NASA SP-7011 (88)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 88)

APRIL 1971

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NASA SP-7011 (88)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 88)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during March, 1971.

Scientific and Technical Information Office
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WASHINGTON, D.C. **APRIL 1971**

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 318 reports, articles, and other documents announced during March 1971 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.

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

Two indexes—subject and personal author—are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1971 Supplements.

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GENERAL AVAILABILITY

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

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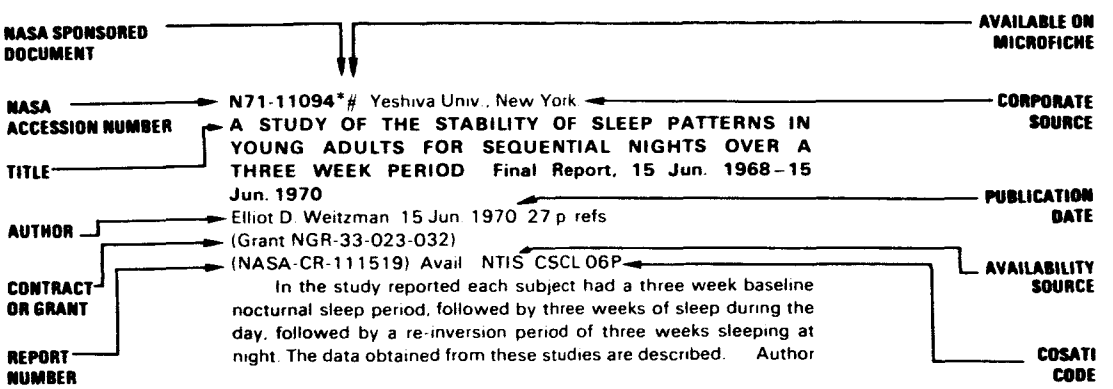

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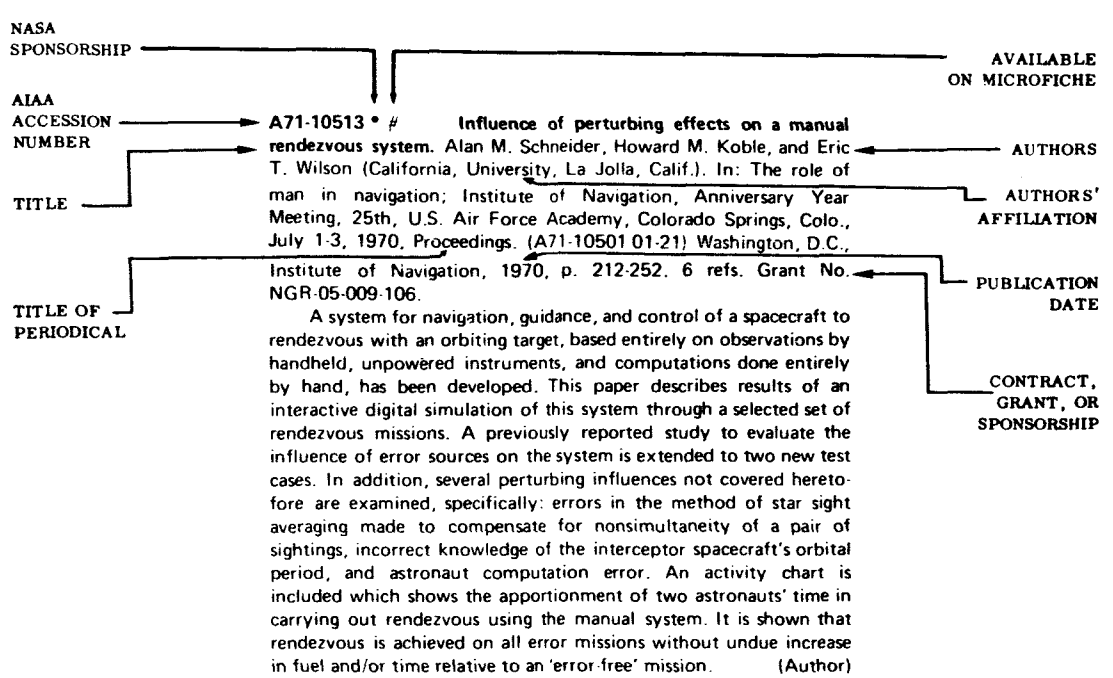

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 88) APRIL 1971

IAA ENTRIES

A71-16150 * Choice of rotation rate for the horizontal clinostat. Charles J. Lyon (Dartmouth College, Hanover, N.H.). *Plant Physiology*, vol. 46, 1970, p. 355-358. 22 refs. Grants No. NsG-231; No. NGR-30-001-001; Contract No. NAS 2-1558.

Description of the testing of a series of nine rates of rotation of the horizontal clinostat to determine optimal and acceptable conditions for simulating weightlessness in plants. The study of wheat seedlings, grown in the same way and judged by the criteria which were used in the Biosatellite II experiments, has permitted the objective evaluation of the clinostat as a device for simulating weightlessness during the growth of such plants. M.M.

A71-16153 Tolerance times of high wet bulb temperatures by acclimatised and unacclimatised men. C. H. Wyndham, N. B. Strydom, A. J. S. Benadé, and A. J. Van Rensburg (Chamber of Mines of South Africa, Human Sciences Laboratory, Johannesburg, Republic of South Africa). *Environmental Research*, vol. 3, Nov. 1970, p. 339-352. 10 refs.

Comparison of the lengths of time for which acclimatized and unacclimatized men can tolerate very hot and humid conditions when resting and when working at moderate rate of energy expenditure. It was found that acclimatized men at rest can tolerate for periods of 400 min and longer wet bulb temperatures which are 1.9 C higher than those which unacclimatized men can tolerate for the same period of time. The results are compared with findings obtained by other research workers. G.R.

A71-16217 Relevance of feedback inhibition applied to the biosynthesis of hexosamines. P. J. Winterburn (South Wales and Monmouthshire, University College, Cardiff, Wales) and C. F. Phelps (Medical School, Bristol, England). *Nature*, vol. 228, Dec. 26, 1970, p. 1311-1313. 14 refs.

Discussion of the control mechanism which is effective in the biosynthesis of hexosamines taking into consideration the function of the UDP-N-acetylglucosamine. The various factors involved are examined. It is proposed that the primary control on the flux through the hexosamine pathway is at the level of the glucosamine 6-phosphate synthetase. This control is not by a fluctuation in the UDP-N-acetylglucosamine concentration but is through an alteration in its binding constant evoked by the other modifiers. G.R.

A71-16218 Experiments in binocular synchronization. Karl U. Smith, Robert Schremser, and Alfred Huang (Wisconsin, University, Madison, Wis.). *Nature*, vol. 228, Dec. 26, 1970, p. 1339-1341. 6 refs. NSF-PHS-supported research.

Discussion of experiments on horizontal and vertical binocular movements which do not confirm the classical theory of Helmholtz that the two eyes are conjugate in binocular coordination. The investigation illustrates how real-time computer systems can be used to obtain high-precision measurements in optometry and visual science. The results obtained suggest that binocular visual coordination depends on several levels of continuous eye movement-retinal feedback timing and that these differ significantly for the two eyes. G.R.

A71-16277 * # The noisiness of impulsive sounds. Sanford Fidell, Karl S. Pearsons, Mario Grignetti, and David M. Green (Bolt Beranek and Newman, Inc., Canoga Park, Calif.). *Acoustical Society of America, Journal*, vol. 48, Dec. 1970, pt. 1, p. 1304-1310. 13 refs. NASA-supported research.

Four experiments were performed in an anechoic chamber to investigate the effects of duration, intersignal interval, repetition, and frequency on the perceived noisiness of impulsive signals. All data were collected by an adaptive psychophysical procedure called Parameter Estimation by Sequential Testing (PEST). The major conclusions were that (1) the phase spectrum of an impulsive signal is irrelevant to its perceived noisiness, and (2) the ear's sensitivity to noisiness of impulsive signals resembles an energy summation process - i.e., it appears to integrate total acoustic power of noise events to at least 100 sec. (Author)

A71-16279 Earmold alteration effects as measured in the human auditory meatus. F. Douglas McDonald (U.S. Veterans Administration Hospital, Columbia, S.C.) and Gerald A. Studebaker (Oklahoma, University, Oklahoma City, Okla.). *Acoustical Society of America, Journal*, vol. 48, Dec. 1970, pt. 2, p. 1366-1372. 9 refs. Research supported by the U.S. Veterans Administration.

Human ears were utilized to examine the effects of change in earmold form upon sound-pressure levels in the ear canal at selected discrete frequencies from 0.1 to 4 kHz. Four earmolds were fabricated for each of eight subjects. One retained an unaltered form for the purpose of comparison, while the other three were modified, respectively, to a shortened canal form, a shortened canal form which was vented, and an open form. Measurements were made utilizing a probe-tube microphone assembly. Relative to the un-

altered earmold form, the shortened canal modification caused a slight reduction for all frequencies except 3 and 4 kHz, while the vented and open forms produced marked reductions in low-frequency response accompanied by large resonances. Certain relevant measurements made using a standard 2-cu cm coupler and a special 2-cu cm coupler are also presented. (Author)

A71-16280 # **A model for two-tone inhibition of single cochlear-nerve fibers.** Russell R. Pfeiffer (Washington University, St. Louis, Mo.). *Acoustical Society of America, Journal,* vol. 48, Dec. 1970, pt. 2, p. 1373-1378. 17 refs. PHS-supported research.

An analog model by Engebretson and Eldredge accounts for nonlinear properties of the cochlear microphonic (CM) in response to single- and two-tone stimulation. Recent evidence that shows strong similarities between CM and spike-discharge patterns of single cochlear-nerve fibers has prompted an association of two-tone interaction of CM with two-tone inhibition of nerve fibers, leading to a modification of the model for CM so as to make it applicable to cochlear-nerve fibers. The result is a model that has clear two-tone inhibition properties similar to those observed experimentally. Mathematical analysis applied to the model shows that the 'inhibition' is easily explained by signal suppressions inherent to bandpass nonlinearities. (Author)

A71-16281 *Degrees of freedom of cochlear patterns.* R. E. Rink (Alberta, University, Edmonton, Alberta, Canada). *Acoustical Society of America, Journal,* vol. 48, Dec. 1970, pt. 2, p. 1379-1382. 5 refs.

Although auditory patterns, from the cochlea inwards, are distributed in space and time, they do not have an infinite number of degrees of freedom. Because of mechanical coupling, motions at neighboring points along the cochlea are not statistically independent. Results are given for the number of equivalent degrees of freedom along the spatial axis of auditory patterns when displacement of the basilar membrane is the pattern variable and when envelope of displacement is the pattern variable. These numbers are compared with other estimates of the dimensionality of auditory pattern space. (Author)

A71-16282 # **Elimination of biases in loudness judgments for tones.** Richard M. Warren (Wisconsin, University, Milwaukee, Wis.). *Acoustical Society of America, Journal,* vol. 48, Dec. 1970, pt. 2, p. 1397-1403. 25 refs. Research supported by the University of Wisconsin and PHS.

Loudness judgments are especially sensitive to experimentally induced biases. By using a method derived from studies of visual intensity, it was found possible to obtain loudness estimates free from known biasing factors. Judgments of 50% loudness corresponded to 25% stimulus intensity (6-dB attenuation) for 1000-Hz tones from 42 through 92 dB, and for tones from 250 through 8000 Hz presented at moderate intensity. These results agree with other data supporting the physical correlate theory of sensory intensity. It is suggested that the tone scale of loudness reflects the influence of known experimental biases and hence does not represent a fundamental relation between stimulus and sensation. (Author)

A71-16283 # **Threshold ultrasonic dosages for structural changes in the mammalian brain.** F. J. Fry, G. Kossoff, R. C. Eggleton, and F. Dunn (Illinois, University, Urbana, Ill.). *Acoustical Society of America, Journal,* vol. 48, Dec. 1970, pt. 2, p. 1413-1417. 16 refs. NIH-NSF-supported research.

Study of the relationship between the acoustic intensity and the time duration of exposure, for a single pulse, necessary to produce a threshold lesion in the cat brain. Focused ultrasound of 1, 3, and 4 MHz was employed with intensities ranging from 100 to 20,000 W/sq cm with the corresponding pulse durations from 7 to .0002 sec, respectively. Three types of lesions were observed attending three regions. At the lower intensities and long time durations of exposure, the lesion is produced by a thermal mechanism. At the highest intensities and shortest time durations, cavitation is believed to be the mechanism responsible for the sometimes randomly appearing lesions. At intermediate dosages, the lesions are formed by a mechanical mechanism which is thus far not well understood. These results exhibit good agreement with that of other investigators on both the cat and the rat brain. (Author)

A71-16284 # **Validation of the single-impulse correction factor of the CHABA impulse-noise damage-risk criterion.** David C. Hodge and Georges R. Garinther (U.S. Army, Human Engineering Laboratories, Aberdeen Proving Ground, Md.). *Acoustical Society of America, Journal,* vol. 48, Dec. 1970, pt. 2, p. 1429, 1430.

Results of exposure of 76 subjects to single-impulse noises produced by two small shoulder-fired rockets. Temporary threshold shift (TTS sub 2) is compared with the CHABA (NAS-NRC Committee on Hearing, Bioacoustics, and Biomechanics) limits. The single impulse, 95% protection, and grazing incidence correction factors of the CHABA damage-risk criterion are validated. Grazing-incidence shock waves produce comparable results when they arrived at the ear from the front and from the rear. F.R.L.

A71-16293 **Effect of long-term hypoxia on protein synthesis in granuloma and in some organs in rats.** M. Chvapil, J. Hurych, and E. Mirejovská (Ústav Hygieny Práce a Chorob z Povolání, Prague, Czechoslovakia). *Society for Experimental Biology and Medicine, Proceedings,* vol. 135, Dec. 1970, p. 613-617. 19 refs.

Testing of the hypothesis that the chronic exposure of animals to systemic low oxygen tension produces hypoxia in certain tissues with consequential increase in the proportion of fibrogenic cells. The hypothesis was tested in artificially induced granuloma and in various tissues of rats exposed to hypoxia for a relatively long period of time. The experimental results showed that, in rats adapted first to hypoxia simulating 7000-m altitude, further exposures to low oxygen tensions stimulated collagen synthesis only in the granuloma tissue and had no effect on the degradation of collagen. The polymerization of soluble forms into less soluble collagen was decreased. In the liver and lung, collagen synthesis did not change. In the heart and small intestine, collagen synthesis was significantly decreased. The formation of noncollagenous proteins was significantly inhibited in all tissues studied. No effect of hypoxia on hydroxylations of collagenous proline was observed. M.M.

A71-16294 **Effects of boranes upon tissues of the rat. II - Tissue amino acid content in rats on a normal diet.** Patricia Korty and Walter N. Scott (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; Mount Sinai Graduate School; Mount Sinai Medical School; Institute for Medical Research and Studies, New York, N.Y.). *Society for Experimental Biology and Medicine, Proceedings,* vol. 135, Dec. 1970, p. 629-632. 15 refs. PHS Grant No. AM-13135.

Assessment of the effects of decaborane (B10H14) on the alteration of amino acid metabolic patterns. The free amino acid content of the liver, heart, brain, kidney, and serum of adult rats was measured 16 hr following the intraperitoneal injection of decaborane. The results obtained indicate that boranes cause significant alterations in the amino acid pool size in all these tissues but the heart. These changes are probably due to the extensive inhibition of aminotransferase and other pyridoxal-dependent enzymes. One possible mechanism for such an effect is the chemical reduction and consequent inactivation of the active holoenzyme by borane. M.V.E.

A71-16319 **Comparative study of sensory input to motor cortex in animals and man.** Sidney Goldring, Erturan Aras, and Peter C. Weber (Washington University, St. Louis, Mo.). *Electroencephalography and Clinical Neurophysiology*, vol. 29, Dec. 1970, p. 537-550. 28 refs. Research supported by the General Clinical Research Center and the Allen P. and Josephine B. Green Foundation; PHS Grants No. NS-06947; No. NS-04513; No. NS-05580.

Discussion of the sensory input to motor cortex in cat, squirrel monkey and man taking into consideration tests in which transcortical recording of evoked responses was used to identify the inputs. Observations were made in both the anesthetized and waking states. In the cat, the input to motor cortex could only be identified in the waking state. In the squirrel monkey, an input can be demonstrated in both anesthetized and waking states. In man, the input varies from one subject to the next. Some show no contralateral sensory input to motor cortex; others show only an SI type projection, or a response of slightly longer latency. The findings suggest that human motor cortex plays a less important role in integration of disparate sensory inputs from the periphery than does motor cortex of lower animals. G.R.

A71-16320 **Ischemic effects on impulse transmission to muscle fibers in man.** Lars-Olof Dahlbäck, Jan Ekstedt, and Erik Stålberg (Uppsala, Universitet, Uppsala, Sweden). *Electroencephalography and Clinical Neurophysiology*, vol. 29, Dec. 1970, p. 579-591. 23 refs. Research supported by the Swedish Medical Research Council and the Swedish Association Against Poliomyelitis.

Study of the influence of ischemia on the impulse transmission to individual muscle fibers in man by single fiber electromvography. The jitter has been used to study the neuro-muscular transmission in individual motor end-plates. Ischemia increased the jitter and caused more and more frequent blocking of the neuro-muscular transmission until total block occurred. From 3500 to 7000 impulses could be approximately transmitted before total block developed. When circulation was restored, the formerly blocked potential reappeared within seconds and the jitter was normal within some minutes, even if ischemia had lasted for 30 min. G.R.

A71-16321 **A method for continuously recording characteristics of EEG topography.** J. C. Shaw (Graylingwell Hospital, Chichester, Sussex, England). *Electroencephalography and Clinical Neurophysiology*, vol. 29, Dec. 1970, p. 592-601. 42 refs.

Description of a method for continuously recording characteristics of EEG topography taking also into consideration an application involving the topographical change in alpha activity. The signal derived from one electrode is chosen as a reference signal and the activities at other electrodes are compared with it. The comparison is made by using exponentially weighted moving average estimates of the correlation coefficient, regression coefficient, and time difference between the signals. The presence of focal activity in noise can be detected provided the signal is available noise-free at one channel. The technique is used to show that the topographical change in alpha activity as a result of doing mental arithmetic differs from that due to opening the eyes. G.R.

A71-16322 **Bilateral simultaneous summated cortical responses to delayed bilateral and single median nerve stimulation.** Robert Cohn (U.S. Naval Hospital, Bethesda, Md.). *Electroencephalography and Clinical Neurophysiology*, vol. 29, Dec. 1970, p. 612-615. 5 refs.

Discussion of tests in which known electrical pulses were applied synchronously, and with variable time delays, to each median nerve simultaneously, and the summated cortical responses were observed from homologous scalp derivations. Single and bilateral electrical stimulation of the median nerves show evidence of hemispheric interaction by alterations of summated responses contralateral to the delayed stimulus and by the appearance of a new wave on the delayed side, with bilateral stimulation, and on the same side in single nerve stimulation. This new wave has a delay in major peaking lasting from 2 to 4 msec. G.R.

A71-16324 **Velocity profiles in the main pulmonary artery of dogs and man, measured with a thin-film resistance anemometer.** S. R. Reuben, J. P. Swadling, and G. de J. Lee (United Oxford Hospitals, Oxford, England). *Circulation Research*, vol. 27, Dec. 1970, p. 995-1001. 11 refs. Research supported by the Medical Research Council and the British Heart Foundation.

Study of the shape of the velocity profile in the main pulmonary artery of both dogs and man making use of a thin-film resistance anemometer designed to measure instantaneous fluid velocity. Instantaneous velocity of pulmonary artery blood was measured using a thin-film resistance anemometer mounted on a hypodermic needle. Studies were performed, at thoracotomy, in five dogs and five patients. Instantaneous blood velocity was recorded at several sites across the transverse axis of the main pulmonary artery to determine the shape of the velocity profile. The velocity profile, in both man and dog, was found to be approximately flat. The results, in dogs, suggest that there is little asymmetry of the velocity profile. The finding of a relatively flat velocity profile in patients will make it easier for catheter-tip flowmeters to measure bulk velocity in the pulmonary artery. G.R.

A71-16341 **Invariances in the cat's retina - Principles underlying the relations between sensitivity, size, and position of receptive fields of ganglion cells (Invarianzen in der Katzenretina - Gesetzmässige Beziehungen zwischen Empfindlichkeit, Grösse und Lage receptiver Felder von Ganglienzellen).** B. Fischer and H. U. May (Neurologische Universitätsklinik, Freiburg im Breisgau, West Germany). *Experimental Brain Research*, vol. 11, no. 5, 1970, p. 448-464. 25 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft and the Stiftung Volkswagenwerk.

Theoretical and experimental study of the invariants in stimulus-response relations for cat retinal ganglion cells. Sensitivity, size, and position of receptive fields were correlated in a population of 171 on- and off-center units of the cat. Corresponding calculations and experiments were performed on a total of 225 cells to establish empirical bases for theoretical invariances. It is found that the threshold excitation constant is sufficient for a complete quantitative description of threshold in the cat's retina - i.e., knowledge of one property of the field (threshold of central area, diameter or position) allows the complete calculation of the others and consequently of thresholds within the whole receptive field to be made. An essential basis for a quantitative determination of the retinal input to the higher centers of the visual system is thereby obtained. O.H.

A71-16342 **Anatomical arrangement and electrophysical properties of sensitive vagal neurons in the cat (Disposition anatomique et propriétés électrophysiologiques des neurones sensitifs vagaux chez le chat).** Noël Mei (CNRS, Institut de Neurophysiologie et Psychophysiologie, Marseille, France). *Experimental Brain Research*, vol. 11, no. 5, 1970, p. 465-479. 22 refs. In French.

Study of anatomic and functional properties of sensitive vagal neurons in the cat using the microelectrode technique applied to the nodose ganglion. The test procedure using this method is described, and the significant advantages of this method over the generally used isolated fiber technique are emphasized. The results show that the vagal afferent fibers form independent bundles at the vetral part of the nodose ganglion. The different type of cells (cardiovascular, respiratory and digestive) form more or less compact areas inside the nodose ganglion. The conduction velocity of the vagal afferent fibers is higher in the peripheral part of the sensitive neuron than in the central part. O.H.

A71-16343 **Cardiovascular and respiratory vagal mechanoreceptors in the cat (Mécanorécepteurs vagaux cardio-vasculaires et respiratoires chez le chat).** Noël Mei (CNRS, Institut de Neurophysiologie et Psychophysiologie, Marseille, France). *Experimental Brain Research*, vol. 11, no. 5, 1970, p. 480-501. 35 refs. In French.

Experimental study of the whole vagal afferent innervation of cardiovascular and respiratory systems in the cat using the microelectrode technique. The discharge of 330 vagal neurons was investigated to obtain data on the pericardial, expiratory, and pneumo-vascular receptors. Several types of pericardial receptors were found, some of which have a spontaneous cardiac rhythm, while others keep silent or discharge irregularly, but get a cardiac rhythm if blood volume is increased. Only four expiratory receptors were observed; they are connected with unmyelinated fibers and discharge only during expiration. Pneumo-vascular receptors, which show superimposed cardiac and inspiratory rhythms, were often observed. They are located near the heart or the great thoracic vessels, the pulsation of which produces the cardiac rhythm. O.H.

A71-16344 **Light microscopic observations on the possible retinohypothalamic projection in the rat.** A. Sousa-Pinto and J. Castro-Correia (Porto, Universidad, Porto, Portugal). *Experimental Brain Research*, vol. 11, no. 5, 1970, p. 515-527. 43 refs. Research supported by the Calouste Gulbenkian Foundation and the Portuguese Ministry of Education.

Following unilateral retinal destruction in rats the existence of a direct retinohypothalamic pathway was investigated using the Nauta and the Fink-Heimer methods. Critical analysis of the Fink-Heimer stained sections of the experimental animals suggests that fibers leaving the optic pathway pass to various hypothalamic nuclei: (1) fibers from the dorsorostral part of the chiasm pass through the lamina terminalis and appear to end in the preoptic and anterior hypothalamic nuclei; (2) fibers leaving the ventrocaudal border of the chiasm and optic tract pass to the arcuate and ventromedial hypothalamic nuclei; (3) from the dorsocaudal part of the chiasm fibers pass to the suprachiasmatic and ventromedial hypothalamic nuclei; (4) from the caudal part of the inferior bundle of the accessory optic tract fibers pass to the premamillary ventral nucleus. The amount of apparently terminal degeneration in the preoptic, anterior hypothalamic, suprachiasmatic and premamillary nuclei was small. Heavier terminal degeneration appears to be present in the arcuate and ventromedial hypothalamic nuclei. (Author)

A71-16345 **Electron microscopic observations on the possible retinohypothalamic projection in the rat.** A. Sousa-Pinto (Porto, Universidad, Porto, Portugal). *Experimental Brain Research*, vol. 11, no. 5, 1970, p. 528-538. 23 refs. Research supported by the Calouste Gulbenkian Foundation and Portuguese Ministry of Education.

Degenerating nerve fibers and boutons were searched with the aid of the electron microscope in the arcuate nucleus of rats 2-7 days after bilateral destruction of the retina. In the arcuate nucleus of the control animals as well as in the operated animals, 4 types of boutons were distinguished on the basis of vesicular contents and glial ensheathment. In the operated animals changes interpreted as degenerating were found in small myelinated axons and boutons of type II (boutons containing both synaptic and granular vesicles). The changes were similar to those described in the literature as the 'dark' type of degeneration in experimentally interrupted axons and boutons. Similar changes were not found in the unoperated animals. The conclusion is reached, that a small number of fibers of the optic tract reach the arcuate nucleus to terminate here. (Author)

A71-16386 # **Effect of the pyrogenic protein fraction of polymorphic-nucleus leukocytes on the thermal control structures of the hypothalamus (Deistvie pirogennoi belkovoi fraktsii polimorfnoiadernykh leikotsitov na teploreguliruiushchie struktury gipotalamusa).** M. D. Khudaiberdiev and I. S. Repin (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 194, Oct. 1, 1970, p. 961-963. 10 refs. In Russian.

Brief account of experiments in which the pyrogenic protein fraction of polymorphic-nucleus leukocytes was injected in various sections of the hypothalamus of rabbits in order to determine the role of the leukofactor in body temperature control. It is found that the pyrogenic effect is proportional to the granulocyte extract microdose when the extract is injected into the medial preoptic region and ventricle III. On the other hand, the same microdose injections into the hypothalamus posterior produced no effect on the body temperature of rabbits. V.Z.

A71-16387 # **Projections of the cortical zone of the vestibular apparatus on the striopallidal complex (Proektsii korkovoi zony vestibuliarnogo apparata na striopallidarnyi kompleks).** T. F. Kuleshova and V. A. Otellin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 194, Oct. 1, 1970, p. 974-976. 12 refs. In Russian.

Description of experiments in which the morphology of the supra- and ectosylvian cortical gyri was studied in five cats with extirpated vestibular zones in a study of the connections between the vestibular and extrapyramidal systems. A microscopic analysis shows the presence of well-pronounced fiber junctions between the extirpated vestibular cortical zone and the nucleus caudatus, the putamen, and the globus pallidus of the striopallidal system. A hypothesis is proposed concerning the functional meaning of these junctions. V.Z.

A71-16424 # **Hippocampal, neocortical, and somatic effects of the stimulation of the reticular formation during different phases of sleep (Gippokampal'nye, neokortikal'nye i somaticheskie effekty razdrazheniia retikuliarnoi formatsii vo vremia razlichnykh faz sna).** T. N. Oniani and P. P. Mol'nar (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 59, Aug. 1970, p. 445-448. 9 refs. In Russian.

Study of the effects of high-frequency electrical stimulation of the mesencephalic reticular formation during different stages of sleep in cats with chronically implanted electrodes. Experiments show that the dissociation between the electrographic and the behavioral arousal threshold, which is characteristic of the paradoxical stage of sleep, is also present in slow-wave sleep. Behavioral wakening on a paradoxical-stage background requires stronger electrical stimulation than on a slow-wave background. T.M.

A71-16481 ***Progress in optics. Volume 8.*** Edited by Emil Wolf (Rochester, University, Rochester, N.Y.). Amsterdam, North-Holland Publishing Co., 1970. 467 p. $21.

Contents:

Preface. E. Wolf (Rochester, University, Rochester, N.Y.), p. vii.

The optical performance of the human eye. G. A. Fry (Ohio State University, Columbus, Ohio), p. 51-131. 100 refs. (See A71-16482 05-05)

Statistical properties of laser light. H. Risken (Stuttgart, Universität, Stuttgart, West Germany), p. 239-294. 106 refs. (See A71-16483 05-16)

Vision in communication. L. Levi (City College, New York, N.Y.), p. 343-372. 52 refs. (See A71-16484 05-05)

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A71-16482 **The optical performance of the human eye.** Glenn A. Fry (Ohio State University, Columbus, Ohio). In: Progress in optics. Volume 8. (A71-16481 05-05) Edited by Emil Wolf. Amsterdam, North-Holland Publishing Co., 1970, p. 51-131. 100 refs.

Review of the present state of knowledge concerning the optical performance of the human eye taking also into consideration a brief survey of investigative approaches used in the studies. The anatomy and physiology of the retina are examined, and such concepts as visual acuity, resolving power and contrast and modulation sensitivity are discussed. Psychophysical techniques, spread and transfer functions, and the determination of the modulation transfer function for the retina are considered. The resolving power at unit modulation is investigated, and the dependence of the resolving power on wavelength composition is explored. The visibility of square-wave gratings, of a bar, and of borders is discussed. An account of retinal reflectometry is given. Aberrations of the eye and motor adjustments of the eye are also considered. G.R.

A71-16484 **Vision in communication.** L. Levi (City College, New York, N.Y.). In: Progress in optics. Volume 8. (A71-16481 05-05) Edited by Emil Wolf. Amsterdam, North-Holland Publishing Co., 1970, p. 343-372. 52 refs. Navy-supported research.

Discussion of the relevant characteristics of human vision in terms which permit their consideration in communication system analysis. Problems of psychophysical investigations are examined, and three major factors which determine the performance of any communication system are considered. The instantaneous and the steady-state brightness functions are discussed. The spatial frequency response is investigated, and aspects of noise in the visual system are explored. The shape of the modulation transfer function is examined, and aspects of stationarity, homogeneity, or isoplanatism are considered. G.R.

A71-16485 * **Dynamic analysis, with feedback characterization, of hybrid human musculo-skeletal frameworks by the linegraph-flowgraph procedure.** Carl W. Stempin (United Aircraft Corp., Norwalk, Conn.) and Dhanjoo N. Ghista (NASA, Ames Research Center, Moffett Field, Conn.). *Bulletin of Mathematical Biophysics*, vol. 32, Dec. 1970, p. 499-520. 6 refs.

The dynamic response of human musculo-skeletal framework is treated by (1) idealization of the musculo-skeletal framework as hybrid structural networks possessing feedback characteristics and then (2) employing linegraph-flowgraph procedures for the feedback characterization of the hybrid structural networks. Topological procedures are used in which a 'tree' of a network furnishes the skeleton upon which the 'linkage' (muscle representing) members provide interaction. Feedback characterization (representing the sensitivity of the skeletal members to the tensile forces) is defined, between the internal 'linkage' and 'tree' members, by means of the flowgraph. Mikusinski operational calculus is used to facilitate representation of inertia effects by dynamic feedback characterization, with inclusion of initial conditions. (Author)

A71-16486 **A concentric layer model for estimating the energy expenditure of the left ventricle.** Alan Y. K. Wong (Dalhousie University, Halifax, Canada). *Bulletin of Mathematical Biophysics*, vol. 32, Dec. 1970, p. 581-598. 10 refs.

The energy cost of the left ventricle is quantitatively analyzed on the basis of the following assumptions: (1) the left ventricle is assumed to be an isotropic, homogeneous elastic, thick, spherical shell; (2) the ventricular wall is made up of a finite number of thin concentric shells; (3) the energetics of the left ventricle is in accordance with the second law of thermodynamics. An expression for the work done during ventricular contraction is derived according to the definition of physical work. The energy liberation during isovolumic contraction is formulated parallel to the concepts of heat production in skeletal muscle during isometric contraction. This expression gives the total work done per stroke in terms of mean systolic pressure, end diastolic volume, stroke volume and wall thickness during diastolic phase. (Author)

A71-16548 **Input and output transformations from magnitude estimation.** Stanley J. Rule (Alberta, University, Edmonton, Alberta, Canada), Dwight W. Curtis (California State College, Fullerton, Calif.), and Robert P. Markley (Fort Hays Kansas State College, Hays, Kan.). *Journal of Experimental Psychology*, vol. 86, Dec. 1970, p. 343-349. 10 refs. NIH-supported research; National Research Council of Canada Grant No. APA-151.

Judged magnitudes of difference in area of paired circles and magnitude estimations of the circles making up the pairs were obtained from 12 Ss. The difference judgments were subjected to nonmetric scaling, and a one-dimensional solution was obtained. The relationships between scale values and physical area and between judged difference and derived distance were each characterized by power functions. The product of exponents from the two functions closely predicted judgments of individual circles. Judgments of differences between paired weights were subjected to the same analysis. The relationships between scale values and physical weight and between judged difference and derived distance were power functions for both pooled data and data from individual Ss, indicating that input and output transformations in magnitude estimation are power functions. (Author)

A71-16549 **Acquisition of pursuit tracking skill under extended training as a joint function of sex and initial ability.** Clyde E. Noble (Georgia, University, Athens, Ga.). *Journal of Experimental Psychology*, vol. 86, Dec. 1970, p. 360-373. 33 refs. Research supported by the U.S. Department of Health, Education, and Welfare; NSF Grant No. GU-2590; Grant No. AF AFOSR 1099-69.

Experimental investigation in which 500 college subjects of both sexes were trained on a rotary pursuit apparatus for 100 20-sec trials spaced by 10-sec rests. The following results were obtained: (1) mathematical forms of the percentage time-on-target curves were independent of aptitude; (2) curves at five ability levels were exponential and highly predictable; (3) significant trend differences revealed early divergence and later convergence; (4) initial ability, acquisition rate, and final level were positively correlated; (5) no significant age differences were found within the range from 17 to 41 yr; (6) men were superior to women in tracking skill; (7) interactions with practice were found between aptitude and sex; and (8) differentiation between subjects of low and high aptitude was maintained at advanced levels of proficiency. Implications for the theory of psychomotor skills are discussed. M.M.

A71-16550 **Three motion-parallax cues in one-dimensional polar projections of rotation in depth.** Wayne A. Hershberger and Daniel Urban (Northern Illinois University, DeKalb, Ill.). *Journal of Experimental Psychology*, vol. 86, Dec. 1970, p. 380-383. Research supported by the Northern Illinois University.

Determination of which of three potentially effective cues actually influences judgments of rotation direction by observers. A polar projection of a dotted line rotating in depth incorporates three distinct cues to direction of rotation: (1) the direction (D) in which the motions of dots on opposite ends of the line are periodically congruent; (2) the order (O) in which the dots reach their respective limits of angular displacement in the visual field; and (3) the differential retinal velocity (V) of dots on the near vs the far side of the axis of rotation. Twenty-four observers repeatedly viewed each of three polar projections of a dotted line rotating in depth: one incorporating only Cue V, another, Cues D and V, and a third, Cues

O and V. The identification of rotation direction by the observers using Cue V alone was better than chance, and improved significantly with the addition of either of the other cues. Performance improved with practice using the two-cue projections but declined using the V projection. M.M.

A71-16596 Interaction of excitation and direct inhibition in the receptive field center of retinal neurons. Christine Büttner, U. Büttner, and O.-J. Grüsser (Berlin, Freie Universität, Berlin, West Germany; Miami, University, Coral Gables, Fla.). *Pflügers Archiv,* vol. 322, no. 1, 1971, p. 1-21. 19 refs. Research supported by the Deutsche Forschungsgemeinschaft; NIH Grant No. NB-07575.

Study of the amplitude and the phase-frequency characteristic of the direct off-inhibition in the receptive field (RF) center on the basis of experiments in which two small spots of light were projected to the RF-center of on-center neurons. The luminance of the two spots of light was modulated by stimuli with the same sinusoidal frequency, but the phase angle of the light stimuli with respect to one another was variable. The results obtained are discussed. It is concluded that on-excitatory and off-inhibitory events interacting at the ganglion cell membrane elicited from the RF-center are summed linearly up to 20 cps. The amplitude and the frequency properties of the off-inhibition does not deviate significantly from the frequency characteristics of the on-excitation up to 15-20 cps. G.R.

A71-16597 Voluntary body water and salt deficits as a cause of differences between men in their tolerance to heat. J. Peter (Chamber of Mines of South Africa, Johannesburg, Republic of South Africa). *Pflügers Archiv,* no. 1, 1971, p. 22-34. 17 refs.

Forty-nine unacclimatized Bantu mine workers divided into two groups were subjected to a standard heat exercise stress. One group had sweat losses replaced by drinking water and the other had no water at all. Salt and water deficits were measured by an indirect method based on the volume of urine and salt excreted over the four-hour period of the test. These excretions were correlated with the fourth-hour temperature response and showed good correlations. The difference in heat tolerance was found to be due to a difference in salt and water deficit. Osmolal clearance and free water clearance were additional measurements which showed agreement in the findings of the relative salt and water deficits. Blood chemistry and sweat physiology and chemistry could not discriminate between the heat intolerant and heat tolerant subjects. Certain features of blood and urine chemistry of water replacements and water deprivation were shown. (Author)

A71-16598 pO2 measurement in the myocardium of the beating heart (pO2-Messung im Myokard des schlagenden Herzens). Sebastian Schuchhardt (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany). *Pflügers Archiv,* no. 1, 1971, p. 83-94. 12 refs. In German.

Description of three types of miniature electrodes - namely, two needle electrodes and one surface electrode - which were developed in order to perform oxygen partial pressure measurements in the beating heart. The miniature glass-needle-electrode has a mean diameter of the tip of 40 microns. The Ag-AgCl reference electrode is either fixed like a collar on the glass shaft of the electrode, thus determining simultaneously the depth of the puncture, or separately on the myocardium. In the cannula-needle-electrode the electrode shaft made of a silver tube of a diameter of 300 microns is used as a reference electrode. The surface electrode is a Clark-electrode (diameter of the surface 3 to 5 mm). It is fixed on the myocardium by means of a vital adhesive. (Author)

A71-16614 Significance of the consumption of oxygen corresponding to a 170 beat/min heart rate (Signification de la consommation d'oxygène correspondant a la fréquence cardiaque de 170/min). F. Pirnay, R. Deroanne, J. M. Petit, R. Bottin, and J. Dujardin (Liège, Université; Institut Ernest Malvoz, Liège, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 1, 1970, p. 1-10. 28 refs. In French.

Assessment of the physical fitness of three different groups of subjects by the oxygen uptake corresponding to 170 beat/min heart rate. The results of this test are compared to the values of $\dot{V}$ sub O2 maximum and to the limiting stable regime. The percentage of the maximal oxygen uptake reached with a 170/min heart rate is highly variable. An important dispersion is observed in the results of each group of subjects. It is shown that the 170 beat/min heart rate does not always correspond to the tolerance for work of long duration. F.R.L.

A71-16615 Comparison between measurements of maximal O2 intake during level run of 1 or 2 minutes (Mesures comparées de la consommation maximum d'O2 par paliers de 1 ou 2 minutes). R. Bottin, J. M. Petit, R. Deroanne, F. Pirnay, and J. Juchmes (Liège, Université; Institut Ernest Malvoz, Liège, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 1, 1970, p. 11-17. 12 refs. In French.

The comparison between the values of O2 intake, ventilation and heart rate obtained during tests of progressive intensity with variable degrees and duration is performed by 14 normal male adults. No statistically significant difference appears between the maximal values whatever the profile of the test may be and the results are comparable except for a lower maximal heart rate, when the duration of the test is reduced. From methodological and practical point of view, the level run of 2 min and with degrees of 2 km/h seems to be more advisable. (Author)

A71-16616 Finger blood circulation in forest workers with Raynaud phenomena of occupational origin. B. Hellstrøm, Inger Stensvold, J. R. Halvorsrud, and T. Vik (Institutes of Occupational Research, Oslo, Norway). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 1, 1970, p. 18-28. 28 refs.

In one experimental series 52 forest workers sat naked at 11 C air temperature for 35 min. During the last 15 min the right hand and forearm were exposed to 2 C air in a cooling-box. Finger skin temperatures were recorded thermoelectrically. Finger pulse 'volumes' were recorded by mercury strain gauges. Ten subjects suffered from 'traumatic vasospastic disease' (TVD) attributable to use of chain-saws (Group III). Thirty subjects used chain-saws but had no symptoms (Group II). Twelve subjects had not been exposed to occupational vibration (Group I). Upon general cold exposure the fingers in Group III cooled to significantly (p less than 0.01) lower temperatures than did the fingers in Group I. This difference may reflect an individual predisposition to TVD, or it may be due to an increment of finger cold vasoconstriction caused by occupational vibration and appearing before full-fledged attacks of Raynaud phenomena. Such attacks were not provoked by the present cold exposure. In a second experimental series 26 forest workers with TVD exposed one hand to 5 C water for 20 min. The occurrence and the magnitude of the cold-induced vasodilatation did not differ between the fingers reportedly affected by TVD and those where symptoms had not been observed. (Author)

A71-16617 Effect of a choking off of the arteria cerebri media on blood flow, oxygen pressure, and acid-base relations in the region supplied by it (Wirkung einer Unterbindung der Arteria cerebri media auf Durchblutung, Sauerstoffdruck und Säure-Basen-Haushalt in deren Versorgungsgebiet). L. Neumann, E. Betz, and H. Benzing (Tübingen, Universität, Tübingen, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich*

Arbeitsphysiologie, vol. 29, no. 1, 1970, p. 29-43. 26 refs. In German.

Study of the effect of middle cerebral artery occlusion upon local cortical blood flow, cortical tissue oxygen pressure, and acid base equilibrium in the disturbed cortical regions. In 15 cats and 12 pigs anesthetized with Nembutal, the middle cerebral artery (m.c.a.) was transiently ligated. The ligations were extended between 5 and 40 min. In the disturbed and in normal cortical regions the following values were simultaneously recorded: local cerebral blood flow with heat clearance, local cortical oxygen pressure, carbon dioxide pressure and local cortical pH. Arterial blood pressure was recorded in the thoracic aorta. It could be seen that the areas supplied by the m.c.a. were different in the two species. The results obtained in the tests are discussed in detail. G.R.

A71-16618 The influence of knowledge of results at different training conditions on the acquisition of a simple sensory-motor performance (Untersuchungen über die Beeinflussung des Erlernens einer einfachen sensumotorischen Fertigkeit durch die Bekanntgabe der Lernresultate bei verschiedenen Übungs-bedingungen). Joseph Rutenfranz and Amin Iskander (Max-Planck-Institut für Arbeitsphysiologie, Dortmund; Giessen, Universität, Giessen, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 1, 1970, p. 44-54. 19 refs. In German.

The influence of knowlege of results (KR) and rest pauses was studied in learning a sensory-motor skill (pursuit tracking at the Rotary Pursuit Apparatus). Four homogeneous groups of female students worked for 60 min under the following conditions: (a) without rest pauses, without KR; (b) without rest pauses, with KR; (c) with rest pauses, without KR; and (d) with rest pauses, with KR. The groups with rest pauses worked in accordance to the schedule: 1 min work, 1 min rest pause. During the learning period the performance of each group increased exponentially. The lowest performance resulted in group a (without pauses, without KR), the best one in group d (with pauses, with Kr). It was found that the training conditions (working with or without rest pauses) had a greater influence on learning success than KR. The simultaneous effect of both the factors was greater than the sum of the effects of each single factor. (Author)

A71-16619 Heart rate and the arterial concentration of glucose and lactate during intermittent work of 2 and 4 min (Die Veränderungen der Herzfrequenz und der arteriellen Glucose- und Lactatspiegel bei zwei- und vierminütigen Intervalläufen). J. Keul, N. Löhmann, and P. Adolph (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, nő. 1, 1970, p. 55-64. 36 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft and the Kuratorium für sportmedizinische Forschung.

In 16 normal male persons (average age 25 years) arterial level of glucose and lactate as well as heart frequency were determined during interval running over a period of 6 times 2 min and 3 times 4 min. The arterial glucose level does not vary significantly in the course of the interval running. The arterial lactate level, however, rises already after 2 min of exercise to 7,3, after 4 min to 8,3 microns moles/ml. At the end of the 3rd run over a period of 4 min the mean lactate level reaches a value of 12,2 microns moles/ml, which is by 1,2 microns moles/ml higher than at the end of the 6th run over a period of 2 min. Either type of exercise is appropriate to develop the anaerobic capacity of the human body. The energy provided by the glycolytic processes anoxidatively could be estimated to be about 20% of the total energy production in the 2 min exercise respectively about 15% in the 4 min exercise. At the beginning of the run the heart frequency rises up quickly. During and after the 4 min exercise the frequencies are slightly higher. As compared with ergometric work tests the heart frequency does not show any significant differences during and after work. Thus the results of the ergometer work test prove to be transferable to normal training conditions. (Author)

A71-16620 Visual response time changes in athletes during physical effort. J. Malomsoki and I. Szmodis (Országos Testnevelés-és Sportegészségügyi Intézet, Budapest, Hungary). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeits-physiologie,* vol. 29, no. 1, 1970, p. 65-72. 23 refs.

Simple visual response time (SVRT) was measured serially before, during, and after cycle-ergometric exercise of 83 athletes. Concurrently also respiratory gas exchange was measured. One of the groups performed steady-state exercise (6400 kp-m in 10 min), while the work load of the other group was increased stepwise (total work 7040 kp-m in 10 min). SVRT showed an almost immediate elongation after work was begun. The elongation was nearly constant during the steady-state effort, and corresponding to the increments of work load it increased in a stepwise manner during the graded exercise. In the postexercise recovery period SVRT returned to the range of preexercise values. The elongation observed during physical effort of SVRT is thought to derive in great part from the fact that during exercise the internal milieu undergoes biochemical changes which affect central nervous functions. SVRT change was found to be proportional (within certain limits) to the work load imposed, its time-pattern was however suggestive of other, nonhumoral contributing factors too. Within the range of work loads investigated by the graded test the relationship of SVRT to excess O2 consumption could be best approximated by rectilinear regression, however a slight curvilinear tendency was also present, most likely because of a cumulative effect of successive steps of nonsteady-state work. (Author)

A71-16621 Selection of workers in hot environment (Selection des travailleurs en ambiance chaude). F. Pirnay, J. M. Petit, R. Deroanne, and A. Hausman (Liège, Université; Institut Ernest Malvoz, Liège; Coordinatie Centrum Reddingswezen van het Kempische Steenkolenbekken, Hasselt, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeits-physiologie,* vol. 29, no. 1, 1970, p. 73-87. 27 refs. In French.

Working capacity of 57 subjects was assessed comparatively in heat and in normal conditions. No significant relation was found between tolerance to heat estimated in hot environment and working capacity in normal conditions measured either by maximal oxygen intake, either by the 'régime stable limite' according to Petit et al. or PWC/170. An exercise in normal environment is insufficient to predict the tolerance to work in heat; meanwhile it can help to make a first selection. Afterwards, an inquiry after selection tests was made studying the physiological reactions during exercise in heat. This exercise consisted in walking slowly (oxygen consumption 1 liter O2/min) during 1/2 hr, in a very hot environment (dry temperature 46 C; wet temperature equal 35 C). In such conditions, the central temperature did not always represent the thermal load; the heart rate seems to be a better criterion because it was more selective and more restrictive. The absolute heart rate synthesizes the global stress caused both by muscular exercise and hot environment. The adaptation to both cardiovascular solicitations does not necessarily induce parallel responses; but it is possible to determine the modality for everyone. The heart rate measured during muscular exercise in normal conditions determines the circulatory possibilities in muscles. The pulse evolution related to hyperthermy reflects the tolerance to thermal stress. (Author)

A71-16622 Effect of beta-adrenergic blockade on circulatory response during muscular work (Effet d'un bloqueur bêta-adrénergique sur la réponse cardiaque pendant l'exercice

musculaire). F. Pirnay, J. M. Delvaux, R. Deroanne, P. Wittamer, and J. M. Petit (Institut Ernest Malvoz; Liège, Université, Liège, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 1, 1970, p. 88-93. 13 refs. In French.

The effect of beta-adrenergic blockade on the circulatory response has been verified during muscular exercise on 7 healthy young men. The administration of 80 mg propranolol induced a significant decrease in cardiac frequency to each metabolic level, however, with an important individual variation. This modification of the circulation reduces the tolerance to muscular exercise and the maximum oxygen consumption (mean: 15.5 per cent). (Author)

A71-16623 The effect of moderate altitude on post-exercise blood lactate. David A. Cunningham and John R. Magel (Western Ontario, University, London, Ontario, Canada). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie,* vol. 29, no. 1, 1970, p. 94-100. 22 refs. Research supported by the Fitness and Amateur Sport Directorate of Canada.

Postexercise blood lactate levels were studied after a short exhaustive bicycle ride in 3 males at sea level control, at altitude (2300 m) and on return to sea level. The short exhaustive bicycle ride was performed at a work rate of 2730 kpm/min and ride times ranged from 55 to 105 sec. Compared to sea level controls, performance time of the tests at altitude were of similar intensity and duration. Although the changes were small, the oxygen uptakes during the ride and oxygen debts following the rides increased with each test. However, in comparison with sea level controls the blood lactate concentrations were reduced. The reduction on the average reached 44% after 4 days at altitude, and 51% after 22 days at altitude. This reduction in blood lactate concentration of the same subject at altitude as compared with his sea level values may indicate a decrease in the activity of the glycolytic pathway relative to the activity of the aerobic pathway. This appears to be a contradiction to what would be expected in the mild hypoxic conditions present at altitude. (Author)

A71-16801 # Average level distribution of asymmetry of the EEG wave phase durations over the human brain surface (Raspredelenie srednego urovnia asimmetrii dlitel'nostei faz voln EEG po poverkhnosti mozga cheloveka). E. A. Zhirmunskaia and G. V. Makarova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Oct. 1970, p. 1321-1328. 13 refs. In Russian.

Study of the average level distribution of asymmetry of ascending and descending EEG wave fronts. The distribution of this EEG parameter over the brain surface was investigated in healthy subjects at rest during rhythmical light stimulation and some other functional tests. The results indicate that the field of the parameter (i.e., its value, gradient, and the signs of the asymmetry average level) tend to change in dependence on the particular EEG pattern. M.V.E.

A71-16802 # Cortical regulation of internal organ functions (O kortikal'noi reguliatsii funktsii vnutrennikh organov). I. T. Kurtsin (Akademiia Nauk SSSR, Laboratoriia Kortiko-Vistseral'noi Fiziologii i Patologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Oct. 1970, p. 1350-1359. 58 refs. In Russian.

Argument for the hypothesis of complete subordination of the functions of the vegetative nervous system to the cerebral cortex. It is asserted that every vegetative function of the human or animal organism, be it on the organism, cellular, or subcellular level, is being controlled by the cerebral cortex via neural or neurohumoral channels, with the aid of mediators, hormones, and vascular changes. Not only cellular functions are thereby affected, but also exchange, fermentation, and oxidation processes occurring on both the cellular and subcellular levels. M.V.E.

A71-16803 # On cortical regulation of the kinesthetic analysis (O kortikal'noi reguliatsii kinestezicheskogo analiza). S. A. Kosilov, A. I. Vasiutina, and A. A. Rigina (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Oct. 1970, p. 1369-1376. 10 refs. In Russian.

Brain electric activity was studied in 16-17 years old school-children during the kinesthetic analysis of excitations caused by precise movements in the radiocarpal joint. Involvement of additional visual and verbal control makes the kinesthetic analysis more exact on account of activation in the brain projection and associative cortical areas, programming those included. Preciseness of the kinesthetic analysis depends on the kind of additional control: it is the best at simultaneous use of both verbal and visual signals, somewhat less exact at visual, and still less exact at verbal. (Author)

A71-16804 # On the human spinal segmental apparatus during cyclic voluntary movements (O sostoianii segmentarnogo apparata spinnogo mozga cheloveka pri tsiklicheskikh proizvol'nykh dvizheniiakh). I. N. Baranov-Krylov (Akademiia Nauk SSSR, Laboratoriia Kortikal'nykh Mekhanizmov Dvigatel'noi Deiatel'nosti Cheloveka, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Oct. 1970, p. 1396-1404. 29 refs. In Russian.

The excitability of m. triceps surae motor neurons was tested by monosynaptic H-reflex during cyclic dorso-plantar flexion, and cyclic and noncyclic plantar flexion. The m. soleus H-wave increased 60-70 msec before and during every voluntary action, and decreased again just before ending of the action. Prolonged post-activity depression occurred after the plantar flexion. This depression is essentially the same for both cyclic and noncyclic movements, and has no connection with antagonist-muscle activity. It was summed with the reciprocal inhibition during the cyclic movements when m. tibialis anterior (the antagonist) was periodically activated. As the H-wave changes during the studied movements are approximately the same, the spinal mechanisms of both cyclic and noncyclic movements may be presumably also the same. (Author)

A71-16805 # Interrelations between the indices of working capacity, performance of cardiovascular and respiratory systems and blood composition in distance runners during exercise with stepwise increasing load (Vzaimootnosheniia mezhdu pokazateliami rabotosposobnosti serdechno-sosudistoi i dykhatel'noi sistem i sostava krovi u begunov pri myshechnoi rabote s povyshaiushcheisia moshchnost'iu). Ia. P. Piarnat, A. A. Viru, and A. P. Pisuke (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 56, Oct. 1970, p. 1427-1432. 14 refs. In Russian.

The observations on 22 trained runners showed that during the exercises on the bicycle ergometer with stepwise increasing load the alterations of the indices of the physiological functions depend on the skill and speciality of the sportsman. If the load of the exercise increased until the limit of the sportsman's aerobic capacity, the anaerobic mechanisms were turned on in middle-distance runners to a higher extent than in long-distance runners. The blood lactate accumulation accompanied respective changes in the acid-base equilibrium. Due to higher efficiency of the buffer systems in more trained sportsmen, the decrease of the pH and buffer bases was less pronounced than in less trained sportsmen. The maximal oxygen intake was in high correlation with the level of the maximal oxygen pulse, relation of the heart volume to the maximal oxygen pulse, level of the lung ventilation during work, and oxygen depth. (Author)

A71-16806 # On the heat effect of muscular contraction during cold adaptation (O temperaturnom effekte myshechnykh sokrashchenii posle adaptatsii k kholodu). K. P. Ivanov, E. Ia. Tkachenko, and M. A. Iakimenko (Akademiia Nauk SSSR, Laboratoriia Obshchei Fiziologii, Novosibirsk; Akademiia Nauk SSSR,

Laboratoriia Termoreguliatsii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Oct. 1970, p. 1438-1443. 16 refs. In Russian.

The effect of cold adaptation on the heat production in muscle was studied. By simultaneous recording of the muscle temperature and electrical activity, the linear dependence was shown to exist between the burst of electrical activity and the muscle temperature increment. The heat effect of muscle contraction increased during cold adaptation. This may account for a decrease in electrical activity of muscular system along with the maintenance of the general metabolic level in cold-adapted animals. (Author)

A71-16807 # **Topography of the biomechanical properties of the skin in man (Topografiia biomekhanicheskikh svoistv kozhi cheloveka).** M. V. Bobrova (Meditsinskii Institut, Aktyubinsk, Kazakh SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Oct. 1970, p. 1444-1450. 6 refs. In Russian.

Study of the extensibility, resiliency, and elasticity of the skin of various body surface areas in living men and women. The results of the study indicate that the biomechanical properties depend upon the segmentary innervation of the skin in both men and women. However, the biomechanical indices of the skin are much higher in women than in men. M.V.E.

A71-16808 # **Statistical analysis of muscle tonus dynamics (Statisticheskii analiz dinamiki myshechnogo tonusa).** A. A. Genkin, N. N. Grigor'eva, and V. M. Smirnov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Oct. 1970, p. 1494-1497. 8 refs. In Russian.

Attempt to apply a method of statistical analysis of time series for obtaining muscle tonus parameters making it possible (1) to prognosticate the most comprehensive and stable therapeutic effects of destructive stereotropic influences, (2) to assess the results of these influences, and (3) to explore the control mechanisms of muscle tonus. The procedures followed in applying this method, the difficulties encountered, and the indications suggested by the results obtained are discussed. M.V.E.

A71-16809 # **Studying the excitability of the skin analyzer in man (K izucheniiu vozbudimosti kozhnogo analizatora cheloveka).** P. O. Makarov and L. G. Safronova (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Oct. 1970, p. 1498-1500. 8 refs. In Russian.

Review of some of the results of experimental and theoretical studies of the skin analyzer function and its excitability in man, and discussion of the approach used in these studies. It is pointed out that the character of the threshold response to excitation of the skin analyzer is conditioned by an unaccountably large multitude of factors defying identification and adequate allowance. The statistical approach, therefore, seems to be the best one for excitability studies. Its results show good agreement with experimental data. M.V.E.

A71-16810 # **Device for recording the changing rotation velocities during examinations of the vestibular apparatus (Ustroistvo dlia registratsii izmeniaiushchikhsia skorostei vrashcheniia pri issledovanii vestibuliarnogo apparata).** R. S. Bogdanov (Akademiia Nauk SSSR, Laboratoriia Fiziologii Vestibuliarnogo Apparata, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Oct. 1970, p. 1500-1502. In Russian.

Description of a stimulus speed and duration recording system for studying the control mechanisms of the vestibular apparatus in input-output terms. The use of this system makes it possible to perform accurate comparisons of the characteristics of vestibular output reactions, such as the nystagmus threshold, speed of the slow components, and other instantaneous values of the stimulus in action. M.V.E.

A71-16815 # **Radiometric method of serial measurement of photosynthesis in unicellular algae.** N. Ousheva (B'lgarska Akademiia na Naukite, Institut po Fiziologiia na Rasteniiata, Sofia, Bulgaria) and K. Popov. *Bolgarskaia Akademiia Nauk, Doklady*, vol. 23, no. 9, 1970, p. 1151-1154. 10 refs.

Use of the principle of radiometric methods of determining photosynthesis in higher plants in a closed system involving a continuous current of nonradioactive and radioactive carbon dioxide to measure photosynthesis in unicellular algae. The measurement takes place in optimum and equalized conditions as regards conditions of light and temperature and of supply with carbon dioxide. The method provides an opportunity of determining the dose of carbon dioxide. Use is made of Na2C14O3, which is appreciably cheaper than NaHC14O3. Photosynthesis can be measured simultaneously in a large number of variants with the necessary number of replications. F.R.L.

A71-16816 # **Effectiveness of chemical radioprotection of primary immune response during irradiation with different gamma-rays doses.** T. Sumerska and V. Denchev (Nauchno-Izsledovatelski Institut po Epidemiologiia i Mikrobiologiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 23, no. 9, 1970, p. 1175-1177. 7 refs.

Study of the dependence between the radiation dose and the radiation-protective effect in white mice which were irradiated with cobalt-60 gamma rays. The chemical radiation protection made use of serotonine, and sheep red blood cells were used as antigen to accomplish immunization. The spleen was used as a source of antibody-producing cells. The radioprotective effect was found to be comparatively most pronounced at 300 rads. It is weaker at 500 rads, and weakest at 400 rads. F.R.L.

A71-16819 # **Antibody formation in irradiated rats depending on the dose of ionizing radiation and of the radioprotection applied.** M. Nedyalkova and L. Dimitrov (Research Institute of Haemotology and Blood Transfusion, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 23, no. 10, 1970, p. 1317-1320.

Determination of the dose of ionizing radiation which, according to the index of survival rate, corresponds to the lethal dose reduced by a mixture of radiation protectors which were described previously. In addition, the haematological indices and the immune reaction of sheep erythrocytes in the lethally irradiated and radiation-protected animals are compared with the animals irradiated with a reduced dose of rays. It was found that the mixture of radiation protectors reduces the lethal dose, with respect to survival rates, to approximately 400 r. Z.W.

A71-16858 # **Bone tissue as a dynamic system (Kostnaia tkan' - Dinamicheskaia sistema).** V. P. Torbenko (Tsentral'nyi Institut Travmatologii i Ortopedii, Moscow, USSR) and B. S. Kasavina (Institut Glaznykh Boleznei, Moscow, USSR). *Priroda*, no. 12, 1970, p. 26-31. 7 refs. In Russian.

Review of the state of the art in studies of metabolic processes in bone tissues as a basis for fighting the bone disease. Bone anatomy, the chemical composition of bone tissues, and the mechanism of the formation of bones are discussed. Special attention is given to the role of enzymes in the synthesis of bone tissues. V.Z.

A71-16896 # **Mechanism of the action of magnetic fields on biological systems (Pro mekhanizm vplivu magnitnikh poliv na biologichni sistemi).** I. L. Degen. *Akademiia Nauk Ukrains'koi RSR, Visnik*, vol. 34, Oct. 1970, p. 39-43. 5 refs. In Ukrainian.

Description of experiments in which ergograms of muscular work were taken on a Dubois ergometer in a group of 150 healthy male and female persons subjected to the action of 450 or

530-oersted magnetic fields. Most of the subjects were unaware of the purpose of the experiments and all of them did not know the time of the magnetic field actuation. Muscular contraction data of the ergograms are treated by variational statistics procedures. It is concluded that the action of a magnetic field on the muscular activity of biological systems is not related to the generation of an emf. V.Z.

A71-16922 The use of spectral analysis to determine the cortical adaptation time course from extracranially recorded responses in man. Gert Pfurtscheller (Erlangen-Nürnberg, Universität, Erlangen, West Germany). *Medical and Biological Engineering,* vol. 8, July 1970, p. 367-372. 9 refs. Research supported by the Alexander von Humboldt Foundation.

The coherence function for two time functions can be computed using certain mathematical methods, such as correlation and Fourier transforms. If one time function is identical to a single response and the other, to an average response (averaged evoked potential) determined from many responses, the coherence function gives the degree of correlation with respect to frequency. Under certain assumptions, the cortical adaptation time course can be inferred from the coherence function of single responses. An example is used to show the determination of the coherence time course of multiple acoustic evoked responses recorded extracranially from man. (Author)

A71-16923 Eight channel scanning and timing controller for physiological data acquisition. Ralph M. Jell (McGill University, Montreal, Canada). *Medical and Biological Engineering,* vol. 8, July 1970, p. 383-388. Medical Research Council Grant No. ME-2761.

A system is described which enables the sequential conversion into digital form, and printing or punching on paper tape of up to eight channels of physiological data. A control unit allows the selection of an acquisition-window time for each successive channel of data, programs the measurement parameters, and switches in the appropriate signal line. The system will accept mixed analogue data, i.e., continuous slowly-varying signals (ECG, EEG, temperature, etc.) as well as pulse data (action potentials, etc.), and is capable of direct analogue-to-digital conversion, or of the counting functions: totalizing, time interval between pulses, period, etc. The basic DAS components are standard Hewlett-Packard instruments. The controller is assembled from Digital Equipment Corporation M-series digital modules. (Author)

A71-16924 A digital tachystoscope. I. C. Dascalov (Ministry of Health, Research Laboratory for Scientific Instruments, Sofia, Bulgaria). *Medical and Biological Engineering,* vol. 8, July 1970, p. 423, 424.

Discussion of the functions, operating principles, and merits of various designs of tachystocopes. Their basic function is to aid in investigations connected with visual perception, such as the testing of attention, apprehension, the process of reading and the like, by presenting the subject under examination with a simple initial image, then substituted by a test image for a given interval of time (exposure time), and finally reestablishing the initial image. The main parts of a tachystoscope are a timing device for exposure-time determination, two or more light sources, a projection screen and an image commutator. M.V.E.

A71-16925 • Dimensional analysis of the heart - A review. H. Sandler (NASA, Ames Research Center, Moffett Field, Calif.). *American Journal of the Medical Sciences,* vol. 260, July 1970, p. 56-70. 161 refs.

A review is presented of the methods presently being used to measure individual atrial and/or ventricular chamber dimensions in animals or man. Angiocardiographic methods are by far the most frequently used techniques for measuring volume and dimensions in man. Sufficient studies have now been reported to demonstrate that such measurements are reliable and reasonably accurate when used properly. Biplane methods have been demonstrated to be more accurate than single plane techniques from studies of models and man. Single plane X-ray techniques, however, have been used increasingly for human studies due to high cost and complexity of biplane equipment and the tedium associated with calculations from the resulting films. Computer assisted methods are alleviating many of these latter difficulties. The discrepancies between biplane and indicator dilution methods in man are now slowly being resolved. Many extremely promising and innovative methods are also presently available for obtaining cardiac dimensional data which use radioisotopic or noninvasive external techniques. (Author)

A71-16932 # Accelerations and vibrations in the pathology related to transport for medical reasons (Les accélérations et les vibrations dans la pathologie liée au transport sanitaire). E. Pichard, M. Poisvert, J.-P. Hurtaud, S. Ivanoff, M. Cara (Hôpital des Enfants Malades, Paris, France), R. Auffret, J. Demange, B. Fatras, and H. Seris (Ministère des Armées, Service de Santé des Armées, Paris, France). *Revue des Corps de Santé des Armées,* vol. 11, Oct. 1970, p. 611-635. 19 refs. In French.

Consideration of various aspects concerning the transportation of gravely ill persons to places where they can be treated by the most modern methods. Three cases are described in detail, the first dealing with an infant suffering from whooping cough and convulsions, the second case concerned a 40-yr old male with a cerebral hemorrhage, and the third dealt with an 80-yr old female with a heart attack. It is shown that rapid transport by helicopter or fixed-wing aircraft produced fewer incidents than was the case with transport by ambulance. It appears that the damping of vibrations is of major importance, and the various resonances of the different suspension elements should be staggered. F.R.L.

A71-16933 # Loss of flying motivation (Les pertes de motivation aéronautique). R. Gelly, J.-C. Lachaud, and J.-C. Hadni (Ministère des Armées, Service de Santé des Armées, Paris, France). *Revue des Corps de Santé des Armées,* vol. 11, Oct. 1970, p. 637-645. In French.

Consideration of the psychogenesis of flying motivation. The wish to fly appears to arise in infancy, but such motivation can be lost later. Seven case histories are cited, which involved long flying histories, physiological causes, air accidents, certain latent and unconscious factors, and attempts to avoid flying duty. F.R.L.

A71-16934 # Physiological evaluation of the effectiveness of antiheat protective clothing (Evaluation physiologique de l'efficacité des vêtements de protection antithermique). J. Colin, J. Timbal (Ministère des Armées, Service de Santé des Armées, Paris, France), and C. Boutelier. *Revue des Corps de Santé des Armées,* vol. 11, Oct. 1970, p. 647-656. 9 refs. In French.

Discussion of the protection of aircraft crew members by means of antiheat protective clothing. Such protection may be either active or passive. Passive protection is assured by the choice of the characteristics of reflectivity and emissivity of the exterior surface of the outer coating, and by use of the insulating layer, which reduces the conduction of heat from the external surface of the coating toward the internal surface. In the French Air Force, ventilation only is utilized, combined with insulating and reflecting clothing. F.R.L.

A71-16935 # **Aeronautical medicine and biotechnology (Médecine aéronautique et ergonomie).** A. de Brisson de Laroche (Ministère des Armées, Service de Santé des Armées, Paris, France). *Revue des Corps de Santé des Armées,* vol. 11, Oct. 1970, p. 657-665. 15 refs. In French.

Evaluation of the protection and the biotechnology of human factors in aeronautical medicine, which are complementary insofar as safety is concerned. Biotechnology and the relationship between disciplines are discussed with reference to their relation to aeronautics. Examples of applications with reference to work load are considered. F.R.L.

A71-16936 # **Systematic radiological study of the spine within the framework of the admission visit of aircrew (L'examen radiologique systématique du rachis dans le cadre de la visite d'admission au personnel navigant).** R.-P. Delahaye (Ministère des Armées, Service de Santé des Armées, Paris, France), H. Mangin, G. Gueffier, A. Combes, M. Cren, and P.-J. Metges (Hôpitaux des Armées, Paris, France). *Revue des Corps de Santé des Armées,* vol. 11, Oct. 1970, p. 667-683. 9 refs. In French.

Discussion of the necessity of radiologically verifying the anatomical state of the spine in aircrew candidates, a procedure which is rapidly being invoked by numerous air forces. The doctors responsible note that there are, among aircrew members, numerous cases of serious spinal symptoms which are related to extremely varied etiologies. Attention is given to various traumatisms due to vibration and acceleration, and more rarely, ejections and crashes. Some disorders are due to posture anomalies. F.R.L.

A71-16941 # **The effect of carbonic acid on isolated skeletal muscle. I - Membrane potential and ion content (Zur Wirkung von Kohlensäure am isolierten Skeletmuskel. I - Membranpotential und Ionengehalt).** G. Küchler (Leipzig, Universität, Leipzig, East Germany) and B. Merrem (Deutsches Zentralinstitut für Arbeitsmedizin, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 25, no. 3, 1970, p. 399-410. 24 refs. In German.

Study of the effect of increased CO2 tension in the solution (pH 7.2 and pH 5.6) on the membrane potential and the ion content of isolated mm. sartorii of rana esculenta. Increased CO2 tension was produced by bubbling the solution with a gas mixture of 32% CO2 and 68% O2. The results are discussed and summarized. O.H.

A71-16942 # **Topography of acoustically evoked potentials triggered by alpha activity (Topographie der durch die Alphaaktivität getriggerten akustisch evozierten Potentiale).** J. Tatsuno, H. J. Marsoner, and F. M. Wageneder (Chirurgische Universitatsklinik, Graz, Austria). *Acta Biologica et Medica Germanica,* vol. 25, no. 3, 1970, p. 441-446. 20 refs. In German.

Topographical differences of evoked potentials triggered by alpha activity were investigated on ten healthy volunteers. The late components of the potentials evoked by acoustic stimuli were obtained from wide areas of the cortex. The distinct peaks (3 and 4) in successive tests were remarkably stable in the parietal region and gradually decreased toward the frontooccipital zone. These changes in stability and latency of the peaks suggest that a functional relation exists between the mechanism of the formation of the evoked potentials and the 'alpha generator.' (Author)

A71-16943 # **The human gamma globulin polymorphism - Calculation of its distribution in Vienna and its utility in paternity cases (Der menschliche Gammaglobulinpolymorphismus - Berechnung seiner Verteilung in Wien und seiner Brauchbarkeit in Paternitätssachen).** W. R. Mayr and D. Mickerts (Wien, Universität, Vienna, Austria). *Acta Biologica et Medica Germanica,* vol. 25, no. 3, 1970, p. 473-482. 14 refs. In German.

Discussion of the characteristics and statistical distribution of gamma globulins and their potential utilization for gene frequency studies. Serologically detectable characteristics belonging either to the Gm or Inv system are discussed. Both systems were tested on serum samples of unrelated persons and the results were used to calculate gene frequencies. Two constellations permitting exclusion in paternity serology are explained. O.H.

A71-16944 # **A contribution to the phosphate metabolism of human erythrocytes in hyperthermia (Beitrag zum Phosphatstoffwechsel menschlicher Erythrozyten bei Hyperthermie).** G. Philipp and H. Banaschak (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 25, no. 4, 1970, p. 539-544. 15 refs. In German.

Experimental study in which human erythrocytes were incubated in a phosphate-containing and a phosphate-free medium at temperatures from 37 to 52 C and the stationary content of ATP and 2,3-diphosphoglycerate was determined. The stationary concentrations and the incorporation of P(32)-orthophosphate allowed conclusions as to the passage of phosphate in either phosphate compound. (Author)

A71-16951 **An autopsy study of the accuracy of the electrocardiogram in the diagnosis of recurrent myocardial infarction.** Steven L. Merrill and Morton Lee Pearce (U.S. Veterans Administration Center; California, University, Los Angeles, Calif.). *American Heart Journal,* vol. 81, Jan. 1971, p. 48-54. 7 refs.

Study of EKGs and autopsies of 21 patients dying of acute myocardial infarction with evidence of prior infarcts. The diagnosis of acute recurrent myocardial infarction was correctly made in 17 of 21 patients (81%). The four new infarcts not diagnosed were all superimposed on areas of preexisting fibrosis. It is pointed out that, in spite of preexisting electrocardiographic abnormalities, careful study of repeated EKGs will generally result in the diagnosis of recurrent myocardial infarction. M.M.

A71-16952 **Effects of ventilation on pulmonary arterial flow and vascular conductance.** Hiroshi Murao (Tokyo University, Tokyo, Japan) and Simon Rodbard (City of Hope Medical Center, Duarte, Calif.). *American Heart Journal,* vol. 81, Jan. 1971, p. 69-79. 10 refs. Research supported by the Los Angeles County Heart Association; NIH Grant No. HE-08721.

Investigation of the effects of the direction and rate of change of lung volume on the pulmonary vascular conductance in the isolated lung lobe of the dog. During inflation of the lobe, the inflow rate decreased. The magnitude of the changes in the pulmonary arterial flow varied directly with the rate of change of volume of the lobe, and inversely with the conductance of the airways. For a given airway conductance or rate of change of lobar volume, the magnitude of the change in pulmonary arterial flow during deflation was greater than the magnitude of the change during inflation. These effects were augmented by the administration of acetylcholine or histamine. The experimental results show that airway conductance and the rate of lobar volume change can significantly affect flow into the pulmonary artery and the mean pulmonary vascular conductance. These effects apparently result from changes in alveolar and transmural capillary pressures. The results also suggest that acetylcholine and histamine act directly on the bronchial smooth muscle, and thereby indirectly on the pulmonary vessels by raising alveolar pressure during deflation of the lung. The elevated alveolar pressure tends to collapse the pulmonary capillaries and thereby to reduce the pulmonary vascular conductance. M.M.

A71-16953 **Acoustic phenomena in pericardial disease.** David H. Spodick (Lemuel Shattuck Hospital; Tufts University; Boston University, Boston, Mass.). *(Symposium on the Pericardium in Health and Disease, University of Kentucky, Lexington, Ky., Sept. 25, 26, 1969.) American Heart Journal,* vol. 81, Jan. 1971, p. 114-124. 21 refs.

Discussion of the wide variety of auscultatory phenomena which accompany disorders of the pericardium. Most of these phenomena are direct or indirect consequences of the pericardial process itself. Some are caused by disease of the heart valves and chordae tendineae having the same origin as an accompanying acute or adhesive pericarditis. A few are due to the natural coincidence of myocardial or valvular disease with unrelated pericarditis. The auscultatory phenomena fall into five categories: rubs, altered heart sounds, effect of *pneumohydropericardium* (spontaneous or induced), murmurs, and clicks. M.M.

A71-17010 **Eye injuries.** Edward Zagora (Sherbrooke, Université, Sherbrooke, Canada). Springfield, Ill., Charles C. Thomas, Publisher, 1970. 599 p. 356 refs. $30.75.

A book on traumatic ophthalmology, representing the outgrowth of over twenty years of experience, is offered to ophthalmologists, as well as neurologists, neurosurgeons, plastic surgeons, roentgenologists, radiation therapists, environmental health specialists, and also investigators interested in aerospace medicine with substantial information. Every aspect of medical and surgical treatment of eye injuries is treated. Measures for the prevention of ocular injuries due to mechanical trauma, chemical contaminants, and noxious radiation are described, including: (1) expert opinion in retinal detachments due to trauma; (2) causal and aggravating relationship of ocular and orbital injuries to tumors; (3) orbital wound ballistics; (4) accidental and operative trauma to trachomatous eyes; and (5) the management of retrobulbar hemorrhage in a hemophiliac patient. One section is devoted to ocular hazards in flight, specifically to ocular responses to high velocities and gravitational stresses of flying, and another to visual effects and performance impairment in environments of space flights. Attention is devoted to ocular symptoms associated with neurological and neurosurgical conditions due to trauma, disability due to orbitocranial penetrating injuries, association of traumatic optic nerve lesions with vascular pathogenesis, and the classification of psychiatric motivation to self-inflicted ocular injuries. A section devoted to eye injuries from radiant energy emphasizes the biological and clinical features of eye exposure to laser energy. Problems of visual disability and rehabilitation are discussed. Clinical photographs, fundus photographs, drawings, diagrams, and tables supply abundant illustrative material. M.M.

A71-17026 # **Latent form of motion sickness (Skrytaia forma ukachivaniia).** V. I. Kopanev. *Voenno-Meditsinskii Zhurnal,* Oct. 1970, p. 62-64. 7 refs. In Russian.

Results of a study of the functional state of the visual analysor in individuals experiencing latent motion sickness on rocking devices simulating moving aircraft. It is established that during the rocking motion the excitability of the visual analysor decreases, the rheobase increases, as well as the chronaxy, and the critical discreteness interval decreases. It is found that, in addition to subjective symptoms, a number of circulatory and motor indices are fairly informative in the diagnosis of the state of motion sickness. A.B.K.

A71-17027 # **An electrically rotating chair (Elektrovrashchaiushcheesia kreslo).** S. I. Kopanev. *Voenno-Meditsinskii Zhurnal,* Oct. 1970, p. 64, 65. In Russian.

Description of a rotating assembly for transmitting medico-biological information concerning the functional state of the vestibular analysor and statokinetic stability. In this case a device widely used for checking and testing gyroscopic devices is used as the rotating part of the arrangement and as the collector of the remote-controlled data transmitter. The proposed assembly ensures rotation of the subject in a horizontal plane in both directions with 42 fixed angular velocities ranging from 1.26 angular minutes to 360 degrees per second. A.B.K.

A71-17028 # **The importance of determining uropepsin in pilots (Znachenie opredeleniia uropepsina u letchikov).** V. S. Lozinskii. *Voenno-Meditsinskii Zhurnal,* Oct. 1970, p. 65, 66. In Russian.

Description of an experiment in which an attempt was made to determine the nervous-emotional state of pilots under flight conditions from the quantity of uropepsin excreted in the urine. Determinations of uropepsin were made on nonflying days, immediately before flights, and about an hour to an hour and a half after carrying out one, two, or more flights. On nonflying days and before a flight the excretion of uropepsin was within the norm, although in the second case it was greater than in the first. The greatest increase in excretion of uropepsin in all subjects was noted after the first two flights. After the third flight the excretion of uropepsin decreased. Moreover, the greatest increase in excretion of uropepsin in all stages of the investigation was noted in young pilots who did not have flying experience. A.B.K.

A71-17079 **An electronic model of the retina.** Kunihiko Fukushima, Yukiya Yamaguchi, Minoru Yasuda, and Shojiro Nagata (NHK Spring Co., Ltd., Tokyo, Japan). *IEEE, Proceedings,* vol. 58, Dec. 1970, p. 1950, 1951.

An electronic model of the retina has been developed with a new technique in making interconnections between the cells. The model consists of about 700 photoreceptors and the same number of output cells. The output cells have concentric on-center type receptive fields and show the Mach-band and the Broca-Sulzer effects. (Author)

A71-17087 **Effects of prolonged water deprivation on hypothalamic self-stimulation.** Z. Annau and A. M. Baetjer (Johns Hopkins University, Baltimore, Md.). *American Journal of Physiology,* vol. 220, Jan. 1971, p. 83-86. 12 refs. PHS Grant No. 5-ROI-ES-0144.

Thirty-six rats with electrodes chronically implanted in the posterior lateral hypothalamus were trained to lever press for electrical brain stimulation. The effect of 10 days of water deprivation on daily self-stimulation rates was studied. The results indicated a significant decrease in self-stimulation rates after 24 hr of dehydration, but no further change in lever-pressing rate during the next 9 days. In a second experiment two groups of rats were trained to self-stimulate at low and high rates and then were subjected to 10 days of dehydration. No significant changes in self-stimulation rates were observed during the 10 days of water deprivation. The results suggest that although self-stimulation and thirst can sometimes be elicited electrically from the same anatomical loci, two independent neural circuits are involved that normally do not interact. (Author)

A71-17108 * **The pineal gland - Endocrine interrelationships.** Richard J. Wurtman (MIT, Cambridge, Mass.). In: Advances in internal medicine. Volume 16. Edited by Gene Stollerman. Chicago, Year Book Medical Publishers, Inc., 1970, p. 155-169. 65 refs. PHS Grant No. AM-11709; Grant No. NGR-22-009-272.

Review of some of the new knowledge on the pineal gland that accumulated during the 11 years since the discovery of melatonin. A

brief discussion of the discovery and biosynthesis of melatonin, as well as the dependence of the pineal function on environmental lighting, is followed by a review of the endocrine effects of pineal compounds and, particularly, of the effects of melatonin on the gonad function. Special attention is given to pineal and gonadal responses to light, as well as to pineal pathology. M.V.E.

A71-17110 **Multichannel EEG radio-telemetry.** H. Fischler (Weizmann Institute of Science, Rehovot, Israel). In: Telemetric methods in pharmacology; Proceedings of the Fourth International Congress on Pharmacology, Basel, Switzerland, July 14-18, 1969. Volume 5. Basel, Schwabe and Co., Publishers, 1969, p. 253-269. 12 refs.

Description of the use of multichannel EEG radio telemetry for a remote recording of biological activity from subjects in motion and from within the human body. Special attention is given to the multiplexing technique which utilizes one common radio-frequency carrier link to convey information from a number of different channels. Two different multiplexing techniques are described: (1) time division system where the information content of the channels is shared in time and encoded by pulse modulation, and (2) frequency division system where the channels are separated by continuously modulating auxiliary subcarrier system. The subsystems of the FM/FM radio multiplex are described, including (1) conditioning amplifiers, (2) EEG amplifier, (3) FM subcarrier oscillator, (4) summing network and transmitter, (5) receiver, and (6) secondary FM discriminator. The system versatility and some experimental results are briefly examined. Z.W.

A71-17111 * **Telemetric measurement of effects of light and drugs on diurnal body temperature rhythms.** Michael J. Zigmond, Donald L. Holmquest, and Richard J. Wurtman (MIT, Cambridge, Mass.). In: Telemetric methods in pharmacology; Proceedings of the Fourth International Congress on Pharmacology, Basel, Switzerland, July 14-18, 1969. Volume 5. Basel, Schwabe and Co., Publishers, 1969, p. 279-287. 5 refs. Grant No. NGK-22-009-272.

Study of the effect of light and drugs on the diurnal body temperature using transmitters implanted in the peritoneal cavity of adult male rats. The characteristics of the diurnal temperature rhythm are briefly described. In examining the effects of light, it was found that the temperature rhythm does not require a 24-hr external cycle in light, but that it does become entrained to such cycles if they exist, even if the light is present in very low intensities. Certain light intensities are, however, below the threshold for this response. It was also found that temperature rhythm can be altered by the administration of drugs. Z.W.

A71-17112 **Telemetry of body temperature, motor activity, food and fluid intake in the rat.** Alexander A. Borbély (Zürich, University, Zurich, Switzerland). In: Telemetric methods in pharmacology; Proceedings of the Fourth International Congress on Pharmacology, Basel, Switzerland, July 14-18, 1969. Volume 5. Basel, Schwabe and Co., Publishers, 1969, p. 295-297.

Description of different telemetric techniques for measuring the pharmacological effects of the body temperature, motor activity, and food and fluid intake on the rat's brain. The recording and monitoring equipment is briefly described. It is concluded that for this kind of problem it is very important to obtain quantitative measurements from completely unrestrained animals. Z.W.

A71-17243 **A theory of visual pattern perception.** David Noton (Colorado, University, Boulder, Colo.). *IEEE Transactions on Systems Science and Cybernetics*, vol. SSC-6, Oct. 1970, p. 349-357. 21 refs. Research supported by the General Electric Co.

A theory of visual patterns perception is proposed, which is intended to explain first how patterns are learned or committed to memory, second how these patterns are recognized when subsequently encountered, and third how the patterns are recognized under unfavorable real-world conditions, for example, when they are distorted, enlarged, or rotated, or are viewed along with other patterns in a cluttered and noisy visual field. The essential idea of the theory is that each pattern is represented in memory as a network of memory traces recording the features of the pattern and the attention shifts required to pass from feature to feature across the visual field. These attention shifts may take the form of saccadic eye movements or they may be executed internally, according to the angular displacement involved. Memorizing and recognizing a pattern are thus seen to be closely analogous to memorizing and repeating a conventional sequence of behavior, each being an alternating sequence of sensory and motor activities. From this analogy come certain predictions concerning the presence of scanpaths in eye movements during pattern perception, and one of these predictions has been verified experimentally. (Author)

A71-17291 # **Disturbances in carbohydrate metabolism at the acute stage of myocardial infarction.** J. Tatoń, L. Ceremużyński, and A. Wiśniewska (Akademia Medyczna, Warsaw, Poland). (*Polskie Archiwum Medycyny Wewnetrznej*, vol. 43, no. 6, 1969.) *Polish Medical Journal*, vol. 9, no. 4, 1970, p. 787-793. 14 refs. Translation.

Evaluation of the oral glucose tolerance test, rapid intravenous glucose test, determinations of the coefficient of tissue glucose uptake, and also the serum insulin-like activity (ILA) in a group of 24 men at the acute stage of myocardial infarction. The results were compared with the corresponding values determined in a control group of 29 men without clinical abnormalities which might affect carbohydrate metabolism. The results suggest that disturbances in carbohydrate metabolism occur in the early stage of myocardial infarction. They are probably related to the fact that the tissues are in a state of relative insulin-resistance. M.M.

A71-17292 # **Diagnostic importance of various enzymatic tests in myocardial infarct.** B. Kolber-Postępska, M. Kędra, and J. Śliwińska (Akademia Medyczna, Lublin, Poland). (*Polski Tygodnik Lekarski*, vol. 24, no. 41, 1969.) *Polish Medical Journal*, vol. 9, no. 4, 1970, p. 798-804. 5 refs. Translation.

Experimental investigation of the activity of alpha-dehydroxybutyric acid dehydrogenase (HBD), lactic dehydrogenase (LDH), creatine kinase (CPK), aspartic acid aminotransferase (AspAT) and alanine aminotransferase (AlAT) in 66 cases during the course of myocardial infarct. It is shown that only LDH activity increased in 100 per cent of the cases, while HBD activity increased in 90 per cent, CPK and AspAT in 97 per cent, and AlAT in 72 per cent of cases. The activity of both dehydrogenases increased in the blood longer than the activity of creatine kinase and aminotransferases. M.M.

A71-17293 # **Quantitative evaluation of the changes in serum prealbumins in myocardial infarction.** J. Huczek-Głębocki and W. Piotrowski (Miejski Szpital, Kraków, Poland). (*Polski Tygodnik Lekarski*, vol. 24, no. 18, 1969.) *Polish Medical Journal*, vol. 9, no. 4, 1970, p. 817-819. 12 refs. Translation.

In ten patients with myocardial infarction determinations of serum prealbumins were carried out by the rosette method using antiprealbumin serum. A rise in the concentration of this fraction in the serum in the course of myocardial infarction was observed. The highest level of prealbumins appeared in the second week of the disease, falling in the fourth week, without reaching, however, the initial values. (Author)

A71-17294 # **Physiological assessment of the physical performance of the patients with acquired valvular heart disease.** S. Kozłowski, A. Kontowt, and A. Dorywalski (Akademia Medyczna, Warsaw, Poland). (*Kardiologia Polska,* vol. 12, no. 4, 1969.) *Polish Medical Journal,* vol. 9, no. 4, 1970, p. 820-826. 21 refs. Translation.

Investigation of the incidence of disparity between oxygen demand and supply in fifteen patients with acquired valvular heart disease performing work with loads at the upper limit of physical work capacity. The 'excess lactate' was calculated according to Huckabee (1958). It was found that the 'excess lactate' appeared in the blood of the patients examined at work loads of 25 to 35 per cent of PWC sub 170 (physical working capacity at heart rate of 170/min). It is suggested that the patients refrain from prolonged work exceeding the latter limits. M.M.

A71-17295 # **Electrophysiological audiometry - Averaged brain responses in man.** W. Bochenek, J. Majkowski, Z. Bochenek, D. Knapik-Fialkowska, and J. Kopeć (Akademia Medyczna, Warsaw, Poland). (*Otolaryngologia Polska,* vol. 24, no. 4, 1970.) *Polish Medical Journal,* vol. 9, no. 4, 1970, p. 954-961. 41 refs. Translation.

Using an averaging computer the authors carried out investigations of auditory evoked potentials in 26 healthy subjects. The responses to the tone of 1024 Hz frequency and intensity of 60 dB above the threshold were analyzed from the point of view of the latency time of the consecutive components. Fifteen tests were carried out with gradually changing intensity and the responses were compared with the threshold determined during subjective audiometry. (Author)

A71-17303 **Human circadian rhythms in continuous darkness - Entrainment by social cues.** J. Aschoff, H. Giedke (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andechs, West Germany), M. Fatranská (Slovac Academy of Sciences, Institut of Experimental Hygiene, Bratislava, Czechoslovakia), P. Doerr, D. Stamm, and H. Wisser (Max-Planck-Institut für Psychiatrie, Munich, West Germany). *Science,* vol. 171, Jan. 15, 1971, p. 213-215. 14 refs.

Three groups of two subjects each were kept in underground chambers, first for 4 days in an artificial light-dark cycle, and thereafter for 4 days in complete darkness. They lived on a rigorous time schedule. Physiological as well as psychological functions were measured at 3-hr intervals. There were no differences in the results between the two sections of the experiment. Social cues are sufficient to entrain human circadian rhythms, and absence of light has no immediate effect on the functions measured. (Author)

A71-17383 # **Special inhibitory neurons in the visual cortex (K voprosu o spetsial'nykh tormoznykh neironakh v zritel'noi kore).** T. N. Loseva, S. N. Khaiutin, and V. B. Shvyrkov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 194, Oct. 21, 1970, p. 1450-1453. 15 refs. In Russian.

Consideration of the special features and the functional role of neurons of the visual cortex which discharge during an inhibitory pause observed in other neurons. On the basis of experiments performed on awake rabbits unimmobilized by myorelaxants, it is found that during an inhibitory pause discharges can occur in elements the reactions of which to light in other cases contain an inhibitory pause. In other words, neurons which discharge during an inhibitory pause in reactions of the remaining neurons and are considered as specially inhibitory neurons can themselves have an inhibitory pause at the site of a former 'inhibitory' discharge. A.B.K.

A71-17384 # **Role of the amygdala complex in the mechanism of convergence of excitations of various sensory modalities on neurons of the large hemisphere cortex (Rol' mindalevidnogo kompleksa v mekhanizme konvergentsii vozbuzhdenii razlichnoi sensornoi modal'nosti na neironakh kory bol'shikh polusharii).** V A. Makarov (Pervyi Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 194, Oct. 21, 1970, p. 1454-1457. 15 refs. In Russian.

Determination of the relation between the amygdala complex and convergent interrelations occurring on a cortex neuron as a result of stimulations of various sensory systems (somatosensory and viscerosensory). An analysis was made of the changes in the pulse activity of cortex neurons recorded at the focus of maximum activity of the sciatic and vagus nerves of unanesthetized immobilized cats. It is found that in the respective projection zones of the large hemisphere cortex there exist two types of neurons determined by the nature of their response reaction to stimulation of the sciatic and vagus nerves - namely, neurons which react by a change in pulse activity to only one of the stimuli presented, and neurons which react to both of the stimuli. A.B.K.

A71-17391 # **Reduction of endogenic radiosensitizers - lipid toxicants - as one of the mechanisms of the radio prophylactic effect (O snizhenii endogennykh radiosensibilizatorov - LTV kak ob odnom iz mekhanizamov radioprofilakticheskogo effekta).** Iu. B. Kudriashov, E. N. Goncharenko, L. I. Deev, T. G. Gorskaia, and T. I. Samoilikova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 195, Nov. 1, 1970, p. 206-208. 7 refs. In Russian.

Study of the change in the content of lipid toxicants (endogenic radiosensitizers) in the tissues of white rats under the action of media providing prophylactic protection from radiation damage. It is found that 15 minutes after the introduction of various classes of high-efficiency chemical radioprotectors a reliable decrease in the lipid toxicant activity occurs in almost all the tissues studied. The same effect results from hypoxic hypoxia, which has the greatest radioprophylactic action. A.B.K.

A71-17392 # **Changes of the physiological activity of developing cultures of certain blue-green algae (Izmenenie fiziologicheskoi aktivnosti razvivaiushchikhsia kul'tur nekotorykh sinezelenykh vodoroslei).** G. A. Karaush and L. D. Gapochka. *Akademiia Nauk SSSR, Doklady,* vol. 195, Nov. 1, 1970, p. 234-237. 7 refs. In Russian.

Study of the activity of two blue-green algae (Anacystis nidulans and Synechocystis aquatilis) developing in a Kratz-Myers (1955) medium. The changes in C 14 uptake are noted for each alga in a monoculture and also for a mixed culture of both algae. It is found that in combined cultivation of A. nidulans and S. aquatilis the latter apparently has a considerable stimulating effect on A. nidulans. It is therefore concluded that in mixed cultivation A. nidulans changes over to a microtrophic type of feeding, using the metabolites of S. aquatilis. A.B.K.

A71-17393 # **Variation of the rate of methionine S 35 uptake in the receptor and neurons of the auditory analysor in the presence of sonic stimulation (A histoautoradiographic study) (Izmenenie intensivnosti vkliucheniia metionina S 35 v retseptore i neironakh slukhovogo analizatora pri zvukovom vozdeistvii /Gistoavtoradiograficheskoe issledovanie/).** V. F. Anichin (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii; Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 195, Nov. 1, 1970, p. 242-245. 9 refs. In Russian.

Experimental study of the changes in the methionine S 35 content in the structures of various elements of the auditory analysor of guinea pigs subjected to a sonic load. The animals were subjected to the action of a sonic load with a frequency of 4000 Hz at an intensity of 100 dB for periods ranging from 1 to 12 hours. It is

found that all elements of the auditory analysor react to such a stimulus, although quantitatively the reaction is different in different parts of the analysor. The most pronounced changes are noted in the fibers of the auditory nerve, while the least pronounced changes are observed in the neurons of the spiral ganglion. Extremely long periods of sonic action (12 hours) lead to a sharp decrease in protein synthesis in all sections of the auditory system. A.B.K.

A71-17394 # **Effect of prior training on the oxygen tension in the brain cortex in the case of progressive high-altitude hypoxia (Vliianie predvaritel'noi trenirovki na napriazhenie kisloroda v kore golovnogo mozga pri progressiruiushchei vysotnoi gipoksii).** F. Z. Meerson, S. M. Mirrakhimov, A. A. Aidaraliev, and M. D. Dzhumushev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Kirgizskii Gosudarstvennyi Meditsinskii Institut, Frunze, Kirgiz SSR). *Akademiia Nauk SSSR, Doklady*, vol. 195, Nov. 1, 1970, p. 252-255. 12 refs. In Russian.

Polarographic determination of the oxygen tension dynamics in the brain cortex of trained and untrained rats undergoing stepwise reduction of oxygen content in a low-pressure chamber. With respect to both motor activity and survival rate the trained animals were found to be considerably more resistant to oxygen deficiency. The important role of an increase in the power of the mechanisms responsible for oxygen transport to the brain in adaptation of the organism to high-altitude hypoxia is stressed. A.B.K.

A71-17409 **Visual perception.** T. N. Cornsweet (Stanford Research Institute, Menlo Park, Calif.). New York, Academic Press, Inc., 1970. 490 p. 115 refs. $15.

This book is aimed at developing an understanding of visual perception; it is not a reference work. The experiment of Hecht, Schlaer, and Pirenne is discussed. Basic principles of the physics of light are examined, and quantal fluctuations are considered. The action of light on rod pigments is investigated, and aspects of the excitation of rods are explored. The relationship between rods and cones is described. Aspects of color vision are discussed taking into consideration such subjects as discrimination among wavelength mixtures, retinal color systems, and the perception of color. The psychophysiology of brightness is investigated. Other subjects discussed include brightness and color constancy, temporal properties of the visual system, stimulus generalization, and speculations on higher processes. G.R.

A71-17412 **Ultrastructural changes in the plasma membrane and sarcoplasmic reticulum of myocardial cells during hibernation.** T. H. Rosenquist (Louisiana State University, New Orleans, La.). *Cryobiology*, vol. 7, July-Aug. 1970, p. 14-18. 21 refs. NIH Grant No. A-2027.

Comparison of the ultrastructure of myocardial cellular membranes in control ground squirrels with that of hibernating ground squirrels. In the control ground squirrels, the cell coat portion of the plasma membrane averaged 249.9 A in thickness and was less electron-opaque than that of the hibernating ground squirrels, whose coat averaged 352.0 A. Electron and light microscopic stains indicate that this coat contains a significant proportion of acid mucopolysaccharides. It is suggested that the changes found may enhance calcium uptake and thereby facilitate excitation-contraction coupling during hibernation. M.M.

A71-17428 **Modification of surface negative slow potential (CNV) in the human brain after total sleep loss.** P. Naitoh, L. C. Johnson, and A. Lubin (U.S. Navy, Medical Neuropsychiatric Research Unit, San Diego, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 30, Jan. 1971, p. 17-22. 20 refs. Navy-supported research; NSF Grant No. GB-6008.

Study of the contingent negative variation (CNV) in the human brain under baseline, total sleep deprivation and recovery conditions in eight subjects, using a 4.5 sec fixed foreperiod. During baseline all subjects developed the CNV during the 4.5 sec foreperiod. One night of sleep loss decreased the CNV, and 2 nights of sleep loss abolished the CNV. The Hotelling T2 showed the loss of the CNV during total sleep deprivation. M.M.

A71-17440 **Epinephrine infusion in man - Standardization, normal response, and abnormal response in idiopathic hypertrophic subaortic stenosis.** Stephen H. Salzman, Bruce Jackson, Eliot Schechter (USAF, Medical Center, Lackland AFB, Tex.), and Steven Wolfson (Yale University, New Haven, Conn.). *Circulation*, vol. 43, Jan. 1971, p. 137-144. 7 refs.

A standard test was designed for measurement of the effect of epinephrine infusion on systolic time intervals in 14 normal subjects as a dose-response phenomenon. In order that we might examine the sensitivity of the test, it was applied in nine patients with idiopathic hypertrophic subaortic stenosis. Normal subjects had a characteristic response - a progressive shortening of the duration of electromechanical systole, left ventricular ejection time, and pre-ejection period. Their left ventricular ejection time, corrected for heart rate, did not change. Patients with idiopathic hypertrophic subaortic stenosis responded to epinephrine infusion with paradoxical lengthening of their left ventricular ejection time, corrected for heart rate. After beta blockade (with propranolol), reinfusion of epinephrine shortened the left ventricular ejection time, corrected for heart rate, to normal levels. (Author)

A71-17500 • **Cell fine structure and function - Past and present.** Humberto Fernández-Morán (Chicago, University, Chicago, Ill.). *Experimental Cell Research*, vol. 62, 1970, p. 90-101. 25 refs. Grant No. NGL-14-001-012.

Review of some of the research results obtained from electron-microscopy studies of two related problems of nerve-membrane ultrastructure: (1) elucidation of the organization of cell membranes and of associated multienzyme and macromolecular components performing energy and information transduction functions, and (2) investigation of the interrelation of the protein synthesizing machinery and nucleic acids with cell membranes, in order to gain a better understanding of membrane biosynthesis, including: (1) study of DNA and RNA conformations associated with membranes in chloroplasts, mitochondria, and nerve cells, and (2) study of RNA polymerase and its participation in the differential RNA transcription upon DNA templates. M.V.E.

A71-17528 **New ultraviolet radiation applications.** D. N. Lazarev. (*Optiko-Mekhanicheskaia Promyshlennost'*, vol. 37, May 1970.) *Soviet Journal of Optical Technology*, vol. 37, May 1970, p. 288-296. 25 refs. Translation.

Ultraviolet illumination equipment is described for the prevention of light starvation in working areas. The results of an integrated measurement of natural ultraviolet radiation are presented, and the high radiation merits of sky bathing - a procedure for exposure to the scattered light of the open sky - are mentioned. (Author)

A71-17599 # **Physiological analysis of the interaction between conscious and unconscious trace processes during a time count (Fiziologicheskii analiz vzaimodeistviia osoznannykh i neosoznannykh sledovykh protsessov pri otschete vremeni).** L. G. Voronin and V. F. Konovalov (Moskovskii Gosudarstvennyi

Universitet, Moscow; Akademiia Nauk SSSR, Institut Biofiziki, Pushchino-on-Oka, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 20, Sept.-Oct. 1970, p. 899-907. 16 refs. In Russian.

Study of the interaction between conscious and unconscious trace processes elaborated on the basis of polygraphic records by pairing acoustic, tactile, and proprioceptive stimuli with a photic stimulus. A light was switched on for three seconds every 6, 9, 15, and 30 seconds after the end of a conditioned stimulus lasting from 0.5 to 3 sec. It is shown that a passive attitude of the subjects to the experiment leads to the formation of traces only at the level of the first-signal system. Therefore trace processes are realized with difficulty or remain unconscious. Interaction between conscious and unconscious processes, and their transition from one to the other are generally achieved only when the subject's attitude to the experiment is active. The trace processes formed in the brain may be reproduced. Their reproduction is based on the mechanism of a 'biological clock' which may function at the level of both the first- and the second-signal systems. A.B.K.

A71-17600 # **Mean period of the spontaneous EEG as a characteristic of certain properties of human higher nervous activity (Srednii period spontannoi EEG kak kharakteristika nekotorykh svoistv vysshei nervnoi deiatel'nosti cheloveka).** A. A. Genkin, E. F. Mordvinov, and V. A. Bodrov. *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 20, Sept.-Oct. 1970, p. 1089-1092. 10 refs. In Russian.

Attempt to ascertain whether a relation exists between the mean period and the mean level of asymmetry of the oscillation phase lengths of the spontaneous EEG, on the one hand, and certain psychophysiological characteristics in humans, an estimate of which was made six months before the recording of the EEG, on the other hand. While no significant correlation is noted between the mean asymmetry level and the psychophysiological indices, a positive correlation is established between the data processing rate in the presence of noise and the mean period of the background EEG, when the measurements of the variables being compared are spaced no less than six months apart. It is therefore concluded that the mean period of the spontaneous EEG is an indicator of the relatively stable properties of the higher nervous activity and is an important differentiating feature of individual differences. A.B.K.

A71-17601 **Acute effects of air blast on pulmonary function in dogs and sheep.** Edward G. Damon, John T. Yelverton, Ulrich C. Luft, Kabby Mitchell, Jr., and Robert K. Jones (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 1-9. 31 refs. Contract No. DA-49-146-XZ-372.

Description of pulmonary function tests conducted before and after exposure of animals to air blast produced in shock tubes or by high explosives. Pressure-time measurements were made with piezoelectric pressure transducers during each air blast exposure. Blood samples were obtained by arterial puncture, but most often from an indwelling arterial catheter. The blood P sub O2, P sub CO2, and pH and the end-tidal and mixed expired CO2, O2, and N2 gas concentrations were measured for subjects breathing air and oxygen. There were increases in the alveolar-arterial O2 differences and venous admixture which generally correlated with the extent of blast-induced lung damage. Calculations indicated that most of the increase in alveolar-arterial O2 differences for subjects breathing air could be attributed to the increase in venous admixture alone. The threshold for lung injury resulting in increased venous admixture in sheep was about 20 psi for reflected 'sharp'-rising overpressures of 'long' duration. Pressures above 43 psi usually caused severe lung damage in which the venous-arterial shunt exceeded 30% of the cardiac output, a condition in which the arterial oxygen tension was below the level required for full saturation of the hemoglobin even with animals breathing pure oxygen. (Author)

A71-17602 # **Predicting the quality of pilot landing performance during night carrier recovery.** C. A. Brictson, W. J. Burger (Dunlap and Associates, Inc., Santa Monica, Calif.), and R. S. Kennedy (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *(Aerospace Medical Association, Annual Scientific Meeting, 41st, St. Louis, Mo., Apr. 27-30, 1970.) Aerospace Medicine,* vol. 42, Jan. 1971, p. 16-19. 5 refs. Contract No. N 00014-70-C-0202.

Use of a linear regression model to predict landing quality from final approach performance measures during night carrier landings. Altitude error from glide slope, lateral error from center line, and aircraft sink rate were sampled at four ranges from touchdown to serve as predictors of landing quality (arrestment wire or bolter). The sample consisted of A4, A6, and F4 experienced pilots and F4 inexperienced pilots making 282 night carrier approaches. Results indicate that 31 to 66% of the criterion variance can be accounted for by final approach variables using a simple linear rule and the derived regression weights. A multiple R of .81 (N = 50, p less than .01) was obtained for F4 inexperienced pilots. The highest multiple R for experienced pilots was .71 for the A4C (N = 40, p less than .01). Altitude error and sink rate were found to be the best predictors of landing quality. A validation study verified the accuracy of the prediction model. The possibility of providing continuous performance feedback in real time to the landing signal officer and/or pilot on the probability of landing success is discussed. (Author)

A71-17603 **Correlation of thermal properties of some human tissue with water content.** T. E. Cooper and G. J. Trezek (California, University, Berkeley, Calif.). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 24-27. 8 refs. NIH Grant No. NS-08236-02.

The thermal properties for several human organs (brain, heart, kidney, liver and spleen) have been correlated with their water content. The thermal conductivity, heat capacity, and density of these tissues fall within the upper and lower bounds of values which can be obtained using a water-fat-protein model. A water-protein system yields the upper limit while a water-fat system yields the lower limit of conductivity and density values predicted by this model. The reverse is true for heat capacity. The correlated results indicate that the thermal properties of these human tissues can be predicted to within 5% by measuring the water content and assuming that the remaining portion of the tissue is composed of an equal amount of fat and protein. (Author)

A71-17604 # **Effect of hyperbaric oxygen on lipid peroxidation in the lung.** Philip Raskin, Richard L. Lipman, and Clarence M. Oloff (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 28-30. 16 refs.

In vitro lipid peroxidation was measured using the TBA method in lung homogenates from normal, tocopherol deficient mice and mice exposed to hyperbaric oxygen. Significantly greater lipid peroxidation occurred in the tocopherol deficient lung homogenate as compared to control. Exposure to hyperbaric oxygen failed to increase in vivo lipid peroxidation. In vitro lipid peroxidation was actually inhibited following hyperbaric oxygen exposure. Addition of ascorbic acid and ferrous iron prior to the incubation restored normal in vitro lipid peroxidation. This study suggests that hyperbaric oxygen probably oxidizes ascorbic acid and ferrous iron in mouse lung, resulting in insufficient quantities to permit lipid peroxidation to occur in vivo or in vitro. When additional ascorbic acid and ferrous iron are added, in vitro peroxidation occurs. (Author)

A71-17605 **Intraocular effects on flashblindness. II - Parafoveal recovery.** Gloria T. Chisum (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aero-*

space Medicine, vol. 42, Jan. 1971, p. 31-35. 5 refs.

The times required for parafoveal detection of a simple display were measured following exposure to three adapting flash areas presented in nine locations. Both the adapting flash area and retinal location produced variations in the time required to respond to the display. The results obtained indicate that intraocular effects are involved in parafoveal flashblindness, with an indication that at least a part of the intraocular effect can be attributed to a retinal interaction. (Author)

A71-17606 # **Comparative effects of vibration on monocular and binocular vision.** Morton K. Ohlbaum, Charles R. O'Briant, and Henning E. von Gierke (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 36-41. 7 refs.

The rapidly increasing use of rotary wing aircraft, the introduction of vertical takeoff and landing (VTOL) and short takeoff and landing aircraft (STOL), and the low frequency vibration generated by rocket boosters are but a few of the examples of operating conditions with acceleration environments that may adversely effect visual acuity. The mechanism of disturbance of the visual system by vibration is still poorly understood, despite a considerable number of investigations on the topic. It is remarkable that until recently only binocular acuity has been examined, without any consideration as to whether the eyes vibrate in phase or to any other motion induced mechanism affecting monocular versus binocular vision. This report presents a comparative analysis of monocular and binocular vision experiments and discusses the possible mechanism of visual disturbances produced by whole body vibration stress environments (5 to 50 Hz). Snellen type charts, photographically reproduced to be of appropriate size, were used to measure acuity at 0.4, 1.0, and 4.0 meter distance under vertical (plus or minus Gz) vibration. (Author)

A71-17607 Stress responses as criteria for personnel selection - Baseline study. Roy B. Mefferd, Jr. (U.S. Veterans Administration Hospital; Baylor College of Medicine; Texas, University, Houston, Tex.), Henry B. Hale, James P. Ellis, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), Ira L. Shannon (U.S. Veterans Administration Hospital; Texas, University, Houston, Tex.), and John R. Prigmore. *Aerospace Medicine,* vol. 42, Jan. 1971, p. 42-51. 40 refs. PHS Grant No. FR-00254; Contract No. AF 41(657)-55.

This was an exploratory study of the feasibility of using physiological responses to an anticipated stressor, to the physical stress per se, and to recovery from the stress as a procedure for selecting personnel for jobs requiring emotional and physical stability in the face of stressful situations. Batteries of physiological, chemical and of psychological tests were used to obtain baseline values. A number of potentially useful indices of responsiveness were delineated and discussed. (Author)

A71-17608 EEG and the effects of photic stimulation at the South Pole. E. A. Serafetinides (Oklahoma, University, Oklahoma City, Okla.), J. T. Shurley (Oklahoma Medical Research Foundation; U.S. Veterans Administration, Oklahoma City, Okla.), and R. E. Brooks (U.S. Veterans Administration Hospital, Oklahoma City, Okla.). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 52, 53. 7 refs. Research supported by the U.S. Veterans Administration; NSF Grants No. GA-683; No. GA-1226.

Eight normal males, mean age 31 (range 22-48), had standard electroencephalograms recorded, with photic stimulation, within four weeks of arrival at South Pole Station, Antarctica, in November, 1968. No EEG evidence was found of brain stress, nor of undue tension or anxiety during the initial period of acclimatization to the hypobaric hypoxia of this cold, alien environment. There was, however, evidence of excessive drowsiness, which was suggested to be clinically related to fatigue, mild sleep deprivation, and the hypobaric hypoxia. (Author)

A71-17609 Development of practical high-intensity thermal protection systems. A. M. Stoll, M. A. Chianta, and L. B. Judge (U.S. Naval Material Command, Naval Air Development Center, Johnsville, Pa.). *(Aerospace Medical Association, Annual Scientific Meeting, 41st, St. Louis, Mo., Apr. 27-30, 1970.) Aerospace Medicine,* vol. 42, Jan. 1971, p. 54-58. 8 refs.

Description of a green thermal protection system which was developed to replace a white one designed for protection of flight personnel from the thermal effects of nuclear weapons. In thermal exposures delivering approximately 50 cal/sq cm in 2 seconds in some areas, with an overall average of about 20 cal/sq cm in 2 seconds, the new system offered protection equal to that of the white assembly while weighing only half as much and representing significant advantages in comfort and logistics. The procedures developed in this study are general in nature and widely applicable to the development of other thermal protection systems. (Author)

A71-17610 Non-sympathetic renal vascular pattern in CO2 death. Joseph M. Stinson (USAF, Aeromedical Research Laboratory, Holloman AFB, N. Mex.). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 62, 63. 10 refs.

Study of the intrarenal vascular pattern in three rhesus monkeys and one dog sacrificed by graded increases in CO2, and in one rhesus sacrificed by rapid decompression to simulated altitude of 35,000 ft. The kidney in death due to rapid decompression shows a sympathetic pattern, while that in CO2 death is more normal. Possible mechanisms are suggested for the disparity between these findings and evidence that CO2 produces sympathetic vasoconstriction in the kidney. (Author)

A71-17611 • **Head cooling in work and heat stress.** Sarah A. Nunneley, S. J. Troutman, Jr. (Ohio State University, Columbus, Ohio), and Paul Webb (Webb Associates, Yellow Springs, Ohio). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 64-68. 18 refs. Grant No. NGT-36-008-007.

Study of head cooling with a water-cooled cap, using techniques recently developed for space suits and other protective clothing. Experiments included head cooling and control (bareheaded) runs by three subjects who exercised for two hours at 50% of aerobic capacity in 20, 30, and 40 C environments. Variables measured during rest and steady-state work included oxygen consumption, heart rate, body temperatures, weight loss, and cap heat removal. Head cooling removed on the average some 30% of resting metabolic heat and 19% of available heat during work. Head cooling also decreased signs of heat stress in hot environments. Maximum cooling was not achieved in these experiments, and further work seems warranted. (Author)

A71-17612 Cardiac depression in the detection of high environmental CO2 - A comparative study in rhesus monkeys and chimpanzees. Joseph M. Stinson and Joel J. Mattsson (USAF, Aeromedical Research Laboratory, Holloman AFB, N. Mex.). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 78-80. 15 refs.

Experimental study in which three unanesthetized chimpanzees were exposed to ambient P sub CO2 of 363 to 390 mm Hg at a rate of 195 mm Hg CO2 hr at ambient pressure (656 mm Hg), oxygen tension, and temperature in an environmental chamber. The ECG,

respiratory rate, and narcotic levels of CO2 were compared to those in three rhesus monkeys similarly exposed. Chimpanzees lost consciousness at significantly higher concentrations of CO2 than did rhesus. Initial increase in heart rate was replaced by progressive bradycardia to near maximal depression of heart rate (30 to 40% of control) at 227 mm Hg CO2 in both species. These findings should have value for physiological monitoring, should man be inadvertently exposed to high CO2 environments. (Author)

A71-17613 Control of acute mountain sickness. G. W. Gray, A. C. Bryan, Regina Frayser, C. S. Houston, and I. D. B. Rennie (Canadian Armed Forces, Institute of Environmental Medicine, Toronto, Canada). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 81-84. 11 refs. Research supported by the Fleischmann Foundation, the Defence Research Board of Canada, and the United Health Foundation; PHS Grant No. EY-00245; Grant No. DA-DA-17-68-0-8019.

Clinical trials of acetazolamide versus placebo, and acetazolamide and furosemide were carried out at 17,500 feet (5400 m), on Mount Logan. Subjects pretreated with acetazolamide before ascent were clinically well with minor symptoms of acute mountain sickness. Subjects started on furosemide on arrival at altitude quickly became medical casualties. (Author)

A71-17614 # Neurological decompression sickness - Report of two cases at minimal altitudes with subsequent seizures. Jefferson C. Davis, Robert Tager, Harry P. Polkovitz, and Robert D. Workman (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 85-88. 13 refs.

The clinical manifestations, pathophysiology and treatment of altitude decompression sickness continue to pose a dilemma for the flight surgeon. This paper presents two cases with similar neurological manifestations and clinical courses resulting from exposure to altitudes of 19,000 feet and 28,000 feet respectively. Both cases suffered from long delay in reaching compression chambers, both were treated with the USN Table VI (minimal pressure - 100% oxygen), both had grand mal seizures in the post-treatment period and both recovered fully. (Author)

A71-17615 # Aeromedical consultation service case report - Uniocular oscillopsia associated with internuclear ophthalmoplegia. Paul L. Richter (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 89, 90. 9 refs. USAF-sponsored research.

A 21-year-old man presented with diplopia and vertical oscillations of the left eye image occurring on gaze to the right. This uniocular oscillopsia was associated with vertical 'retinal nystagmus' and internuclear ophthalmoplegia. Oscillopsia occurs commonly but not exclusively in multiple sclerosis; its main clinical value is to direct attention toward finding a correlative neurological sign. Abnormal eye movement may be visible only through the ophthalmoscope. (Author)

A71-17616 Safety of flight helmets in Army aviation personnel serving in Vietnam. Dennis Bauman and Eric E. Lindstrom. *Aerospace Medicine,* vol. 42, Jan. 1971, p. 90-92.

An aircraft accident fatality that would probably have been prevented by helmet retention stimulated evaluation of the flight helmet fittings of 282 Army aviation personnel serving in Vietnam. It was found that only 44.9% of officers and 30.7% of enlisted personnel had a satisfactory fit, the most common deficiency being the use of sizing pads that were too small. Only 4.3% of the personnel tested had been previously fitted by a flight surgeon, and 75% of this group had a satisfactory fit. The current procedure for issuing, but not properly fitting, flight helmets at the primary Army aviation training centers is discussed. It is recommended that all flight helmets be fitted at the time of issue, and that this fitting be done by specialists trained and supervised by flight surgeons. (Author)

A71-17617 Susceptibility to moderate hypoxia in aircrew with a history of episodes of impaired consciousness in flight. W. Hartzell and P. D. Newberry (Canadian Armed Forces, Institute of Environmental Medicine, Toronto, Canada). *Aerospace Medicine,* vol. 42, Jan. 1971, p. 93-97. 9 refs.

Comparison of tolerance to hypoxia in seven aircrew who reported unexplained impaired consciousness in flight at cabin altitudes above 12,000 ft (IICF), ten aircrew who denied IICF, and ten CFIEM staff. The seated subjects breathed 11% oxygen in nitrogen. Blood pressure was recorded. The test was stopped after 45 minutes, or sooner, if necessary in the opinion of two experienced observers, or the subject. Three of the seven aircrew in the test group were unable to complete the test. In contrast, all of the ten aircrew controls, and nine of the ten CFIEM subjects completed the test. The mean blood pressure of the hypoxia sensitive subjects was significantly lower than that of the aircrew control group (p less than 0.05). Aircrew who have reported IICF are less tolerant of moderate hypoxia than other aircrew. It is likely some IICF are caused by unsuspected, moderate hypoxia in susceptible individuals. (Author)

A71-17667 # Study of certain physiological indices of rats during hypothermia produced by various methods (Issledovanie nekotorykh fiziologicheskikh pokazatelei krys v usloviiakh gipotermii pri raznykh metodakh ee polucheniia). N. N. Partskhaladze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 60, Oct. 1970, p. 189-192. 6 refs. In Russian.

Study of the oxygen consumption and carbonic acid output in hypothermal rats cooled to 20 to 21 C under ether (diethyl) anesthesia. It is shown that both of these physiological indices in rats subjected to hypothermia are reduced to 30% of normal. Gas exchange at the same low temperature in animals cooled under hypoxia and hypercapnia does not change. The expired air of hypothermal rats under ether anesthesia contains less ether than that of animals subjected only to narcosis. A.B.K.

A71-17668 # Potassium, sodium, calcium, and iodine content in the thyroid gland and in the blood during experimental hypothyrosis. A. I. Bolkvadze. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 60, Oct. 1970, p. 237-240. 11 refs. In Georgian, with abstract in English.

Experimental study in which hypothyrosis was induced in rabbits by injection of 6-methylthiouracil. The content of the electrolytes (K, Na, Ca, and I) and the coefficients of K/Na, K/Ca, and Na/Ca in the thyroid gland were determined. The content of K and Na was determined by the photometric method; the content of calcium and iodine was determined by the trilonometric and iodometric methods, respectively. The content of cations in the tissue of the rabbits' thyroid glands was higher than the norm, while the iodine content was lower. The content of the four elements under investigation in the blood of the experimental animals was reduced in comparison with the norm. The coefficients of K/Ca and Na/Ca were not changed markedly in one or the other direction, but the coefficient of K/Na changed in the direction of a relative increase in sodium. A.B.K.

A71-17669 # **Electroencephalographic and motor effects of electrical stimulation of reinforcing and negative brain structures during various phases of sleep (Elektroentsefalograficheskie i motornye effekty elektricheskogo razdrazheniia podkrepliaiushchikh i otritsatel'nykh mozgovykh struktur v razlichnye fazy sna).** P. P. Mol'nar and T. N. Oniani. *Akademiia Nauk Gruzinskoi SSR, Soobscheniia*, vol. 59, Sept. 1970, p. 681-684. In Russian.

Comparative analysis of the arousal effects of electrical stimulation of reinforcing (n. ruber) and negative (central gray matter) subcortical structures in cats with chronically implanted electrodes. It is found that while the arousal threshold in the case of n. ruber stimulation increased significantly during the paradoxical phase of sleep as compared with slow wave sleep, the central gray matter threshold in the paradoxical phase was lower than in slow wave sleep. Thus there is assumed to be a strong possibility that those environmental stimuli which signal danger, and in the waking animal trigger off defensive or avoidance behavior through the central gray matter, appear to cause cessation of supraspinal inhibitory influences on the spinal motor mechanisms, which are active in all phases of sleep, especially in the paradoxical phase. A.B.K.

A71-17683 # **Integratism - The path from the simple to the complex in understanding the phenomena of life (Integratizm - Put' ot prostogo k slozhnomu v poznanii iavlenii zhizni).** V. A. Engel'gardt (Akademiia Nauk SSSR. Institut Molekuliarnoi Biologii, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, Nov.-Dec. 1970, p. 799-822. 17 refs. In Russian.

Study of the phenomena of integration, occurring at the level of the construction of macromolecules of biopolymers and conformational changes in these molecules. The problem of reconciling two contrasting trends in the study of living processes - reductionism and organicism - is considered. In reductionism it is assumed that a complex whole can be reduced to the sum of its parts, and that a study of these parts can yield information concerning the initial whole. Organicism, on the other hand, postulates the impossibility of reducing the complex to the simple. An entirely new, fundamentally different significance is ascribed to integratism - a trend of scientific study the task of which is to learn how primitive elements are incorporated or integrated into a new entity situated at a higher level of the organizational hierarchy. In integratism it is assumed that this new entity possesses qualitative features which were absent in the photomers of which it is composed, but which are predetermined to a certain extent by the properties of these photomers. A.B.K.

A71-17739 # **Extraterrestrial civilizations - Subject of explorations and investigations (Vnezemnye tsivilizatsii - Ob'ekt poiskov i issledovanii).** L. M. Gindilis. *Zemlia i Vselennaia*, Sept.-Oct. 1970, p. 2-9. In Russian.

Discussion of arguments for and against the existence of extraterrestrial civilizations, and analysis of problems concerning the recognition of these civilizations and communication with them. The number of extraterrestrial civilizations in the universe is estimated in terms of probability theory. The use of radio communication in the range of decimeter, centimeter, and millimeter wavelengths is discussed. The problems involved in the recognition of radio signals coming from intelligent beings are examined. Z.W.

A71-17873 • **Digitalis-induced bundle-branch ventricular tachycardia studied by electrode catheter recordings of the specialized conducting tissues of the dog.** Anthony N. Damato, Sun H. Lau, and Gustavus A. Bobb (U.S. Health Service Hospital, Staten Island, N.Y.). *Circulation Research*, vol. 28, Jan. 1971, p. 16-22. 13 refs. NIH-supported research; NASA Contract No. T 22416(G).

Experimental investigation in which electrode catheter recordings of the bundle of His (H), the right bundle branch (RB) and the left bundle branch (LB) were obtained in 15 dogs without thoracotomy during sinus rhythm and digitalis-induced ventricular tachycardia. In 10 of 15 cases of digitalis-induced ventricular tachycardia the LB potential preceded the onset of ventricular depolarization (QRS), and an LB-H-RB sequence was recorded. These findings indicated that during ventricular tachycardia the pacemaker was located in the left bundle branch and the bundle of His was retrogradely depolarized. M.M.

A71-17874 **Myocardial blood flow in coronary artery disease - Correlation with severity of disease and treadmill exercise response.** Suzanne B. Knoebel, William C. Elliott, Paul L. McHenry (Indiana University; Marion County General Hospital, Indianapolis, Ind.), and Edward Ross. *American Journal of Cardiology*, vol. 27, Jan. 1971, p. 51-58. 49 refs. Research supported by the Herman C. Krannert Fund; the Indiana Heart Association; the American Medical Association Committee for Research on Tobacco and Health; PHS Grants No. HE-6308; No. HTS-5363; No. HE-5749.

Correlation of the severity of cinearteriographically demonstrated coronary artery disease with nutrient myocardial blood flow response to either right atrial pacing or isoproterenol infusion in 28 patients. Severity of coronary disease was estimated by per cent of the three coronary vessels remaining patent, and a numerical rating based on a possible 300 was assigned to each patient. Response of the S-T segment during treadmill exercise was also recorded. The results show good correlation between the severity of coronary artery disease and the response of myocardial blood flow to demand. In those patients with less severe disease myocardial blood flow increased to within the normal range with stress from either right atrial pacing or isoproterenol. Patients with more severe disease were unable to increase myocardial blood flow with either form of stress. The response to treadmill exercise paralleled the myocardial blood flow results, being positive in the patients showing a decreased flow reserve. M.M.

A71-17875 **Right and left ventricular systolic time intervals - Effects of heart rate, respiration and atrial pacing.** Richard F. Leighton, Arnold M. Weissler, Philip B. Weinstein, and Charles F. Wooley (Ohio State University, Columbus, Ohio). *American Journal of Cardiology*, vol. 27, Jan. 1971, p. 66-72. 22 refs. Research supported by the Central Ohio Heart Association and Clinical Research Center.

Comparison of measurements of right ventricular systolic time intervals from high fidelity pulmonary arterial pulse waves to simultaneously recorded left ventricular systolic time intervals in 27 normal subjects with normal hemodynamic findings and a wide range of resting heart rates. As heart rate increased there was a parallel diminution in the length of total systole for both ventricles, but the ejection time diminished more rapidly for the right ventricle. With increasing heart rate the preejection period shortened slightly for the left ventricle and remained unchanged for the right ventricle. The effects of respiration and atrial pacing were studied in four normal subjects. Respiration was associated with a continuous opposite change in the duration of right ventricular preejection period and ejection time, but no significant change occurred in left ventricular intervals. In response to atrial pacing, the preejection period lengthened for the right ventricle and remained constant for the left ventricle. The ejection time of each ventricle diminished with increasing heart rate, varying linearly with stroke volume. Alterations in duration of the right ventricular preejection period correlated with changes in pulmonary arterial diastolic pressure and resulted principally from changes in duration of the isovolumetric contraction time. Mechanisms are proposed for the dissimilar responses of each ventricle to respiration and to changes in heart rate. M.M.

A71-17950 # **Results of a study of the spatial field of vision in healthy subjects and in glaucoma patients (Rezul'taty izucheniia**

ob'emnogo polia zreniia u zdorovykh lits i u bol'nykh glaukomoi). B. A. Tremeit. *Akademiia Nauk Kazakhskoi SSR, Vestnik,* vol. 26, Nov. 1970, p. 49-57. In Russian.

Study of the spatial field of vision in 120 healthy subjects of various ages and in 270 preglaucoma and glaucoma patients, using a specially constructed three-dimensional perimeter. It is shown that the normal spatial field of vision has the shape of a hill the size of which depends on age: the greater the age, the smaller the size of the hill. Characteristic of the spatial field of vision in the initial stage of glaucoma is a reduction in height along all meridians and parallels within the established limits without contraction of the base of the vision hill. The spatial field of vision in the developed stage of glaucoma is characterized by lower height limits than occur in the initial stage and a contraction of the vision hill not exceeding 10 deg from the point of fixation. The spatial field of vision in a highly advanced stage of glaucoma is characterized by lower height limits than in the developed stage and a maximum contraction of the base of the vision hill amounting to 10 deg from the point of fixation.

A.B.K.

A71-17956 Biological evaluation of various spacecraft cabin atmospheres. I. Robert W. Hamilton, Jr., Gerald F. Doebbler, and Heinz R. Schreiner (Ocean Systems, Inc., Tarrytown, N.Y.). *Space Life Sciences,* vol. 2, Dec. 1970, p. 307-334. Contract No. AF 41(609)-2711.

Evaluation of the physiological consequences of exposure to several possible spacecraft atmospheres. Each atmosphere contained oxygen at a partial pressure of 180 mm Hg. Rabbits and rats were exposed at 1 atm abs for one week each to atmospheres containing nitrogen, helium, argon or neon; and to pure oxygen at 200 mm Hg. In addition rats were exposed at a total pressure of 474 mm Hg to atmospheres containing nitrogen, helium or neon. Metabolic rates were increased in animals exposed to helium-oxygen at sea level, and reduced in those exposed to the low pressure, pure oxygen environment. Rates during sea-level exposures to argon and neon, and during the altitude exposures, did not differ appreciably from results obtained in air at sea level. Rabbits sustained a significant loss of hemoglobin (9%) and red blood cells during exposure to helium-oxygen. These responses are consistent with the thermal characteristics of the several gaseous environments. A good correlation was found to exist between the calculated relative convective heat transfer in the various atmospheres and the observed metabolic rates. The possibility of an effect of helium at the molecular level has not been ruled out completely. After saturation with the inert gases studied, rats decompressed to 100 mm Hg showed the most severe symptoms of decompression sickness; nitrogen produced less damage; animals exposed to helium or neon were free of serious symptoms.

M.M.

A71-17957 • Water cooled garments - A review. Sarah A. Nunneley (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.). *Space Life Sciences,* vol. 2, Dec. 1970, p. 335-360. 118 refs. Grant No. NGT-36-008-007.

Water cooled garments have found a variety of applications in aerospace and industrial settings since 1962 and the pertinent literature is widely scattered. This review includes a brief look at human thermoregulation followed by a history of water cooled garment (WCG) development and a description of current suits in the U.S. and U.K. Discussion includes variables affecting WCG design and operations, the development of automatic cooling control, and possible uses for regional cooling.

(Author)

A71-17958 • Vascular dynamics - Impedance plethysmograph study during a standardized tilt table procedure. Robert D. Allison (Scott and White Clinic, Temple, Tex.), Charles E. Lewis, and Terry W. Rezek (NASA, Flight Research Center, Edwards, Calif.). *Space Life Sciences,* vol. 2, Dec. 1970, p. 361-393. 29 refs. Contract No. NAS 4-1321.

A study, using the four-electrode impedance plethysmograph system, was completed to evaluate simultaneous variations in conduction of upper and lower body segments relative to displacement of blood volume during change in body position. Measurements of cardiac output were compared with simultaneous results by dye dilution methods as a means of assessing the use of impedance techniques to determine cardiac output during tilt table studies. Two groups, 48 healthy private pilots and 22 patients with diabetes mellitus, were tested and the results were compared. Control and test heart rate values were higher in the afternoon than in the morning for the same healthy subjects, and the blood pressure and heart rate changes paralleled the variations in stroke volume and calf blood pulse changes. The results in the patients with diabetes differed markedly in terms of the magnitude of the cardiovascular changes and indicated the value of the tilt table in assessing 'fatigue' in the circulatory system as a result of metabolic disturbance. The change from horizontal to 65 degree head up position in the patients with diabetes showed a marked fall in thoracic stroke and conductive volume in contrast to the minimal decrease observed in healthy subjects.

(Author)

A71-17959 • Optimizing thermal and radiation effects for bacterial inactivation. M. C. Reynolds and D. M. Garst (Sandia Laboratories, Albuquerque, N. Mex.). *Space Life Sciences,* vol. 2, Dec. 1970, p. 394-399. 11 refs. NASA Contract No. W-12853.

Observation that thermoradiation - the simultaneous application of dry heat and gamma radiation - can provide the same degree of microbial inactivation as dry heat alone while substantially reducing component degradation. This is made possible by the synergistic effects produced when relatively low levels of these agents (e.g., 90 to 350 krads and 60 to 105 C) are applied simultaneously, thus permitting the use of lower temperatures and a reduced duration of heat exposure. The effects of temperature, radiation dose rate, and relative humidity on microbial inactivation during thermoradiation exposure have been established.

(Author)

A71-17960 Hemodynamic and bioelectric disturbances in striated muscles of rats subjected to accelerative forces after a period of hypokinesia (Research note). Stanisław Baranski, Z. Edelwejn, and M. Wojtkowiak (Instytut Medycyny Lotniczej, Warsaw, Poland). *Space Life Sciences,* vol. 2, Dec. 1970, p. 400-403.

A series of experimental investigations are described concerning the influence of hypokinesia, acceleration and associated effect of hypokinesia and acceleration in different periods of time on the displacement of plasma proteins and on bioelectric activity of striated muscles. Disturbances in hemodynamic and bioelectric activity of striated muscles by these two factors are discussed.

(Author)

A71-17962 Scanpaths in eye movements during pattern perception. David Noton (Colorado, University, Boulder, Colo.) and Lawrence Stark (California, University, Berkeley, Calif.). *Science,* vol. 171, Jan. 22, 1971, p. 308-311. 14 refs. Contract No. N 00014-67-A-0114-0022.

Study of the paths in saccadic eye movements associated with serial pattern recognition by subjects under conditions of poor visibility. In this study, human subjects learned and recognized patterns which were marginally visible so that they were forced to look directly at each feature to which they wished to attend. It was found that fixed scanpaths, specific to subject and pattern, appeared in their saccadic eye movements, both intermittently during learning and in initial eye movements during recognition. A theory of pattern perception is proposed for explaining these results.

Z.W.

A71-18028 * Effects of low- and high-LET cyclotron-accelerated alpha-particles on longevity of Drosophila melanogaster. H. Atlan, J. Miquel (NASA, Ames Research Center, Moffett Field, Calif.), and G. Welch (California, University, Berkeley, Calif.). *International Journal of Radiation Biology,* vol. 18, no. 5, 1970, p. 423-431. 15 refs.

An investigation of the effects of exposing Drosophila melanogaster to gamma-rays and alpha-particle radiation of low- and high-LET has resulted in dose-mean longevity curves of the exponential type. The effect of low-LET particles was similar to that of Co-60, whereas the high-LET alpha-particles were more effective than the two other types of radiation with an RBE of 1.3. No protective effect of low doses (3 and 5 krads) was observed. No dose-rate effect was observed in the range of 4 to 256 krads/min. (Author)

A71-18029 A review of audiometry. D. W. Robinson (Ministry of Technology, National Physical Laboratory, Teddington, Middx., England). *Physics in Medicine and Biology,* vol. 16, Jan. 1971, p. 1-24. 53 refs.

A compressed account of audiometry, or rather of an arbitrarily selected portion of the subject, is presented. Various classes of hearing tests are considered, and the significance of pure-tone audiometry is discussed. The practice of speech audiometry is investigated, and a variety of forms of pure-tone air-conduction audiometry is examined. Some psychophysical aspects are explored. Bone-conduction audiometry is discussed taking into consideration the design of an artificial mastoid. Various complications arising in bone-conduction audiometry are considered. Attention is given to the environmental requirements for audiometry, and approaches for overcoming such limitations as room noise and physiological noise are discussed. Manual and self-recording audiometers are considered, and the physical principles of audiometry are investigated. G.R.

A71-18030 A unified approach to dosimetry problems in radiological protection. T. E. Burlin (Central London, Polytechnic, London, England) and B. M. Wheatley (Central Electricity Generating Board, Berkeley Nuclear Laboratories, Berkeley, Glos., England). *Physics in Medicine and Biology,* vol. 16, Jan. 1971, p. 47-56. 16 refs.

The dose equivalent per unit fluence in various organs is calculated for monodirectional incident radiation. From this the fluence which will produce the maximum permissible annual organ dose recommended by ICRP is determined. By using the simple parameters of number and energy of quanta, which can describe all radiations, the proposed method avoids the difficulties of present practice which relies on various units for different radiations. Practical applications of the method are given, and it is shown that it is simple to relate the calibration of instruments based on the method to existing radiological standards. (Author)

A71-18060 Oxygen transport mechanisms in residents at high altitude. J. D. Torrance, C. Lenfant, J. Cruz, and E. Marticorena (Washington, University, Seattle, Wash.; Universidad Peruana Cayetano Heredia, Lima; Chulec General Hospital, La Oroya, Peru). *Respiration Physiology,* vol. 11, Dec. 1970-1971, p. 1-15. 40 refs. PHS Grants No. HE-12174; No. AM-5130; No. HE-06242.

Study of the mechanisms by which normal oxygen transport is maintained in dwellers at various altitudes taking into consideration also a comparison of findings with results obtained with residents from sea level after three days at the same altitudes. It was found that the ratio of ventilation to oxygen uptake was greater at altitude than at sea level and greater in the sojourners than in the natives. Cardiac index, oxygen consumption per kilogram of body weight and arteriovenous difference in oxygen content did not differ between the two groups nor with altitude. The mixed venous partial pressure of oxygen decreased with altitude, more in the sojourners than in the natives. The role played by the change in each of the oxygen transport mechanisms with altitude on the delivery of oxygen is discussed. G.R.

A71-18061 Hypoxia and hypercapnia as respiratory stimulants and depressants. N. S. Cherniack, N. H. Edleman, and S. Lahiri (Pennsylvania, University, Philadelphia, Pa.). *Respiration Physiology,* vol. 11, Dec. 1970-1971, p. 113-126. 24 refs. NIH Grant No. HE-10979.

Evaluation of the effect of wide variations in arterial oxygen and carbon dioxide tensions on phrenic nerve activity in anesthetized dogs which were paralyzed so that the physical properties of the lung and chest wall could not influence respiratory neuron response. The techniques used allowed the effects of hypoxia and hypercapnia to be assessed either separately or in combination. The results showed that hypoxia enhanced the stimulating effects of hypercapnia on respiratory neuron response by (1) decreasing the arterial carbon dioxide tension at which phasic phrenic activity begins and by (2) increasing the change in phrenic nerve activity produced by a given rise in arterial carbon dioxide tension. However, hypoxia also augmented the depressing effect of hypercapnia. The results suggest that the usual steady state methods of evaluating hypoxic response may be measuring opposing effects of hypoxia on ventilation; a stimulating effect of hypoxia at the peripheral chemoreceptor; and a depressing central effect of hypoxia. G.R.

A71-18188 Human circulatory reactions released by low frequency mechanical vibrations (Réactions circulatoires humaines déclenchées par des vibrations mécaniques de basse fréquence). Bernard Vettes and Jean Demange. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 175-178. 7 refs. In French.

Discussion of the effects of low vibration frequencies (between 4 and 15 Hz) on human beings. These frequencies are the most injurious because they correspond to the major resonances of different parts of the body, particularly the viscera. In addition to fatigue phenomena and lowered performance, more or less prolonged exposure to vibration involves little-understood circulatory reactions. Some testing procedures and physiological measurement techniques are described which confirm the deleterious effects of vibration. F.R.L.

A71-18189 Thermography and the psychoneurological survey - Evaluation of this method by some ophthalmological examples (La thermographie et l'expertise P. N. - Evaluation de cette méthode par quelques exemples ophtalmologiques). G. Raynaud, P. Manent, and H. Bourgeois (Ministère des Armées, Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 179-181. In French.

Investigation of the possibility that thermography might be useful in aviation medicine as a means of studying circulatory or thermal changes related to physical exercise, anoxia, or accelerations. The method is based on the fact that the human body radiates thermal energy of an electromagnetic nature, especially in the infrared region. One of its great advantages is sensitivity, and it may also be useful in studies of aging. The method is absolutely harmless. It appears that signs of vascular imbalance occur with some frequency among those with ophthalmological symptoms, and those who complain of headaches. F.R.L.

A71-18190 The physiological effects of a thermal shock. IV - Study of thermal changes by convection as a function of barometric pressure (Les effets physiologiques d'un choc thermique.

IV - Etude des échanges thermiques par convection en fonction de la pression barométrique). J. Timbal, J. Colin, and C. Boutelier (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 183-186. 13 refs. In French.

Study of the problem of determining the coefficient of heat exchange by convection, the air temperatures and the skin temperatures being accessible to direct measurement. The factors involved in the heat exchange coefficient are specific heat, thermal conductivity, density, viscosity, speed of displacement of the fluid under consideration, and the factor of shape of the body. F.R.L.

A71-18191 Accelerations and vibrations in hospital transport by ambulance, helicopter, and fixed-wing aircraft (Accélérations, vibrations dans les transports sanitaires par ambulances, helicopteres et avions). E. Pichard, S. Ivanof, M. Poisvert, J. P. Hurtaud (Hôpital Necker-Enfants-Malades, Paris, France), B. Fatras, H. Seris, and M. Auffret (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 187-192. 21 refs. In French.

Consideration of the pathology involved in the transport of gravely ill patients. Statistics indicate that 30 per cent of patients are adversely affected by ambulance travel, due to stresses incurred during braking of the vehicle and stresses due to resonance vibration. Adverse incidents occurred to 20 per cent of patients transported by helicopter, and to 10 per cent of patients transported by fixed-wing aircraft. F.R.L.

A71-18192 Diagnosis of coronary insufficiency - Significance of electrocardiographic modifications observed after exertion (Diagnostic de l'insuffisance coronarienne - Signification des modifications électrocardiographiques observées après l'effort). G. Leguay, J. C. Richart, and R. Pannier (Ministère des Armées, Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 193-201. 17 refs. In French.

Evaluation of the utility of the electrocardiogram which, when given after exercise, seems to be the best method of determining whether or not to ground aircrewmen due to latent heart conditions. The modifications most often observed are the aspect of sub-endocardiatic ischemia, lowering of the J point, and inversion of the T wave. The pathological modifications appear more freely several minutes after exercise than they do immediately after it. F.R.L.

A71-18193 The production of oxygen by chemical means in open circuit - Its utilization in aviation (La production d'oxygène par voie chimique en circuit ouvert - Son utilisation en aéronautique). Michel Jurion and André Vauzelle (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 204-207. 31 refs. In French.

Study of the use of chlorates as a means of producing breathable oxygen for aircrews. It has been shown (Miller, 1967) that the volume of gas produced is 630 times the volume of the chemical solid. The advantages of the process are such that, particularly concerning simplicity of maintenance and long storage time, it should be of great interest in the future. F.R.L.

A71-18194 Modification of uterine rheography of women Aircrew subjected to moderate hypoxia tests (Modification de la rhéographie utérine des femmes - Personnel navigant soumises aux épreuves d'hypoxie modérée). M. Vasiliad, M. Anton, and I. Pintille (Centre Médical Aéronautique, Bucharest, Rumania). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 208-211. 5 refs. In French.

Use of the uterine rheographic method of obstetrical and gynecological investigation as a means of determining the fitness of female aircrew subjected to low-pressure tests. Among healthy women, a phasal behavior of the uterus was noted, demonstrated by the increase of rheological amplitude during the first part of the menstrual cycle, and lowering of the amplitude in the second half. The rapidity index increased significantly in all the healthy females. In women showing related inflammations, the rheological amplitude was reduced after the action of hypoxia, with no relation to the phase of the menstrual cycle, but the rapidity index did not show significant modification. F.R.L.

A71-18195 The world gliding championships at Marfa, Tex., and the medicophysiological preparation of crews (Les championnats du monde de vol a voile de Marfa /Texas/ et la préparation médico physiologique des équipes). G. Stedtfeld and J. P. Crance. *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 211-213. In French.

Analysis of various medical aspects of the international glider competition, with reference to the preparation of German and French crew members. Problems of dehydration and salt depletion occurred because of the hot, dry climate. Intake of fruit juices and fruit concentrates was recommended, as well as physical training and an acclimatization program. F.R.L.

A71-18196 Human factors in gliding accidents (Les facteurs humains dans les accidents de vol à voile). M. Boulangé (Nancy, Université, Nancy, France). *Revue de Médecine Aéronautique et Spatiale,* vol. 9, 4th Quarter, 1970, p. 213-215. In French.

Medical evaluation of certain glider accidents which may have been due to somatic human factors. An incident involving the use of tranquilizers, possibly after the use of an excitant drug, is described, and other incidents are reported which may have been due to fatigue, oxygen lack, lack of aptitude, or nervous tension. F.R.L.

A71-18323 Response time of the Pt electrode during measurements of unsteady oxygen partial pressures (Einstellzeit der Pt-Elektrode bei Messungen nicht stationärer O2 Partialdrucke). W. Grunewald (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany). *Pflügers Archiv,* vol. 322, no. 2, 1971, p. 109-130. 19 refs. In German.

Description of the measuring signal during a jump in the oxygen partial pressure (pO2) on the basis of the diffusion field of the Pt electrode. The signal dependent on the time is considered for the bare and the membrane-covered electrode in gaseous and nongaseous media. The response time as a systematic error of measurement can be derived from the variation of the measuring signal. In nongaseous media (e.g., biological tissue) a jump of the pO2 to higher values is followed by the signal exceeding the steady end signal. Therefore the response time in such media has to be taken into account. The response time for Pt electrodes with a single and with a double membrane is given explicitly. Finally, the response time for biological media is compared to the diffusion error. The conditions for a membrane of the Pt electrode with a short response time, as well as a low diffusion error, are listed. (Author)

A71-18324 Regional cutaneous and visceral sympathetic activity during asphyxia in the anesthetized rabbit. M. Iriki, O.-E. Walther, K. Pleschka, and E. Simon (William G. Kerckhoff-

Herzforschungsinstitut, Bad Nauheim; Giessen, Universität, Giessen, West Germany). *Pflügers Archiv*, vol. 322, no. 2, 1971, p. 167-182. 14 refs.

Examination of the changes of activity in cutaneous and visceral sympathetic efferents during asphyxia in anesthetized, paralyzed, artificially ventilated rabbits. In all cases an increase of activity in the splanchnic nerve and a simultaneous decrease of activity in the cutaneous sympathetic branch were observed during asphyxia. The decrease of cutaneous sympathetic activity was closely related with an increase of ear blood flow. This decrease was found to represent a regional sympathetic response which is antagonistic to the hitherto known excitation of the sympathetic system by asphyxia. This antagonism is, however, not a manifestation of an invariable pattern of sympathetic activity. A stronger asphyctic stress led to an increase of activity in the cutaneous sympathetic branch as in other sections of the sympathetic system. An increase of activity in the cutaneous sympathetic branch was likewise observed during asphyxia, if its activity had been reduced before by a central heat stimulus. O.H.

A71-18356 # **Study of the control of carbon dioxide concentration in a sealed chamber with animals during atmosphere regeneration by Chlorella (Issledovanie protsessov regulirovaniia kontsentratsii uglekislogo gaza v germokamere s zhivotnymi pri regeneratsii atmosfery kul'turoi Khlorelly).** V. I. Savkin, G. I. Meleshko, and B. A. Adamovich. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 3-7. In Russian.

Study of a system for controlling the CO2 concentration in a sealed chamber with animals, which involves a biological component - Chlorella. The culture productivity was controlled by step-by-step changes of the illumination of the reactor surface correlated with a known deviation of the CO2 concentration. The achieved accuracy of the stabilization of this value was 0.5% CO2. Spontaneous fluctuations of the culture productivity as well as changes of animal gas exchange were approached as changes affecting the control system. An analysis of the experimental data produced numerical values of these changes. In terms of the dynamic characteristics, the tested model is close to the CO2 control system in a manned space cabin. (Author)

A71-18357 # **Use of intensive Chlorella cultivation for controlling toxic gaseous contaminants in the atmosphere (Issledovanie vozmozhnosti ochistki atmosfery ot nekotorykh gazoobraznykh primesei s pomoshch'iu kul'tury Khlorelly).** G. I. Meleshko, T. B. Galkina, A. I. Kazakov, I. I. Kashkovskii, and E. K. Lebedeva. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 7-13. 14 refs. In Russian.

The paper discusses a possibility of using Chlorella suspensions to absorb toxic gaseous contaminants produced by heterotrophic organisms, including man, in an isolated environment. Results of the experiments show that the contaminants tested do not accumulate in the atmosphere of the closed Chlorella-animal system though the load is several times greater than the normal due to the decomposition of nonutilizable wastes. (Author)

A71-18358 # **Problem of prevention of radiation damages in space flights (Problema profilaktiki radiatsionnykh porazhenii pri kosmicheskikh poletakh).** V. D. Rogozkin, S. A. Davydova, M. V. Tikhomirova, and K. S. Chertkov. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 13-17. 7 refs. In Russian.

The effectiveness of two types of radioprotectants - chemical and biological - was studied using short- and longterm irradiation of animals. Biological radioprotectants - amino acids, bacterial polysaccharides, hormones, and vitamins - gave a 16-25% increase of mice survived after their prolonged irradiation. It is concluded that biological radioprotectants may be well used in space flights. (Author)

A71-18359 # **Protection of spacecrews from cosmic radiation by radioprotectants (O zashchite chlenov ekipazhei kosmicheskikh korablei ot radiatsionnykh porazhenii s pomoshch'iu radioprotektorov).** P. P. Saksonov, V. V. Antipov, B. I. Davydov, and N. N. Dobrov. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 17-19. 5 refs. In Russian.

General approaches to the radiation protection of spacecrews with the aid of various drugs are discussed. An attempt is made to extrapolate the experimental data obtained on animals to humans. The validity of the extrapolation is confirmed by observations accumulated in the clinical use of radioprotectants during X-ray treatment. (Author)

A71-18360 # **Effectiveness of shielding of different body portions during repeated irradiations with protons (Ob effektivnosti ekranirovaniia razlichnykh uchastkov tela pri povtornykh oblucheniiakh protonami).** G. F. Nevskaia, G. M. Abramova, E. V. Ginsburg, and M. P. Kalandarova. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 20-23. 7 refs. In Russian.

Dogs were exposed to 700 rads of proton irradiation (two exposures of 350 rads each with an interval of 45 days). The pelvic zone and the upper portion of the abdomen making 15% of total body weight were exposed. The protection effect was found to be related to the size of the undamaged portion of bone marrow. This amounted to 15% and 5% of total bone marrow in the dog skeleton when the pelvix and the abdomen, respectively, were shielded. During a single or repeated irradiation with minimal absolutely lethal doses the shielding of 5% bone marrow failed to repair hemopoiesis to a sufficient degree and the changes of the tested parameters were more significant than in animals with 15% bone marrow shielded. These changes became manifest not so much in hemopoiesis inhibition as in the rate and degree of bone marrow reparation and level of recovery of blood indices. (Author)

A71-18361 # **Use of a unilateral labyrinthectomy model to assess the drug effect on the vestibular function (Primenenie modeli odnostoronnei labirintektomii dlia otsenki vliianiia farmakologicheskikh preparatov na funktsiiu vestibuliarnogo analizatora).** E. L. Epshtein and A. A. Shipov. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 23-26. 18 refs. In Russian.

The effect of different intramuscularly injected drugs on the fall-out nystagmus developing by animals after unilateral labyrinthectomy was investigated on guinea-pigs. It was found that central M- and N-cholinolytics, adrenomimetics and allylthiourea decreased whereas cholinesterase inhibitors and adrenolytics increased the frequency of the fall-out nystagmus. It is suggested that unilateral labyrinthectomy may be successfully used as a model to evaluate and select antimotion drugs. (Author)

A71-18362 # **Ischemic deafferentation of transversostriated muscles (Ishemicheskaia deafferentatsiia poperechnopolosatykh myshts).** V. I. Savchuk and S. N. Antonov. *Kosmicheskaia Biologiia i Meditsina*, vol. 4, Sept.-Oct. 1970, p. 26, 27. In Russian.

Experimental study of the influence of a severe disorder in blood circulation (ischemia) on the functional state of the afferent apparatus of the muscle quadriceps femoris in cats. It is shown that severe disturbances of blood circulation in the skeletal musculature cause changes in the functional state of the afferent apparatus that in turn contribute to hypokinesia and to the formation of several pschophysiological disturbances. Strong changes in the function of proprioreceptors, observed during prolonged restriction of the blood supply, are shown to be fully reversible. T.M.

A71-18363 # **Changes in the circulating blood volume during lower body negative pressure exposure (Izmenenie ob'ema**

aktivno tsirkuliruiushchei krovi pri dekompressii nizhnei poloviny tela). I. S. Balakhovskii, O. A. Virovets, and V. G. Voloshin. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 27-30. 11 refs. In Russian.

The paper gives a modified method for measuring the circulating blood volume which is based on calculations of the carboxyhemoglobin concentration in the blood after an inhalation of a known amount of carbon dioxide. The method has been tested during exposure to lower body negative pressure (-80 mm Hg) which is supposed to reduce the circulating blood volume. Changes in the concentration of carboxyhemoglobin have been found in the experiment and control. It has been shown that on the 10th minute of the LBNP exposure the circulating blood volume reduces significantly but the level of the reduction does not determine individual tolerance to the test. (Author)

A71-18364 # **Changes in the permeability of the hemato-ophthalmic barrier of rabbits after their exposure to accelerations (Ob izmeneniiakh pronitsaemosti gematooftal'micheskogo bar'era u krolikov posle vozdeistviia uskorenii).** Z. N. Nakhil'nitskaia. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 30-35. 7 refs. In Russian.

Rabbits were exposed to single and repeated accelerations of 10 g for 4 min. At different time intervals after the exposure their anterior chambers were examined for intravenously injected fluorescein. Following a single exposure the changes, though showing great variability, were as follows: during the first hours the penetration of fluorescein was accelerated and during the next 15 days it was limited and the excretion was delayed. A repeated exposure 6 days later produced more significant changes. During daily exposures performed for 8 days the level of the reaction, regardless of its pattern, became stabilized to increase in the posttest period. The changes persisted for over a month after the exposure. (Author)

A71-18366 # **Relative biological effectiveness of multi-charged ions during single irradiation of Chlorella (Otnositel'naia biologicheskaia effektivnost' mnogozariadnykh ionov pri odnokratnom obluchenii Khlorelly).** L. K. Vekshina, I. G. Kogan, E. I. Kudriashov, A. M. Marennyi, D. R. Piatyshev, I. S. Sakovich, and V. A. Shevchenko. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 39-42. 5 refs. In Russian.

The dose dependence of relative biological effectiveness of accelerated C ions has been found. The increase of the inactivation cross-section with an increase at the linear energy transfer of ionizing radiation has been shown. The dose-dependent change of Chlorella mutability has been observed. (Author)

A71-18367 # **Effect of ionizing radiation on food products (Vliianie ioniziruiushchei radiatsii na produkty pitaniia).** V. P. Bychkov, M. I. Kozar', V. I. Popov, N. N. Boiko, A. G. Kasatkina, E. V. Kolchin, and V. V. Iurgov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 42-46. 9 refs. In Russian.

The paper describes experimental data concerning the effect of gamma-irradiation with doses of 35,000 and 70,000 rads on physicochemical and organoleptic properties of casein, sunflower seed-oil, yeast, and oil concentrates of vitamins A and D. It has been found that a single irradiation of the products with the above doses reduces some essential amino acids, destructs significant amounts of water-soluble and small quantities of fattysoluble vitamins in the foods, and increases the concentration of peroxides in sunflower oil. (Author)

A71-18368 # **Immunological reactivity of the human body during 120-day feeding on dehydrated diets (Immunologicheskaia reaktivnost' organizma cheloveka pri 120-sutochnom pitanii ratsionom iz obezvozhennykh produktov).** V. P. Bychkov, M. I. Kozar', S. N. Zaloguev, M. V. Markarian, and M. M. Shinkareva. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 47-51. 11 refs. In Russian.

The data collected in a 180-day experiment are presented. Six volunteers, ages 25-31 years, with the weight range 68-91 kg, were studied. In December and May the test subjects were given baseline diets of natural foods providing 3100 cal. During 120 days (January through April) they were given test diets that were similar to the baselines in their composition but included dehydrated ingredients. During the first two months lysozyme activity of the saliva and blood serum decreased, dysbacteriosis in the oral cavity and pharynx developed, and the ratio of protein fractions in the blood serum changed. In the course of the 3rd month these parameters returned to the normal and at the end of the experiment the phagocytic activity of leukocytes increased. (Author)

A71-18369 # **Study of streptococcal flora in the pharynx of men during their prolonged enclosure (Issledovanie streptokokkovoi flory zeva liudei v usloviiakh dlitel'nogo prebyvaniia ikh v germokamere).** V. I. Drozdova, R. V. Petrov, and V. M. Shilov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 51-55. 7 refs. In Russian.

Results of studies of streptococcal flora in the pharynx of men during their year-long enclosure are presented. It has been shown that a long-term enclosure of men in an isolated environment involves transfers of streptococci from man to man which is accompanied by an increase of not only total number of streptococci but also of hemolytic microbes. (Author)

A71-18370 # **The renal osmoregulation function of Soyuz-4 and Soyuz-5 crewmembers (Osmoreguliruiushchaia funktsiia pochek u chlenov ekipazhei kosmicheskikh korablei 'Soiuz-4' i 'Soiuz-5').** A. I. Grigor'ev and G. I. Kozyrevskaia. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 55-59. 14 refs. In Russian.

The Soyuz-4 and Soyuz-5 crewmembers were examined for the renal osmoregulation function before and after the flight. On the 2nd postflight day they were given a 2% water load. The osmolar concentration, Na and K concentration in the blood, in the 24-hour urine and every urine portion were determined after the load. The glomerular filtration was also measured using endogenous creatinine. The water load indicated an elevated activity of the osmoregulation system. After the load all cosmonauts excreted 1.3 to 2.8 times less fluid. It was found that the osmolar concentration and index of the maximally diluted urine portion increased and the clearance of osmotically free water reduced; the osmolar concentration and Na concentration in the blood plasma grew; the glomerular filtration rate changed insignificantly. No differences were detected in the postflight response of the command pilots and the EVA pilots. The above changes may be attributed to an increase of ADH activity that tends to recover the fluid content in the body during the postflight period. (Author)

A71-18371 # **Main changes in the human body during a 120-day bed rest experiment (Osnovnye izmeneniia v organizme zdorovogo cheloveka pri 120-sutochnom postel'nom soderzhanii).** V. V. Parin, T. N. Krupina, G. P. Mikhailovskii, and A. Ia. Tizul. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 59-64. 21 refs. In Russian.

The main results of studying changes developed by 10 test subjects during a 120-day bed rest experiment are presented. The test subjects were divided into three groups: the first group included four people who served as controls, the second and third groups were experimental and consisted of three test subjects each. The second and third group subjects were given pituitrin, deoxycorticosterone

acetate and nerobol to prevent possible disturbances of mineral and protein metabolism. Comprehensive examinations conducted once in every 10 to 15 days revealed polymorphic changes in almost all systems of the human body. Clinical, physiological and metabolic changes increased with the experimental time, forming distinct clinical symptoms and syndromes by the end of the 2nd month. The following syndromes were most pronounced: autonomic-vascular dysfunction, asthenization, allergy, hemocoagulation disturbance accompanied occasionally by prethrombotic abnormalities, muscular atrophy aggravated by muscular atony and disordered bioelectric activity, etc. Mineral metabolism was disturbed, diuresis was negative, and weight losses progressively increased till the 3rd month of the hypokinetic condition after which a tendency to return to the baseline values was noted. The most distinct changes were found in Ca metabolism the excretion of which was 2.5 times higher than the pretest value. The use of nerobol gave good therapeutic effect whereas pituitrin and DOCSA were found ineffective. (Author)

A71-18372 # **The state of nervous and muscular systems of the Soyuz-4 and Soyuz-5 crewmembers (Sostoianie nervno-myshechnogo apparata u chlenov ekipazhei kosmicheskikh korablei 'Soiuz-4' i 'Soiuz-5').** L. I. Kakurin, V. I. Pervushin, and M. A. Cherepakhin. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 64-67. 9 refs. In Russian.

Reflex excitability of the nervous and muscular systems of four cosmonauts was studied by means of provocative tests performed before and after the flight. The cosmonauts with high reflex excitability exhibited a decrease of biopotentials generated by the patellar reflex in response to light and heavy physical loads. After the flight their reflex excitability fell lower than before the flight. The cosmonauts with low reflex excitability displayed insignificant changes in their response to physical loads both before and after the flight. All cosmonauts showed higher levels of tendon reflexes at rest after the flight as compared with the preflight values. A more pronounced decrease of biopotentials of the muscles involved in the patellar reflex during physical loads after the flight apparently indicates some deterioration of the functional state of the nervous and muscular systems of the cosmonauts. (Author)

A71-18373 # **Mathematical analysis of correlations between cerebral and systemic circulation (Matematicheskii analiz sutochnykh korreliatsii mezhdu pokazateliami tserebral'nogo i sistemnogo krovo-obrashcheniia).** V. V. Skriabin, I. E. Oranskii, T. V. Krupina, A. E. Miakota, and V. P. Sakovich. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 68-70. In Russian.

The purpose of the investigation was to determine correlations between the level of the brain blood-filling and systemic circulation. The healthy test subjects kept under mild bed rest conditions were examined. Simultaneously rheoencephalograms, transverse rheograms of the body, arterial pressure and pulse rate were recorded. The data obtained were processed by a computer. Diurnal variations in the pulse blood-filling of the brain were found; it increased in the daytime and decreased at night. Linear regression equations were derived to determine the ohmic amplitude of rheoencephalograms using several baseline indices of the systemic circulation. (Author)

A71-18374 # **Conditions of growth and decay of gas bubbles in physical systems and organism tissues (Usloviia rosta i szhatiia gazovykh puzyr'kov v fizicheskikh sistemakh i tkaniakh organizma).** V. P. Nikolaev. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 70-76. 17 refs. In Russian.

Peculiarities typical of the behavior of gas bubbles in physical systems and living tissues are described. High priority is given to the problem of bubble statics. Absolute stability of a single bubble in a closed oversaturated solution of small size is demonstrated theoretically. The effect of bubbles formed in the tissue during decompression on the inert gas washing-out from the tissue is evaluated qualitatively. The change in the initial distribution of inert gas in the organism produced by bubble transfer is discussed. It is concluded that the resolution of 'traveling' bubbles deposited in poorly perfused tissues may be accelerated only by means of the body recompression to the pressure exceeding the initial level. (Author)

A71-18375 # **Otolithic reactions in animals during intravenous administration of sodium bicarbonate (Otolitovye reaktsii u zhivotnykh pri vnutrivennom vvedenii bikarbonata natriia).** G. I. Gorgiladze and B. B. Egorov. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 77, 78. 12 refs. In Russian.

Experimental study of the influence of intravenously administered sodium bicarbonate on the otholithic reactions of cats and rabbits to accelerations and motion. Previous studies by Hasegawa (1949) indicated that sodium bicarbonate reduces or completely eliminates vegetative disturbances during rectilinear accelerations by opening the otholiths. The present study was designed to test this conclusion. The results show that both single and multiple intravenous administrations of sodium bicarbonate fail to cause any changes in the otolithic reactions. The treated animals in no way differed from the control subjects. No explanation is offered for the advantageous effects of sodium bicarbonate in alleviating the symptoms of motion sickness. T.M.

A71-18376 # **Influence of 96% oxygen respiration on the 'self-stimulation' and 'avoidance' reactions in rabbits (Vliianie dykhaniia 96% kisloroda na reaktsii 'samorazdrazheniia' i 'izbeganiia' u krolikov).** N. A. Agadzhanian, G. P. Goroian, and L. V. Kaliuzhnyi. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 79, 80. 6 refs. In Russian.

Investigation of the behavioral and emotional reactions to electrical stimulation of the hypothalamus in rabbits breathing a 96% oxygen mixture at a pressure of 760 mm Hg. Experiments were conducted with 'self-stimulation' and 'avoidance' procedures. During the initial phase of exposure to the test atmosphere (25 to 50 hours), the self-stimulation reactions were reduced while the avoidance reactions were enhanced. This period of exposure is characterized by predominating motivational reactions of a detensive nature. After three to four days of exposure, a reduction of both self-stimulation and avoidance reactions testifies to a depression of the emotional state. T.M.

A71-18377 # **Morphology of the liver and skeletal musculature during hypokinesia and protein deficiency (Morfologiia pecheni i skeletnoi muskulatury pri gipokinezii i defitsite belka).** G. P. Bykov, A. V. Novikova, and S. M. Ivanova. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 80, 81. 5 refs. In Russian.

Histological and histochemical investigation of the liver and skeletal muscle tissues in white mice suffering alimentary protein deficiency under conditions of hypokinesia caused by individual confinement in tight cages. Results show that in addition to changing the morphological structures of muscle tissue, the reduction in motor activity causes changes in the protein metabolism of the skeletal muscles. The metabolic changes are manifested by reduced synthesis and enhanced decomposition processes. T.M.

A71-18378 # **Strain gauge for recording isometric contractions of skeletal muscles (Tenzodatchik dlia registratsii izometricheskikh sokrashchenii skeletnykh myshts).** Iu. M. Bazzhin, V. S. Oganov, A. N. Potapov, and A. A. Tsyvin. *Kosmicheskaia Biologiia i Meditsina,* vol. 4, Sept.-Oct. 1970, p. 81-83. In Russian.

Description of the design and operation of a strain gauge designed for in vivo recording of single and tetanic responses of skeletal muscles in mice during work in an isometric regime. The device can be used for tests with other animals, provided that the maximum force developed does not exceed 400 g. The electronic circuit of the instrument is based on a half-bridge arrangement of two tensoresistors which provide a signal displayed on a CRT oscilloscope. T.M.

A71-18379 Immediate effects of positive-pressure breathing on the ventilatory response to CO2. D. C. Flenley (Royal Infirmary, Edinburgh, Scotland), L. D. Pengelly, and J. Milic-Emili (McGill University, Montreal, Canada). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 7-11. 30 refs.

Acute exposure of four conscious subjects to continuous mouth pressures up to +30 cm water throughout the respiratory cycle for four breaths caused the tidal volume to fall during the pressure breathing, this fall being greater at higher pressures. End-expiratory lung volume increased along the relaxation pressure-volume curve of the respiratory system. When CO2 mixtures were breathed before and during continuous positive pressure the tidal volume response to CO2 was always decreased. However, since the frequency of breathing always increased, the impairment in minute volume response to CO2 was less pronounced. In one subject this increase in frequency completely compensated for tidal volume decreases. Reduction in the length of inspiratory muscles by lung inflation, diaphragmatic flattening, and the decreased respiratory compliance at high lung volumes could explain this fall in tidal volume during continuous positive-pressure breathing. (Author)

A71-18380 * # Changes in aortic, coronary, and carotid flows during +G sub x acceleration. H. L. Stone, H. F. Stegall, M. B. Kardon, H. Sandler, and R. M. Payne (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; Washington, University, Seattle, Wash.; NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 21-26. 14 refs. USAF-NASA-supported research.

Measurements of flows from the ascending aorta, left circumflex coronary artery, and common carotid artery in intact anesthetized dogs in an attempt to ascertain which vascular beds change their flows with increased gravitational stress. The measurements were made during exposure to 5, 10, and 15 +G sub x for 120 sec. Ascending aortic flow and heart rate decreased, while the descending aortic pressure increased with each level of acceleration. The flow in the left circumflex artery did not change except at 15 +G sub x, where it increased significantly. Common carotid flow decreased transiently, but returned toward control levels before the 2-min acceleration exposure was completed. The coronary and possibly in part the common carotid vascular beds respond to the arterial hypoxemia of acceleration stress and contribute very little to the increase in arterial pressure. M.M.

A71-18381 * Circadian patterns of oxygen consumption in Peromyscus. Alfred A. Heusner, Jane C. Roberts, and Robert Em. Smith (California, University, Davis, Calif.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 50-55. 33 refs. PHS Grants No. GM-09261; No. HD-01826; NIH Grant No. FR-3; Grant No. NsG-721.

Long-term recordings of oxygen consumption (1-2 weeks) in deer mice put in constant dark and in the thermal neutral zone, but previously subjected to a 12:12 hr dark-light cycle, show that (1) a male deer mouse has a tendency to display a daily pattern which is replicated every day; (2) this pattern may vary among individual males placed under identical conditions. With respect to the duration and shape of the transitory phases (i.e., passage from high level to low level of oxygen uptake and vice versa), four patterns can be distinguished in the deer mouse. A constant pattern demonstrates the tendency of a deer mouse to maintain constant circadian patterns in spontaneous activity and feeding behavior. (Author)

A71-18382 * Venomotor responses to rapid changes in skin temperature in exercising man. Loring B. Rowell, George L. Brengelmann, Craig Wyss (Washington, University, Seattle, Wash.), and Jean-Marie R. Detry. *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 64-71. 26 refs. NIH Grant No. RR-37; Grant No. NGR-48-002-082.

Venomotor responses of superficial forearm and hand veins were measured via the occluded-limb technique in 10 men. Body skin temperature (Ts) was controlled with a water-perfused suit. With Ts at 34 C, veins constricted in response to exercise at 300 kpm/min; they constricted more at 600 kpm/min. When Ts was raised toward 38 C (after limb occlusion) venomotor responses to both levels of exercise were abolished in seven men and attenuated in one. One subject showed no venomotor response to exercise; another was not consistently responsive to heating. One experiment was designed to eliminate potential problems from changing base-line conditions in occluded veins. After occlusion Ts was cycled between 33 and 38 C during continuous exercise. Veins relaxed with heating and constricted with cooling. Effects could be attributed only to local thermal or cutaneous reflex effects of altered Ts on veins - and not to alterations in rate and depth of breathing, arm motion, central blood temperature, or CO2 levels. (Author)

A71-18383 * Venomotor responses to local and remote thermal stimuli to skin in exercising man. Loring B. Rowell, George L. Brengelmann, Craig Wyss (Washington, University, Seattle, Wash.), and Jean-Marie R. Detry. *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 72-77. 14 refs. NIH Grant No. RR-37; Grant No. NGR-48-002-082.

Venomotor responses to occluded, superficial forearm veins were measured in six exercising men. Body (Ts) and occluded arm skin temperature (Tsa) were controlled independently in a four-part experiment. In part I, Ts was constant (34 C); and Tsa was cycled between 25-40 C every 2 min. Exercise-induced venoconstruction was slowly abolished and restored by raising and lowering Tsa, respectively. In part II, Ts was elevated (38 C); Tsa was cycled as above. Venomotor responses were abolished. Venous tone was restored by lowering Tsa only after Ts was lowered. In part III, Tsa was constant (31 C); Ts cycled between 33-38 C every 2 min. Venomotor response to exercise was rapidly abolished and restored upon raising and lowering Ts. While Ts fell in the last cycle, venoconstruction was slowly abolished and restored by changing Tsa. In part IV, Ts and Tsa were normal. Veins responded normally to exercise. Central blood temperature was not a cause of venomotor responses. We conclude that venomotor state is influenced reflexly by cutaneous thermoreceptors and locally by vein temperature. (Author)

A71-18384 Ventilatory control in the athlete. Edward Byrne-Quinn, John V. Weil, Engvar E. Sodal, Giles F. Filley, and Robert T. Grover (Colorado, University, Denver, Colo.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 91-98. 51 refs. Research supported by the American Thoracic Society; PHS Grant No. HE-03191; Contract No. DA-49-193-MP-2227.

Control of ventilation was studied by measuring resting hypoxic and hypercapnic ventilatory drives together with the ventilatory response to hypoxia on exercise in a group of 13 athletes who were compared with a control group of 10 nonathletes. All subjects were native to low altitude and were resident at 1,600 m altitude. Hypoxic ventilatory drive was measured as the shape of the isocapnic ventilation vs alveolar oxygen tension curves and in the athletes averaged 35% of the value for the controls. Similarly hypercapnic ventilatory drive as measured by the slope of the isoxic minute ventilation vs alveolar carbon dioxide tension lines was reduced in the athletes to 47% of the controls. In contrast, the induction of hypoxia during exercise produced an increase in ventilation in the athletes that was not significantly different from the controls. Both hypoxic and hypercapnic ventilatory drives were inversely related to

maximal oxygen uptake. There was a positive correlation between resting hypoxic and hypercapnic ventilatory drives. Thus normal low-altitude native athletes have been shown to have marked attenuation of hypoxic and hypercapnic ventilatory drives at rest suggesting diminished peripheral chemoreceptor function. (Author)

A71-18385 Mechanical factors influencing collateral ventilation in human, dog, and pig lungs. Ann J. Woolcock and Peter T. Macklem (Royal Victoria Hospital, Montreal, Canada). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 99-115. 25 refs. Research supported by the John Hartford Foundation, the Defence Research Board, and the Medical Research Council of Canada.

The time constant (T) for collateral ventilation was measured in human, dog, and pig lungs under different physiological conditions by two methods with comparable results. Values for T were of the same order as values for the whole lungs in the dog and human; they varied with age, lung volume, volume history, volume of the collaterally ventilated space, bronchomotor tone, and whether the lungs were excised or in situ. The relative values of the flow resistance of the collateral channels and the compliance of the collaterally ventilated space were important in determining how these variables influenced collateral ventilation in these species. It was not possible to be sure that collateral ventilation exists in the pig lung. Since in the dog and human lungs it is possible for air to flow into the parenchyma just as quickly through collateral channels as it does through airways, the degree of collateral ventilation present in any given lung will be important in determining the degree of functional abnormality occurring in response to airway obstruction. (Author)

A71-18386 Neural stimuli increasing respiration during different types of exercise. E. D'Angelo and G. Torelli (Milano, Università, Milan, Italy). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 116-121. 37 refs. Research sponsored by the Consiglio Nazionale delle Ricerche.

Minute ventilation and alveolar carbon dioxide tension have been measured breath-by-breath during continuous and intermittent exercise of various type and intensity up to about 70 per cent of the aerobic power; furthermore, the ventilatory response to CO2 has been measured at rest and during exercise. At the onset and at the end of exercise, ventilation increases and respectively decreases abruptly by an amount which appears to be related both to the metabolic intensity and to the type of exercise. These rapid changes of ventilation are similar in intermittent and continuous exercise and at all levels of carbon dioxide breathing. During steady exercise for any given alveolar carbon dioxide tension, ventilation is increased by about the same amount as the abrupt increase of ventilation at the onset of the same exercise. The rapid changes of ventilation are thus due to neural stimuli and appear to be a reliable estimate of the neural component of the steady-state hyperpnea of exercise. During downhill walking and at low metabolic intensities during level walking, nearly all the hyperpnea of exercise appears to be due to neural stimuli, whereas at higher metabolic intensities particularly during uphill walking, the neural component would contribute only about 60-70 per cent of exercise hyperpnea, the remaining 30-40 per cent being due to carbon dioxide. (Author)

A71-18387 Carbohydrate metabolism and electrolyte changes in human muscle tissue during heavy work. Jonas Bergström, Gianfranco Guarnieri, and Eric Hultman (Renal Clinic, St. Erik's Sjukhus, Stockholm, Sweden). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 122-125. 32 refs. Research supported by the Swedish Medical Research Foundation and the Swedish National Association Against Heart and Lung Diseases.

Changes in muscle glycogen, lactate, glucose-6-P, fructose-6-P, water, and electrolytes were studied in three healthy men, performing heavy bicycle work (1,000 kpm/min) for 17-20 min. Needle biopsy specimens of m. quadricepts femoris were obtained at rest, after 5 min exercise, and at the end of exercise. A rapid glycogenolysis took place during the first 5 min of exercise; at the end of exercise the glycogen concentration in the muscle tissue was low. A parallel increase in glucose-6-P and fructose-6-P was recorded after 5 min. At the end of exercise the concentration of these metabolites decreased toward or below the basal value. A considerable accumulation of lactate occurred in the working muscle, the intracellular concentration being about 3 times higher than the concentration in peripheral blood. Due to the osmotic effect of lactate intracellular water increased. Intracellular potassium concentration decreased as a consequence of dilution. A sodium shift into the cells also took place possibly due to a diminution of the sodium efflux from the acidotic muscle cells. (Author)

A71-18388 Effects of walking on body composition and cardiovascular function of middle-aged men. Michael L. Pollock, Henry S. Miller, Jr., Richard Janeway, A. C. Linnerud, Bob Robertson, and Richard Valentino (Wake Forest University, Winston-Salem, N.C.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 126-130. 32 refs. Research supported by the United Medical Research Foundation of North Carolina and the Wake Forest University; PHS Grant No. NB-06655.

Sixteen sedentary men 48.9 years of age volunteered to train 40 min 4 times/week, for 20 weeks. Eight controls of similar qualifications were also evaluated. Training progressed from 2.5 miles during week 1 to 3.25 miles during weeks 16-20. The experimental group increased significantly in maximal oxygen intake capacity from 2.30 to 2.94 l/min (+28%), pulmonary ventilation from 86.9 to 102.6 l/min (STPD: +15%), and oxygen pulse from 13.8 to 17.4 ml/beat (+21%). Maximal heart rate, resting heart rate, and systolic blood pressure did not change. Resting diastolic blood pressure reduced significantly from 77.7 to 74.9 mm Hg. Heart rate reductions from a standard treadmill walk ranged from 4 to 17 beats/min during exercise and from 16 to 26 beats/min during recovery. Body composition showed reductions in total body weight (-1.3 kg) and per cent fat (-1.1%). The control group remained constant in most cardiovascular and body composition measures. Vigorous walking training had a significant effect on cardiovascular function and body composition of adult men. (Author)

A71-18389 Determination of cardiac output by ether dilution. H. Bachofen, D. A. Bloom, and L. E. Farhi (New York, State University, Buffalo, N.Y.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 131-135. 14 refs. USAF-supported research; Contract No. N 00014-68-A-0216.

Ethyl ether dissolved in saline has been used as an indicator for measuring cardiac output in dogs. The solution was infused at constant rate into the vena cava or the right atrium. Simultaneously a rebreathing maneuver was performed, and the alveolar ether tension was monitored. Based on this procedure, two different methods have been established to obtain reliable estimates of the mixed venous ether tension. Once the ether tension is known, the ether concentration in the mixed venous blood, the ether dilution in the blood stream, and the cardiac output can be computed. The accuracy of the ether-dilution method, which does not require blood analysis and which is repeatable within short time intervals, was tested by comparison with the direct Fick method. Good agreement between values obtained simultaneously by the two techniques was found: on an average the difference was 6%. (Author)

A71-18390 Simple manometric apparatus for measuring partition coefficients of highly soluble gases. H. Bachofen and L. E. Farhi (New York, State University, Buffalo, N.Y.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 136-139. 13 refs. USAF-supported research; Contract No. N 00014-68-A-0216.

A manometric apparatus for determining the solubility of inert (i.e., that do not combine chemically with the solvent) gases in water, blood, and other liquids is described. Equilibration between gas and solvent and the solubility measurement itself are done with the same instrument; no separate analysis of gas concentrations in the gas and liquid phase is required. Only the changes of the chamber pressure need to be measured with a pressure transducer in order to calculate the partition coefficient. The technique is easy to follow, and yields reproducible results for gases having a partition coefficient between 0.5 and 20. At 37 C the water/gas partition coefficient for ethyl ether was found to be 13.07, for chloroform 4.04, and for nitrous oxide 0.482. The partition coefficients of ethyl ether was also established in saline, plasma, and dog and human blood for temperatures ranging from 35 to 39 C. (Author)

A71-18391 A simple technique for attaching a strain gauge to tissue without sutures. Carl E. Aronson (Pennylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 151, 152. 9 refs. Research supported by the American Heart Association and the Heart Association of Southeastern Pennsylvania; NIH Grant No. HE-01813.

A technique is described for attaching a small isometric strain gauge to the ventricle of a rat heart in situ with fine stainless steel pins. The gauge may be easily repositioned or quickly removed prior to excising and freezing the heart for subsequent biochemical analysis. (Author)

A71-18392 An isometric muscle force transducer. Richard A. Meiss (Peter Bent Brigham Hospital, Boston, Mass.). *Journal of Applied Physiology*, vol. 30, Jan. 1971, p. 158-160. PHS Grant No. HE-11306.

A photoelectric isometric force transducer for muscle mechanics was developed in order to overcome several limitations of existing force transducers. A stiff glass rod, illuminated by a small light bulb, was used as both the stressed element and as a 'light pipe.' The bending of the glass rod in response to an applied force was sensed by measuring the change in illumination on a pair of photodiodes connected in a bridge circuit. Typical characteristics included: 100 g-wt linear range; 50 mv/g-wt sensitivity; 0.5 micron/g-wt compliance; and natural resonant frequencies up to 9,000 Hz. The dimensions of the glass rod were modified in several models to emphasize different desired characteristics. (Author)

A71-18464 # Data of multicanal radioelectroencephalography in man in neuroemotional stress (Dannye mnogokanal'noi radioelektroentsefalografii u cheloveka pri nervno-emotsional'nom napriazhenii). S. S. Gofman and Ia. V. Freidin (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Sverdlovsk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 70, Nov. 1970, p. 19-22. 7 refs. In Russian.

With the aid of radiotelemetry the authors studied changes in the bioelectric activity of the cerebral cortex in 10 students during the examination period. It is shown that the whole conditioned reflex behavior in such a stress condition corresponds to a definite electroencephalographic manifestation which is predominantly expressed by an increased (in open eyes) high-amplitude rhythmics, especially in occipital regions. (Author)

A71-18465 # The antagonistic character of descending effects of medial and lateral hypothalamic nuclei on the excitation of spinal cord motoneurons (Antagonisticheskii kharakterniskhodiashchikh vliianii medial'nykh i lateral'nykh iadergipotalamusa na vozbudimost' motoneironov spinnogo mozga). A. R. Chubakov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 70, Nov. 1970, p. 22-24. 15 refs. In Russian.

In acute experiments on 20 curarized cats the author investigated the effects of electric stimulation of medial (ventro- and dorsomedial nuclei) and lateral regions of the hypothalamus on the spinal cord reflex activity. Electric stimulation of medial hypothalamic structures caused a marked inhibition of mono- and polysynaptic reflexes of the spinal cord, whereas stimulation of its lateral regions was accompanied by facilitation of the referred to reflexes by 200-300% from the initial value. The descending hypothalamic effects were bilateral. A conclusion is drawn on the presence within the hypothalamic region of two contralasting systems - facilitating and inhibiting the spinal cord reflex activity. (Author)

A71-18466 # Interoceptive influences on vestibular nystagmus (Ob interotseptivnykh vliianiiakh na vestibuliarnyi nistagm). A. M. Dutov (Ivano-Frankovskii Meditsinskii Institut, Ivano-Frankovsk, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 70, Nov. 1970, p. 25, 26. 5 refs. In Russian.

In chronic experiments on rabbits by means of electronystagmography the author studied the influence of interoceptive afferentation on vestibular nystagmus. Stimulation of mechanoceptors of the stomach and rectum exerts a noticeable influence on the frequency and amplitude of the rotation nystagmus and there was noted a definite relation between changes of the nystagmus and the degree of visceral stimulation. In weak stimulation of mechanoceptors of the rectum an insignificant reduction of nystagmus pulsations per unit of time was noted; similar changes of the rotation nystagmus are observed in weak stimulation of gastric mechanoceptors. In a stronger stimulation of rectal mechanoceptors there is seen an augmented frequency of nystagmus pulsations and their amplitude. The data obtained to the importance of visceral afferentation in the reflex regulation and functional 'adaptation' of the vestibular apparatus. (Author)

A71-18467 # The myocardial function in the process adaptation to high-altitude hypoxia and after its cessation (Dinamika sokratitel'noi funktsii miokarda v protsesse adaptatsii k vysotnoi gipoksii i posle ee prekrashcheniia). N. A. Novikova and V. I. Kapel'ko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 70, Nov. 1970, p. 30-32. 9 refs. In Russian.

In acute experiments on rats the authors recorded the pressure and rate of its alteration in the cavity of ventricles. The index of contractility and index of maximal contraction of myocardial ventricles were determined in short-term occlusion of the aorta and pulmonary artery. After 7-day presence in the barochamber for 5 hours daily at the 'altitude' of 6000 m the function of myocardial ventricles did not differ from the controls. Adaptation of animals on the same 'altitude' for 8 weeks was accompanied by an increase of the index of contractility and maximal contraction of the right ventricle by 33%. The mass of the ventricle increased by 25%, consequently the contraction force of the whole ventricle was augmented to an even greater degree. Adaptation of the animals to an 'altitude' of 7300 m was attended by marked hypertrophy of the right ventricle without changes in the myocardial contractile function. The maximal systolic pressure of the ventricle in these animals was increased by 58%. As the result of 6-week training at an altitude of 7000 m the mass of the right ventricle augmented by 30%. Six weeks after cessation of training ventricular hypertrophy disappeared and indices of the myocardial contractile function did not differ from the controls. (Author)

A71-18468 # A method of contactless kinetocardiography (Metod beskontaktnoi kinetokardiografii). M. N. Tumanovskii, V. S. Postnikov, V. M. Provotorov, and B. F. Filiakin (Voronezhskii

Meditsinskii Institut; Voronezhskii Politekhnicheskii Institut, Voronezh, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 70, Nov. 1970, p. 121-123. 7 refs. In Russian.

The paper demonstrates the advantages of the proposed contactless method of recording low-frequency vibrations of the patient's chest in comparison with the existing contact and short-wave contactless techniques. The proposed device is described. The authors commit to paper the principal correlations for choice of optimal parameters of the device. (Author)

A71-18469 # **A highly-sensitive apparatus for temperature measurements (Pribor dlia vysokochuvstvitel'noi registratsii temperatury s pomoshch'iu termistorov).** V. P. Kornil'ev (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) and V. M. Koval'zon (Akademiia Nauk SSSR, Laboratoriia po Izucheniiu Nervnykh i Gumoral'nykh Reguliatsii, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 70, Nov. 1970, p. 124, 125. 10 refs. In Russian.

Description of a portable two-channel apparatus for temperature measurements with small glass-insulated thermistors. The apparatus can be used together with direct-current recorders with a sensitivity of 10 mV/cm. The apparatus has two identical channels consisting of balanced bridges of alternating current (working frequency of 10 kc/sec), narrow-band amplifiers with synchronous phase-sensitive detectors and a common supporting generator. The apparatus is fully transistorized and equipped with an autonomous power supply. The noise level is of the order of 10 microvolts. The potential at the thermistor is not more than 70 mV. The apparatus makes it possible to record temperature changes in the range of .001 degree and less. It can be used for temperature measurements of the brain. (Author)

A71-18556 # **Fluid mechanics of the human mitral valve.** David W. Wieting, N. H. C. Hwang, and John H. Kennedy (Baylor University, Houston, Tex.). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 9th, New York, N.Y., Jan. 25-27, 1971, Paper 71-102.* 7 p. 10 refs. Members, $1.50; nonmembers, $2.00. PHS Grants No. HE-13330-01; No. GM-46009-01.

Theoretical and experimental fluid mechanics studies of the human mitral valve are presented. Experimental and anatomical observations led to the following hypothesis: a large vortex forms behind the anterior leaflet during the period of diastasis and occupies a major portion of the intraventricular space. It serves an important role in controlling the movement of the mitral valve leaflets and apparently aids in 'washing' the ventricular cavity. Flow patterns reproduced in vitro downstream from a mitral valve confirmed the existence of this vortex. An approximate mathematical model, one-half of a Hill spherical vortex, has been suggested to simulate the flow pattern. (Author)

A71-18561 # **Mechanical properties of cancellous bone.** James McElhaney and Verne Roberts (Michigan, University, Ann Arbor, Mich.). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 9th, New York, N.Y., Jan. 25-27, 1971, Paper 71-111.* 9 p. 16 refs. Members, $1.50; nonmembers, $2.00. NIH Contract No. PH-43-67-1137.

Samples of human femora, vertebrae and cranial bone have been tested in compression. The results of these experiments have been analyzed, taking into account observed anisotropies and varying structures. Statistical correlations of properties have been made with density and a model proposed that summarizes these results. The cranial bones appear to be transversely isotropic and they are generally much stronger and stiffer in the transverse or tangent to the skull direction in comparison to the radial direction. The structure of the cancellous bone was found to be highly variable and this strongly influenced many of the mechanical responses. The model, however, explains much of the observed variation. (Author)

A71-18587 # **Structural considerations of the human vertebral column under +G sub z impact acceleration.** Channing L. Ewing (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.), Albert I. King, and Priyaranjan Prasad (Wayne State University, Detroit, Mich.). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 9th, New York, N.Y., Jan. 25-27, 1971, Paper 71-144.* 10 p. Members, $1.50; nonmembers, $2.00. Contract No. N 00014-69-A-0235.

Description of a hypothesis as to the mechanism of vertebral fracture under +G sub z impact acceleration. The hypothesis suggests an approach capable of raising the structural limit of the vertebral column. The theory proposed is that one of the major causes of vertebral fracture in ejection is the dynamic reaction of the vertebral column under ejection in the presence of improper restraint. There are certain movements of the individual vertebral bodies under vertical +G sub z impact acceleration that cause the characteristic vertebral fracture of ejections. A device was designed on the basis of this theory and was tested experimentally on cadaveric exposures to +G sub z acceleration. A statistically significant increase in the level of acceleration required to cause fracture was measured. M.M.

A71-18672 * **pH-conditional, ammonia assimilation-deficient mutants of Hydrogenomonas eutropha - Isolation and growth characteristics.** Leon F. Strenkoski and B. T. DeCicco (Catholic University of America, Washington, D.C.). *Journal of Bacteriology*, vol. 105, Jan. 1971, p. 291-295. 7 refs. Grant No. NGR-09-005-022.

Two mutants of the facultative autotroph Hydrogenomonas eutropha were isolated by using a modified penicillin selection method. The mutation involved was unusual in that its effect on cellular growth was conditional with regard to extracellular pH and the type of substrate employed. Growth of both mutants was abnormal under autotrophic conditions and during heterotrophic cultivation in the presence of organic substrates which lacked an amino group. Those substrates yielding abnormal growth were oxidized at normal rates by the mutants, indicating that the mutation did not impair their uptake or metabolism. The data suggest that the mutants are defective in their ability to assimilate inorganic nitrogen into organic forms, and this defect is strongly influenced by the pH. M.M.

A71-18673 * **pH-conditional, ammonia assimilation-deficient mutants of Hydrogenomonas eutropha - Evidence for the nature of the mutation.** Leon F. Strenkoski and B. T. DeCicco (Catholic University of America, Washington, D.C.). *Journal of Bacteriology*, vol. 105, Jan. 1971, p. 296-302. 23 refs. Grant No. NGR-09-005-022.

Experimental investigation of two amination-deficient mutants of Hydrogenomonas eutropha, characterized by pH-dependent linear growth on nonamino acid substrates, in order to determine the exact nature of the mutation. The experimental results suggest that the mutant strains lack an NH4(+) ion transport system and consequently are dependent on NH3 diffusion which does not support optimal amination rates. The significance of the findings for the amino acid metabolism of H. eutropha is discussed. M.M.

A71-18690 **Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy).** Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970. 190 p. In Russian.

New methods of the morphometry and photometry of biological objects at subcellular and cellular levels are described, and

problems of computer methods for biological studies are outlined. Among the topics considered are the use of the conductometric method of granulometric analysis for recording and analyzing erythrocytometric curves, digital coding of electron-microscopic cell images, computer analysis of chromosomes, automation of cytochemical studies, automatic processing of the microspectral characteristics of living cells, the use of holography for image identification, two-dimensional filtration of microscopic images, and the use of servoscanning (contour scanning) to introduce data concerning microbiological structures into a computer.

Individual items are abstracted in this issue. A.B.K.

A71-18691 # The state of the art and the formulation of problems (Sostoianie voprosa i postanovka zadach). G. R. Ivanitskii. In: Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy). (A71-18690 06-05) Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970, p. 7-21. 30 refs. In Russian.

Current applications of computer technology in the analysis of biological structures are discussed as an introduction to a collection of papers included in this book. A scheme is proposed for a classification of structural levels of living organisms, including the tissue (level 4), the cell (level 3), the chromosomes and subcellular structures (level 2), and DNA, RNA, proteins and lipids (level 1). Recent Soviet studies in the field are reviewed. Specifications are given for Soviet-made analyzers of biological microobjects used in cellular studies. Mathematical problems related to the geometry of tissue structures are mentioned. V.Z.

A71-18692 # New possibilities for application of the conductometric method of granulometric analysis to the recording and analysis of erythrocytometric curves (Novye vozmozhnosti konduktometricheskogo metoda granulometricheskogo analiza primenitel'no k registratsii i analizu eritrotsitometricheskikh krivykh). F. M. Rabinovich, A. D. Manaenkov, and A. G. Rybkina. In: Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy). (A71-18690 06-05) Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970, p. 27-34. In Russian.

Description of a method for determining the geometrical form of erythrocytes with the aid of a circuit having a conductometric sensitive element. The method is based on the fact that the pulse amplitudes obtained by conductometry of blood samples are proportional not only to the volume of erythrocytes but also to the factor of their geometrical form. Essential in this method is a comparison of the erythrocytometric curve of the blood sample under study with that of the same erythrocytes spherulitized by lecithin additions. Factors of geometrical form of erythrocytes are determined for various diseases. V.Z.

A71-18693 # Automation of quantitative cytochemical studies (Avtomatizatsiia kolichestvennykh tsitokhimicheskikh issledovanii). L. S. Agroskin, L. B. Kaminir, L. L. Litinskaia, Iu. R. Khrust, and D. P. Babadzhanian. In: Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy). (A71-18690 06-05) Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970, p. 66-86. 35 refs. In Russian.

Review of papers published in the last decade concerning the automatic acquisition and processing of cytophotometric data. The design and operation of a modern microphotometer, a high-speed ultramicrospectrograph, an automatic CYDAC system, an automatic radiographic analyzer, automatic Svenson and Lomakka microinterferometers, a cytofluorometer, and a differential microfluorometer are described. Special attention is given to the application of automatic cytophotometric techniques in the identification of various microobjects, such as chemical elements of the cell, and the dry mass and the redox potential of cells. V.Z.

A71-18694 # Cytophotometric method using a Razdan 2 digital computer and a scanning microscope (Metodika tsitofotometrii s primeneniem ETsVM 'Razdan-2' i skaniruiushchego mikroskopa). Sh. I. Barilko, L. I. Orlova, A. A. Shirogorov, and O. M. Storzhinskii. In: Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy). (A71-18690 06-05) Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970, p. 87-90. In Russian.

An automatic technique is described which uses a Razdan-2 digital computer and a TM-1 scanning microscope for photometering cellular elements and portions of cells. A memoscope-oscillograph with a light pencil is used for marking the areas of a cell intended for study. Stages of a computer program for optical density measurements are specified. Tables of digits representing the three-dimensional optical density cross sections used in this program are given. V.Z.

A71-18696 # Operational contact between the researcher and the machine during an analysis of biological structure images (Operativnoe obshchenie issledovatelia s vychislitel'noi mashinoi pri analize izobrazhenii biologicheskikh struktur). Sh. I. Barilko and A. P. Kutyshenko. In: Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy). (A71-18690 06-05) Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970, p. 134-145. 16 refs. In Russian.

The basic features of devices (memoscopes) providing communications between the operator and the machine during studies of biological images are described. The components of these devices include a light-pen containing a miniature photomultiplier or an optical fiber bundle transmitting light to a photomultiplier on the control panel, and a light-pencil in the form of a conducting probe which is used by the operator for determining the position of an electron tube beam scanning an image photograph frame. A table of existing multipurpose indicator panels is given. Possible uses and operational steps of CYDAC and FIDAC biological image processing systems are outlined. V.Z.

A71-18698 # Microobject data input into a computer with the aid of a follow-up scanning system (Vvod informatsii o mikroob'ektakh v vychislitel'nuiu mashinu s pomoshch'iu slediashchei razvertki). Zh. M. Agadzhanian and G. R. Ivanitskii. In:

Current problems of machine analysis of biological structures; All-Union Conference on Machine Analysis of Biological Structures and Processes, 2nd, Pushchino, USSR, May 1968, Proceedings (Sovremennye problemy mashinnogo analiza biologicheskikh struktur; Vsesoiuznoe Soveshchanie po Mashinnomu Analizu Biologicheskikh Struktur i Protsessov, 2nd, Pushchino, USSR, May 1968, Materialy). (A71-18690 06-05) Edited by G. M. Frank. Moscow, Izdatel'stvo Nauka, 1970, p. 165-172. In Russian.

Description of a computer data input system effectuating a maximum possible information volume contraction to facilitate a computer analysis of biological structures in some complex problems, such as the construction of a human karyotype or the determination of the blood formula. Essential in this data input system is a scanning microscope with a mechanical scanner using a rotating follow-up spot. The search for a desirable microobject is made in the plane of the sample and the scanning is executed in the plane of the image. The realization of a follow-up scanning process in this microscope is discussed. A block diagram of the scanning system is given. A specialized or universal digital computer is used to control the process. V.Z.

A71-18700 # **Man in space (Chelovek v kosmose).** S. P. Umanskii. Moscow, Voenizdat, 1970. 190 p. 34 refs. In Russian.

A general description is given of the technological aspects of manned space flight, including spacecraft and booster details, life support systems, mission characteristics, and medical considerations. The properties of the space environment are outlined, together with the effects of space flight on the human organism. Respiration, heat balance, accelerations, vibration, noise, and radiation are discussed from the viewpoint of their significance in space flight. General concepts of flight trajectories are explained with emphasis on flight paths to the moon, Mars, and Venus. Spacecraft design is treated in terms of meteorite protection, radiation shielding, temperature control, artificial gravity systems, energy sources, and sterilization. Astronaut apparel and spacesuit systems are described, and many life support systems are examined ranging from systems relying on reverses to closed systems featuring regeneration of the environment. The text is intended for a wide range of readers without special competence in the subject matter considered. T.M.

A71-18716 # **Optical distortions in the shadow projector of an aviation training apparatus (Opticheskie iskazheniia v tenevom proektore aviatsionnogo trenazhera).** A. N. Bazilevskii and A. A. Mel'nik. *Samoletostroenie i Tekhnika Vozdushnogo Flota,* no. 18, 1970, p. 133-141. In Russian.

The performance of a shadow projector as a device creating a visual illusion of the space surrounding a flying aircraft is evaluated. Special attention is given to the optical distortions due to longitudinal, lateral and vertical displacement of an observer's eye when this device is used during training sessions. Recommendations are given for the selection of projector parameters to minimize these distortions. The relation between the distortions of a visual image seen by the human eye in a shadow projector and the shadow system parameters is analyzed. V.Z.

A71-18721 # **Variation of certain physiological functions in aqualung-diver drillers (Zmina deiakikh fiziologichnikh funktsii u akvalangistiv-buril'nikiv).** S. O. Guliar, P. M. Kazakov, Iu. M. Barats, V. I. Pesok, A. O. Ivanin, and V. G. Rudenko (Donetskii Institut Gigieni Pratsi i Profesiinikh Zakhvoriuvan, Donetsk, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 768-773. 15 refs. In Ukrainian.

Respiration, blood circulation, thermoregulation, energy output, and the state of muscles were studied in eight underwater laborers (drillers) before, during, and after performing their work functions. It is shown that during manual exertion under water the organism undergoes changes whose severity depends on the nature of the labor and on the working conditions. The results are given in tables of physiological indices, including the respiration rate, minute volume, oxygen uptake, energy loss, and pulse rate. The low-temperature environment is shown to cause significant changes in the operation of the cardiovascular system, respiratory system, and thermoregulatory mechanism. T.M.

A71-18722 # **Cardiac output during submaximal exercise in children and teen-agers (Sertseve vikidannia pri submaksimal'nomu fizichnomu navantazhenni u ditei i pidlitkiv).** V. S. Mishchenko and B. K. Guniadi (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 774-783. 45 refs. In Ukrainian.

The data are presented on the minute volume of circulation (the acetylene method) and other parameters of hemodynamics in children of 8-9, 10-11 years old, teen-agers of 13-15 years and in adult people during submaximal exercise on a bicycle when oxygen consumption and functional shifts of the circulation approach the maximal indices. Besides, the data are analyzed obtained by the authors on the oxygen-transport function of blood with such a kind of load and on efficiency of circulation with respect to supplying the tissues with oxygen. It is shown that with a submaximal physical load at the age from 8-9 to 13-15 the possibilities of the central circulation grow very considerably, but utilization of oxygen from blood in this period of age development rises insignificantly. In this connection the reserve possibilities of a rise in oxygen at this age are associated to a greater extent with the peripheral factors of circulation, which are responsible for a low utilization of oxygen from blood, than with possibilities of the central circulation. At the age from 13-15 to the adult state both the central circulation, oxygen transport by blood and utilization of oxygen from blood increase. (Author)

A71-18723 # **Cardiovascular responses in case of hypoxic hypoxia (Reaktsiia sudin sertsia pri gipoksichnii gipoksii).** Iu. P. Galaguza (Institut Endokrinologii ta Obminu Rechovin, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 789-794. 33 refs. In Ukrainian.

The investigations were carried out with 25 mongrels under not deep morphine-chloral narcosis with the application of catheterization, autoperfusion and resistography of coronary vessels without chest dissection. At the same time the principal hemodynamic indices of respiration and oxygenation of arterial blood were recorded. Hypoxia caused a dilatation of the coronary vessels which was distinctly differentiated due to extravascular influences. The injection of catecholamines into the coronary artery circulation induced a dilatation of the coronary vessels. In case of hypoxia the depressor responses to catecholamines either decreased or changed into pressor-depressor or pressor ones. The changes in the responses of the coronary vessels to catecholamines are considered as a significant disorder in the regulation of coronary circulation in case of hypoxia. (Author)

A71-18724 # **Estimate of oxygen tension in the skin and kidneys (Do otsinki napruzhennia kisniu v shkiri i nirkakh).** V. Ia. Berezovs'kii and I. E. Indichenko (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 795-801. 28 refs. In Ukrainian.

Chronoamperometric measurements of oxygen tension in the skin and kidneys confirm indirect data of previous authors and show higher values than those for oxygen tension in the muscles, brain, and liver. When breathing air, the oxygen tension of the skin is about 92% and of the kidneys about 78% of the oxygen tension in arterial blood. This may be due to the specific nature of blood flow

regulation in the skin and kidneys, involving not only the delivery of oxygen, but also the functions of thermal regulation and excretion. When breathing a 95% oxygen mixture and during a hyperoxic state, the oxygen tension of all organs increases, but lags behind the increase for arterial blood. This may be caused by the spastic reaction of blood vessels, related to physiological mechanisms of protection against oxidation in the organism. T.M.

A71-18725 # **Stereoisomerism in animate nature - Its role in processes of the origin of life on earth (Stereoizomeriia v zhivii prirodi - Ii rol' u protsesakh pokhodzhennia zhittia na zemli).** R. I. Khil'chevs'ka (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 810-817. 21 refs. In Ukrainian.

Discussion of the significance of stereoisomerism in organic structures, and review of steps in the evolution of life on earth from the viewpoint of the development of stereoisomeric organic compounds. The effects of environmental conditions on a changing earth are evaluated, and energy sources available in different stages of evolution are outlined. Stereomeric forms of amino acids are considered in terms of their functions and activity. T.M.

A71-18726 # **Influence of sympathetic denervation of the heart on the activity of certain myocardium enzymes (Vpliv simpatichnoi denervatsii sertsia na aktivnist' deiakikh fermentiv miokarda).** G. M. Butenko and Iu. V. Khmelevs'kii (Kiivs'kii Medichnii Institut, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 835-838. 18 refs. In Ukrainian.

Sympathetic denervation of the heart was performed on cats and mice by surgical removal of cervical and thoracic sympathetic nerve ganglia. The activity of pyruvatedehydrogenase (PDG) and alpha-ketoglutaratedehydrogenase (GDG) in the hearts of cats was studied from two to three weeks after the operation. The activity of hexokinase (HK), lactatedehydrogenase (LDG), succindehydrogenase (SDG), and malatedehydrogenase (MDG) was studied in the hearts of mice. The activity of PDG, GDG, and SDG was reduced, while that of HK and LDG increased. An explanation is offered for the causes of the observed changes. T.M.

A71-18727 # **Excretion of glucocorticoid metabolites with urine in healthy people as a function of age and sex (Ekskretsiia metabolitiv gliukokortikoidiv iz secheiu u zdorovikh liudei zalezhno vid viku ta stati).** I. Ia. Brestovits'ka (Kharkivs'kii Institut Medichnoi Radiologii, Kharkov, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 842, 843. 6 refs. In Ukrainian.

Data for the fractional content of glucocorticoid metabolites (tetrahydrocortisol, cortisol, tetrahydrocortisone, cortisone, and tetrahydro S) in the urine of subjects differing in age and sex. Thin-film chromatography on silica gel was utilized. Tests involved 52 subjects of both sexes, grouped in ages of 20 to 29, 30 to 39, and 40 to 49. Results were processed by variational statistical techniques, and no significant differences peculiar to age or sex were found. T.M.

A71-18728 # **Influence of X rays on the protein and mineral content of blood serum in dogs (Vpliv rentgenivs'kikh promeniv na bilkovii ta mineral'nii sklad sirovatki krovi sobak).** V. I. Isaenko (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 16, Nov.-Dec. 1970, p. 845-848. 14 refs. In Ukrainian.

Experiments were performed on a group of male dogs in which four were irradiated with a 200-r dose and four were given a dose of 400 r. It is shown that overall irradiation by X rays reduced the protein content of the blood serum for both doses. Reduced globulin fractions were observed after the 200-r dose, and reduced albumin fractions were seen after 400 r. Calcium and potassium contents in blood serum dropped after both doses. Sodium content increased somewhat after 200 r, but no significant changes were seen after 400 r. T.M.

STAR ENTRIES

N71-14571# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
OLD AND NEW DATA ON TONE PERCEPTION
Reinier Plomp 1970 59 p refs
(TDCK-56077-16; IZF-1970-14) Avail: NTIS

Experiments in the physiological aspects of tone perception are discussed. The experiments treated concern, successively: (1) the ear's ability to distinguish the sinusoidal components of a complex sound, (2) the dependence of timbre as a multidimensional attribute of complex sounds upon the amplitude pattern and the phase pattern of the harmonics, (3) the occurrence of combination tones as products of the ear's nonlinearity, (4) the occurrence of beats between sinusoidal tones with frequency ratios slightly different from m:n (m, n small integers) as evidence for the ear's phase sensitivity, and (5) the dependence of tonal consonance and dissonance of simultaneous complex tones on critical bandwidth. Author

N71-14572# Oak Ridge National Lab., Tenn.
APPLIED HEALTH PHYSICS AND SAFETY Annual Report, 1969
Aug. 1970 68 p refs
(Contract HW-7405-eng-26)
(ORNL-4563) Avail: NTIS

There were no accidental releases of gaseous or liquid waste from the Laboratory that were of a reportable level as defined in AEC Manual Chapter 0524. The concentration of radioactive materials in the environs was well below the maximum levels recommended by the ICRP, FRC, and AEC. No employees received an external or internal radiation dose of a level that required a report to the AEC. The highest whole-body dose received by an employee was about 3.8 rem or 32% of the maximum permissible annual dose. There were no cases of internal exposure where the deposition of radioactive materials within the body was estimated to have averaged greater than one-half of a maximum permissible body burden. There were 12 unusual occurrences recorded during 1969, which is the lowest number recorded since the present system of reporting unusual occurrences was established in 1960. The second lowest number for any one year was 16, the number reported for 1967. The average number reported for the past five years was 22. Author (NSA)

N71-14573# Brandeis Univ., Waltham, Mass.
[ON PROPERTIES OF X-IRRADIATED lambda PHAGES] Progress Report, 1 Jan.–30 Jun. 1970
David M. Freifelder 15 Jun. 1970 7 p refs
(Contract AT(30-1)-3797)
(NYO-3797-10) Avail: NTIS

It was shown that an X-irradiated lambda phage could inject only a fragment of its DNA into bacteria. When lambda DNA was fragmented to low molecular weight and centrifuged, it was found that fragments from both the left and the right ends of the phage DNA were injected with equal frequency. It was found that replication of lambda DNA proceeded simultaneously to the left and right. Recombination studies showed that if the irradiation was carried out in the absence of oxygen there was a stimulation of recombination by X-radiation. Deoxyribonucleic acid was released from P labeled T7 phage and subjected to zonal centrifugation. It was shown that the terminal regions were very high in adenine and thymine. NSA

N71-14574# Argonne National Lab., Ill.
THE ARGONNE RADIUM STUDIES: COMPUTED RADIOBIOLOGICAL INDICES
Charles E. Miller, Asher J. Finkel, and Robert J. Hasterlik (Argonne Cancer Res. Hospital) Apr. 1969 110 p refs
(Contracts W-31-109-eng-38; AT(11-1)-2088)
(ANL-7680) Avail: NTIS

Data are tabulated on a number of radiobiological indices for 208 humans with a Ra burden acquired by ingestion during occupational exposure. Data are included on the exposure history of each person, radium body burdens as determined by whole-body counting, radiographic changes in bones attributed to radium, daily dose rate to the skeleton of each patient calculated in rads, and calculations of the radiation dose for a hypothetical patient who worked 30 days and contained 1 micro Ci of Ra on the 14,000th day following cessation of employment. Computer programs were used to compile the data. NSA

N71-14575# IIT Research Inst., Chicago, Ill.
EFFECTS OF CARBON MONOXIDE ON BRAIN CELLULAR METABOLISM IN MONKEYS Final Report, Nov. 1968–Jun. 1969
Marilyn E. George, James P. F. Murphy, and Kenneth C. Back Wright-Patterson AFB, Ohio AMRL Aug. 1970 32 p refs
(Contract F33615-68-C-1270)
(AD-713609; AMRL-TR-70-88) Avail: NTIS CSCL 6/20

The toxicity of carbon monoxide has been extensively studied in many animal species and in man. The current interest is primarily concerned with air pollution and with establishing standards and controls for community and industrial atmospheric contamination. The effects of low level exposure to various air pollutants, including carbon monoxide, on the general population, i.e., people of all age groups in varying states of health and disease, are receiving wide attention. A study was undertaken to determine if continuous CO exposure would cause changes in brain tissue at the cellular and subcellular level in the absence of any overt clinical signs and to establish and measure any impairment in cellular respiration and high energy production. Relatively high concentrations of CO were used initially in an attempt to induce changes with succeeding exposures to be at lower concentrations. The two exposure concentrations of CO described in this paper were 220 mg/cu M and 440 mg/cu M in the atmosphere used for spacecraft; namely, 68% oxygen, 32% nitrogen at 5 psia. Author (TAB)

N71-14576# Army Behavior and Systems Research Lab. Arlington, Va.
HUMAN PERFORMANCE EXPERIMENTATION IN NIGHT OPERATIONS: TECHNOLOGY AND INSTRUMENTATION FOR FIELD RESEARCH. NIGHT OPERATIONS PROGRAM
Aaron Hyman, Jack J. Sternberg, and James H. Banks Jun. 1970 29 p refs
(AD-713463; BESRL-TRN-223) Avail: NTIS CSCL 5/5

The NIGHT OPERATIONS program is concerned with problems in optimizing human performance in relation to night vision devices and related sensors. The present publication provides a description and evaluation of the effectiveness of an instrumentation system developed under concepts provided by BESRL research scientists.

The primary objective in this phase of the research was to develop an instrumentation system, embodying the requirements and essential characteristics for effective and accurate measurement of target detection and search behavior in field testing. Author (TAB)

N71-14601*# Research Triangle Inst., Durham, N.C.
APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Semiannual Report, 15 Mar.–30 Sep. 1970
Sep. 1970 159 p refs
(Contract NASw-1950)
(NASA-CR-115888) Avail: NTIS CSCL 06B

The activities of a biomedical application team are presented. Subjects discussed are: (1) team composition and participating medical institutions, (2) summary and analysis of technology transfers, (3) summary and analysis of problems investigated by the biomedical application team, and (4) computer information searches. Author

N71-14602*# General Electric Co., Schenectady, N.Y. Research and Development Center.
APOLLO HELMET DOSIMETRY EXPERIMENTS Final Report
G. M. Comstock, R. L. Fleischer, and H. R. Hart, Jr. Nov. 1970 29 p refs
(Contract NAS9-9828)
(NASA-CR-114804) Avail: NTIS CSCL 06B

Recent reports by Apollo astronauts of lines of light apparently seen with the eyes closed have caused concern for the possible biological effects of heavily ionizing particles that penetrate the shielding of the spacecraft or space suit. A dosimetry experiment consists of using plastic Apollo helmets as recorders of heavy cosmic ray particles directly incident on the face and heads of the astronauts. Particle tracks are revealed by chemically etching the interior of the Lexan polycarbonrate helmet to produce cone-shaped holes, which are later counted. Author

N71-14609# RAND Corp., Santa Monica, Calif.
THE PUPIL: IMPORTANCE IN THE OPTICS OF THE VISUAL SYSTEM. PART 1: CLINICAL DATA
Hubert L. Moshin and Edward Goodlaw Oct. 1970 25 p refs Presented at the Meeting of the Am. Acad. of Optometry, Fla., Dec. 1970
(AD-713427; P-4469-Pt-1) Avail: NTIS CSCL 6/5

Closeup photographs were taken of each eye of 163 patients who had obtained and were wearing contact lenses. These photographs were taken in both an illuminated and a dark environment. Twenty-three variables were recorded and seven of these, relative to the pupil diameter, were analyzed. These data were then evaluated against the findings of other investigators. Author (TAB)

N71-14625# Joint Publications Research Service, Washington, D.C.
COORDINATION OF HUMAN VOLUNTARY MOVEMENTS IN SPACEFLIGHT
L. V. Chkhaidze 2 Dec. 1970 127 p refs Transl. into ENGLISH of the publ. 'Koordinatsiya Proizvolnykh Dvizheniy Chelovaka v Usloviyakh Kosmicheskogo Poleta' Moscow, Sci. Publishing House, 1968 p 1–135
(JPRS-51899) Avail: NTIS

A detailed examination of the theoretical principles concerning the coordination of man's movements under normal conditions and when exposed to increased and reduced gravity fields is presented. Self-observations of cosmonauts on the stability of their motor skills during flight are also given, confirming the general conclusions drawn concerning the possibility of man retaining the coordination of movements during space flight in orbiting satellites. Author

N71-14632*# Israel Program for Scientific Translations, Ltd., Jerusalem.
BIOLOGICAL EFFECT OF MICROWAVES IN OCCUPATIONAL HYGIENE
Z. V. Gordon 1970 101 p refs Transl. into ENGLISH of the publ. 'Voprosy Gigieny Truda i Biologicheskogo Deistviya Elektromagnitnykh Polei Svekhvysokikh Chastot Leningrad, Izd-Vo. Med., 1966 Supported by NASA and NSF
(NASA-TT-F-633; TT-70-50087) Copyright. Avail: NTIS CSCL 06I

Results of years of investigations in collaboration with laboratory personnel in the fields of occupational hygiene and biological effects of radio frequency electromagnetic irradiation are generalized for the range of superhigh frequencies (SHF). Emphasis has been placed on the occupational hygiene of personnel working with SHF sources and on protection against detrimental effects established by clinical and experimental investigations. A.L.

N71-14633*# University of Southern Calif., Los Angeles. Environmental Physiological Labs.
MONITORING CARDIOVASCULAR FUNCTION IN THE PRIMATE UNDER PROLONGED WEIGHTLESSNESS
John P. Meehan and Roland D. Rader [1970] 48 p refs
(Contract NAS2-2633)
(NASA-CR-73498) Avail: NTIS CSCL 06P

The Biosatellite 3 primate orbital mission was undertaken to determine the physiological effects of earth orbit on subhuman primates, to provide insights into possible hazards associated with long term space flights, and to acquire information on basic physiological adjustments to extended weightlessness. The design and construction of bioinstrumentation, ground conditioning experiments, and results of the flight tests are described. A.L.

N71-14641# School of Aerospace Medicine, Brooks AFB, Tex.
SOME EFFECTS OF D-AMPHETAMINE ON CARBOHYDRATE METABOLISM AT GROUND LEVEL AND ALTITUDE Interim Report, Dec. 1969–Mar. 1970
Patricia R. Korty Sep. 1970 10 p refs
(AD-713726; SAM-TR-70-62) Avail: NTIS CSCL 6/19

Measurement was made of blood glucose, liver glycogen, phosphorylase, and glucose-6-phosphatase in rats treated with d-amphetamine at ground level and at a simulated altitude of 8,000 ft. An increase in blood sugar levels was obtained in drug-treated animals in both environments. Altitude exposure per se also increased blood sugar levels, but the increase was not additive at altitude following drug treatment. Liver glucose-6-phosphatase activity was unaffected by drug or altitude exposure. Glycogen levels were lower in both amphetamine-treated groups, while phosphorylase activity was increased. The response of these two parameters was the same at ground level and at altitude. Author (TAB)

N71-14651# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

A COMPARISON OF VISUAL AND AUDITORY AUTOKINESIS

F. Ph. van Eyl and J. Th. Eernst [1970] 20 p refs
(IZF-1970-12; TDCK-55847) Avail: NTIS

The stationary visual stimulus was a 2-mm lightsource, the stationary auditory stimulus a 2000-Hz sine wave. Both stimuli were presented singly or simultaneously in a reverberation room and in an anechoic room. More visual than auditory movement was reported and statistical analysis of the Experiment 2 data showed a significant interaction between mode of stimulus presentation and kind of environment: visual autokinesis was greater in the anechoic room, auditory autokinesis was greater in the reverberation room. The same interaction tendency was present in the Experiment 1 data but they did not reach statistical significance. It is suggested that the difference in extent of interaction was due to the fact that Ss were standing in Experiment 1 and seated in Experiment 2. The found autokinesis/environment interaction fits the frame-of-reference theory if it is assumed that spatial orientation (person-room relationship) was a variable. Auditory autokinesis can be attributed in part to response-bias behavior. Author

N71-14653*# Oakland Univ., Rochester, Mich. School of Engineering.

BIOSYSTEMS ENGINEERING RESEARCH. VOLUME 4: AUGMENTATION OF THE FOCUS CONTROL SYSTEM OF THE HUMAN EYE THROUGH INDEX OF REFRACTION VARIATION OF LIQUID CRYSTALS MATERIALS Final Report, 15 Mar. 1969 – 31 Jun. 1970

R. H. Edgerton Nov. 1970 49 p refs
(Grant NGR-23-054-003)
(NASA-CR-115864; TR-70-8) Avail: NTIS CSCL 06P

Research on the feasibility of developing a focus control device utilizing nematic liquid crystals is presented. Application to the development of a replacement for bifocal lenses is discussed. Experimental results obtained by applying a simple shear to nematic liquid crystals demonstrated that approximately a 5% change in index of refraction is realizable. A theoretical model to predict changes in the index of refraction assuming the crystals behave as ellipsoids when in a shear field is developed. This model is used in the geometrical design of the shear element. Author

N71-14665# Naval Postgraduate School, Monterey, Calif.

ACTIVITY LEVELS AND AIRCRAFT TYPES IN JET PROFICIENCY FLYING CRT AT NALF MONTEREY. DATA ACQUISITION AT FOUR HOURS PER MONTH IN THE T-1A AIRPLANE Interim Technical Report

David A. Schrady Sep. 1970 84 p refs
(AD-713115; NPS-55SO0091A; ITR-1) Avail: NTIS CSCL 5/9

Methods were developed for the collection of data with respect to the knowledge, skill, and satisfaction of aviators in combat readiness training (CRT). The methods are described and data pertaining to aviators flying the T-1A aircraft at the rate of forty-eight hours per year is given. Author (TAB)

N71-14666# Martin Marietta Corp., Baltimore, Md. Research Inst. for Advanced Studies.

PHOTOCHEMISTRY AND ENZYMOLOGY OF PHOTOSYNTHESIS Technical Report, 1 May 1969 – 30 Jan. 1970

30 Jan. 1970 13 p refs
(Contract AT(30-1)-3706)
(RIAS-3706-15) Avail: NTIS

The concept of light conversion in photosynthesis reviewed is shown to have the electron transport chain driven by two linearly connected photosystems. Each photosystem consists of separate physical units, containing chlorophylls which funnel their absorbed energy into a trapping center. Each photosystem and the connecting ATP and ADP chain are described. Research given the most emphasis is outlined, and includes the cooperation of positive charges in oxygen evolution; pool sizes and kinetics of the interconnecting reaction chain; energy migration in the pigment bed; and role of manganese in oxygen evolution. N.E.N.

N71-14667# IIT Research Inst., Chicago, Ill.

CAPABILITIES IN MECHANICAL ENGINEERING

[1970] 18 p
Avail: NTIS

Aerospace research was achieved in the fields of crew restraint, life support, lunar surface exploration devices, and lunar shelter technology. Machine design for industry and government resulted in the development of totally new processes, high-speed assembly and packaging equipment, and unique approaches to mechanization. Current research has added knowledge to the phenomena of hypervelocity projection and impact, interior ballistics of unconventional launch systems, new methods of initiation of explosives, and space trajectory models. A space simulation laboratory permits the study of solar ultraviolet degradation, vacuum friction, sealing, lubrication, and cold welding while maintaining models under an ultrahigh vacuum. Author

N71-14668# California Univ., San Francisco. Lab. of Radiobiology.

SIMILARITIES AND DIFFERENCES BETWEEN UV AND IONIZING RADIATION DEATH

Robert B. Painter [1970] 10 p refs Submitted for publication Supported by AEC
(UCSF-10-P-2-114; Conf-700610-6) Avail: NTIS

Comparisons of the effects of ultraviolet and X-radiation on mammalian cells are made using data from recent literature. Studies on survival levels and radioinduced damage to DNA of Chinese hamster cells indicated that ultraviolet radiation caused 1,000 times as much damage as X-rays. Studies on HeLa cells showed that although X - radiation caused mitotic delay, nearly every cell arrived at and completed the first mitosis; however, with uv, cell death often occurred during the first S phase after irradiation and many cells never arrived at mitosis. Mechanisms of repair of sublethal damage by mammalian cells are compared for uv and X-radiation. Repair of X-ray damage begins immediately, requires 1-1/2 to 2 hrs for maximum expression, and is relatively independent of cell cycle position. The action of uv, however, suggests that the main problem encountered by the cell is successful completion of DNA replication. NSA

N71-14673# Frankford Arsenal, Philadelphia, Pa.

RETINAL DAMAGE BY Q-SWITCHED RUBY LASER

Edwin S. Beatrice, M. B. Landers, J. O. Powell, and G. H. Bresnick 1970 15 p refs
(AD-713511) Avail: NTIS CSCL 6/5

In studies of retinal damage by the Q-switched ruby laser, threshold values were determined for both minimal and large retinal spot sizes. In addition to using the conventional ophthalmoscopic methods for detecting injury in the living animal, histopathological examinations were performed on a number of irradiated eyes following enucleation. The microscopic evaluation of irradiated tissue was considered to be particularly important in the minimal retinal spot size experiments in order to support the ophthalmoscopic

observations of very small retinal lesions. In analyzing the data the macular and extramacular exposure sites have been considered separately because of conflicting reports concerning the relative sensitivity of these two retinal areas to laser damage. Author (TAB)

N71-14683# Human Resources Research Organization, Alexandria, Va.
DEVICE-TASK FIDELITY AND TRANSFER OF TRAINING: AIRCRAFT COCKPIT PROCEDURES TRAINING
Wallace W. Prophet and H. Alton Boyd Jul. 1970 55 p refs
(Contract DAHC19-70-C-0012)
(AD-713433; HumRRO-TR-70-10) Avail: NTIS CSCL 5/9

The objective of the research was to evaluate the training effectiveness of two cockpit procedures training devices, differing greatly in their physical fidelity (and, consequently, cost), in the teaching of ground cockpit procedures for a twin-engine, turboprop, fixed wing aircraft. One group of students received training in cockpit procedures in a relatively expensive, sophisticated, high-fidelity, computerized cockpit procedures trainer, while another group were trained in an inexpensive, low-fidelity mockup of the aircraft cockpit. Their subsequent performance in the actual aircraft was compared with that of a control group who received all of their procedures training in the aircraft. Results indicated that both training devices produced significant transfer of training, in terms of error and time reduction, in performance in the actual aircraft. There were no significant differences in training effectiveness of the two devices, in spite of their great differences in physical fidelity and cost. Implications for the design of procedures training devices and associated training programs are discussed. Author (TAB)

N71-14684# Brookhaven National Lab., Upton, N.Y.
EVALUATION OF POTENTIAL HAZARDS FROM TRITIUM WATER
V. P. Bond Jul. 1970 25 p refs Presented at the Symp. on Environ. Aspects of Nucl. Power Stations, New York, 10-14 Aug. 1970 Sponsored by AEC
(CONF-700810-6; SM-146/13) Avail: NTIS

The possible biological effects of tritium are analyzed, and several factors that must go into an evaluation are considered both from the theoretical and experimental standpoints. Maximum permissible concentrations or maximum permissible doses of tritium are based principally on the absorbed radiation dose delivered by the tritium beta rays. Several possible factors that might increase the degree of toxicity over that expected from the absorbed dose are considered in detail. These include the possibility of biological concentration of tritium, or of additional toxicity by virtue of the fact that some tritium may be incorporated into biological molecules such as DNA. The conclusion is reached that these factors do not significantly increase the effective dose that might be expected from a given concentration of tritium in the environment. Author (NSA)

N71-14696# Oak Ridge National Lab., Tenn.
STUDY OF CHROMOSOMAL ABERRATIONS IN PERSONS EXPOSED TO REPEATED OCCUPATIONAL IRRADIATION
A. V. Sevan'kaev et al [1969] 5 p refs Transl. into ENGLISH from Genetika (USSR), v. 5, no. 7, 1969 p 126-128 Sponsored by AEC
(ORNL-tr-2332) Avail: NTIS

Chromosome aberrations were studied in a culture of peripheral blood leukocytes taken from 12 men subjected to repeated professional gamma irradiation during periods of time varying from 2 months to 4 years. The total cumulative doses received by these men during these periods varied from 0.02 to 2.08 R. The frequency of chromosomal aberrations in this group was shown to be 3 to 4 times as high as that in the control group consisting of 7 men of the same age. The frequency of aneuploid cells was also higher than in the control group. The determination of the chromosome aberrations in the cultures of peripheral blood leukocytes is recommended as a method of detection of the early symptoms of the effect on the organism of low radiation levels associated with the profession of the persons affected and with roentgeno-radiological medical procedures. Author (NSA)

N71-14702# School of Aerospace Medicine, Brooks AFB, Tex. Pharmacology-Biochemistry Branch.
DECREASED DIURESIS IN RESPONSE TO A THIAZIDE DIURETIC AT A SIMULATED ALTITUDE Interim Report, Jan.-Mar. 1970
Thomas S. Sulkowski and James H. Merritt Aug. 1970 12 p refs
(AD-713069; SAM-TR-70-48) Avail: NTIS CSCL 6/15

The effect of hydrochlorothiazide on the diuretic response of rats at 12,000 ft. was examined. After administration of a saline load, with and without drug, urine was collected over a 5-hr. period at both altitude and ground level. Total volume, urinary Na(+) and K(+), and pH were determined. The most pronounced effect of the altitude-drug interaction was decrease in the expected urine volume while the increased Na(+) output did not change from the observed with the drug at ground level. The results are discussed in relation to the possible basis for the observed phenomenon. Author (TAB)

N71-14703# School of Aerospace Medicine, Brooks AFB, Tex. Neuropsychiatry Branch.
PERFORMANCE DECREMENT AS A FUNCTION OF SEVEN DAYS OF BEDREST Final Report, Oct.-Nov. 1969
Ralph W. Trimble and Charles S. Lessard Sep. 1970 11 p refs
(AD-713070; SAM-TR-70-56) Avail: NTIS CSCL 5/10

The hypothesis that performance decrements will occur as a function of 7 days of complete bedrest was tested in a study in which healthy, normal, young adult males served as subjects. Results indicate that longer periods of bedrest may be needed before any decrements become observable in this type of study. Author (TAB)

N71-14705# Battelle Memorial Inst., Columbus, Ohio.
LOW-PRESSURE COMPRESSED AIR BREATHING SYSTEMS STUDY. 2: MARK 5 HELMET VENTILATION STUDIES Summary Technical Report, 1 Apr.-1 Aug. 1970
Jerry A. Henkener 22 Sep. 1970 53 p refs
(Contract N00014-69-C-0352)
(AD-713395) Avail: NTIS CSCL 6/11

This report presents experimental results of a testing program for determining mixing effectiveness factors and required ventilation rates for U. S. Navy Mark V diving helmets. Based upon the experimental results and data the following are concluded: Previous ventilation calculations based on a mixing effectiveness factor of 1.0 were conservative; a data base was obtained to more accurately predict required ventilation rates for hard hat diving; The data base for the Mark V should prove to be a valuable tool for comparing the effectiveness of other ventilated helmets. Author (TAB)

N71-14706# Battelle-Northwest, Richland, Wash.
THE DOSE FROM Kr 85 RELEASED TO THE EARTH'S ATMOSPHERE

M. M. Hendrickson Jul. 1970 15 p refs Presented at the Symp. on Environ. Aspects of Nucl. Power Stations, New York Sponsored in part by AEC
(BNWL-SA-3233-A; CONF-700810-16; SM-146/12) Avail: NTIS

The total body exposure rate was calculated for immersion in Kr-85. The exposure from both gamma rays and from X-rays produced from bremsstrahlung was accounted for. Immersion exposure for one year to a semi-infinite cloud of Kr-85 with an activity concentration of 3 × 10 to the minus 6th power microcurie/cu cm would result in a calculated dose of 75 mrem. In numerous instances 1/10 the above concentration has been equated to a total body exposure rate of 500 mrem per year when in fact a continuous concentration of 3 × 10 to the minus 7th power microcurie/cu cm is calculated to give a total body exposure rate of 7.5 mrem per year. The reason for the numerous overestimates of the projected total body dose is traceable to use of the recommendations of the ICRP for immersion dose calculations. The ICRP-recommended method gives valid estimates of the dose for mixtures of inert gas isotopes which are primarily gamma emitters, not beta emmiters. The method also gives a valid estimate of the skin dose for beta emitters. Author (NSA)

N71-14722# State Univ. of New York, Stony Brook. Div. of Biological Sciences.
BIOCHEMISTRY OF GROWTH, GAMETOGENESIS, AND FERTILIZATION IN ALGAE Comprehensive Report, Oct. 1967 – Sep. 1970
Sep. 1970 36 p refs
(Contract AT(30-1)-3475)
(NYO-3475-24) Avail: NTIS

Research investigation indicates that the unicellular green alga chlamydomonas reinhardtii is a model system for the study of cell differentiation during growth, gametogenesis, and fertilization. Briefly reviewed are: the organism and its potential; synchronous growth and cell division; periodic enzyme activity; gametogenic differentiation; nucleic acid synthesis during vegetative growth and gametogenic differentiation; and, role or organelle and nuclear DNA in growth and development in Chlamydomonas. A.L.

N71-14741# Army Natick Labs., Mass.
MICROCLIMATE-CONTROLLED (THERMALIBRIUM) CLOTHING SYSTEMS FOR MILITARY APPLICATIONS
Leo A. Spano and Vincent D. Iacono [1970] 15 p
(AD-713581) Avail: NTIS CSCL 6/17

Contents: Design principles for microclimate-controlled protective clothing systems; Protective clothing system for explosive ordnance disposal; Air-conditioned clothing for Army aircrewmen; and Performance evaluation of air-conditioned clothing. TAB

N71-14742# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
PARAMETERS OF HUMAN PATTERN PERCEPTION Semiannual Progress Report, 18 Mar. – 18 Sep. 1970
Selby H. Evans 18 Oct. 1970 31 p refs
(Contract DAAD05-68-C-0176; Proj. Themis)
(AD-713185; SAPR-6) Avail: NTIS CSCL 5/10

The report is the sixth semi-annual progress report on a research program an parameters of human pattern perception. Empirical developments during this period have included: The successful application of multivariate techniques to the study of feature selection, and further specification of the effects of knowledge of results and temporal context on pattern recognition performance. Methodological and empirical results from the laboratory have been extended to the areas of individual difference testing and discrimination of polygraph recordings. Author (TAB)

N71-14743# Illinois Univ., Urbana. Aviation Research Lab.
WHAT MOVES, THE AIRPLANE OR THE WORLD? A REVIEW OF THE MOTION RELATIONSHIP PROBLEM IN PRESENTING AIRCRAFT ATTITUDE AND GUIDANCE INFORMATION
Steven L. Johnson and Stanley N. Roscoe Jun. 1970 50 p refs
(Contract N00014-67-A-0305-0014)
(AD-713179; ONR-70-1) Avail: NTIS CSCL 1/4

Display motion relationships for attitude and steering indicators have always been controversial issues in flight display design. The questions involve whether the pilot thinks the aircraft is moving relative to the outside world or the outside world is moving relative to the airplane. The pertinent information, obtained through both experience and formal experimentation, is reviewed. An alternative to the standard forms of attitude presentation employs the frequency separation principle. The problems considered when doing experimental investigations on flight displays are subject pools, research environments, flight tasks, and performance measures. Research requirements necessary to solve the longstanding questions on display motion relationships are presented. Author (TAB)

N71-14832# Maryland Univ., College Park. Computer Science Center.
EDGE AND CURVE DETECTION FOR VISUAL SCENE ANALYSIS
Azriel Rosenfeld and Mark Thurston Aug. 1970 37 p refs
(Contract F19628-70-C-0208)
(AD-713159; AFCRL-70-0488; SR-1) Avail: NTIS CSCL 6/16

Simple sets of parallel operations are described which can be used to detect texture edges, spots and streaks in digitized pictures. By comparing the outputs of the operations corresponding to (e.g.) edges of different sizes, a composite output may be constructed in which edges between differently textured regions are detected, and isolated objects are also detected, but the objects composing the textures are ignored. Relationships between this class of picture processing operations and the Gestalt psychologists laws of pictorial pattern organization are discussed. Author (TAB)

N71-14833# Maryland Univ., College Park. Computer Science Center.
SHAPE SYNTHESIS, 1
Azriel Rosenfeld and Emily Johnston Sep. 1970 34 p refs
(Contract F19628-70-C-0208)
(AD-713163; CSC-TR-70-130; SR-2; AFCRL-70-0502) Avail: NTIS CSCL 6/4

The project is concerned with the computer synthesis of classes of natural shapes and patterns. The goal is to gain an understanding of the types of mathematical models that can be used to specify such classes. In this initial study, an approach based on medial axis transformations was used, and the synthesis of leaf shapes was taken as a test problem. A computer program was written to implement the chosen approach, and a mathematical model for this approach - in effect, a picture grammar for the leaf shapes - was formulated. Explicit use of coordinates appears to be desirable in grammars of this type. Author (TAB)

N71-14834# Technology, Inc., San Antonio, Tex. Life Sciences Div.

EVALUATION OF EYE HAZARDS FROM NUCLEAR DETONATIONS Final Report, 1 Aug. 1969 – 31 Aug. 1970

James A. Nickel Sep. 1970 62 p refs

(Contract F41609-69-C-0049)

(AD-713152) Avail: NTIS CSCL 6/21

The retinal exposure equation, from which safe separation distances were calculated, was used as a basis for developing a linearized equation. New scaling laws for the spectral power and fireball radiance were also developed. These equations were used in deriving a variance equation for the safe separation distance. This equation is expressed in terms of variances of the independent variables: retinal exposure, time of irradiation, yield, observer and burst altitude. The importance of retinal irradiance at the time of cutoff (as effected by blinking or introduction of other shielding) is demonstrated by an analysis of the coefficients in the variance equation, supported by a limited set of calculations. Retinal irradiance is affected by variations in the f-number of the eye and pulse profile of the fireball. The largest variances occur when the cutoff time is near a radiance maximum (approximately a thermal maximum). Small increases in the variance are realized with increased differences in the vertical separation of observer and fireball, but these appear to be of importance only with very low yield weapons. Author (TAB)

N71-14899*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

THE EFFECTS OF MOTION CUES AND MOTION SCALING ON ONE- AND TWO-AXIS COMPENSATORY CONTROL TASKS

Hugh P. Bergeron, James J. Adams, and George J. Hurt, Jr. Washington Jan. 1971 30 p refs

(NASA-TN-D-6110; L-7365) Avail: NTIS CSCL 06B

One- and two-axis compensatory control tasks were performed both with and without motion inputs. Additional tests were made in which the motion input, compared with the visual input, was reduced in scale. Little or no difference in error measurements was observed in the single-axis-motion/no-motion tests. However, a decrease in normalized tracking error and an increase in the closed-loop system frequency were observed when motion was added to the two-axis tests. In the tests with reduced motion scale, the normalized tracking error remained constant for full 1/2, and 1/4 motion scaling but increased with a further reduction in motion scaling. In general, the results show that motion may or may not be an aid in controlling a compensatory tracking task, depending on the difficulty of the task and on the requirements of the mission. Also it is shown that for cases in which motion is beneficial, it is not always necessary to supply full-scale motion cues. Author

N71-14917*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A METHOD OF DESCRIBING THE SPONTANEOUS ACTIVITY OF NERVE UNITS THAT EXHIBIT A STOCHASTIC DEAD TIME

Michio Aoyagi Nov. 1970 20 p refs

(NASA-TM-X-62007) Avail: NTIS CSCL 06P

A method is presented for describing the statistical characteristics of the spontaneous electrical activity of nerve units that have stochaaric dead times following an impulse. The method is based on the determination of the possible functional forms of the marginal cumulative distribution of the interspike times that result from a concept of the nerve unit behavior. For the purpose of illustration, the method is applied in the appendix to an observed series of electrical impulses originating spontaneously from an isolated vestibular nerve unit of the frog. Author

N71-14991# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

AUDITORY PROCESSING FOR SPEECH INTELLIGIBILITY IMPROVEMENT

Jerry V. Tobias Apr. 1970 12 p refs

(FAA-AM-70-6) Avail: NTIS

The human auditory system, appropriately stimulated, is capable of creating the effect of an improved signal-to-noise ratio without actually changing either the signal or the noise intensities. Tests of these techniques show that their proper appllication to a loudspeaker-listening situation is equivalent to a 5-dB improvement in signal-to-noise ratio. Since the method is based in the human observer's signal-processing ability, it requires no special equipment in the aircraft. Two loudspeakers are used, driven from the same signal source, but with the two speakers wired in opposite phase to each other. Within broad limits, variations in speaker placement permit the improved results. These limits are defined. Author

N71-14992# Joint Publications Research Service, Washington, D.C.

THIRD ALL-UNION CONFERENCE ON ENGINEERING PSYCHOLOGY

N. Mazok 16 Dec. 1970 10 p Transl. into ENGLISH from Sots. Trud (Moscow), No. 10, Oct. 1970 p 149 – 153 Conf. held at Kalinin, 7 – 11 Jul. 1970

(JPRS-52006) Avail: NTIS

The development of engineering psychology an an independent science is discussed. The topics discussed include systems engineering, the reliability and effectiveness of man-machine systems, reception and processing of information by the human operator, means of presenting information, modeling in engineering psychology, and methods of research and experiment planning. R.B.

N71-15481# Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.

SPARK CHAMBERS AND THEIR APPLICATIONS TO NUCLEAR MEDICINE [CHAMBRES A ETINCELLES ET APPLICATION A LA MEDECINE NUCLEARE]

Alain Lansiart 1970 19 p refs In FRENCH Presented at the 12th Meeting on Exploration Tech. Using Radioact. Isotopes, Strasbourg, 22 – 24 May 1970

(CEA-CONF-1578; CONF-700536-1) Avail: AEC Depository Libraries

The development of spark chambers is briefly reviewed, and their classification (operation by wall effects, gas particle interactions, three electrode chamber) and different recording techniques are discussed. An example is given of the excellent results obtained using the Kellershohm-Lansiart chamber for thyroid examination. Author (NSA)

N71-15494# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.

DOSE DISTRIBUTION OF PRIMARY NEUTRON COLLISION IN TISSUE AS A FUNCTION OF LINEAR ENERGY TRANSFER [DISTRIBUTION DE LA DOSE DE PREMIERE COLLISION DES NEUTRONS DANS LES TISSUS EN FONCTION DU TRANSFERET D'ENERGIE LINEIQUE]

Marc H. Dousset, Jean Hamard, and Alain Ricourt [1970] 26 p refs In FRENCH; ENGLISH summary Presented at the 2d Intern. Radiation Protect. Assoc. Congr., Brighton, England, 3 – 8 May 1970

(CEA-Conf-1554; Conf-700505-12) Avail: AEC Depository Libraries

In order to contribute to the interpretation of the radiobiological data obtained when thin samples of tissue are exposed to neutrons,

the first collision dose distribution as a function of LET was calculated for monoenergetic neutrons with energies between 0.025 eV and 10 MeV. From the results obtained the same distribution for neutrons with complex energy spectrum may be easily calculated. Author (NSA)

N71-15718# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.

EFFECTS ON HEALTH OF ATMOSPHERIC DISCHARGES OF TRITIATED STEAM

Jacques Planet, Guy Uzzan, and Jacques Le Grand 1970 23 p refs In FRENCH Presented at the 2d Congr. of the Intern. Radiation Protection Assoc., Brighton, England

(CEA-CONF-1560; CONF-700505-11) Avail: AEC Depository Libraries

A general method of evaluating the irradiation of man is first described and then applied to the case of a given site. The dispersion of tritiated water in the physical environment (dispersion in air, rainwater contamination, and ground contamination), the contamination of plant and animal foodstuffs, and finally the irradiation of man are examined. The dose corresponding to a yearly exposure in a contaminated atmosphere and the variation in this dose as a function of the age of individuals are estimated. The dose absorbed by ingestion of tritiated water vapor is also studied. This method is applied to a plant, 3 km distant from a village, discharging tritiated steam continuously through a chimney. Author (NSA)

N71-15724# Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany).

INVESTIGATIONS ON LUMINOUS BACTERIA FOR EXPERIMENTS IN ROCKETS AND SATELLITES [UNTERSUCHUNGEN AN LEUCHTBAKTERIEN FUER RAKETEN- UND SATELLITENEXPERIMENTE]

H. Buecker, G. Horneck, E. Kuepper, and G. Roeder Bad Godesberg, West Ger. Bundesmin. fuer Bildung und Wiss. Aug. 1970 59 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Bildung und Wiss.

(BMBW-FB-W-70-46) Avail: NTIS; ZLDI Munich: 12 DM

Continuous measurements of spaceflight effects on cellular metabolism were planned using bacterial luminescence. Tests were conducted with luminous bacteria (Photobacterium harveyi and pierantonii) and the effects of selected simulated space factors e.g. ultraviolet light, high vacuum, on luminescence, growth, and colony formation were investigated and found to be similar. The luminescence increased after ultraviolet irradiation of 600 microwatt sec/sq cm. Author (ESRO)

N71-15749# Naval Research Lab., Washington, D.C.

USE OF LiF TEFLON DISCS IN LAMINATED IDENTIFICATION PASSES FOR PERSONNEL ACCIDENT DOSIMETRY

A. E. Nash and F. H. Attix *In its* Rept. of NRL Progr., Oct. 1970 p 11 15 refs (See N71-15747 06-24)

Avail: NTIS CSCL 18F

The application of LiF-Teflon disks laminated between the plastic layers of an identification pass is described. Pairs of (Li-7)F and (Li-8)F disks are employed to provide some neutron detection capability. The disks are each 6 millimeters in diameter and 0.13 millimeter in thickness, and the pair is wrapped in aluminum foil to avoid sticking to the lamination and generation of spurious thermoluminescent signals. Author

N71-15832*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

INTENSIVE CARE ALARM INDICATOR SYSTEM Final Technical Report, 22 Jun. 28 Aug. 1970

J. Lauris Christensen and Andre L. Hebert Jan. 1971 36 p refs

(NASA-TM-X-65421; X-207-71-10) Avail: NTIS CSCL 06B

Based on observations of the nurse alerting system in the Intensive Care Unit of three hospitals, a recommendation is submitted for an inductive loop system with an audible signal. The device would be worn by the staff responsible for care, usually within the immediate area of room, and would indicate when alarms on monitoring equipment are activated. A diagram of the prototype loop system is presented. The floor plan, type of interface, amplifier output, and packaging of the receiver are some of the variables which must be established prior to final installation at each location. It should be noted that attempts to use existing equipment were successful; the equipment is relatively inexpensive, and, in the case of the receiver, already in a miniaturized form. The emphasis is on the development of the alarm device. E.M.C.

N71-15848*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

PHONOCARDIOGRAPHIC PREPROCESSOR Final Technical Report, 22 Jun. 28 Aug. 1970

Mohammad Ali Hooshmand and Robert Martino Jan. 1971 20 p refs

(NASA-TM-X-65420; X-207-71-9) Avail: NTIS CSCL 06B

Progress is reported on the development of a phonocardiographic preprocessor which gives the physician a picture of what he hears, and gives the computer a waveform that can be easily stored and analyzed. A breadboard circuit consisting of a full wave rectifier with simple resistance capacity filtering was successfully demonstrated. Actual phonocardiographic recording on 1/4 inch magnetic tape was used to develop the circuit. E.M.C.

N71-15858 Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.

THEORY OF NERVOUS REGULATION OF INTRAOCULAR PRESSURE

R. W. Hart *In its* APL Tech. Dig., Vol. 9, No. 4 Apr. 1970 p 2 -13 refs (See N71-15857 06-23)

(Grant PHS-NS-07226)

Copyright. Avail: APL, Johns Hopkins Univ., 8621 Georgia Ave., Silver Spring, Md. 20910: $0.50

A phenomenological theory is developed that mimics a number of features characteristic of the living eye. The two essential concepts are: (1) both aqueous humor and venous blood compete for space in the aqueous outflow drainage channels so the aqueous outflow resistance depends on the rate of blood flow, and (2) blood flow, and thereby the rate of formation of aqueous humor, is controlled by vascoconstrictors and vasodilators excited by neural elements that respond to tissue deformation. The theory is applied to develop a detailed conception of how intraocular pressure is regulated in the normal eye and what may go wrong when pressure regulation deteriorates in the abnormal eye. Author

N71-15884# Princeton Univ., N.J. Elementary Particles Lab.

APPLICATIONS OF CERTAIN HIGH ENERGY PHYSICS TECHNIQUES TO SOME PROBLEMS IN BIOLOGY

George T. Reynolds 4 Jul. 1970 58 p refs

(Contract AT(30-1)-4159)

(PURC-4159-1) Avail: NTIS

The development of image intensifiers in high energy physics is briefly reviewed, and the applications of image intensifiers in biological research are discussed. Topics include bioluminescence, image intensification of a luminescent system as a cytochemical probe, radioactive tracer detection, quantum efficiency of the human eye, and X-ray image intensification. NSA

N71-15895*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SUMMER INSTITUTE FOR BIOMEDICAL RESEARCH IN TECHNOLOGY UTILIZATION Final Administrative and Technical Report, 22 Jun. 28 Aug. 1970
Wayne T. Chen Jan. 1971 142 p refs Conf. held in Greenbelt, Md.; sponsored by NASA. Goddard Space Flight Center
(NASA-TM-X-65418; X-207-71-6) Avail: NTIS CSCL 06B

The technical results and the administrative procedures of the program are presented. Undergraduate engineering and science students cooperated in utilizing NASA's technology for developing medical diagnostic monitoring instrumentation. Research is reported in the following areas: electrocardiographic electrodes for rapid application; heart sound microphone miniaturization; phonocardiographic preprocessor; intensive care alarm indicator system; and digital realization of pulmonary screening and motivating spirometer. N.E.N

N71-15896*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DIGITAL REALIZATION OF PULMONARY SCREENING AND MOTIVATING DEVICE Final Technical Report, 22 Jun. 28 Aug. 1970
Israel F. Charo and Donald Gorelick Aug. 1970 12 p
(NASA-TM-X-65417; X-207-70-475) Avail: NTIS CSCL 06B

The digital logic design was developed for duplicating the concept of the spirometer, and a breadboard model was fabricated. The computer was made to evaluate Kory's equation correctly, and the Kory regression module was digitized. N.E.N.

N71-15913# Los Alamos Scientific Lab., N.Mex.
PRODUCTION OF ALGAE CONTAINING 93 PERCENT C 13
Eric B. Fowler and Victor H. Kollman May 1970 4 p refs
(Contract W-7405-eng-36)
(LA-4496) Avail: NTIS

Carbon-13 was biologically incorporated into Chlorella pyrenoidosa to the 93% level with no observable induction period or gross changes in cell morphology or size. Author (NSA)

N71-15929# Louisville Univ., Ky. Dept. of Psychology.
ORGANIZATIONAL AND TRANSFORMATIONAL PROCESSES IN MEMORY Final Report
John A. Robinson 1 Oct. 1970 7 p refs
(Grant AF-AFOSR-1008-67)
(AD-714630; AFOSR-70-2557TR) Avail: NTIS CSCL 5/10

The research has dealt with the relationships of coding to the speed and accuracy of recall. Specifically, the research examines: Effects of solution-word categorizability; effects of code structure and presentation order; knowledge of prior recall; and organization in free-recall learning. Author (GRA)

N71-15940*# Public Health Service, Phoenix, Ariz. Applied Microbiology and Planetary Quarantine Section.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, OCTOBER DECEMBER 1970
Martin S. Favero Jan. 1971 30 p
(NASA Order W-13062)
(NASA-CR-116182; Rept-32) Avail: NTIS CSCL 06M

Studies of the naturally occurring bacterial spore population from Cape Kennedy soil are discussed. The extinction of the population when exposed to 125 degrees C was beyond 16 hr. Additional preliminary attempts to determine the 125 degrees C end point at 24 and 30 hr were unsuccessful. All broth tubes into which heated strips were placed (QR 31) were positive for growth within 5 days of incubation at 32 degrees C. An equal number of uninoculated control strips included in each run remained negative after 5 days of incubation. After 48 hr of heating, however, 30 strips and 30 uninoculated controls were all negative for growth after 1 week of incubation. An FN-MPN testing system (QR 26) was therefore designed accordingly. Sixty inoculated strips and 60 control strips were suspended in the oven and 10 of each were removed at 1.5-hr intervals out to 48 hr. As strips were removed and cooled, they were placed in tubes of TSA broth plus 0.1% soluble starch and 0.2% yeast extract (QR 26) and incubated for 1 week at 32 C. All control strips were negative and the number of positive tubes per replicate of 10 at each heating interval is presented. Author

N71-15942# Systemed Corp., Dayton, Ohio.
TOXIC HAZARDS RESEARCH UNIT Final Report, Jun. 1969 May 1970
J. D. MacEwen and E. H. Vernot Aug. 1970 98 p refs
(Contract F33615-70-C-1046)
(AD-714694; W70005; AFML-TR-70-77) Avail: NTIS CSCL 6/20

Modification of animal exposure facilities are discussed including the installation of an automatic weighing system in each Thomas Dome. Acute toxicity experiments were conducted on beta cloth glass fiber dust, chlorine trifluoride (ClF3), oxygen difluoride (OF2), and hydrogen fluoride. Subacute toxicity studies were conducted on 1,1,2-Trichloro 1,2,2-trifluoroethane and *methylisobutylketone. The interim results of chronic toxicity* experiments on monomethylhydrazine (MMH) are also described. Author (GRA)

N71-15985# Los Alamos Scientific Lab., N.Mex.
COMPARATIVE TESTS OF FINE-DUST MASKS
Fritz Regenberg 1970 8 p refs Transl. into ENGLISH from Atemschutz-Inform., v. 8, no. 3, 1969 p 66 71
(LA-4459-TR) Avail: NTIS

Comparative tests were carried out with several dust masks. Not all of the models responded to the specifications concerning *the degree of dust removal.* Author (NSA)

N71-15993# McElroy (Ralph) Co., Austin, Tex. Custom Div.
AIRTIGHT FIT OF RESPIRATORY PROTECTION MASKS
G. Aurich [1970] 10 p refs Transl. into ENGLISH from Atemschutz-Inform., v. 8, no. 2, 1969 p 32 36 Prepared for Los Alamos Scientific Lab.
(LA-TR-70-17) Avail: NTIS

The problems of a tight sealing fit of face masks are of equal importance with respect to the efficiency of devices of

respiratory protection as the problems of their functioning. The efficiency of devices for respiratory protection is more limited by insufficient sealing than by functional failure or other leaks. An optimal fit of the mask is the prerequisite for a satisfactory seal between mask and face of the bearer of the device. Fit and sealing are in close correlation because adequate sealing with tolerable inconvenience may only be achieved with a good-fitting mask. Fit and sealing of face masks are determined by the ratio between the dimensions and the shape of the mask and the shape and the dimensions of the bearer of the device, by the shape and the material of the sealing frame, by the tape-lapping, and by the forces and moments exerted by the accessories which are attached to it.
Author (NSA)

N71-15994# Naval Civil Engineering Lab., Port Hueneme, Calif.
AIR REVITALIZATION UNIT FOR SEALED SURVIVAL SHELTERS Technical Report, Jul. 1965 - Jun. 1969
D. E. Williams Oct. 1970 57 p refs
(AD-714163; NCEL-TR-697) Avail: NTIS CSCL 6/11

An air revitalization unit for use with sealed survival shelters without an external power supply was developed. The unit is capable of supplying oxygen to and removing carbon dioxide and odors from a 100-man personnel shelter for a 24-hour period. The system utilizes (1) a dry chemical absorbent (Baralyme) for carbon dioxide removal, (2) pressure cylinders for the oxygen supply, (3) an activated charcoal filter to remove odors, and (4) a battery-powered fan for air circulation. A prototype unit was designed, fabricated, and tested. Following tests of individual components, a 24-hour continuous test of the unit was completed. In general, the test results for the chemical, mechanical, and structural aspects of the air revitalization unit were affirmative. A similar assessment cannot be made for the human element inherently involved with the operation of the unit.
Author (GRA)

N71-15995# RAND Corp., Santa Monica, Calif
NOTES ON PERCEPTUAL GEOMETRIES
Fred S. Roberts Jul. 1970 21 p refs Presented at the Workshop on Perceptual Geometries, Miami, Fla., 26 Aug. - 1 Sep. 1970; sponsored by NSF
(AD-714106; P-4423) Avail: NTIS CSCL 6/16

The purpose of the document is first of all to standardize some terminology useful for describing models of perceptual geometry. Using this terminology, certain models are very briefly described, some very limited experimental data are discussed, and rather general open questions are posed.
Author (GRA)

N71-15996# Human Engineering Labs., Aberdeen Proving Ground, Md.
STANDARDIZATION OF TASKS AND MEASURES FOR HUMAN FACTORS RESEARCH
1970 113 p refs Proc. of a Conf. held at Lubbock, Tex., 18 - 19 Mar. 1970
(AD-714669; HEL-TM-19-70) Avail: NTIS CSCL 5/5

Contents: Is standardization necessary in human factors research; Data requirements for operational performance prediction; An approach to standarizing human performance assessment; Use of the synthetic-work technique in the assessment of sustained performance; Specification and measurement of intragroup coordination in various types of tasks and work groups; Considerations of fatness and body compositon in evaluating physical fitness and performance; and Physical and physiological measurements--are they interchangeable.
GRA

N71-16022*# Sandia Corp., Albuquerque, N.Mex. Planetary Quarantine Dept.
PLANETARY QUARANTINE PROGRAM Quarterly Progress Report, 30 Sep. 1970
Sep. 1970 79 p refs
(NASA Order W-12853)
(NASA-CR-111309; QPR-18) Avail: NTIS CSCL 06M

Activities included an appraisal of the overall thermoradiation program along with considerable experimentation in dry heat, radiation and thermoradiation inactivation of B. subtilis var. niger. Heat resistance and dose rate sensitivity experiments at 95 C revealed promising results at that temperature. At a dose rate of 12 krads/hour, the D value was two hours. A 10 log population reduction could then be accomplished at 95 C with a total dose of less than 250 krads in 20 hours. Good confirmation was also obtained in the dose rate sensitivity of radiation inactivation at room temperature. High rate gamma radiation inactivation at room temperature required twice the total dose that low rate radiation required. A preliminary analysis of the radiation burden for a Mars Lander derived a safe upper bound of about 6300 krads of radiation encountered post launch.
Author

N71-16049# London Univ. (England). Dept. of Zoology.
ULTRASONIC BIOACOUSTICS Final Scientific Report, 1 May 1965 - 30 Jun. 1970
J. D. Pye 31 Jul. 1970 12 p refs
(Contract AF 61(052)-876)
(AD-714632; AFOSR-70-2570-TR) Avail: NTIS CSCL 6/3

The following four areas of research are summarized: (1) the improvement of existing techniques and the development of novel methods for studying air-borne ultrasound; (2) acoustic aspects of echolocation in bats, especially a quantitative taxonomic survey of emitted signal patterns and their changes with behaviour; (3) a study of the newly discovered ultrasonic social communication in rodents and (4) studies of ultrasonic signals emitted by other groups of animals, especially by tittigonid grasshoppers and certain nocturnal moths.
Author (GRA)

N71-16092# School of Aerospace Medicine, Brooks AFB, Tex.
MEDICAL AND BIOLOGICAL RESEARCH IN THE USSR DURING 1968 AND EARLY 1969 UNDER THE SPACE RESEARCH AND CONQUEST PROGRAM
V. V. Parin et al 1970 18 p Transl. into ENGLISH of the book "Medico-Biologichkie Issledovaniya, Provedennye v SSSR v Techenie 1968 G. I. Nachola 1969 G. Po Programme Issledovaniya i Osnoveniya Kosmicheskogo Prostranstva" Moscow, 1969 18 p
(AD-714407; SAM-TT-R-1024-0770) Avail: NTIS CSCL 6/19

A Chronic Experiment was begun on 180 dogs (138 males and 42 bitches) in order to investigate and provide an experimental basis for permissible radiation dosage during long space flights. The experiment was designed for several years of gamma radiation. The report sets forth some of the results obtained from observations made of the animals during two years of the experiment. Also, results of medical examinations of the crew members of Soyuz 3, 4, and 5 are summarized.
GRA

N71-16097# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RED STAR, NUMBER 240, 1969: SELECTED ARTICLES
M. Rebrov et al 13 Aug. 1970 38 p Transl. into ENGLISH from Krasnaya Zvezda (USSR), no. 240, 1969 p 3 - 4
(AD-714771; FTD-HT-23-406-70) Avail: NTIS CSCL 5/9

The article gives some brief intimate details of the lives of the Soviet Cosmonauts who went up in Soyuz-7 and Soyuz-8. Most of the details date back to World War II and prior to it. What motivated the men to become flyers and some of their early school and flying-school experiences are mentioned. Author (GRA)

N71-16151*# Agricultural Research Service, Weslaco, Tex.
REFLECTANCE AND STRUCTURE OF CYCOCEL-TREATED COTTON LEAVES, GOSSYPIUM HIRSUTUM L
H. W. Gausman, R. Cardenas, W. A. Allen, V. I. Myers, and R. W. Leamer *In* NASA. Manned Spacecraft Center Earth Resources Aircraft Program Status Rev., Vol. 2 1968 9 p refs (See N71-16147 06-13)
Avail: NTIS CSCL 02A

Cycocel induced changes in the internal structure of cotton leaves and their relation to reflectance, transmittance, and absorptance of near infrared light were investigated. Cycocel treated leaves had more intercellular spaces in the spongy parenchyma which caused increased reflectance and decreased transmittance, particularly over the 750 micron to 1350 micron range in which the influence of internal leaf structure is highly important. Understanding the relation of light reflectance to the internal structure of leaves will be helpful in interpreting data obtained from aircraft and satellites. A.L.

N71-16152*# Agricultural Research Service, Weslaco, Tex.
RELUCTANCE PRODUCED BY A PLANT LEAF
W. A. Allen, A. J. Richardson, and H. W. Gausman *In* NASA. Manned Spacecraft Center Earth Resources Aircraft Program Status Rev., Vol. 2 1968 13 p refs (See N71-16147 06-13)
Avail: NTIS CSCL 02A

Proper interpretation of multispectral imagery acquired from the NASA aircraft depends upon reliable ground truth information. In the case of vegetation, ground truth information can be reduced, in part, to effective optical parameters determined from individual leaves. Correlations can be, and have been, made between multispectral imagery acquired from the NASA aircraft and effective optical parameters measured in the laboratory. Author

N71-16153*# Purdue Univ., Lafayette, Ind. Lab. for Agricultural Remote Sensing.
BIOPHYSICAL RESEARCH AT LARS-PURDUE
Roger M. Hoffer *In* NASA. Manned Spacecraft Center Earth Resources Aircraft Program Status Rev., Vol. 2 1968 28 p (See N71-16147 06-13)
Avail: NTIS CSCL 06C

The Laboratory for Agricultural Remote Sensing (LARS) was founded to plan and conduct research on data collection, data processing, and data distribution techniques which permit the rapid collection of accurate information important to the management of agricultural resources. Much of the work at LARS has centered around photographic and multispectral optical-mechanical scanner data. The primary advantage of optical-mechanical scanner data is in the ease and accuracy with which the data can be quantized and then processed and analyzed by computer. The advantages of automatic data processing of operational remote sensed information in agriculture would be the capability of obtaining data rapidly over large geographical areas and the timely processing of such data to useful information with accompanying benefit in improved accuracy, timeliness, and possible economy of agricultural surveys. A.L.

N71-16158*# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
DEVELOPING SPECTROSIGNATURE INDICATORS OF ROOT DISEASE ON LARGE FOREST AREAS
John F. Wear *In* NASA. Manned Spacecraft Center Earth Resources Aircraft Program Status Rev., Vol. 2 1968 11 p (See N71-16147 06-13)
Avail: NTIS CSCL 06C

Losses to forest diseases are more serious threats to the forest natural resource than either fire or insects. It is of continuing importance to develop remote sensing techniques that will collect data rapidly on pest problems from aircraft and orbiting platforms. Expanded research on the spectral emission and the spectral reflectance properties of specific forest types and on the physiological parameters of healthy and root-rot-infected trees are of great potential value in analyzing this serious forestry problem. Considerable progress has been made in the development of remote sensing techniques for efficient disease detection surveys that may eventually become an integral part of resource surveys from orbital altitudes. Author

N71-16159*# Agriculture Dept., Berkeley, Calif. Forest Service.
DETECTION OF FOREST INSECT OUTBREAKS BY REMOTE SENSING
R. C. Heller *In* NASA. Manned Spacecraft Center Earth Resources Aircraft Program Status Rev., Vol. 2 1968 62 p refs (See N71-16147 06-13)
Avail: NTIS CSCL 06C

Studies are underway in the Black Hills of South Dakota to determine the ground instrumentation, aerial sensing equipment, and techniques required to detect vigor loss and previsual signs of tree mortality caused by bark beetles in coniferous timber stands. Ground data have been collected on spectral reflectance, Munsell color notations, emitted and absolute temperature, transpiration, and needle moisture tension of ponderosa pine trees and foliage. Aerial photography (color and infrared color) was taken over six ground instrumented test sites at seven periods to capture changes in foliage coloration. Optical-mechanical scanning imagery was obtained in three wavebands (2.0 to 2.6 microns, 4.5 to 5.5 microns, and 8.0 to 14.0 microns). To date, no aerial sensor has been successful in detecting stressed conifers before the foliage discolors. No differences in photointerpretation accuracies have been found between color and false-color films. Scanners with better optical qualities exhibiting improved spatial and thermal resolution are needed before thermal techniques can be used with any degree of confidence. Author

N71-16160*# California Univ., Berkeley. School of Forestry and Conservation.
THE IDENTIFICATION OF WESTERN FOREST SPECIES BY MEANS OF REMOTE SENSING
Donald T. Lauer *In* NASA. Manned Spacecraft Center Earth Resources Aircraft Program Status Rev., Vol. 2 1968 16 p (See N71-16147 06-13)
Avail: NTIS CSCL 06C

Systematic analysis of several factors governing the interpretability of tree species on high altitude, small scale imagery obtained by remote sensing was conducted. This research has sought, in particular, to determine which image characteristics are most useful for identifying the major tree species and timber types that occur in the western United States. Data acquired from the NASA aircraft are discussed and illustrated in the form of certain advanced techniques such as: (1) acquisition of sequential imagery, (2) acquisition of spectrozonal imagery, and (3) false color image enhancement of multiband imagery. In addition, a comparison has been made to determine the ease with which tree species

composition, timber-type boundaries, and cultural patterns can be interpreted on Gemini photography and on a 10- by 15-foot aerial photographic mosaic comprised of 3200 conventional aerial photographs suitably reduced in scale. Author

N71-16200# Colorado Univ., Denver. Medical Center.
THE INFLUENCE OF HYPOXIA ON THE PULMONARY MICROCIRCULATION Annual Progress Report, 1 Oct. 1969 - 30 Sep. 1970
Wiltz W. Wagner, Jr. 1 Oct. 1970 18 p refs
(Contract DADA-17-68-C-8071)
(AD-714671; APR-3) Avail: NTIS CSCL 6/5

A technique designed to permit direct microscopic observation via a transparent window implanted in the chest wall of dogs of the pulmonary capillaries in vivo has been developed. Cine- and photomicrographic techniques have been developed to permit high speed, high resolution study of the pulmonary microcirculation. These systems have been designed to provide information related to the following: The velocity of the erythrocytes as they cross the alveolar capillary net to determine contact time between oxygen and hemoglobin; the orientation of the erythrocytes in the capillaries to determine the intracapillary diffusion distance of molecular oxygen; the site of action of the hypoxic vasopressor response; the quantitation of the oxyhemoglobin gradient along the microcirculation to determine a) the boundaries of the oxygen uptake process, b) the shape of the uptake curve, and c) how the curve and boundaries are affected by stress, e.g. hypoxemia or exercise; and the effect of fatty acid embolism on the pulmonary microcirculation. Author (GRA)

N71-16251# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.
PARAMETERS OF HUMAN PATTERN PERCEPTION Annotated Bibliography of Reports, Sep. 1967 Aug. 1970
Selby H. Evans Aberdeen Proving Ground, Md. Human Eng. Labs Oct. 1970 24 p refs
(Contract DAAD05-68-C-0176; Proj. Themis)
(AD-714672) Avail: NTIS CSCL 5/10

Abstracts of reports resulting from a research project on human pattern perception are collected in the bibliography. Journal publications, technical memorandums, theses, and dissertations are included. Author (GRA)

N71-16284# Air Force Systems Command, Brooks AFB, Tex. School of Aerospace Medicine.
NOISE PROBLEMS IN AEROMEDICAL EVACUATION OPERATIONS
Donald G. Gasaway and Harrell C. Sutherland Sep. 1970 22 p refs
(AD-713882; SAM-TR-70-50; SAM-Review-2-70) Avail: NTIS CSCL 20/1

Problems arising from the presence of noise in air evacuation aircraft are described. These include effects of noise on understanding speech and the possibility of noise-induced hearing loss. Examples of noise spectrums found in current air evacuation aircraft are given and their implications discussed. The effectiveness of ear protective devices, plugs and muffs, is described and factors involved in successful earplug use are listed. Author (GRA)

N71-16285# Massachusetts Inst. of Tech., Cambridge.
LEARNING STRUCTURAL DESCRIPTIONS FROM EXAMPLES
Patrick H. Winston (Ph.D. Thesis) Sep. 1970 268 p refs
(Contract Nonr-4102(02))
(AD-713988; MAC-TR-76) Avail: NTIS CSCL 9/2

The research described centers on how a machine can recognize concepts and learn concepts to be recognized. Explanations are found in computer programs that build and manipulate abstract descriptions of scenes such as those children construct from toy blocks. One program uses sample scenes to create models of simple configurations like the three-brick arch. Another uses the resulting models in making identifications. Throughout emphasis is given to the importance of using good descriptions when exploring how machines can come to perceive and understand the visual environment. Author (GRA)

N71-16298# School of Aerospace Medicine, Brooks AFB, Tex.
MEDICAL AND BIOLOGICAL RESEARCH [MEDIKO-BIOLOGICHESKIYE ISSLEDOVANIYA]
1970 13 p Transl. into ENGLISH from Proccedings of COSPAR, 12th Meeting (Moscow), 1969
(AD-714406; SAM-TT-R-1043-0770) Avail: NTIS CSCL 6/19

Summaries are given of studies involving the effects of weightlessness and confinement on man and other organisms. GRA

N71-16299# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.
PERFORMANCE, RECOVERY, AND MAN-MACHINE EFFECTIVENESS Semiannual Progress Report, 1 Mar. - 31 Aug. 1970
Richard A. Dudek 15 Sep. 1970 28 p refs
(Contract DAAD05-69-C-0102; Proj-Themis)
(AD-714375) Avail: NTIS CSCL 5/8

The purpose of this program is the generation of basic data concerning human performance and recovery within several work systems settings under conditions of varied environments, task demands, motivational levels, and nutritional factors. Further, to generate from this basic data the solution to real problems and recommended procedures for mans operation under varying conditions of the work system, e.g., work-facilitating period combinations for various task types, duration of tasks, environments, etc., determination operations, procedures, and methods for improved team operations, optimal work-rest schedules for crews of vehicles creating a vibrational environment, etc. The task model described in the previous report has been revised slighly in order to more fully encompass the work activities of man. The classification continuum of human work has been extended to include man as a social interactor when mans primary function is to perform within a group with minimal machine interaction. With this addition, activities of work where men are required to make judgements are included in the task model. Author (GRA)

N71-16313# Army Foreign Science and Technology Center, Washington, D.C.
DIURNAL VARIATIONS IN THE FUNCTIONAL ADJUSTMENT OF THE VISUAL ANALYZER DURING DIFFERENT SEASONS [SUTOCHNYYE IZMENENIYA FUNKTSIONALNOY NASTROYKI ZRITELNOGO ANALIZATORA V RAZNYYE PERIODY GODA]
L. M. Kurilova et al 14 Apr. 1970 14 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 60, no. 3, 1969 p 301 - 308
(AD-714064; FSTC-HT-23-082-70) Avail: NTIS CSCL 6/16

A study was made of changes in the dark-adaptation curve of two subjects, ages 35 and 40, and its variation according to time of day and season. Two indices were used: intensity threshold (characterizing level of sensitization) and threshold area of light stimulus (reflecting level of mobilization). All observations were carried out under uniform conditions in a dark testing room; thresholds were determined with a model AM adatometer and with a device designed by one of the authors and described in a previous work. Differences between the two subjects were noted and attributed to individual variation. Curves for different times of the year were found; shifts of maxima in the curves were correlated with the changes in the time of sunrise and sunset in different seasons. The results indicate the presence of a circadian rhythm of light sensitivity, varying seasonally, which persists even when the subject is tested in a dark room without the influence of natural illumination. These findings will be of interest in labor physiology, since work efficiency depends to a degree upon the punctuality of adaptive reactions of the visual analyzer. Author (GRA)

N71-16350# Geoscience, Ltd., Solana Beach, Calif.
STUDY OF THE INFLUENCE OF ELECTROMAGNETIC FORCE FIELDS ON BIOLOGICAL SYSTEMS Final Report, Jan. 1969 –Jan. 1970
Heinz F. Poppendiek, Gunnar Mouritzen, James E. Cloakey, and Patricia A. Greene Jul. 1970 43 p refs
(Contract F41609-69-C-0016)
(AD-714071; AMD-TR-70-1) Avail: NTIS CSCL 6/16

The report describes studies of the effects of unidirectional electromagnetic force fields, applied at a frequency of 800 cps, for six hours on dunaliella and ciliates suspended in media with electrical resistivity similar to the organism under study. Electromagnetic force fields were studied for significant differences in survival rate, external configuration, mobility and subsequent growth rate. Electrical resistivity measurements for several biological fluids and tissues are reported. Author (GRA)

N71-16351# Computer Research Corp., Newton, Mass.
MAN-COMPUTER INTERACTION AND CONTEXT PROGRAMMING Final Report
Lewis C. Clapp Jul. 1970 52 p refs
(Contract Nonr-4861(00))
(AD-714232; R102-6) Avail: NTIS CSCL 9/2

The report is concerned with the communication between man and the computer systems he uses for problem solving and management planning. To bridge the gap between problem solving needs and the ability of problem solvers to write their own programs, the trend has been to create pre-packaged programs which can solve a class of problems once the pertinent data has been supplied. One impediment toward the development of better problem solving tools which will operate in conjunction with on-line computer systems is a methodology for structuring the dialogue between the problem solver and his machine. A series of generalized dialogue handling routines was programmed for a time-sharing system operating on a Scientific Data Systems computer (SDS-940) The general set of routines is called the Command Package. The Command Package is then used in several different applications areas drawn from mathematics, engineering, and general modeling and simulation. Author (GRA)

N71-16358*# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
THE MEASUREMENT OF RADIATION EXPOSURE OF ASTRONAUTS BY RADIOCHEMICAL TECHNIQUES Quarterly Research Report, 6 Apr. 5 Jul. 1970
R. L. Brodzinski and W. A. Haller 15 Jul. 1970 27 p refs
Sponsored in part by NASA
(Contract AT(45-1)-1830)
(NASA-CR-116223; BNWL-1183-5) Avail: NTIS CSCL 06P

The urine and feces specimens from the Apollo 13 mission were analyzed for their radionuclide content. A comparison of radionuclide concentrations to those of the Apollo 9 mission yields a dose of 250 mR for the Apollo 13 astronauts. The K-40, Fe-59, and Cs-137 concentrations in three of the fecal specimens were high compared to previously observed levels, while all other radionuclide concentrations in both feces and urine remained comparable. Radioisotope concentrations in feces from the Apollo 7 through 11 missions and urine from the Apollo 11 and 12 missions were normalized to the weight of the respective inert element in the specimen, and confirmed all prior conclusions. Daily excretion rates of Ca, K, and Fe for Apollo 7 through 11 astronauts are found to be higher than the intake rates by factors of 2.24, 1.54, and 2.2, respectively. The observed concentrations and total weights of glass fibers in Apollo 13 feces fall within the range of results for previous missions except one sample which had large quantities of extremely long fibers in it. A piece of outer thermal coating of the Apollo 7 spacecraft yielded no cosmic-ray-induced nuclides 77 days after splashdown. Author

N71-16367# Argonne Cancer Research Hospital, Chicago, Ill.
INCREASED TURNOVER OF MITOCHONDRIAL CONSTITUENTS IN CARDIAC HYPERTROPHY AND ACUTE HYPOXIA IN THE RAT
V. Aschenbrenner, R. Albin, R. Zak, K. G. Nair, and M. Rabinowitz Jun. 1970 15 p refs Presented at 3d Ann. Meeting of the Intern. Study Group for Res. in Cardiac Metab., Stowe, Vt.
(Contract AT(11-1)-69; Grants NIH HE-9172; NIH HE-4442)
(ACRH-1000-199; CONF-700626-1) Avail: NTIS

Chemical composition changes in mitochondria, the principle sites of myocardial ATP synthesis, was observed during cardiac hypertrophy and acute hypoxia. Experimental cardiac hypertrophy was produced by banding the ascending aorta in rats; a 20 to 40% increase in heart weight was achieved within 36 to 48 hours after aortic constriction. Changes in mitochondrial mass were estimated from the activity of mitochondrial respiratory enzymes in homogenate and mitochondria. After exposure of rats to a six hour period of 4 to 5% hypoxia, the specific activity of mitochondrial proteins was 15 to 20% less than controls. J.A.M.

N71-16386# Sandia Corp., Albuquerque, N.Mex.
DEVELOPMENT OF A HUMAN ERROR RATE DATA BANK
A. D. Swain Jul. 1970 5 p refs Presented at US Navy Human Reliability Workshop, Washington, D.C., 22 - 23 Jul. 1970
Sponsored in part by AEC and Navy
(SC-R-70-4286; CONF-700704-1) Avail: NTIS

A program to develop a human error rate data bank for use by system planners and designers and by human reliability analysts and human engineering specialists is described. The point of view is taken that sufficient work has been done in reliability technology (including the mathematical modeling) and in behavior classification (task taxonomy) so that an interim human performance data bank can be initiated almost immediately. A procedure for establishing a noncomputerized, manual entry, interim human performance data bank is outlined. The basic criterion variable suggested is the human error rate. A method of identifying and scaling the independent variables (called performance shaping factors) is presented. An approach for refining and validating the data bank is described. Validation includes using multivariate analysis techniques to find out what performance shaping factors have maximum postdictive power for various types of equipment/task combinations for which human error rate data was collected. It is questioned whether the gains realized from automatic, high-speed data retrieval would be

worth the added complexity (and related unreliability and down time) of a computerized data bank and the time, effort, and costs of developing and maintaining it. Author (NSA)

N71-16399# Army Medical Research Lab., Fort Knox, Ky.
SERIAL ISOMETRIC FATIGUE FUNCTIONS WITH VARIABLE INTERTRIAL INTERVALS
Lee S. Caldwell 5 Aug. 1970 20 p refs
(AD-714190; USAMRL-886) Avail: NTIS CSCL 6/16

The objective of this study was to measure the effects of repeated maximal isometric exertions with various intertrial intervals on the shape of the fatigue function, and to examine the relationship between strength and relative decrement. The maximum voluntary strength of 60 subjects was measured during ten successive 25-sec trials separated by rest periods of 25, 50, or 100 sec. The intertrial intervals within a session were constant. Response strength was recorded at 3-sec intervals from the beginning of the contraction thus yielding eight scores per trial and 80 scores per session for each subject. The adjustment to the various work-rest schedules occurred early in the trial series. When the reduction in mean output was taken as 100% for each rest condition, the loss between the first two trials was 33%, 35%, and 24% for the 25-, 50-, and 100-sec conditions, respectively. An equation derived by a multiple regression analysis with the number of previous trials, intertrial intervals, and contraction time as independent variables produced a set of predicted values which correlated .99 with the actual means. This analysis indicated that the fatigue functions may be assumed to b identical in form for the various trials at the different intertrial intervals. Strength was found to be significantly correlated with absolute decrement but not with relative decrement. Author (GRA)

N71-16409# School of Aerospace Medicine, Brooks AFB, Tex.
HEART RATE AS AN INDEX OF NEUROENDOCRINE COMPENSATION DURING SPACE FLIGHT
V. V. Parin et al [1970] 14 p refs Transl. into ENGLISH of Russian Conf. Paper Presented at the 18th Congr. of Intern. Astronaut. Federation, Belgrade, 25 – 30 Sep. 1967
(AD-714405; SAM-TT-R-945-0670) Avail: NTIS CSCL 6/19

Heart rate is one of the simplest indices to record during space flight. Discovery of a significant sinusoidal arrhythmia in the first cosmonauts during weightlessness gave impetus to the development of mathematical and cybernetic heart rate analysis techniques. An algorithm facilitating automatic physiological control of the cosmonauts has been devised based on heart rhythm. The report presents data on variations in a series of mathematical and statistical indices of cardiac rhythm related to neutroendocrine regulation. Cardiac rhythm is viewed from the point of view of the theory concerning random functions in the form of a series of 100-150 values for cardiac cycle duration. Each of the values is a single manifestation of a random process which may be wholely characterized by a distributive function, by a histogram (variational pulsometry), by an autocorrelational function, or by a spectral function. GRA

N71-16410# School of Aerospace Medicine, Brooks AFB, Tex.
THEORETICAL AND PRACTICAL PHYSIOLOGICAL ASPECTS OF THE BASIC TRAINING OF COSMONAUTS FOR PROLONGED SPACE FLIGHTS [NEKOTORIE FIZIOLOGICAESKIE POLOZHENIYA K RAZRABOTKE TEORETICHESKIKH I PRAKTICHESKIKH OSNOV TRENIROVKI KOSMONAVTA K DLITELNYM POLETAM]
I. M. Khazen [1970] 33 p refs Transl. into ENGLISH of Russian Conf. Paper Presented at the Conf. on Space Med. and Biol., 10 – 12 Nov. 1964
(AD-714404; SAM-TT-R-805-0170) Avail: NTIS CSCL 6/19

Contents: The neuro-glandular system of the digestive apparatus as an indicator of the general physiological responses of the body; Endocrine secretion of serotonin by glands of the digestive apparatus; Extralabyrinthine symptoms of motion sickness; and The influence of acceleration. GRA

N71-16411# Army Aeromedical Research Unit, Fort Rucker, Ala.
PROBLEMS OF ADAPTATION TO LONG RANGE LARGE SCALE AERIAL TROOP DEPLOYMENTS
Stanley C. Knapp Sep. 1970 28 p refs
(AD-714368; USAARL-71-10) Avail: NTIS CSCL 6/16

The paper discusses the demonstrated stresses and adaptation problems during large scale, long range, rapid reaction time, aerial troop deployments. Long range aerial troop transport and deployment is a technological achievement of the 1960s that has influenced and shaped international political thinking and military strategy. Super transport aircraft, capable of around-the-world troop lifts, are important in the military inventory. Careful consideration has been given to the air-crews that operate these aircraft. It is necessary to carefully assess the position, role, and regard for the individual soldier, the passenger, whom all this aviation technology and engineering supports. Author (GRA)

N71-16446# Naval Ordnance Station, Indian Head, Md.
GEOMETRICAL CONSIDERATIONS INVOLVED IN MILITARY MARKERS FOR SEARCH AND RESCUE
E. W. Anderson and O. H. Dengel 31 Dec. 1969 28 p refs
(AD-713861; IHMR-69-82) Avail: NTIS CSCL 6/7

Calculations are made to determine the intensity of the radiation reflected by signal markers with various geometrical configurations. Recommendations are offered for the optimum signal marker shape for day and night use. Author (GRA)

N71-16463# Joint Publications Research Service, Washington, D.C.
MODEL OF A BIOLOGICAL SUBJECT SUITABLE FOR THE CONTROL PROBLEM
R. I. Burlakov et al 1 Feb. 1971 11 p refs Transl. into ENGLISH from Med. Tekhn. (Moscow), no. 4, 1970 p 6 12
(JPRS-52300) Avail: NTIS

Mathematical models of a biological subject suitable for control problems are presented. The solution of the problems of automatic control of the most important and complex processes of medical practice is complicated by the absence of information permitting the construction of simple and adequate mathematical models of the process on the basis of which it would be possible to sensitize the automatic control system. Steps to develop radionuclide concentrations in both feces and urine remained comparable. Radioisotope concentrations in feces from the Apollo 7 through 11 missions and urine from the Apollo 11 and 12 missions were normalized to the weight of the respective inert element in the specimen, and confirmed all prior conclusions. Daily excretion rates of Ca, K, and Fe for Apollo 7 through 11 astronauts are found to be higher than the intake rates by factors of 2.24, 1.54, and 2.2, respectively. The observed concentrations and total weights of glass fibers in Apollo 13 feces fall within the range of results for previous missions except one sample which had large quantities of extremely long fibers in it. A piece of outer thermal coating of the Apollo 7 spacecraft yielded no cosmic-ray-induced nuclides 77 days after splashdown. Author

N71-16464# Joint Publications Research Service, Washington, D.C.

THE QUANTITATIVE AND QUALITATIVE ADEQUACY OF FOOD RATIONS

I. M. Buznik 20 Jan. 1971 7 p refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 1, 1970 p 54-57
(JPRS-52208) Avail: NTIS

The physiological effects of diets as related to the activities of the individual are discussed. The indices of metabolism are evaluated with a consideration of the quantitative and qualitative adequacy of the diet. Accurate information on the actual energy expenditures of individuals is required in order to determine the adequacy of the diet. Author

N71-16477# Illinois Univ., Urbana. Biological Computer Lab.

ACCOMPLISHMENT SUMMARY 1969/1970 OF THE BIOLOGICAL COMPUTER LABORATORY Interim Period, 1 June 1969 - 31 May 1970

H. Von Foerster 15 Jul. 1970 343 p refs
(Grant AF-AFOSR-1865-70)
(AD-714608; BCL-70.2; AFOSR-70-2595TR) Avail: NTIS CSCL 6/4

The theories of multi-valued mathematics and transclassical logic have been advanced. Methods for axiomatizing and describing cognition are proposed. The properties of complex dynamic systems have been investigated. A novel structure for classifying data is described and applications discussed. The properties of speech, vision, neurons and movements are investigated. Various devices have been constructed which are computational principles based on living organisms. GRA

N71-16488*# George Washington Univ. Washington, D.C. Medical Center.

TECHNOLOGY APPLICATIONS Semiannual Project Report, 1 Jun. -30 Nov. 1970

Jan. 1971 111 p
(Contract NASw-2055)
(NASA-CR-116130) Avail: NTIS CSCL 06B

A qualitative overview is presented of the Application Team Program and its role as a major operational project, sponsored by the TU Office, for facilitating a systematic, continuing transfer of technology. In this activity, the teams involved are cooperating with over 100 organizations, professional groups, and medical research and clinical centers in joint problem solving efforts which facilitate applications of aerospace developments and expertise for broad public benefit. Specific achievements of the Applications Teams over a 6-month period are described along with several program support activities designed to assist NASA and the Applications Teams in their technology transfer efforts. D.L.G.

N71-16506*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

REACTION TIMES OF SUBJECTS IN TESTS WITH DISPLAY-CONTROL CONFIGURATIONS TYPICAL OF THOSE USED IN CONTINUOUS TRACKING TASKS

Walter W. Hankins, III and Patrick A. Gainer Washington Feb. 1971 26 p refs
(NASA-TN-D-6132; L-7034) Avail: NTIS CSCL 06B

Reaction times of human subjects to different displays have been measured. Statistical analyses were made of the effects of intersubject variability, direction of display motion, display differences, learning and fatigue, and rates of display indicator motion. Subjects using the same display-control configuration exhibited significantly different response times. Reaction times were found to differ significantly with displays and display indicator rates. Author

N71-16520# Joint Publications Research Service, Washington, D.C.

PROBLEMS OF SPACE FLIGHT

2 Feb. 1971 31 p *Transl. into ENGLISH from various Russian publications*
(JPRS-52309) Avail: NTIS

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1. THE PROBLEM OF WEIGHTLESSNESS AND HYPODYNAMIA p 1-18 (See N71-16521 06-04)

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N71-16521# Joint Publications Research Service, Washington, D.C.

THE PROBLEM OF WEIGHTLESSNESS AND HYPODYNAMIA

In its Probl. of Space Flight 2 Feb. 1971 p 1-18 (See N71-16520 06-04)
Avail: NTIS

Weightlessness was simulated by prolonged stay in a prone position under condition of hypodynamia in order to evaluate its prolonged effects on man during space flight. Observed were the different shifts produced in the body systems, from reduced muscular activity to physical and mental working capacity. Regulations of positions and locomotions, the stability of the kinetic functions, and the rationing of muscular efforts in limited space and under space flight conditions are discussed. It is concluded that after some time the cosmonaut evidently adapts to weightless conditions and that his body forms a number of protective-adaptive mechanisms if life-support systems on the spacecraft maintain proper conditions for gas composition, temperature, humidity, and atmospheric pressure and the cosmonauts prepared physically and *mentally for the prolonged flight.* G.G.

N71-16523# Joint Publications Research Service, Washington, D.C.

MEDICAL AID ABOARD SPACECRAFT

T. Krupina et al *In its* Probl. of Space Flight 2 Feb. 1971 p 25-27 Transl. into ENGLISH from Sov. Rossiya (Moscow), 18 Jun. 1970 p 4 (See N71-16520 06-04)
Avail: NTIS

The described medicine chest for astronauts contains medicines in tablet form, solutions for injections in special tubes, ointments, etc. Medications constitute treatment against infection, tranquilizers, analgesics, drugs for the cardiovascular system, the gastrointestinal tract, and other possible disorders. Besides therapeutical measures, prophylactic measures during selection, training, and space flight conditions are recommended. G.G.

N71-16524# Joint Publications Research Service, Washington, D.C.

PROBLEM OF NUTRITION IN SPACE FLIGHT

V. Yefimov et al *In its* Probl. of Space Flight 2 Feb. 1971 p 27-29 Transl. into ENGLISH from Komsomolskaya Znamya (Kiev), 16 Sep. 1970 p 3 (See N71-16520 06-04)
Avail: NTIS

Space flight nutritional requirements insure a daily caloric count of about 2,600 cal per person for the crews of multiman spaceships; the weight of the food, its packaging, and its volume are limited. Daily food supply is represented by preserved dishes in aluminum tubes and cans of a wide variety; preserved meats are supplemented by ham, sausage meat, minced pork with egg, and pate. Bread products constitute common and rye bread as well as honeycakes. Also included in the menues are chocolates and candies prepared in bite sizes and packaged in polymeric films. Several dried fruits complete the selection. G.G.

N71-16540# Joint Publications Research Service, Washington, D.C.

CHARACTERISTICS OF FLIER'S BEHAVIOR UNDER COMPLICATED FLIGHT CONDITIONS

N. D. Zavalova et al 25 Jan. 1971 14 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 5, 1970 p 110 - 121
(JPRS-52233) Avail: NTIS

The behavior of fliers in emergency situations that may develop during flight was studied to develop qualities insuring adequate responses by pilots in flight training. The model used to complicate the situation during flight was action on the lateral controls (while on automatic pilot) which caused the plane to rotate about its longitudinal axis at an angular velocity of 70 deg per second. The dynamics of physiological functions during the malfunction, the skill in coping with emergencies, and characteristics of a flier's behavior in the decision-making process are discussed. It is concluded that emergency situations should be simulated to train fliers to respond to unusual circumstances. F.O.S.

N71-16541# Joint Publications Research Service, Washington, D.C.

THE STRUCTURE OF HUMAN THINKING ACTIVITY

O. K. Tikhomirov 18 Jan. 1971 89 p refs Transl. into ENGLISH from the book 'Struktura Myslitelnoy Deyatelnosti Cheloveka' Moscow, Univ. Printing House, 1969 p 3 - 4, 232-304
(JPRS-52199) Avail: NTIS

The relationship between the cybernetic and psychological approaches to human thought are studied to derive ways of constructing a general theory for the activity of living systems. Impairments of the processes of solving problems requiring thought, and the problem of thought in engineering psychology are discussed. Thought is defined as an activity involved in problem solving which produces results after a search, and like other mental processes can be regarded as an information process. F.O.S.

N71-16551# Ohio State Univ., Columbus. Dept. of Electrical Engineering.

A STUDY OF REGULARLY REALIZABLE GAIT MATRICES

Anil Kumar Jain (M.S. Thesis) 1970 63 p refs
(Grant AF-AFOSR-1901-70)
(AD-714592; AFOSR-70-2583TR) Avail: NTIS CSCL 6/2

A gait of an n-legged machine or animal can be represented by a binary matrix, called a gait matrix, in which each row specifies the succession of leg states involved in the gait. By convention, a leg is said to be in the 0-state when it is in contact with the ground and in the 1-state when it is raised above it. A specific gait matrix is regularly realizable if and only if it is possible to execute the gait with every leg spending the same amount of time in the 0-state as every other leg. The report presents some general properties of such matrices. Both a sufficient condition and a necessary condition for regular realizability is obtained for a general n-legged machine. For quadrupeds and bipeds, a single condition which is both necessary and sufficient is found and it is determined that a total of 4 nonsingular biped gaits and 480 nonsingular quadruped gaits are regularly realizable. Author (GRA)

N71-16552# Ohio State Univ., Columbus. Dept. of Electrical Engineering.

A MATHEMATICAL THEORY FOR LEGGED LOCOMOTION SYSTEMS

Robert B. McGhee [1970] 14 p refs Presented at the 1970 Midwest Symp. on Circuit Theory
(Grant AF-AFOSR-1901-70)
(AD-714591; AFOSR-70-2581TR) Avail: NTIS CSCL 6/2

While legged locomotion systems typically possess a large number of degrees of freedom and are inherently very non-linear, it is nevertheless possible to construct a mathematical theory powerful enough to produce results not obtainable by informal methods. Although the present theory is not very far advanced, a framework suitable for the organization of further research has been established. Continued efforts to extend and improve the current understanding of legged locomotion should eventually produce a useful theoretical basis for the design and analysis of legged vehicles and prosthetic and orthotic appliances. Author (GRA)

N71-16553# Ohio State Univ., Columbus. Dept. of Electrical Engineering.

ON THE DYNAMIC STABILITY OF LEGGED LOCOMOTION SYSTEMS

Robert B. McGhee and Mark B. Kuhner 23 Oct. 1970 21 p refs Presented at the 3d Intern. Symp. on External Control of Human Extremities, Bubrovnik, Yugoslavia, 1969
(Grant AF-AFOSR-1018-67)
(AD-714589; AFOSR-70-2580FR) Avail: NTIS CSCL 6/2

While legged locomotion is obviously very efficient and versatile and is widely encountered in nature, only limited success has been attained in constructing legged vehicles. The failure of such vehicles to appear is to a large extent due to the lack of a well developed mathematical theory of legged locomotion. Another manifestation of this lack is the absence of electronically controlled lower extremity prostheses and orthotic devices. The purpose of this paper is to summarize the available body of theoretical knowledge relating to stability and control in legged machines and animals and to suggest areas where additional research ought to be undertaken. The paper includes a discussion of a hierarchy of mathematical models beginning with finite state models and concluding with rigid body dynamics. Some new results on balancing mechanisms for inherently unstable systems are also included. Author (GRA)

N71-16619# Mound Lab., Miamisburg, Ohio.

LIFE SUPPORT 2 PROGRAM Final Report

N. E. Davis and E. W. Johnson 28 Oct. 1970 50 p refs
(Contract AT-33-1-GEN-53)
(MLM-1757) Avail: NTIS

Five radioisotope-powered heat sources fueled with Pu-238O2 microspheres were fabricated at Mound Laboratory for use in the Life Support 2 Program. Four of the heat sources had a thermal power of 73.5 W each, and the fifth source had a thermal power of 48 W. These heat sources provided energy for operating the Life Support 2 water reclamation system. This system was satisfactorily operated for approximately 70 days total test time. The system, including the five heat sources, will be operating during the 90-day manned chamber tests in the Space Station Simulator at McDonnell-Douglas, Huntington Beach, California. Author (NSA)

N71-16624# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

THE EFFECTS OF INPUT POWER SPECTRA ON HUMAN OPERATOR COMPENSATORY TRACKING

John C. Heifferon (M.S. Thesis) Mar. 1970 98 p refs
(AD-714130; GE/EE/70-11) Avail: NTIS CSCL 5/10

An investigation is made into the effect on mean-squared error, as a performance measure in a single-axis compensatory tracking task, due to changes in the shape of the input power spectral density. Quasi-linear describing function theory is used to predict normalized mean-squared error with the pilot-vehicle dynamics represented by the crossover model. A digital computer program is used to evaluate the resultant mean-squared integrals and to plot normalized mean-squared error as a function of input

and crossover model parameters. The effect on human operator performance due to an added low-amplitude high frequency extension to a near-rectangular input spectrum is studied. Author (GRA)

N71-16702*# Public Health Service Hospital, San Francisco, Calif. Medical Dept.

A STUDY OF THE ROLE OF EXTRAVASCULAR DEHYDRATION IN THE PRODUCTION OF CARDIOVASCULAR DECONDITIONING BY SIMULATED WEIGHTLESSNESS (BEDREST), PART 1 Final Report

Kenneth H. Hyatt, William M. Smith, John M. Vogel, Robert W. Sullivan, William R. Vetter et al Dec. 1970 72 p refs

(NASA Order T-68099-G)

(NASA-CR-114808) Avail: NTIS CSCL 06P

Extravascular dehydration occurring during bedrest with resultant loss of plasma water to the extravascular tissues of the lower extremities during the post-recumbency tilt was investigated. Healthy male volunteers underwent a 14 day ambulant control phase, a 28 day bedrest phase, and a 14 day ambulant recovery phase. Details are given on the biochemical and isotopic analyses, dietary control, 70 deg tilt and exercise studies, and pulmonary function studies. The following conclusions were reached: The orthostatic tolerance decrease is not caused by autonomic insufficiency, extravascular dehydration, increased venous pooling, or increase in plasma water transudation. Past-recumbency orthostatism is affected by extracellular volume during bedrest coupled with an unchanged plasma water transudation during post-recumbency tilting. Initial large saluresis and diuresis, and rapid restitution of plasma volume and extracellular fluid voume to normal after bedrest are related to alterations in aldosterone production. A decrease in myocardial function, depressed red cell production by bone marrow, and calcium loss were observed. N.E.N.

N71-16703*# Public Health Service Hospital, San Francisco, Calif. Medical Dept.

A STUDY OF THE ROLE OF EXTRAVASCULAR DEHYDRATION IN THE PRODUCTION OF CARDIOVASCULAR DECONDITIONING BY SIMULATED WEIGHTLESSNESS (BEDREST), PART 2 Final Report

Kenneth H. Hyatt, William M. Smith, John M. Vogel, Robert W. Sullivan, William R. Vetter et al Dec. 1970 152 p

(NASA Order T-68099(G))

(NASA-CR-114809) Avail: NTIS CSCL 06P

Data tables are presented for the biochemical and isotopic analyses, tilt and exercise studies, and pulmonary function studies. N.E.N.

N71-16704*# Little (Arthur D.), Inc., Cambridge, Mass.

A STUDY OF THE EFFECTS OF THE SPACECRAFT ENVIRONMENT ON DRUG ACTION Final Report, 1 Jul. 1969 31 Oct. 1970

31 Oct 1970 108 p refs

(Contract NAS9-9806)

(NASA-CR-114821) Avail: NTIS CSCL 06P

A study of possible effects of 5 psia oxygen on oxidative drug metabolism has been carried out in the rat. Several drugs in the Apollo medical kit were studied. Exposures to 5 psia oxygen of approximately four, eight, twelve, and twenty-eight days were carried out. This environment had no effect on liver size, amount of liver microsomal protein, or cytochrome P-450 and cytochrome b sub 5 levels in the rat liver. In vitro metabolic rates for oxidation of the following materials were studied using rat liver microsomes from rats exposed to 5 psia oxygen: (1) meperidine, (2) propoxyphen, (3) cyclizine, (4) hexobarbital, and (5) aniline. Use of the first three substrates provides a measure of microsomal N-demethylase activity, hexobarbital provides a measure of barbiturate oxidase activity, and aniline provides a measure of activity of an aryl hydroxylase. From Lineweaver-Burk plots of the rate data, the kinetic parameters K sub m and V sub max were obtained for most of these substrates. No differences in oxidative metabolic rates were found between oxygen-exposed groups and control groups of rats. Author

N71-16736*# Miami Valley Hospital, Dayton, Ohio. Dept. of Research.

THE EFFECT OF A LIQUID FOOD DIET ON HUMAN SUBJECTS IN A LIFE SUPPORT SYSTEMS EVALUATOR Final Report, 5 Apr. - 18 May 1965

Bernard J. Katchman, George M. Homer, James P. F. Murphy, Carol A. Linder, and Vickie R. Must Wright-Patterson AFB, Ohio. AMRL Jul. 1970 64 p refs

(NASA-Order R-85; Contract AF 33(657)-11716)

(NASA-CR-116253; AD-711790; AMRL-TR-67-76) Avail: NTIS CSCL 06P

A 6-week study with four college students as volunteer subjects was conducted for the purpose of evaluating the water, caloric and protein requirements of individuals undergoing simulated stresses of aerospace conditions. During this time the subjects spent 28 days in the Life Support Systems Evaluator. Two subjects wore the MA-10 space suit, unpressurized for 24 hours a day. The subjects ate a 1-cycle, 4 meals per day fresh food diet and a 3-cycle, 4 meals per day liquid food diet. The only variety in the fresh food diet was the meat and fruit served at each meal. This diet was acceptable and did not show monotony even after 21 days. The fresh food diet was comprised of 63 g protein, 150 g fat, 204 g carbohydrate and 2372 kcal energy. The liquid food diet was composed of 70 g protein, 167 g fat, 246 kcal energy. The daily requirement of water was about 2700 ml for both diets. Author (GRA)

N71-16793# Chicago Univ., Ill.

HIGH RESOLUTION SCANNING MICROSCOPY OF BIOLOGICAL SPECIMENS

A. V. Crewe [1970] 27 p refs Presented at Conf. on Electron Microscopy, London

(Contract AT(11-1)-1721)

(COO-1721-21; CONF-700332-1) Avail: NTIS

A scanning microscope is described which is capable of a point resolution of 5 A. It can produce the same kinds of micrographs as a conventional microscope. However, by using several detectors to produce signals corresponding to different groups of transmitted electrons, an image contrast closely proportional to Z, the atomic number is produced. Such a system is very promising for the study of stained molecules. Author (NSA)

N71-16840*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ELECTROCARDIOGRAPHIC ELECTRODES FOR RAPID APPLICATION Final Technical Report

Mitchell Weisberg and Rolfe D. White Jan. 1971 18 p refs

(NASA-TM-X-65438; X-207-71-32) Avail: NTIS CSCL 06B

Basic research aimed at the development of an electrode for rapid application is reviewed. The following areas of the investigation are reported: (1) identification and scope of the project, (2) results of a literature search, (3) construction and breadboarding of buffer amplifiers and electrodes, and (4) fabrication techniques for electrodes including an anodizing procedure for tantalum. D.L.G.

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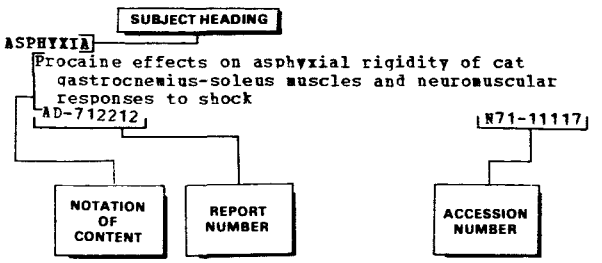

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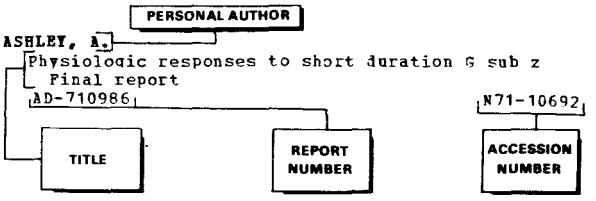

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