SYSTEM Interim Report

Wada G. Holcomb and Philip J. Rasch Feb. 1972 28 p refs (AD-737111; NAVMED-MF12.524.007-8009B; IR-4) Avail: NTIS CSCL 06/2

The object was: (1) To devise a technique which will allow high-power radio telemetering of heart rate as detected by means of electrocardiogram skin electrodes, without being restricted by simultaneous electrocardiogram amplifier overload or saturation; (2) To design an electronic circuit which, when attached to an electrocardiogram amplifier, will allow the taking of an ECG without requiring readjustment for each body type. Author (GRA)

N72-23093# Naval Training Device Center, Orlando, Fla.
THE 25TH ANNIVERSARY COMMEMORATIVE TECHNICAL JOURNAL

G. Vincent Amico and James J. Regan Nov. 1971 253 p refs (AD-735487) Avail: NTIS CSCL 05/9

Included are both the technical history of training devices and the issues which currently confront their design and use. These subjects are discussed by a group of distinguished scientists and engineers to commemorate a quarter of a century of progress in military training. A blend of human factors and engineering papers reflects the twin thrusts that make up the educational tools that are training device systems. Author (GRA)

N72-23094# American Inst. for Research, Pittsburgh, Pa.
DEVELOPMENT OF A TAXONOMY OF HUMAN PERFORMANCE: VALIDATION STUDY OF ABILITY SCALES FOR CLASSIFYING HUMAN TASKS

George C. Theologus and Edwin A. Fleishman Apr. 1971 98 p refs (Contracts DAHC19-71-C-0004; F44620-67-C-0116; ARPA Order 1623)

(AD-736194; AIR-R71-10; AIR-726/2035-4/71-TR10; BESRL-Research-Study-71-9) Avail: NTIS CSCL 05/10

This report is the second of a series of studies designed to explore the feasibility of an approach to the development of a comprehensive taxonomy of tasks based upon the use of known parameters of human performance for describing and classifying tasks. The first report described the development of human abilities based rating scales and presented data on their reliability. The present report focuses on establishing preliminary estimates of the constructive and predictive validity of these scales. The validity data were obtained through judges' ratings of a set of 38 tasks on 37 ability rating scales. GRA

N72-23095# Lincoln Lab., Mass. Inst. of Tech., Lexington.
EDUCATIONAL TECHNOLOGY PROGRAM Quarterly Technical Summary Report, 1 Sep. - 30 Nov. 1971

Frederick C. Frick 15 Dec. 1971 15 p (Contract F19628-70-C-0230; AF Proj. 649L) (AD-738030; ESD-TR-71-320) Avail: NTIS CSCL 05/9

The first three of the prototype terminals that will be used in the field tests at Keesler Air Force Base were completed and

are being operated in full system shakedown tests. The microfiche production facility has been completed, and preparation and production of lesson materials for the Keesler Trial are proceeding on schedule. Author (GRA)

N72-23096# Singer-General Precision, Inc., Binghamton, N.Y. Link Div.

STUDY OF ADVANCED VEHICLE SIMULATION TECHNIQUES Final Report, Jul. 1970 - Apr. 1971

A. F. Collier, D. Peters, and R. G. Simpson Oct. 1971 419 p refs

(Contract N61339-70-C-0312) (AD-736238; NAVTRADEVEN-70-C-0312-1) Avail: NTIS CSCL 05/9

The report presents the results of a study to determine the feasibility of developing a visual simulation system for meeting the training requirements for operators of a variety of surface vehicles. The vehicles considered were a tank (MBT-70), an air cushion vehicle (SKMR-1), a hydrofoil (PC(H)-1) and an amphibious assault personnel carrier (LVTP-7). Included in the report is an analysis of the visual system requirements for these vehicles, a state-of-the-art investigation of visual system techniques, and the formulation of a recommended visual system. The recommended system combines a camera model approach for generating land scene with a scanned transparency approach for generating waves, the latter being inset into the land imagery. Author (GRA)

N72-23097# Life Sciences, Inc., Fort Worth, Tex.
ADAPTIVE TRAINING OF MANUAL CONTROL. 1: COMPARISON OF THREE ADAPTIVE VARIABLES AND LOGIC SCHEMES Final Report

Don A. Norman, Ann L. Lowes, and W. Guy Matheny Orlando, Fla. Naval Training Device Center Jan. 1972 65 p refs (Contract N61339-69-C-0156-1)

(AD-736621; NAVTRADEVEN-69-C0156-1) Avail: NTIS CSCL 05/9

Gain-Effective Time Constant product (KT), System Compensation (SC) (a compensation of aiding and quickening) and Forcing Function Amplitude (FF) were compared as adaptive variables in an adaptive training experiment using 104 subjects. Comparison was also made of automatic and manual adjustment of the difficulty level determined by the level of the adaptive variable during training. Results showed KT to be slightly superior to FF as an adaptive variable while SC produced poor performance and a high rate of failure. Study of the results suggests that principles underlying KT and a correct form of SC can be used to develop an optimal method of shaping operator behavior. It was concluded that conventional concepts of aiding and quickening cannot be implemented as satisfactory adaptive variables. The results were additionally interpreted to indicate that logic for adjustment of difficulty level should utilize a performance measurement interval longer than 5 seconds. Author (GRA)

N72-23971# Naval Research Lab., Washington, D.C. Marine Biology and Biochemistry Branch.

EFFECTS OF POLLUTANTS ON GROWTH OF ALGAE

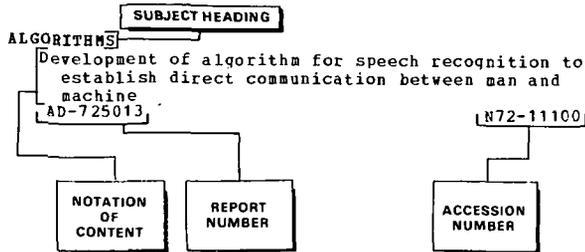
P. J. Hannan and Constance Patouillet *In its* NRL Progr. Rept. Feb. 1972 p 1-8 ref

Avail: NTIS HC \$4.50
The effects of a variety of pollutants on the growth rates of several freshwater and marine algae were investigated. Algae growth was determined by the increase in fluorescence of the test cultures, the pigment primarily responsible for this property being chlorophyll alpha. Of the pollutants tested, mercury was the most toxic. DDT was nontoxic unless added with appreciable amounts of solvent. Toxicity varied inversely with the concentrations of nutrients present, therefore any toxic effect should be described in the context of a given availability of nutrients. Author

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AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 105)* AUGUST 1972

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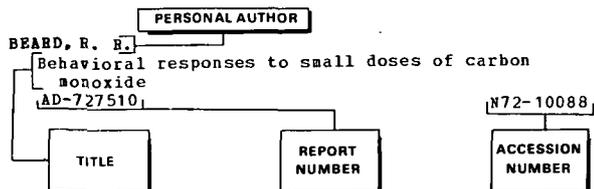
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