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AEROSPACE MEDICINE AND BIOLOGY

**A CONTINUING BIBLIOGRAPHY
WITH INDEXES**



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AEROSPACE MEDICINE AND BIOLOGY

**A CONTINUING BIBLIOGRAPHY
WITH INDEXES**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during September, 1968.



Scientific and Technical Information Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. OCTOBER 1968

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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects 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 will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

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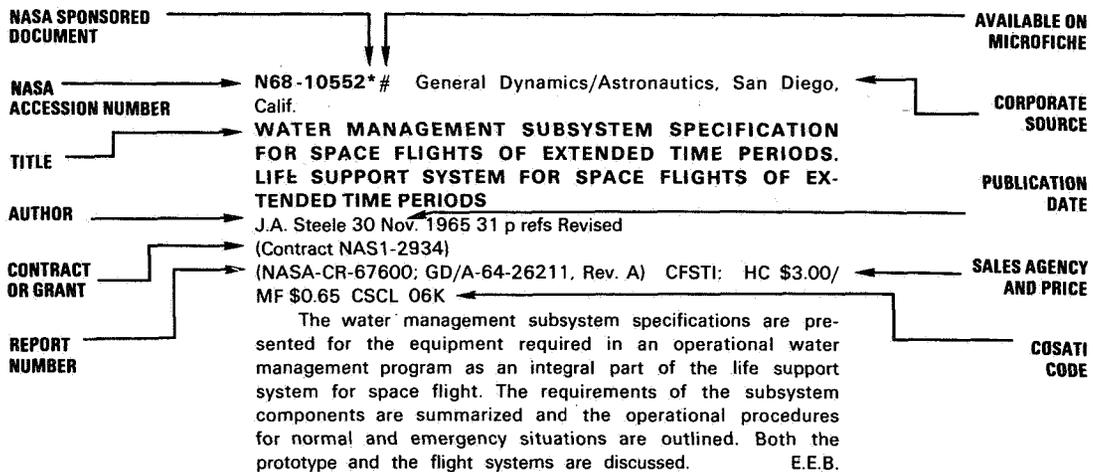
Copies of *Aerospace Medicine and Biology* (SP-7011) and its supplements can be obtained from NASA (Code USS-A), without charge, by NASA offices and contractors, U.S. Government agencies and their contractors, and organizations that are working in direct support of NASA programs.

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TYPICAL CITATION AND ABSTRACT





AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography OCTOBER 1968

STAR ENTRIES

N68-28337*# Scripta Technica, Inc., Washington, D. C.
**BREATHING APPARATUS FOR SELF-RESCUE FROM AREAS
CONTAMINATED BY IRRESPIRABLE GASES [ATMUNGS-
APPARAT ZUR SELBSTRETTUNG AUS DEM BERECHE
IRRESPIRABLER GASE]**

Max Bamberger and Friedrich Boeck NASA Jun. 1968 15 p
Transl. into ENGLISH from Z. Angew. Chem. (Germany), v. 17,
1904 p 1426-1437
(NASw-1694)

(NASA-TT-F-11701) CFSTI: HC\$3.00/MF\$0.65 CSCL06K

Design details are presented on a portable emergency oxygen generator based on the principle of the reaction of alkali peroxides with water. Low weight, small volume, simple operation combined with reliable functioning, long life, and minimum cost were considered in developing the self-rescue apparatus. The device is divided into two parts: an absorption and regeneration section, and an oxygen-generating section. Since alkali peroxides decompose when exposed to moist air, they are kept hermetically sealed before use. Also discussed is the use of sodium potassium peroxide in dust-free, coarse propus form. Equations are derived to show that twice the amount of oxygen present in water vapor and all the oxygen in carbon dioxide are liberated in the regeneration process. The physiological reactions of users to the apparatus are considered, and it is concluded that no difficulties or adverse effects are likely. M.G.J.

N68-28398 Claremont Mens Coll., Calif.
**ELECTRICAL ACTIVITY OF THE EYE: RESPONSES TO
BRIGHTNESS AND HUE**

Richard Loren Bruce (Ph.D. Thesis) 1967 97 p
Available from Univ. Microfilms: HC \$5.00/MF \$3.00

Electrophysiological activity was recorded from the eye of the laboratory rat, the wood rat, and the antelope ground squirrel in response to flashes of light varied in intensity and hue. Histological sections of the retinas revealed the laboratory rat and the wood rat to have structural qualities indicative of an all rod retina. Electroretinograms recorded from each species showed characteristics consistent with the histological observations. Intraocular electroretinographic responses to hue could be matched by appropriate brightness white light responses in all species. Micropipette recordings of the intraretinal electroretinograms in response to equal brightness red, blue-green, and white stimuli showed no spectral activity at any retinal level, in any species.

Changes in the intraretinal electroretinogram were consistent between species in apparent retinal origin and are in agreement with conclusions drawn from research by others. The inability of the electroretinogram to detect spectral activity in the eye of a species with color vision (ground squirrel) is noted. Dissert. Abstr.

N68-28499# Joint Publications Research Service, Washington, D. C.

SPACE BIOLOGY AND MEDICINE, VOLUME 2, NO. 2, 1968

27 Jun. 1968 143 p refs Transl. into ENGLISH of Kosmicheskaya Biologiya i Meditsina (Moscow), v. 2, no. 2, 1968 p 1-93
(JPRS-45798) CFSTI: HC\$3.00/MF\$0.65

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2. SOME RESULTS OF A MEDICAL-BIOLOGICAL EXPERIMENT ON THE BIOLOGICAL SATELLITE KOSMOS 110 V. V. Parin, V. N. Pravetskiy, N. N. Gurovskiy, Yu. G. Nefedov, B. B. Yegorov et al p 6-16 refs (See N68-28501 17-04)

3. QUANTITATIVE EVALUATION OF THE CARDIOVASCULAR SYSTEM IN ANIMALS DURING LONG-TERM ORBITAL FLIGHT Yu. G. Nefedov, N. N. Gurovskiy, A. D. Yegorov, B. B. Yegorov, A. A. Kiselev et al p 17-27 refs (See N68-28502 17-04)

4. FEEDING TEST ANIMALS DURING SPACE FLIGHTS K. V. Smirnov and A. A. Lepskiy p 28-32 refs (See N68-28503 17-04)

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9. UREA DECOMPOSITION BY UREASE M. I. Belyakova, B. G. Gusarov, V. V. Krasnoshchekov, and Yu. Ye. Sinyok p 68-72 ref (See N68-28508 17-04)

10. QUANTITATIVE AND QUALITATIVE DISTRIBUTION OF BONE MARROW IN ADULT DOGS P. A. Korzhuyev, T. N.

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16. SPACE MEDICINE AND BIOLOGY PROBLEMS DISCUSSED AT THE EIGHTEENTH CONGRESS OF THE INTERNATIONAL ASTRONAUTICAL FEDERATION N. A. Agadzhanian p 117-125 (See N68-28515 17-04)

17. WORK OF THE SECTION ON AVIATION AND SPACE MEDICINE OF THE MOSCOW PHYSIOLOGICAL SOCIETY IN 1967 I. M. Khazen, F. P. Kosmolinskiy, and P. V. Buyanov p 126-130 (See N68-28516 17-04)

18. THE POSSIBILITY OR SURVIVAL OF TERRESTRIAL ORGANISMS UNDER "MARTIAN" CONDITIONS (A REVIEW OF THE FOREIGN LITERATURE) V. L. Levin p 131-137 refs (See N68-28517 17-04)

N68-28500# Joint Publications Research Service, Washington, D. C.

RADIATION DANGER DURING LONG SPACE FLIGHTS AND RADIOBIOLOGICAL RESEARCH

Ye. I. Vorobyev, Yu. G. Grigor'yev, Ye. Ye. Kovalev, and V. A. Sakovich *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 1-5 (See N68-28499 17-04)

The characteristics of radiation conditions during long space flights are discussed in the context of the need for examining radiation exposure levels and adequately evaluating possible radiobiological effects. The components which form the absorbed radiation dose are identified as cosmic radiation, solar flare protons, and protons from the earth's inner radiation belt; the average dose to be expected from each is given. The complexities involved in estimating the total doses to be expected during forthcoming space flights and determining permissible doses to ensure continued viability and work capacity of cosmonauts are assessed. The need for formulating criteria on protective shielding for the spaceship crew is stressed, with the most important tasks for space radiobiology cited as the sound determination of the magnitudes of the justified risk dose and the degree of risk of exceeding these values.

M.G.J.

N68-28501# Joint Publications Research Service, Washington, D. C.

SOME RESULTS OF A MEDICAL-BIOLOGICAL EXPERIMENT ON THE BIOLOGICAL SATELLITE KOSMOS 110

V. V. Parin, V. N. Pravetskiy, N. N. Gurovskiy, Yu. G. Nefedov, B. B. Yegorov et al *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 6-16 refs (See N68-28499 17-04)

Results are presented on biomedical experiments using two test dogs during and after the 22-day flight of the Kosmos 110 biological satellite. Space flight factors produced reversible changes in the function of vital systems in the animal body. The detected changes are typical of those in highly organized animals.

It is felt that this makes it possible to predict the effect of space flight factors on the human body by extrapolating the results of tests on animals. Author

N68-28502# Joint Publications Research Service, Washington, D. C.

QUANTITATIVE EVALUATION OF THE CARDIOVASCULAR SYSTEM IN ANIMALS DURING LONG-TERM ORBITAL FLIGHT

Yu. G. Nefedov, N. N. Gurovskiy, A. D. Yegorov, B. B. Yegorov, A. A. Kiselev et al *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 17-27 refs (See N68-28499 17-04)

Results are presented on a mathematical analysis of the physiological indices showing the functioning of the cardiovascular system in dogs during their long-term exposure to weightlessness aboard the Kosmos-110 biological satellite. The test dogs exhibited different trends in the changes of the cardiac cycle stages and heart rate due to their individual characteristics. The dogs exhibited a lower level of the pulse rate during the ejection period and a higher level during the tension period than at the baseline level. This indicates more economical performance by the heart during weightlessness and appears to be a regular response of the cardiovascular system to the orbital flight effect. Different factors responsible for the changes are analyzed, and the possibilities of predicting space flight effects on the human body on the basis of data obtained during flights of animals are discussed. Author

N68-28503# Joint Publications Research Service, Washington, D. C.

FEEDING TEST ANIMALS DURING SPACE FLIGHTS

K. V. Smirnov and A. A. Lepskiy *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 28-32 refs (See N68-28499 17-04)

Information is given to show that the technique of forced feeding and water supply of test dogs can be reliably used during prolonged space flights. The described technique was successfully used during flight of the Kosmos 110 biological satellite. Author

N68-28504# Joint Publications Research Service, Washington, D. C.

FUNCTIONAL STATE OF THE BLOOD COAGULATION SYSTEM IN DOGS AFTER A 22-DAY FLIGHT ON THE KOSMOS 110 ARTIFICIAL EARTH SATELLITE

O. D. Anashkin *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 33-39 refs (See N68-28499 17-04)

The data show that on the first day after their space flight the two dogs exhibited a significant rise in fibrinogen, proaccelerin, and prothrombin complex factors, and a decrease in free heparin in the blood. These changes can promote thrombotic damage of different organs at early postflight stages. It therefore appears urgent to study basic parameters of the blood coagulation system during the pre- and post-flight periods. It is felt that the study will help in diagnosing these changes in sufficient time and in treating them properly. Author

N68-28505# Joint Publications Research Service, Washington, D. C.

EFFECT OF HIGH OXYGEN CONCENTRATIONS ON THE ANIMAL BODY

N. A. Agadzhanian, M. S. Gayevskaya, V. M. Zemskov, I. R. Kalinichenko, G. D. Knyazeva et al *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 40-51 refs (See N68-28499 17-04)

The effect of long exposure of rats to high oxygen concentrations (89-95%) was studied. During the first two days the test animals exhibited hyperdynamia, an increased oxygen consumption, and an increased rate of oxygen phosphorylation by brain tissues. Beginning with the third day the general condition of the test rats deteriorated sharply: they exhibited disorders in the

oxygen phosphorylation system, inhibition of immunity reactions, and reduced tolerance to hypoxia. Many animals died. The most distinct pathomorphological changes were found in the lungs. After the exposure a compensatory increase in oxygen consumption and tissue oxygen phosphorylation occurred; altitude tolerance gradually returned to normal levels. Author

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CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF HEMODYNAMIC PECULIARITIES IN THE EYE VASCULAR SYSTEM OF TEST ANIMALS EXPOSED TO ACCELERATIONS

E. S. Kotova and Ye. A. Savina *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 52-60 refs (See N68-28499 17-04)

The changes occurring in the eye vascular system of rabbits during their single and repeated exposure to transverse accelerations of 4 to 12 g for 1.5 to 6 minutes were studied from the clinical and morphological points of view. The retinal vessels showed different reactions relative to different accelerations. The dynamics of vascular responses was investigated during the immediate and remote aftereffect periods. The morphological analysis confirmed basic regularities in hemodynamic changes established during the ophthalmological study. It also demonstrated that hemodynamic disturbances in the eye vascular system were accompanied by increased vascular permeability. These experiments lent support to the concept of a combined effect of accelerations on the retinal vessels during repeated exposure to accelerations which has been advanced as a result of similar experiments on human subjects. Author

N68-28507# Joint Publications Research Service, Washington, D. C.

A METHOD FOR EXTRACTING METABOLITES FROM CHLORELLA CULTURE MEDIA

V. V. Shaydorova, Ye. K. Lebedeva, V. V. Krasnoschchekov, and V. I. Yazdovskiy *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 61-67 refs (See N68-28499 17-04)

A method was developed for extracting organic compounds (metabolites) from nutrient media after an intensive cultivation of a *Chlorella* culture. The metabolites were shown to undergo no decomposition during diethyl ether extraction in a nitrogen atmosphere. Thin-layer and paper chromatography of the organic compounds demonstrated that they contained unsaturated acids involving phenol groups, unsaturated amines, and phenols. Author

N68-28508# Joint Publications Research Service, Washington, D. C.

UREA DECOMPOSITION BY UREASE

M. I. Belyakova, B. G. Gusarov, V. V. Krasnoschchekov, and Yu. Ye. Sinyak *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 68-72 ref (See N68-28499 17-04)

The enzymic decomposition of the urea in urine was shown to be applicable for ammonia production. Urea hydrolysis can develop at a sufficient rate in the absence of a buffer solution. Amino acids, phenols, esters, ketones and other urea components produce no significant effect on the hydrolysis rate. It takes three hours for the decomposition of 1.5 liter of urine urea (the daily human average) at 20°C in the absence of a buffer solution. Author

N68-28509# Joint Publications Research Service, Washington, D. C.

QUANTITATIVE AND QUALITATIVE DISTRIBUTION OF BONE MARROW IN ADULT DOGS

P. A. Korzhuyev, T. N. Glazova, I. O. Alyakrinskaya, and M. P. Kalandarova *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 73-79 refs (See N68-28499 17-04)

A study of the quality and quantity of bone marrow in the animal body is required for a proper evaluation of compensatory reactions of hematopoietic organs in response to radiation damage. A study of adult dogs revealed that the average weight of their bone marrow under normal conditions is 217 g, 80% of which is active red bone marrow. Most of this is in the spinal column, shoulder blades, pelvis, and ribs. The hematopoietic process occurring in the sternum and iliac bone exhibits no significant difference with respect to the percentage of bone marrow cells or their content of myelokaryocytes. Author

N68-28510# Joint Publications Research Service, Washington, D. C.

A MINIATURE TELEMETRIC DEVICE FOR ELECTROMYOGRAM TRANSMISSION

T. S. Chervyakova and V. V. Tyazhelov *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 80-84 refs (See N68-28499 17-04)

A miniature transmitter for a single-channel biotelemetric system of limited range was developed. The device is designed for transmitting electromyograms. Some transmitter components were made using film technology. Parameters of the system indicate its reliability for use in biological experiments. Author

N68-28511# Joint Publications Research Service, Washington, D. C.

EFFECT OF LONG-TERM HYPOKINESIA ON THE HUMAN BODY AND THE HYPOKINETIC COMPONENT OF WEIGHTLESSNESS

L. I. Kakurin *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 85-91 refs (See N68-28499 17-04)

An experimentally diminished muscular activity of man can be used as a model to reproduce some human reactions similar to those induced by weightlessness. The purpose of the 62-day experiment was to study adaptive processes of the human body and to establish the efficiency of physical exercises during hypokinesia. Detailed clinical and physiological examinations revealed disturbances in the functioning of the circulatory, respiratory, and neuromuscular systems, changes in natural immunity, and diuretic deterioration. Physical exercises with a load up to 1,000-1,200 cal/day produced a limited positive effect. Author

N68-28512# Joint Publications Research Service, Washington, D. C.

VARIATION IN THE DYNAMICS OF PERFORMANCE OF SOME HUMAN PHYSIOLOGICAL SYSTEMS DURING PROLONGED CONFINEMENT IN A SMALL CHAMBER

B. A. Dushkov, A. N. Zolotukhin, and F. P. Kosmolinskiy *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 92-101 refs (See N68-28499 17-04)

The work capacity and adaptation of test subjects were investigated during a 30-day confinement in an enclosed chamber, aggravated by isolation and sensory deprivation. The functional state of the test subject, and his mental and physical performance were evaluated in thorough examinations, including psychological and clinical tests, and time-study methods. Adaptation of the human body to long-term confinement was established: first stage (first one or two days) is one of excitation (a stage of initial adaptation); second stage (second to eighth-tenth days) is a stage of unstable adaptation; third stage (eighth-tenth day to the last day of confinement or the day before) is a stage of stable adaptation; fourth stage (last one or two days) is considered the last effort. Author

N68-28513# Joint Publications Research Service, Washington, D. C.

NOISE IMMUNITY IN HUMAN PSYCHIC ACTIVITY

N68-28514

V. V. Suvorova and Z. G. Turovskaya *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 102-111 refs (See N68-28499 17-04)

Laboratory experiments were conducted to study stress effects on human subjects. Two stress effects having different physiological mechanisms were compared. Electroencephalograms were recorded prior to, during, and following the experiments. The stress effects differed in the three parameters studied. Individual thresholds of adaptation to different stresses varied. Most test subjects easily tolerated one stress effect but could not tolerate the other. The behavior and health status of the test subjects were also different during the two exposures to stress. The failure of test subjects to contend with the stress was deeper and longer in one case, having a different behavioral expression. Some test subjects were uncomfortable during one exposure to stress. Author

N68-28514# Joint Publications Research Service, Washington, D. C.

ROLE OF THE VESTIBULAR ANALYZER IN MAN'S SPATIAL ORIENTATION DURING WEIGHTLESSNESS IN AIRCRAFT FLIGHTS

V. I. Lebedev and I. F. Chekirda *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 112-116 refs (See N68-28499 17-04)

The capacity of man to orient himself in space without visual control was studied during brief weightlessness (24 to 26 seconds). The experiments were made on six male test subjects who were instructed to estimate the angle by which the Barany seat rotated. Half the test subjects were not informed of their estimation errors. The subjects usually erroneously underestimated the rotation angle, the errors becoming greater as the angle increased. After five flights the test subjects gave correct estimates in cases when they had been informed of their errors. The tendency to underestimate the rotation angle can be attributed to an increased sensitivity of the semicircular canals and the subjective sensation during weightlessness that time passed more rapidly. Author

N68-28515# Joint Publications Research Service, Washington, D. C.

SPACE MEDICINE AND BIOLOGY PROBLEMS DISCUSSED AT THE EIGHTEENTH CONGRESS OF THE INTERNATIONAL ASTRONAUTICAL FEDERATION

N. A. Agadzhanyan *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 117-125 (See N68-28499 17-04)

An overview is presented on the various reports pertaining to such fields as astrodynamics, rocket fuels and the thermodynamics of combustion, the orbital laboratory, and bioastronautics. Both Soviet and United States contributions to the ten year history of the space age are traced. It is reported that emphasis was placed on the medical and biological aspects of space flight, and it is noted that considerable physiological information was obtained, primarily in the laboratory. It was concluded that some of the central problems are directly related to supporting long-duration space flights. These are identified as long-term habitability in spacecraft cabins; a physiologically sound gas medium; formulation of the best work, rest, and feeding schedules for cosmonauts; finding effective means for life support; and measures for increasing body tolerance to the effects of extremal factors. M.G.J.

N68-28516# Joint Publications Research Service, Washington, D. C.

WORK OF THE SECTION ON AVIATION AND SPACE MEDICINE OF THE MOSCOW PHYSIOLOGICAL SOCIETY IN 1967

I. M. Khazen, F. P. Kosmolinskiy, and P. V. Buyanov *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 126-130 (See N68-28499 17-04)

Summary information is given on the 26 reports which were presented at the nine meetings held to discuss problems in aviation and space medicine. These included the effect of dynamic

flight factors on the human body; psychological problems in supersonic and space flight; the effects of hypokinesia and weightlessness; physiology of the work of flight personnel and cosmonauts; theoretical principles of increasing body tolerance to extremal factors; and developing safety measures and means for reducing the unfavorable effect exerted on the human body by some environmental factors. Author

N68-28517# Joint Publications Research Service, Washington, D. C.

THE POSSIBILITY OF SURVIVAL OF TERRESTRIAL ORGANISMS UNDER "MARTIAN" CONDITIONS (A REVIEW OF THE FOREIGN LITERATURE)

V. L. Levin *In its Space Biol. and Med.*, Vol. 2, No. 2, 1968 27 Jun. 1968 p 131-137 refs (See N68-28499 17-04)

The different concepts which have developed on the physical conditions existing on the Martian surface are discussed in terms of the numerous astrophysical experiments which are being conducted to assess the possibility of extraterrestrial life. This research involves (1) attempts to clarify the results of exposure of terrestrial organisms to the set of physical conditions presumably existing on Mars; and (2) the collection of data for establishing environmental conditions extremal for various terrestrial organisms. The experiments mentioned were conducted in chambers at a pressure of about 0.1 atm, or about 100 mbar, with a relatively small carbon dioxide concentration in the gas mixture. It is pointed out, however, that analysis of the Mariner 4 data indicates that the barometric pressure at the Martian surface is 4 to 7 mbar; thus the carbon dioxide determined from the earth by spectrographs is a considerably greater part of the Martian atmosphere (from 37% to 100%). Two experiments conducted under these Martian conditions are reported, and the view is offered that the survival of some terrestrial organisms on Mars is not impossible. M.G.J.

N68-28558# Bunker-Ramo Corp., Canoga Park, Calif.

SUMMARY OF ALL WEATHER LANDING SIMULATION STUDIES Final Report

R. D. Monroe, D. Vreuls, and C. A. Semple Feb. 1968 42 p refs

(Contract FA-67-WA-1700)

(SRDS-RD-68-13)

Six studies were conducted in a flight simulator in an effort to determine the essential characteristics of the cockpit displays required for Category III all weather landing operations. The first two studies, reported on an earlier contract, examined the utility of current flight directors for all-weather landing in a jet transport. The last four studies examined various display and control concepts. This report briefly summarizes all six studies, discusses the general results of the work and suggests areas for future study. Author

N68-28559# Bunker-Ramo Corp., Canoga Park, Calif.

EFFECTS OF A 100 FOOT OPTION ALTITUDE RULE AND AN ANNUNCIATOR PANEL ON FAILURE DETECTION, GO-AROUND DECISIONS AND LANDING PERFORMANCE, PHASE 3 Final Report, 18 Aug.-29 Sep. 1967

C. A. Semple, S. B. Stewart, S. F. Barnebey, and D. E. Nichols Feb. 1968 78 p refs

(Contract FA67WA-1700)

(SRDS-RD-68-11)

Twenty rated pilots participated in a simulator study designed to investigate pilot and system responses to control and display system failures occurring during automatic Category III-C instrument approach to landing. The option altitude rule used in the study required that: (1) when a failure occurred above 100 feet, the pilot was required to execute a go-around; (2) when a failure occurred below 100 feet, it was the pilot's option to continue the approach or to go-around. The utility of a failure annunciator panel also was explored. Author

N68-28564*# Techtran Corp., Glen Burnie, Md.
**ACUTE AND CHRONIC STRESS SYNDROMES. PART 2:
 PSYCHIATRIC EFFECTS OF EXTREME STRESSES [DAS
 AKUTE UND DAS CHRONISCHE BELASTUNGSSYNDROM
 (2)]**

Ulrich Venzlaff (Göttingen Univ.) Washington NASA Jun. 1968
 15 p refs Transl. into ENGLISH from Med. Welt (W. Germany),
 no. 8, 1966 p 369-376

(Contract NASw-1695)

(NASA-TT-F-11787) CFSTI: HC\$3.00/MF\$0.65 CSCL05J

Immediate psychological reaction and later psychotic and psychosomatic effects of confinement in prisoner of war camps and concentration camps are discussed in general, without case histories. The relevant German language and English language literature is extensively cited and quoted. Similar and dissimilar causal factors in the two situations are pointed out and problems of rehabilitation are discussed. Author

N68-28605 Polytechnic Inst. of Brooklyn, N. Y.
**THRESHOLD TRACKING INSTRUMENT FOR USE IN
 NEUROPHYSIOLOGICAL EXPERIMENTATION**

Lawrence Eisenberg (Ph.D. Thesis) 1967 125 p

Available from Univ. Microfilms: HC \$6.00/MF \$3.00 Order No.
 67-10952

An instrument is described which is capable of plotting, on-line, the threshold of electrical stimulation of nerve cells as a function of time. An oscilloscopic display is presented which will yield information about the stochastic parameters of the threshold fluctuation if the probability density function is Gaussian. The hypothesis that the fluctuations in the threshold of electrical stimulation of the motoneuron are stochastic in character, is supported by an examination of the neurophysiological and electrical literature. The physical basis of these fluctuations is explored. Several search strategies are considered with the purpose of reaching the desired threshold levels, in a minimum number of search steps. Using these criteria, a Binary Increment search strategy, which requires 10 steps per search interval is chosen. Dissert. Abstr.

N68-28606*# Harvard School of Public Health, Boston, Mass.
**STUDY OF SPACE CABIN ATMOSPHERES Status Report,
 Jul. 1-Dec. 31, 1967**

William A. Burgess and Parker C. Reist May 1968 21 p refs

(Grant NGR-22-007-053)

(NASA-CR-95398) CFSTI: HC \$3.00/MF \$0.65 CSCL 06K

Particle concentration and size distribution in closed space cabin environments, and calibration of hot-wire sensing devices for detecting and sizing liquid aerosols were studied. Test data analysis indicated average particle concentration of 40,000 particles per cubic foot. Although removal of particles by the environmental control system caused variations the base-line concentration did not appear to change, indicating that the removal was balanced by new particle generation. The aerosol particle analyzer was calibrated at atmospheric pressure and at one-half atmosphere. For particle size analysis, manual calibration of the hot wire sensor was performed using water droplet aerosol with size distribution identified by available data. Count, size, and percent by size of particles are tabulated. Schematics of hot wire calibration apparatus, and pulse conditioning circuits are included. F.O.S.

N68-28651*# Massachusetts Inst. of Tech., Cambridge.
**THE RESISTIVITY OF MICROORGANISMS TO
 INACTIVATION BY DRY HEAT Summary Report, May 5,
 1967-May 5, 1968**

Gerald Silverman [1968] 15 p

(Grant NsG-691)

(NASA-CR-95401) CFSTI: HC \$3.00/MF \$0.65 CSCL 06M

The importance of internal and external water in dry heat resistivity of *Bacillus subtilis* var. niger was studied. The internal water content was established by equilibrating the spores over salt

solutions at 20°C for specific water activity (A_w) values. External water was established by adding definite quantities of water to air (RH) passing over the spores in glass cover slips placed in a chamber. The optimal internal water content for maximal resistance was found to be approximately .80 for a variety of spores. Data illustrating the effects on survival by RH, A_w , temperature, and exposure time are graphed. The conclusions indicate that both external and internal water are protective, but the effectiveness depends on temperature and extent of A_w . At active water greater than .80 or temperatures higher than 130°C water loses its effectiveness. F.O.S.

N68-28686*# National Aeronautics and Space Administration,
 Manned Spacecraft Center, Houston, Tex.

**A STUDY OF REFRIGERATION AND CONSTRICTING BAND
 FOR EARLY TREATMENT OF PIP VIPER SNAKEBITE**

Jesse P. Blalock Jun. 1968 17 p refs

(NASA-TM-X-58019) CFSTI: HC \$3.00/MF \$0.65 CSCL 06E

The refrigeration and constricting-band treatment was studied as a method that could be adapted to a first aid procedure for poisonous snakebites. A search of the literature revealed that snakebite authorities recognize the serious limitations and possible harmful effects of the incision-and-suction first aid procedure. This study was conducted by injecting rabbits with eastern diamondback rattlesnake venom and comparing the survival time of untreated animals and animals treated with the refrigeration and constricting-band method. A significant increase in survival time of the treated animals was indicated. Recommendations are made for first aid procedures. Author

N68-28770# Air Force Personnel and Training Research Center,
 Lackland AFB, Tex.

**AIR FORCE OFFICER PERFORMANCE EVALUATION:
 RATING TRENDS AND RELATIONSHIPS FROM 1954
 THROUGH 1965**

Ludrew B. Grappe, Ray W. Alvord, and James V. Poland Oct.
 1967 55 p refs

(PRL-TR-67-12; AD-669076)

The success of a performance evaluation system is at least partially assessed through observation and experience. This report is a documentation of the thinking, the effort, and the results of research based on an accumulation of selected data from officer effectiveness reports prepared during the period 1954 through 1965, and deemed to be of general interest to those either engaged in the study of performance assessment or directly responsible for the evaluation of performance. Development of the complex Officer Effectiveness Report Data Bank, its periodic updates, and its current status as a source of continued research are briefly discussed. A number of categories relating to the magnitude of the data base and the description of rating trends and rating relationships are treated separately. Recurring differences in performance measures (mean OERs) are noted between the officer grades for regular vs. reserve, rated vs. nonrated, and among the major commands and duty, AFSC groups. In almost every instance, inflationary trends were prevalent for each grade; exceptions to these trends were apparent for a short period in 1961 following the introduction of AF Form 707 when the mean OER for all field grades dropped significantly and a short period in 1963 following the revision of AF Form 77 when the mean OER for all company grades dropped slightly. Similar mean OER differences (from data available only for 1965) were found between grades, for different periods of supervision and for different grades of the reporting official. Author (TAB)

N68-28808# Naval Air Development Center, Johnsville, Pa.
 Aerospace Crew Equipment Dept.

**LEGIBILITY OF VARIOUS SIZED LETTERS UNDER
 AVIATION RED, "LUNAR", AND NEUTRALLY-FILTERED
 INCANDESCENT WHITE LIGHTING SYSTEMS Final Report**

Gabriel Patrick Intano 17 Oct. 1967 41 p refs

(NADC-AC-6705; AD-661829)

N68-28829

The legibility of various sized letters was evaluated under Aviation Red, Lunar, and Neutrally-Filtered Incandescent White lighting using a simulated instrument panel. Seven brightness levels were employed: 0.005, 0.01, 0.05, 0.10, 0.15, 0.19 FT-L, and the maximum brightnesses obtained at the rated voltage of the lamps. Legibility was significantly better under Aviation Red than either of the white systems. There was no significant differences between the white systems. Increases in performance were found above brightness levels previously reported. It is recommended that work be continued on legibility under various types of lighting using different test material.
Author (TAB)

N68-28829*# Esso Research and Engineering Co., Linden, N. J.
STUDY OF METHODS FOR CHEMICAL SYNTHESIS OF EDIBLE FATTY ACIDS AND LIPIDS: FINAL SUMMARY

John W. Frankenfeld, ed. Washington NASA Jul. 1968 97 p refs
(Contract NAS2-3708)

(NASA-CR-1104) CFSTI: HC \$3.00/MF \$0.65 CSCL 06A

A survey and critical evaluation of existing methods for the synthesis of fatty acids and lipids from the metabolic wastes under conditions of space travel has been completed. An extensive literature search was conducted and the candidate processes were evaluated from the standpoints of chemical feasibility and nutritional value of the products. The only promising route involved synthesis of ethylene from carbon monoxide, polymerization to α -olefins via the Ziegler growth reaction, conversion to fatty acids by oxidative ozonolysis and combination with glycerol to form edible glycerides. A first approximation engineering design was made and some rough estimates of power requirements were drawn up. The system was found to be extremely complex and unreliable. Hence it is not recommended as a method for food preparation on board a space craft. Four methods for the synthesis of glycerol were discovered. The most promising are base catalyzed trimerization of formaldehyde followed by hydrogenation and hydrogenolysis of higher sugars which may be prepared by controlled polymerization of formaldehyde. The synthesis of glycerol is much less complicated than fatty acid production and hence is a recommended alternate.
Dissert. Abstr.

N68-28833*# Garrett Corp., Los Angeles, Calif.

THE EFFECTS OF LUNAR GRAVITY ON METABOLIC RATES

W. G. Robertson and E. C. Wortz Washington NASA Jul. 1968 91 p refs
(Contract NAS9-6494)

(NASA-CR-1102; Rept.-67-2174) CFSTI: HC \$3.00/MF \$0.65 CSCL 06S

Experiments were conducted to determine the effects of simulated lunar gravity on the metabolic cost of work in both the A-5-L and the RX-2 full pressure suits. Lunar gravity simulation was accomplished using a modified Hewes and Spady inclined-plane simulator and a 6-degree-of-freedom (DOF) suspension simulator. Six subjects wearing the A-5-L and RX-2 pressure suits were instrumented for determining metabolic rates; data were collected for walking and upper-torso exercises during ventilated and pressurized modes of operation for each suit. Results show that the metabolic rates for walking are lower in the 1/6-g environment than in the 1-g environment. There were no significant differences in the energy costs of walking between the RX-2 and the A-5-L pressure suits at 1/6 g with the suits pressurized. Pressurization results in a slight but significant increase in metabolic rate in the RX-2. Pressurization of the A-5-L results in a significant increase in metabolic rate in all exercise modes in each simulator. There were no significant differences between suits while performing upper-torso tasks in the pressurized mode during 1/6-g simulation.
Author

N68-28836*# California Univ., Los Angeles.

NEUROPHYSICAL DATA ANALYSIS USING A REMOTE CONSOLE COMPUTING SYSTEM

Herbert Levitan and Laszlo Betyar [1967] 31 p refs
(Grants NsG-505; PHS-NB-02501-05; PHS-NB-05264; PHS-1F2-NB-30686-01; PHS-1F2-NB-30686-02; et al)
(NASA-CR-95656) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

A time-shared, multiple access computing system with remote consoles has been developed for use by physiologists. This intent is reflected in the design of the input/output console unit, the analog-to-digital conversion routines and the programming language. The capability, versatility and limitations of the system are demonstrated in this communication by describing its use in the analysis of neurophysiological data. The neurophysiological problem concerned the relation between an impulse train providing input to a neuronal junction and the fluctuations in the post-junctional membrane potential thereby produced. The data was therefore of two forms: as a train of impulses and as potential fluctuations in time. Analysis was focused on a statistical description of interspike intervals and the fluctuations in potential. The mode of analog-to-digital conversion used depended upon the type of analysis to be performed. The capabilities of these routines and their control by way of the console is described. The remote console consists of a 64 button keyboard for input and a memory scope for output.
Author

N68-28847*# Decision Science, Inc., San Diego, Calif.

MODELING THE HUMAN OPERATOR WITH FINITE-STATE MACHINES

L. J. Fogel and Roger A. Moore Washington NASA Jul. 1968 236 p refs

(Contract NAS1-6739)

(NASA-CR-1112) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

The prospect of using finite-state machines to represent arbitrary analog transducers and the human operator in his performance of flight control is considered in this experimental investigation, together with the use of evolutionary programming as a means for finding such representations. A series of tasks of increasing difficulty which demonstrate this capability are presented, ranging from the characterization of relatively simple linear analog "pilots", through more complex nonlinear analog "pilots", and on to the human pilot acting both in a simulator and in flight. The findings of the investigation demonstrate that finite-state machines do offer a suitable means for representing the human operator in terms of his stimulus-response behavior with respect to non-convergent tracking tasks. In addition, alternative hypotheses concerning the logic of pilot behavior were examined in order to reveal their relative worth on the basis of the available empirical evidence. Additional tasks are outlined which may well be addressed through the use of the technique described in this report.
Author

N68-28916# Joint Publications Research Service, Washington, D. C.

RESEARCH ON SPACE BIOLOGY AND MEDICINE

17 Jun. 1968 61 p Transl. into ENGLISH from *Kratkiy Spravochnik po Kosmich. Biol. i Med. (USSR)*, 1967 p 298-351 (JPRS-45706)

Experimental and computational data from Soviet sponsored research on space biology and medicine in the following areas are tabulated: respiration; water exchange; energy exchange; nutrition; physical constants; physical properties of gases and solids; and conversion factors for measurement units. Included also are basic data tables on USSR and United States space flights. S.C.W.

N68-28920*# National Aeronautics and Space Administration, Flight Research Center, Edwards, Calif.

NONLINEAR, TIME-DOMAIN MODELS OF HUMAN CONTROLLERS

Lawrence W. Taylor, Jr. [1968] 24 p refs Presented at Hawaii Intern. Conf. on System Sci., Honolulu, Hawaii, 29-31 Jan. 1968 (NASA-TM-X-60996) CFSTI: HC \$3.00/MF \$0.65 CSCL 05H

The applicability of nonlinear time domain analysis to the problem of modeling the human operator (pilot) is discussed. A method of selecting the maximum memory time and the order of the nonlinear model is analyzed, and results of orthogonal expansion of the weighting functions for reasons of data compression and reduced computation are discussed. It is shown that analysis in the time domain is more advantageous than that in the frequency domain because: (1) fewer values are needed for a characterization, and (2) greater accuracy is achieved especially when the input disturbance is not large compared to the remnant. The fit error over the data used to determine the model decreased with increased memory time and order of nonlinearity; however, this result can be misleading, as the average variance of the weighting terms increases. The fit error over new or independent data should be used to assess which memory time and what order of nonlinearity should be used. Eigen vectors which correspond to the principal Eigen values of a summation matrix of the outer products of a large, representative sample of weighting functions proved to provide an efficient orthogonal expansion. The determination of the coefficients of these functions, as opposed to that of a much larger number of weighting function elements, promises to offer not only a means of summarizing large sets of results but also of reducing the computation necessary. It is concluded that although the studies of applying nonlinear time domain analysis to the problem of modeling the human controller have been profitable, any advantage of a nonlinear model over a linear model or the human controller performing a compensatory tracking task appears to be small. S.C.W.

N68-28930# Montpellier Univ. (France).
RESEARCH ON THE PREPARATION OF p^{32} LABELLED LIPO-PROTEINS [RECHERCHES EN VUE DE LA PREPARATION DE LIPOPROTEINES MARQUEES AU ^{32}p]
 R. Morfin and J. Cortez Brussels Euratom May 1968 11 p refs In FRENCH; ENGLISH summary (Contract EURATOM-091-67-1 RISF) (EUR-3919.F) CFSTI: HC\$3.00/MF\$0.65

By protracted shaking in a 0.002 M borated buffer solution with a pH of 8, *Saccharomyces cerevisiae* allows a lipoprotein to diffuse. This is isolated by selective precipitation with dextran sulfate and seems more or less pure in electrophoresis. The lipoprotein thus obtained has an alkaline phosphatase activity. Author

N68-28968*# National Aeronautics and Space Administration, Washington, D. C.
LIVING IN SPACE
 1966 12 p
 (NASA Facts V. 3, No. 5) GPO: HC \$0.15; CFSTI: MF \$0.65 CSCL 06K

As part of its educational services program NASA has prepared a fact sheet on the major problems of living in space. The basic requirements and quantities of oxygen, water, and food are discussed. Brief descriptions of the main life support subsystems of atmospheric control, water management, food management, thermal control, waste management, personal hygiene, and instrumentation and control are given. It is pointed out that crew safety and reliability are the paramount factors in the design of all equipment and development of procedures. A.L.

N68-29040 Library of Congress, Washington, D. C. Aerospace Technology Div.
BIOINSTRUMENTATION Surveys of Foreign Scientific and Technical Literature
 Boris Mandrovsky 29 Jun. 1968 42 p refs (ATD-68-33-108-1)

Abstracted data are presented on various research projects being conducted on space-oriented bioinstrumentation, medical monitoring, and biotelemetry. It is pointed out that the current Soviet trend is directed toward creating a biomedical early warning system to enable ground-based specialists to detect danger signals

in time to take countermeasures or terminate the mission. This has involved refining existing instrumentation, exploring the use of new biosensors, selecting critical parameters for cybernetic analysis, and developing an on-board computer for medical purposes and algorithms for automatic medical control. Specific information is given on findings pertaining to the combined use of electrocardiography, phonocardiography, and seismocardiography for completely evaluating the cosmonaut's condition during space flight; monitoring reactions to an altered gas medium; devices for testing perception in space, studying the tracking movements of the eyes, and testing reactions and reflexes; electrocardiogram recordings under flight conditions; and method of recording the magnetic field of a heart-magnetocardiography. M.G.J.

N68-29056# Aeronautical Research Labs., Melbourne (Australia).
HEAD IMPACT PROTECTION ON AN AIRLINE SEAT
 S. R. Sarraillhe and C. F. Wood Jun. 1967 15 p refs *Its Struct. and Mater. Note 319*
 (ARL/SM-319) CFSTI: HC\$3.00/MF\$0.65

An airline seat was tested to determine the effect of the impact of a passenger's head, at a velocity of 30 f.p.s., against the rear surface and arm rest of the seat in front of him. At this velocity the impacts would probably cause fatal injury. The results of these tests are comparable to those of a series of tests carried out by Swearingen on eight other airline passenger seats. Concepts for improved occupant safety are proposed. Author

N68-29128*# National Aeronautics and Space Administration, Washington, D. C.
THE ROLE OF THE VESTIBULAR ORGANS IN SPACE EXPLORATION

1968 437 p refs 3d Symp., Held at Naval Aerospace Med. Inst., Pensacola, Fla., 24-26 Jan. 1967 Sponsored by NAS-NRC (NASA-SP-152) GPO: HC\$3.25; CFSTI: MF\$0.65 CSCL 06S

In the conference papers presented, the problems of studying disorientation under space conditions is discussed in relation to the basic research being conducted on vestibular mechanisms. Attention is focused on circulation of the endolymph, efferent vestibular function and anatomical considerations, blood supply to the labyrinth, tests of otolith and canal function. For individual titles see N68-29128 through N68-29158.

N68-29129*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.
ORBITAL SPACE STATIONS WITH ARTIFICIAL GRAVITY
 Maxime A. Faget and Edward H. Olling *In its The Role of the Vestibular Organs in Space Exploration* 1968 p 7-16 (See N68-29128 17-04)

Various aspects and functions of an orbital space station that may be permanently occupied by men and women accomplishing a variety of tasks are discussed. Consideration is given to the size of the space station in which the total living volume in cubic feet per man for a number of comparable situations was plotted against the total amount of time that the volume is occupied. It was shown that the longer the period of occupancy, the greater the amount of volume provided. Artificial gravity requirements is discussed in relation to amount of gravitation required, a suitable radius, and the speed of rotation. Based on flight level tests, in which predefined tasks were carried out, it was concluded that 0.2g provided a much better environment for such tasks than did 0.1g. Three basic configurations are of an artificial-gravity space station are given along with significant features of each. The possible arrangement and dimensions of the living quarters are also included. B.S.D.

N68-29130*# Naval School of Aviation Medicine, Pensacola, Fla.
TRANSFER OF HABITUATION ON CHANGE IN BODY POSITION BETWEEN VERTICAL AND HORIZONTAL IN A ROTATING ENVIRONMENT

Ashton Graybiel, F. Robert Deane (Naval Air Sta., Miramar, Calif.), Allen B. Thompson (GE, Houston, Tex.), James K. Colehour, Alfred R. Fregly et al. *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 17-35 refs (See N68-29127 17-04)

The changing symptomatology manifested by four normal young subjects throughout the course of an experiment involving exposure in a slowly rotating room (SRR) was used in studying two derived phenomena: susceptibility to SRR sickness and transfer effects. The unique feature in the experimental design required the subjects to shift from either a start-horizontal or a start-vertical mode to the other mode at the middle of a 4-day perrotation period. The findings indicated that susceptibility to overt symptoms of SRR sickness was similar in the two orientation modes. With regard to postural equilibrium, rough estimates of habituation were made perrotation when subjects were in the vertical mode, and quantitative measurements prerotation and postrotation. An incidental finding of theoretical interest was the postrotatory preservation of postural habituation to the rotating environment as long as 36 hours after the cessation of rotation during which time the subjects were restricted in their activity. With the limitations of this experiment taken into consideration, the findings regarding SRR sickness indicate that habituation acquired in the Slow Rotation Room with a subject parallel to the axis of rotation transfers to the orientation with subject at right angles to the axis of rotation, the situation in a rotating spacecraft. Our findings with respect to postural disequilibrium indicate that simulation of spacecraft conditions in the laboratory will, at best, be poor, but that elucidation of the underlying mechanisms is possible. Author

N68-29131*# General Dynamics Corp., San Diego, Calif.

DISPLAY MONITORING IN A ROTATING ENVIRONMENT

B. D. Newsom and James F. Brady *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 37-47 refs (See N68-29127 17-04) (Contract NAS9-5232)

Several experiments are described in which the subject orientation and head motion of a subject in a rotating environment were considered. An inclined chair and subject simulator were used in the experiments which were designed to assess this experimental artifact of positioning and to determine its significance upon vehicle design criteria. The function and purpose of the instruments used to perform the experiments are detailed. The results indicated that head motions out of the plane of spin become quantitatively more disorienting as the interplanar angle approaches 90°; and that Y-axis head turns are significantly less affected than comparable Z-axis head turns in an environment rotating at a highly stressful rate and under the orientations studied. The experimental results also suggest that a console operator in a rotating space station can perform without perceptual motor decrement even prior to adaptation if positioned in the spin plane facing tangentially to the direction of spin and his head turns are restricted to nodding motions with a 45° range from the plane of spin. B.S.D.

N68-29132*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

THE EFFECTS OF THE PLANE OF VESTIBULAR STIMULATION ON TASK PERFORMANCE AND INVOLUNTARY EYE MOTION

William Letko and Ralph W. Stone, Jr. *In* its The Role of the Vestibular Organs in Space Exploration 1968 p 49-55 refs (See N68-29127 17-04)

The influence of different orientations on vestibular stimulations was studied. To determine the effect of the subject orientation and the resulting differences in cross coupled angular accelerations on task performance, experiments were performed in a rotating space vehicle simulator with the subjects facing axially and tangentially. Results are summarized in relation to rates and amplitude of head-turning motion at various rates of simulator rotation for subject facing axially and tangentially, and response time while turning

head at various rates of simulator rotation for subjects facing axially and tangentially. Results indicate that for a turning head motion, the stimulation experienced by the tangentially oriented subjects is considerably different from that experienced by the axially oriented subjects and that the subjects could tolerate greater cross-coupled accelerations when facing tangentially than they could while facing axially. B.S.D.

N68-29133*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

RESPONSE DIFFERENTIATION IN SLOW ROTATION

Norman W. Weissman *In* its The Role of the Vestibular Organs in Space Exploration 1968 p 59-62 refs (See N68-29127 17-04)

Rats were trained to respond on a nose response key in a rotating chamber with food as the reinforcement. For each subject a selected speed of rotation was paired with reinforcement, and in some cases one or two speeds were paired with nonreinforcement. Extinction testing for stimulus generalization to the training speeds, plus four other speeds, produced orderly differential rates of responding. Those speeds similar to the speed reinforced during training yielded high rates, and those speeds similar to the nonreinforced training speeds yielded low response rates. These results indicate that rats are capable of discriminating different speeds of rotation. It is suggested that the mechanism involved is the sensitivity to centripetal acceleration of the otolith organ. Author

N68-29134*# Baylor Univ., Houston, Tex. Coll. of Medicine.

VESTIBULAR END-ORGAN DAMAGE IN SQUIRREL MONKEYS AFTER EXPOSURE TO INTENSIVE LINEAR ACCELERATION

Makoto Igarashi and Masao Nagaba (Naval Aerospace Med. Inst.) *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 63-82 refs (See N68-29127 17-04)

Fifty-four squirrel monkeys were exposed to different levels of high-intensity linear acceleration stimuli which were directed so as to produce a backward (-G_x) reaction force. Otoconia dislocation from the maculae was observed by light microscopy after an exposure of 1 minute at the 60-g level and above, but was more constant and extensive after 1 minute at the 150-g level and above. No architectural change was detected either in the semicircular canal cristae of organ of Corti. In the monkeys which were exposed to 200 g for 1 minute and to a peak of 450 g, the ultrastructural changes noticed were increased lysosomes and transformation of mitochondria in the nerve chalice. Macroscopic examination immediately after exposure showed the severity of gross ataxia in the monkeys to be relatively parallel to the intensity of g-levels. The ataxia rail test of dynamic equilibrium under a behavior-conditioning program carried out 2 to 35 days after exposure demonstrated the same results. No significant change from preexposure values was observed in the caloric threshold tests. Motion-sickness tests in the slow rotation room exhibited almost similar results, although the data were more fluctuating. Author

N68-29135*# Washington Univ., St. Louis, Mo. School of Medicine.

BEHAVIORAL LOSS AND OTOCONIA DISPLACEMENT IN GUINEA PIGS FOLLOWING LINEAR ACCELERATION

Donald E. Parker (Miami Univ., Oxford, Ohio), Walter P. Covell, and Henning E. von Gierke (AMRL) *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 83-97 refs (See N68-29127 17-04) (Contracts AF 33(615)-2276; AF 33(615)-1252)

Guinea pigs were examined with behavioral tests, gross dissection, and celloidin serial sections of the temporal bone following exposure to either linear acceleration, vibration, or loud sound. The major results of these investigations are as follows: (1) Minimum acceleration intensity for loss of the righting reflex and

swimming ability is approximately 50 g applied for 60 seconds. Loss of otoconia from the maculae may be produced by acceleration as low as 12 to 25 g for 195 to 330 seconds. Acceleration at 100 g for 30 seconds results in severe loss of otoconia from all maculae. Although the stimulus intensity required to produce evidence of behavioral loss is greater than the stimulus intensity which results in structural damage, ability to perform the righting reflex and otoconia loss ratings are highly correlated ($r = -0.69$). (2) Recovery of swimming ability and the righting reflex may take place from 1 to 64 days following exposure to accelerations of up to 300 g for 15 seconds. Exposure to 400 g for 15 to 20 seconds results in irreversible loss of the righting reflex and severe disturbance of swimming ability. No histological evidence for otoconia reformation during the postexposure period was obtained, but the possibility of replenishment of the gelatinous layer is suggested.

Author

N68-29136*# Defence Research Medical Labs., Toronto (Ontario).
SECRETION AND ABSORPTION OF THE ENDOLYMPH

G. F. Dohlman /n NASA The Role of the Vestibular Organs in Space Exploration 1968 p 101-123 refs DRML Rev. Paper No. 661 (See N68-29127 17-04)

The mechanism of secretion, its products and their importance for the function of the sensory cells and the ways and mechanisms for absorption were the subjects for this discussion. Microscopic and electron-microscopic studies have over the years accumulated morphological evidence for a secretion from *stria vascularis* in the cochlea and *plana semilunata* in the ampullae. Physiological evidence for a mucopolysaccharide secretion from *plana semilunata* and equivalent areas in the cochlea in birds was produced with the use of labeled isotopes. The unique constitution of the endolymph, high potassium and low sodium concentration, was firmly established. In the last few years it was shown that this electrolyte pattern is produced and maintained by an active energy consuming secretion and a selective and likewise active excretion of sodium around the sensory areas. Extensive investigation of the process of absorption in the endolymphatic sac of waste products and of potassium has strongly supported and extended the information on the circulation of endolymph. The hypothesis of nutrition of the hair cells from the endolymph was reviewed, since recent studies of the oxygen and nutrient content of endolymph seem to indicate that the hair cell areas cannot be dependent on the endolymph for their survival. Revised knowledge of the vascular supply to the cochlear hair cells has shown the supply routes of the blood vessels to be the most important source of nutrition. If its primary function is not that of a carrier of nutrients, it remains to consider what purpose the elaborate apparatus for secretion and absorption might serve beyond providing a suitable vehicle for transmission of mechanical movements to the hair cell areas.

Author

N68-29137*# State Univ. of Iowa, Iowa City.
THE VESTIBULAR AND COCHLEAR AQUEDUCTS: DEVELOPMENTAL AND ADULT ANATOMY OF THEIR CONTENTS AND PARIETES

Barry J. Anson, David G. Harper (Wis. Univ.), and Thomas R. Winch (Wis. Univ.) /n NASA The Role of the Vestibular Organs in Space Exploration 1968 p 125-146 refs Sponsored in part by the Central Bur. of Res. of the Am. Otol. Soc., Inc. (Grant NIH NB-03855-05)

The present report is based upon the study of gross specimens of temporal bone, both unembalmed and skeletal, upon the examination of serially sectioned temporal bones and of reconstructions prepared therefrom. The following are the features of major interest: The endolymphatic duct, cranial expansion, is divisible into three segments—proximal and distal expansions, and an intermediate narrow portion. The distal part, the endolymphatic sac is the most complex of the three, being either rugose or vesiculate. It occupies a correspondingly widened terminal part of the vestibular aqueduct, and extends beyond the external aperture of the latter

to rest within the *dura mater encephali* in a foveate impression on the posterior surface of the petrous pyramid, just superior to the point of continuity of the jugular fossa and sigmoid sulcus. The connective tissue around the sac, in the aqueduct, is continuous with that of the dural layer. It is rendered highly vascular by vessels that pass into the aqueduct from channels in the surrounding bone. The presence of capillary offsets around the membranous sac would seem to meet the requirements of a histological mechanism for exchange between blood and endolymph; and the nature of the interfibrillar spaces of the connective tissue could be regarded as a means of comparable exchange between endolymph and perilymph.

Author

N68-29138*# Glasgow Univ. (Scotland).

LABYRINTHINE CONTROL OF THE POSTURAL MUSCLES

Tristan D. M. Roberts /n NASA The Role of the Vestibular Organs in Space Exploration 1968 p 149-168 refs (See N68-29127 17-04)

The stabilizing reflexes operate according to the principle of minimizing undesired motion; muscles act as stiffer springs during elongation than they do when shortening. Analysis of this effect reveals the nature of the mechanisms available for postural adjustments, and the consequences of control messages in the alpha, gamma, and Renshaw control pathways. Nonlabyrinthine stabilizing reflexes involving several joints are briefly reviewed. The concept of a behavioral vertical, with servo adjustment to bring the body into line, is discussed in relation to the roles of the various labyrinthine receptors. The positional reflexes from the labyrinth are shown to have a stabilizing function in contrast to the role attributed to them by Magnus. The new scheme presented here successfully predicts the reactions of an animal on a moving platform.

Author

N68-29139*# McGill Univ., Montreal (Quebec).

NEURAL REFLECTION OF VESTIBULAR MECHANICS

G. Melvill Jones /n NASA The Role of the Vestibular Organs in Space Exploration 1968 p 169-180 refs (See N68-29127 17-04)

(Grant DRB-G-9910-37)

Systematic analysis of response in vestibular neural units, selected for their specific dependence upon rotational stimuli in a particular canal plane, indicates close reflection of known physical properties of the semicircular canal. The dynamic response of similar units selected for their specific dependence upon simple linear acceleration suggests a much wider range of physical properties associated with sensory mechanisms in the otolith organs. However, the response of canal-dependent units to rotation of a linear acceleration vector without rotation of the animal appears to be relatively uniform and of significant magnitude. This suggests that the latter mode of stimulus may normally generate a meaningful component of information in the central nervous system during angular head movement in vertical planes, since such movement introduces rotation of the gravitational acceleration vector relative to the head. In the zero-gravity environment of space flight this component would be absent, thus introducing the potential hazard of discordant information in the central nervous system.

Author

N68-29140*# Washington Univ., St. Louis, Mo. School of Medicine.

NERVE ENDINGS IN THE MACULAE AND CRISTAE OF THE CHINCHILLA VESTIBULE, WITH A SPECIAL REFERENCE TO THE EFFERENTS

Catherine A. Smith and Grant L. Rasmussen (NIH) /n NASA The Role of the Vestibular Organs in Space Exploration 1968 p 183-201 refs (See N68-29127 17-04)

(Grant PHS NB-00966)

The nerve endings in the maculae and cristae of the chinchilla's vestibule can be put into two general classes, calyciform and boutons. The calyciform terminals form chalice which completely encircle the hair cells except for their hair-bearing head. The

boutons are subdivided into two types. The first type of bouton terminates only on the hair cells which often develop an adjacent synaptic bar, and its neuroplasm is similar to that of the chalice. These calicyform and first-type bouton terminals are believed to belong to the vestibular nerve. The second-type bouton, the vesiculated bouton, contains many small homogeneous vesicles and synapses sometimes by means of passing boutons in hair cells, other boutons, chalice terminals, and nerve fibers. The vestibular nerve root to one ear was transected in six chinchillas. The animals were sacrificed at 2, 3, 6, 8, 32, and 35 days postoperatively. The 6- and 8-day animals yielded the most useful information regarding the efferent nature of the boutons. There were almost no normal vesiculated boutons present. Instead, some boutons were seen in these two animals which contained a fair number of dense vesicles, and these were interpreted as being altered vesiculated boutons. The studies strongly suggest that the vesiculated boutons are the terminals of efferent nerve axons. Author

N68-29141*# Massachusetts Eye and Ear Infirmary, Boston.
ANATOMICAL EVIDENCE FOR AN EFFERENT VESTIBULAR PATHWAY

Richard R. Gacek /in NASA The Role of the Vestibular Organs in Space Exploration 1968 p 203-212 refs (See N68-29127 17-04)

The pattern and distribution of the efferent vestibular innervation to the labyrinth are reviewed first as originally revealed by classical axon-degeneration techniques, Sudan black and the Nauta silver method. The histochemical method of AChE localization in efferent fibers was then used to demonstrate the system in an intact rather than a degenerated state. This enables one to form a better idea of the size and extent of the efferent fiber system. The origin of the efferent vestibular fibers is not entirely known, although some of the neurons appear to be located in the lateral vestibular nucleus. Precise termination is assumed to be on vestibular hair cells by small vesiculated endings, since the efferent cochlear fibers were proven to terminate in the vesiculated endings on hair cells in the organ of Corti. Author

N68-29142*# Turin Univ. (Italy).
CENTRAL PROJECTIONS TO THE VESTIBULAR RECEPTORS

Giovanni Rossi /in NASA The Role of the Vestibular Organs in Space Exploration 1968 p 213-224 refs (See N68-29127 17-04)

The efferent innervation of the vestibular receptors is reviewed in reference to data from a literature survey and various experimental findings. Various research projects are considered in which the electron microscopic features of the vestibular receptors and acetylcholinesterase activity in the cristae and maculae were examined. Based on various anatomical, histological, histochemical studies, the efferent vestibular fibers are discussed. B.S.D.

N68-29143*# Yale Univ., New Haven, Conn. School of Medicine.
CEREBELLAR PROJECTIONS TO THE VESTIBULAR NUCLEI

Robert P. Eager /in NASA The Role of the Vestibular Organs in Space Exploration 1968 p 225-237 refs (See N68-29127 17-04)

The cerebellum gives rise to two major efferent pathways which terminate in the vestibular nuclei. One is formed by Purkinje-cell axons and projects directly to the lateral vestibular nucleus. In the cat and rabbit the connections are homolateral and arise primarily from anterior lobe vermal and paravermal cortices. Direct fibers are traceable from posterior vermal regions of the cat cerebellum as well, but in the rabbit, lesions confined to lobule 3 of the posterior vermis result only in degeneration to the fastigial nuclei. Details of the terminations of the above pathways are discussed, as well as relevant information on the manner in which extracerebellar

afferent pathways terminate in the vestibular nuclei. In addition, some new data on the fine structure of the lateral vestibular nucleus in the cat are presented, including the finding of axo-axonic synapses there. Author

N68-29144*# Michigan Univ., Ann Arbor. Kresge Hearing Research Inst.

VASCULAR PATTERNS OF THE MEMBRANOUS LABYRINTH

Joseph E. Hawkins, Jr. /in NASA The Role of the Vestibular Organs in Space Exploration 1968 p 241-258 refs (See N68-29127 17-04)

(Grants PHS NB-05065-03; PHS NB-05785-02)

The vascular supply to the membranous labyrinth originates intracranially and is thus entirely separate from that of the middle ear. The *arteria cochleae propria* spirals about the cochlear nerve in the modiolus, giving off branches which first form the thin-walled glomeruli of Schwalbe and then divide to supply the structures of the lateral wall of the cochlea, on the one hand, and those of the spiral lamina, on the other. Four separate capillary networks arranged in parallel supply the spiral ligament, stria vascularis, spiral prominence, and outer sulcus region. The capillaries of the spiral lamina form a stepped series of arcades within the substance of the limbus, beneath the tympanic lip, and under the pars arcuata of the basilar membrane. Pericapillary spaces and avascular channels are associated with many of these vessels, but not with those of the stria vascularis, which are closely invested by processes from basal and intermediate cells of the stria. The inner and outer spiral vessels are surrounded by extensive pericapillary spaces, which are sometimes connected by avascular channels. The pericapillary spaces of the inner spiral vessels communicate with the perineural spaces of the nerve bundles approaching the foramina nervosa in the habenula perforata, and thus with the interior of Corti's organ, to which they probably supply the cortilymph that fills it. The spiral vessels are innervated by unmyelinated fibers, which can be demonstrated by the Champy-Maillet zinc iodide-osmic acid technique. The major capillary networks of the vestibular organs underlie the neural and secretory epithelia. Certain areas of the membranous canals and sacs are supplied by capillaries, whereas others, like Reissner's membrane, are avascular. Author

N68-29145*# State Univ. of Iowa, Iowa City.
THE VASCULAR ROUTES TO THE PETROUS PART OF THE TEMPORAL BONE: DEVELOPMENTAL AND ADULT ANATOMY

Barry J. Anson, David G. Harper (Wis. Univ.), and Thomas R. Winch (Wis. Univ.) /in NASA The Role of the Vestibular Organs in Space Exploration 1968 p 259-288 refs¹ Sponsored in part by the Central Bur. of Res. of the Am. Otol. Soc., Inc. (See N68-29127 17-04)

(Grant NIH NB-03855-05)

¹The entire petrous part of the temporal bone is discussed. At least nine channels conduct blood vessels to or from the interior of the petrous pyramid. They were described and illustrated as seen in dissections, in serially sectioned specimens, and as demonstrated by reconstructions prepared from the latter. In each instance the description of the adult form was introduced by an account of developmental anatomy. These routes are the following: the spiral foraminous tract of the cochlea; the vestibular areas of the fundus of the internal acoustic meatus; the subarcuate fossa; the vestibular aqueduct; the petrosal sulci; the facial canal; the fissula ante fenestram; and the channel for the cochlear vein. For the innervation of the sensory elements in the cochlear duct, of the utricle and the saccule in the vestibule, and those of the ampullae in the semicircular canals, the routes traversed are the foraminous tract and the vestibular areas in the fundus of the meatus; the statoacoustic (VIII) nerve, in division and subsequent arborescent spread, is accompanied by blood vessels of neural supply. In short, then, the blood supply to the *pars petrosa* and its labyrinthine contents is

divisible into neurovascular and capsular parts. The former is associated with the brain, the latter with the skull. This arrangement finds its genesis in embryonic germ-layer sources: The membranous labyrinth, like the brain, is an ectodermal derivative; the capsule, with the skull in which it is lodged, is derived from the mesoderm.

Author

N68-29146*# Chicago Univ., Ill.

AUTOREGULATION OF STRIAL BLOOD FLOW EFFECT OF INCREASED EXPIRATORY RESISTANCE: HYPERVENTILATION

Henry B. Perlman and Shigeo Yamada *In* NASA The Role of the Vestibular Organs in Space Explorations 1968 p 289-303 refs (See N68-29127 17-04)

(Grant PHS NB-00269)

Short periods of graded abrupt drops in carotid pressure were produced by graded increases in expiratory resistance. Strial flow rates were correspondingly reduced. With longer periods of increased expiratory resistance, strial blood flow dropped during the first 30 seconds but returned to normal at between 60 to 120 seconds, while carotid pressure remained low. Immediately after terminating the short and longer increases in expiratory resistance, carotid pressure returned toward normal while strial flow rate was supernormal for about 60 to 180 seconds. Hypocapnia produced by hyperventilation reduced strial flow rates without significant change in blood pressure. Hypercarbia and hypoxia increased strial flow rate. These findings support the concept that intravascular pressure as well as arterial oxygen and carbon dioxide tension directly affects vascular smooth muscle of cerebral and cochlear resistance vessels and thereby influences cochlear blood flow. In this way cochlear blood flow can adjust to physiological stresses so that cochlear function can be sustained.

Author

N68-29147*# Amsterdam Univ. (Netherlands).

ON THE OTOLITHS: THEIR FUNCTION AND THE WAY TO TEST THEM

L. B. W. Jongkees *In* NASA The Role of the Vestibular Organs in Space Explorations 1968 p 307-330 refs (See N68-29127 17-04)

A description is given of the topography and microscopic anatomy of the otolith organs. The importance of the topographic arrangement of the kinocilia for their function is discussed. Some hypotheses about this function seem more or less certain: stimulation of the otoliths is produced by linear accelerations or higher derivatives. Some data indicate the existence of cooperation between semicircular canals and otoliths; for example, otolith stimulation influences nystagmus provoked by canal stimulation. On the other hand, it was proven that linear accelerations can provoke nystagmus, but only under certain conditions. Both sensations and reflexes can be used as indicators in tests of otolith function in man for clinical purposes or as means of examining the degree of vestibular normality. The tilt chair, the centrifuge, and the parallel swing seem to be the most appropriate instruments for these kinds of tests. Untrained subjects seem to find it rather difficult to judge sensations of position and of change in position. Trained subjects can give some, but limited, information; even subjects without labyrinthine function get a certain amount of information about their position. Eye reflexes, especially compensatory rolling of the eyes on the tilt chair, and horizontal or vertical displacements of the eyes on the parallel swing can be used for the investigation of patients and untrained persons. It seems probable that the absence or presence of otolith function on one or both sides can be found with these tests. Up to the present time there was insufficient experience with these tests to prove their practical value as routine procedures.

Author

N68-29148*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

THE OCULOGRATIC ILLUSION AS A TEST OF OTOLITH FUNCTION

Brant Clark *In* its The Role of the Vestibular Organs in Space Explorations 1968 p 331-340 refs (See N68-29127 17-04)

This paper presents a review of recent literature on the oculogravic illusion and an evaluation of the illusory effect as an indicator of otolith function. The evidence presented indicates that normal observers are highly susceptible to the oculogravic illusion, that it varies widely with the specific testing situation, and that several sensory processes may contribute to the effect. Individual differences are substantial, particularly among naive unselected observers. Marked differences between normal and labyrinthine-defective observers, for both the static and dynamic components of the oculogravic illusion, were reported in many studies. It is concluded that under very specific testing conditions, the oculogravic illusion may be an indicator of otolith function.

Author

N68-29149*# Naval School of Aviation Medicine, Pensacola, Fla.

EFFECT OF DRUGS ON OCULAR COUNTERROLLING

Earl F. Miller, II and Ashton Graybiel *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 341-349 refs (See N68-29127 17-04)

(NASA Order T-47557(G))

Ocular counterrolling, a specific indicator of otolith activity, under controlled conditions was measured before and at various times after the oral administration of one of several selected drugs or a placebo. A pool of nine normal subjects participated, and from four to six were used in each experimental trial. Alcohol, 1 cc/lb body weight, has a significant and progressive depressant effect on the amount of eye roll during the intoxication period; complete recovery was recorded 6 hours after its ingestion. Scopolamine, chlordiazepoxide hydrochloride, meprobamate, meclizine, acetylsalicylic acid, *d*-amphetamine, the diphenidol, given in twice the usually recommended doses, had no significant effect.

Author

N68-29150*# Defence Research Medical Labs., Toronto (Ontario).

TESTS OF SEMICIRCULAR CANALS AND OTOLITHS IN CATS

K. E. Money *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 351-354 ref (See N68-29127 17-04)

The fast tilt test of the semicircular canals of cats is discussed along with the slow tilt and the dropping platform test of the otoliths in cats. Normal cats, labyrinthectomized cats, and cats with the semicircular canals discretely plugged were tested while blindfolded. It was concluded that the semicircular canals contribute to bodily equilibrium by initiating corrections for fast angular displacements for the normal orientation. The otoliths initiate corrections for slow angular displacements about horizontal axes and initiate the responses to dropping. Histological confirmation of the successful elimination of single semicircular canals, without damage to other canals or the otoliths was obtained.

B.S.D.

N68-29151*# Toronto Univ. (Ontario).

SOME PHYSIOLOGIC RESPONSES TO VESTIBULAR STIMULATION

W. H. Johnson, F. Sunahara, and W. J. R. Taylor *In* NASA The Role of the Vestibular Organs in Space Exploration 1968 p 355-362 refs Prepared jointly with the Defence Res. Med. Labs. and the Inst. of Aviation Med., RCAF (See N68-29127 17-04)

Although it was well established that strong stimulation of the organ of balance can readily result in incapacitating motion sickness and disorientation effects, much remains to be understood of the probable widespread physiologic effects which are evidenced in part at least by the symptoms of pallor, perspiration, and nausea. In an attempt to clarify our understanding of some of these effects, human and animal experimentation was carried out in regard to: (a) cardiovascular effects, (b) autonomic reactivity changes, and (c) intracranial blood flow changes. The results indicate that vestibular stimulation sufficient to cause nausea just short of emesis results

in decreased peripheral blood flow and greatly increased skeletal muscle vascularity to such a degree as to be similar to vasovagal syncope in its effects. Further evidence of such incapacity was obtained by measurement of intracranial vascularity changes, probably mediated by autonomic nervous system activity. Author

N68-29152*# Massachusetts Inst. of Tech., Cambridge.

A REVISED DYNAMIC OTOLITH MODEL

Laurence R. Young and Jacob L. Meiry *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 363-368 refs (See N68-29127 17-04)
(Contract AF 33(615)-5038)
(AMRL-TR-66-209)

The application of control theory to analysis of vestibular function has yielded mathematical models of the semicircular canals and, more recently, the otoliths. A proposed dynamic otolith model is based on input-output experiments including dynamic counterrolling, subjective perception of velocity during sinusoidal linear oscillation, and threshold to constant acceleration. This model is consistent with electrophysiological data and includes a low-frequency lag term to permit a steady output to sustained tilt or acceleration. Author

N68-29153*# Lund Univ. (Sweden).

TESTS OF CANAL FUNCTION WITH SPECIAL REFERENCE TO CENTRAL VESTIBULAR PATHWAYS

N. G. Henriksson, A. Lundgren, Lita Tibbling, A. Nilsson, and A. Anderson *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 371-381 refs (See N68-29127 17-04)

In a rotating spacecraft the complex vestibular stimulations will probably involve separate parts of the vestibular system quite differently. For this reason methods for differentiated examination of the vestibular systems are advocated and techniques for examination of some different parts or controlling mechanisms of the vestibular reflex arc are described. Author

N68-29154*# Massachusetts Inst. of Tech., Cambridge.

EFFECTS OF LINEAR ACCELERATION ON VESTIBULAR NYSTAGMUS

Laurence R. Young *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 383-391 refs (See N68-29127 17-04)
(Grant NGR-22-009-156; Contract AF 33(615)-5038)

The notion that human vestibular perception of rotation is uniquely attributable to the semicircular canal models, and perception of linear acceleration attributable only to the otoliths, is clearly an oversimplification. The range of relevant experimental data on the subject of interactions between the two sets of sensors is reviewed in an attempt to produce some preliminary testable models of this interaction. This paper summarizes the results of this analysis. The major portion deals with the influence of linear acceleration on vestibular nystagmus and postulates a simple model based on otolith contribution. Subjective orientation on the basis of canal and otolith outputs is also treated briefly. Author

N68-29155*# Federal Aviation Administration, Oklahoma City, OKla.

SOME METHODOLOGICAL CONSIDERATIONS IN CALORIC TESTS OF VESTIBULAR FUNCTION

William E. Collins *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 393-401 refs (See N68-29127 17-04)

The widely used Fitzgerald-Hallpike caloric test of vestibular function is examined in detail. Improvements in the physical aspects of the test procedure are suggested. Experimental analyses of some variables which might affect the test response indicate that results are influenced by a considerable number of usually uncontrolled or poorly controlled factors. Author

N68-29156*# Louisiana State Univ., New Orleans. Medical Center.
EYE-MARK RECORDING AS A VESTIBULAR TEST RELATED TO THE OCULOMOTOR REFLEX

Masaaki Kitahara *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 403-408 refs Prepared in cooperation with Kyoto Univ. (See N68-29127 17-04)

Eye movements are essential for tracking an object in the visual field and stabilizing its image on the fovea. Therefore, for analysis of eye movements under this consideration, they should be observed in respect to the object in the visual field. For this purpose, a kind of eye-mark recorder which produces satisfactory results was introduced into the field of vestibular study. The principal feature of this device is that the light reflected by means of a half mirror placed in front of the eye and an image of the visual scene taken by a lens fixed between the eyes are superimposed and transmitted to a 16-mm movie camera. Optokinetic nystagmus was analyzed to illustrate the use of the device in this field of study. The exact relationship between eye movement and moving objects in the visual field is revealed, and several different patterns which would serve as clues to vestibular function information are

N68-29157*# Massachusetts Inst. of Tech., Cambridge.

PHYSICAL PROPERTIES OF THE LABYRINTHINE FLUIDS AND QUANTIFICATION OF THE PHENOMENON OF CALORIC STIMULATION

Robert W. Steer, Jr., Yao T. Li, Laurence R. Young, and Jacob L. Meiry *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 409-420 refs (See N68-29127 17-04)

The physical properties of endolymph and perilymph which are pertinent to the quantification of the dynamic behavior of the human vestibular sensors were evaluated. Descriptions and error analyses of the instruments used for the measurements are presented. The phenomenon of caloric stimulation of the semicircular canals is described quantitatively, and a dynamic model is presented. To support the proposed model, the human's response to caloric stimulation is compared to his response to angular acceleration stimulation. Author

N68-29158*# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

POSTROTATIONAL SENSATION AND NYSTAGMUS AS INDICANTS OF SEMICIRCULAR CANAL FUNCTION

Alan J. Benson *In NASA The Role of the Vestibular Organs in Space Exploration 1968* p 421-432 refs (See N68-29127 17-04)

In man, measures of the time constant of decay of the vestibular response, following angular impulses in yaw, were found to differ according to whether postrotational sensations or nystagmus were studied. On the average, the time constant derived from the sensation cupulogram was about half that of the decay of nystagmus slow-phase velocity, which itself decayed more than twice as rapidly as subjective angular velocity. The disparity of the subjective measures was attributed to: (1) an adaptive alteration in sensory threshold with the magnitude of the impulse; and (2) a power law relationship between subjective velocity and the physical stimulus. It was concluded that nystagmus slow-phase velocity is the most stable indicator of the afferent signal from the ampullary receptors, though transduction in the vestibulo-ocular pathway can be modified by signals from other somesthetic receptors and the behavioral state of the subject. Author

N68-29237# Advisory Group for Aerospace Research and Development, Paris (France).

AIRCRAFT INSTRUMENT AND COCKPIT LIGHTING BY RED OR WHITE LIGHT

Oct. 1967 299 p refs Presented at the Aerospace Med. Panel of AGARD-NATO, Rhode-Saint-Genese, Belgium, 30-31 Oct. 1968

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N68-29238# Royal Air Force, Farnborough (England).

COCKPIT LIGHTING REQUIREMENTS IN THE RAF

A. M. McVitie *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 7 p (See N68-29237 17-05)

The problems associated with cockpit lighting from the pilot's point of view are presented. To do this, the worst case is selected, that of low level night flying while dependant upon external cues. The current types of lighting are briefly reviewed and their attendant problems outlined. Author

N68-29239# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

VISUAL FUNCTIONS AS DETERMINING FACTOR FOR QUALITY AND AMOUNT OF EFFECTIVE PANEL AND COCKPIT LIGHTING

D. Kurschner *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 6 p refs (See N68-29237 17-05)

Changes in engineering and in operational flight environments necessitate a reassessment of the problems of effective panel and cockpit lighting within increasingly shorter periods of time. The interaction between changed environmental factors and optical-physiological factors are discussed. The general physiological requirements for quality and amount of panel cockpit lighting, visual acuity, accommodation, adaptation, color sense and visual field are considered as the determining factors, and conclusions drawn accordingly. Wavelengths from the red part of the spectrum up to approximately 500 m or orange-yellow to greenish-yellow are suggested for panel and cockpit lighting. The intensity of illumination must not, however, exceed 0.02 lux. As operational flight environments may shift the compromise between the requirements for highest possible visual acuity and maximum adaptation in favor of the latter, a flexible illumination system in this wave band is recommended. Author

N68-29240# Naval Air Development Center, Johnsville, Pa. Aerospace Crew Equipment Dept.

LEGIBILITY OF VARIOUS SIZED LETTERS UNDER AVIATION RED, "LUNAR" WHITE, AND NEUTRALLY-FILTERED INCANDESCENT WHITE LIGHTING SYSTEMS

Gabriel P. Intano *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 17 p refs (See N68-29237 17-05)

Three types of cockpit lighting were employed to illuminate a simulated instrument panel: aviation red, lunar white, and neutrally-filtered incandescent white. The different lighting systems were equated at seven brightness levels: 0.005, 0.01, 0.05, 0.10, 0.15, 0.19 FT-L, and rated voltage. The legibility of photographically reduced Armed Forces Visual Acuity Charts was measured. Results showed increases of performance above brightness levels reported in past research. Legibility was significantly better under Aviation Red than either of the two white systems. No significant differences were found between the lunar white or neutrally-filtered incandescent white lighting. Author

N68-29241# Naval Air Systems Command, Washington, D. C. Crew Systems Div.

AN EXAMINATION OF CARRIER FLIGHT DECK AND HANGAR DECK LIGHTING SYSTEMS

Roland A. Bosee *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 11 p (See N68-29237 17-05)

Twenty five Naval pilots with aircraft carrier night time landing experience were interviewed concerning their preference to carrier flight deck and hangar deck lighting systems. The white flight deck flood lighting system met with almost universal pilot acceptance. It provides all the improvement in aircraft deck handling activities noted for the red flood lights, and is superior as an aid for carrier landings. No significant problems were attached to the use of the white light system. Tables summarizing experience of pilots interviewed are included. F.O.S.

N68-29242# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

COLOR DISCRIMINATION AND CHART READING UNDER RED AND LOW INTENSITY WHITE LIGHT

Gloria T. Chisum *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 18 p ref (See N68-29237 17-05)

The type and level of cockpit illumination are important considerations in providing a work space in which flight personnel

N68-29243

can operate efficiently. In order to reach a satisfactory decision on these considerations, it is essential to show the kinds, and relations among, visual tasks required of personnel inside the cockpit. One of the most obvious tasks required of flight personnel is to read topographical charts. With only a few exceptions, features of maps and charts are distinguished by color discriminations. Data are presented on the accuracy of color discrimination required in reading topographical charts and the identification of map features under red and low intensity white light. The accuracy of color discrimination is significantly greater under white light as compared with red light. The results on the identification of chart features are more equivocal. Factors in addition to color discrimination apparently influence the accuracy of map reading. Author

N68-29243# France. Ministere de l'Air, Paris.
EFFECT ON VISION OF DIFFERENT MODES OF INSTRUMENT PANEL LIGHTING [ACTION SUR LA VISION DES DIFFERENTS MODES D'ECLAIRAGE DU TABLEAU DE BORD]

Armand Mercier and G. Perdriel *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 5 p *In* FRENCH (See N68-29237 17-05)

To assess the visual acuity of pilots, studies were undertaken to verify the adaptation curve and variations in recuperation speed after subjection to dazzling flashes of red, white, and ultraviolet light. The results indicate: (1) The illumination of the instrument panel by a white, red, or ultraviolet light does not affect the pilot who is able to adapt his vision immediately to nocturnal conditions. However, the ultraviolet illumination gives the best adaptometric results. (2) After an artificial flash of white light, pilots quickly regain the ability to read the instrument panel. The red lighting appears to be less effective. Transl. by M.G.J.

N68-29244# Naval Submarine Medical Center, Groton, Conn.
MERITS OF RED OR WHITE LIGHTING FOR NAVAL USE
S. M. Luria and Jo Ann S. Kinney *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 20 p refs (See N68-29237 17-05)

A comparison of the effects of red and white light on both the subsequent development of dark adaptation and its disruption is presented. Also discussed is the relative usefulness of red light for purposes of ship concealment. Red light results in both faster dark adaptation and less disruption of completed dark adaptation than white light of equal brightness, but the saving in time is less than 5 minutes. This is deemed to be of far more importance when dark adaptation is interrupted than it is for original adaptation. Recent data on atmospheric transmission of light show that red is transmitted with increasing relative effectiveness as the density of air increases. This acts to reduce the usefulness of red light for purposes of concealment at night and exploratory calculations suggest that under certain circumstances red would be less effective than blue. Author

N68-29245# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.
ASSESSMENT OF RED AND WHITE ILLUMINATION FOR EQUAL LEGIBILITY

A. B. Chaloner *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 15 p refs (See N68-29237 17-05)

The purpose of this study was to determine the amount of light needed to resolve test objects of similar size illuminated by red and white light. This information was needed to compare the effect on a pilot's dark adaptation of viewing cockpit instruments by red and white light. Flicker photometry was employed to measure the density of the red filter used. For the range of visual acuities investigated (0.1 to 0.4) using illuminated figures on a dark ground, it was found that approximately equal amounts of red and white light were required for resolution. Author

N68-29246# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE EFFECT OF RED AND OF WHITE INSTRUMENT LIGHTING ON THE DARK ADAPTATION INDEX

T. C. D. Whiteside and A. Mercier (French Air Force) *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 9 p refs (See N68-29237 17-05)

A study was performed to determine whether there are any marked differences in the level of dark adaptation when a pilot views an instrument panel illuminated by red light, or by low-temperature white light giving, however, equal legibility. The level of night vision when scanning an instrument panel depends upon the time for which the instrument panel is observed, the amount of scanning, and the number of markings, as well as the level of illumination of these markings. In order to relate thresholds of visual sensitivity to practical aspects, these thresholds are expressed in terms of the time required for the eye to reach that particular level of sensitivity. This is referred to as the dark adaptation index. It is concluded that there is little valid argument against the use of white low temperature and low intensity light instead of red. Author

N68-29247# School of Aerospace Medicine, Brooks AFB, Tex. Ophthalmology Branch.

THE EFFECT OF NIGHT COCKPIT LUMINANCE, RED AND WHITE, ON CENTRAL AND PERIPHERAL VISUAL PERFORMANCE

Benjamin Kislin and Richard H. Dohrn *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 17 p refs (See N68-29237 17-05)

Eighteen subjects were light adapted for 20 minutes to an approximated cockpit luminance of 0.1 foot Lamberts (ft-L) red light and 0.1 ft-L incandescent white light. Thresholds for peripheral perception and central identification were taken with a Goldmann Weekers adaptometer. A transilluminated Landolt C subtending a 32.5' arc overall, and a 6.5' arc opening served as the target for peripheral detection and central identification. Statistically, there appears to be some advantage in peripheral retinal sensitivity after extended exposure to 0.1 ft-L level red light over white of equal intensity. The foveal recognition threshold appears to be the same after either exposure. From a nighttime, operational viewpoint for jet aircraft there should be no requirement for the retention of full scotopic capability to the detriment of color perception. The maintenance of maximum rod sensitivity in observation aircraft and helicopter pilots engaged in night operations is questioned. Until further resolution of the visual capability from hover, and low and slow aircraft under starlit conditions in mission achievement, they should continue using red lit instrumentation. Author

N68-29248# School of Aerospace Medicine, Brooks AFB, Tex. Ophthalmology Branch.

LUMINANCE MEASUREMENTS FOR RED AND WHITE LIGHTED AIRCRAFT INSTRUMENTS

Richard H. Dohrn *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 21 p refs (See N68-29237 17-05)

A Spectra Brightness Spot Meter, Model U.B. 1/2, was used to measure the luminance level of flight instruments during night flight. Measurements were taken in red and white-lighted cockpits. Recordings were made of pilot adjustments for maximum, minimum, and optimum instrument luminance levels used during night flight. The maximum instrument luminance levels ranged between .05 and 0.3 ft.-L. (foot-lamberts). Most of the normal luminance levels ranged between .01 and .03 ft.-L. There was less variation of instrument luminance between different aircraft than between instruments within the same type of aircraft. The distribution of light over single instruments or groups of instruments shows extreme gradations for the cockpits studied. Since a single unnecessarily bright instrument light may have the same detrimental effect as an entire instrument panel on the pilot's level of dark

adaptation, it is important that the luminance of individual instruments be balanced and evenly distributed. It was concluded that there is a definite need to evaluate and upgrade the quality of instrument lighting. Author

N68-29249# Aerospace Medical Div. Aerospace Medical Research Labs (6570th), Wright-Patterson AFB, Ohio.

THE EFFECT OF RED VERSUS WHITE LIGHTING ON DARK ADAPTATION USING A SIMULATED INSTRUMENT PANEL FOR PREADAPTATION

W. F. Grether and H. N. Reynolds *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 13 p refs (See N68-29237 17-05)

Evidence for the superiority of red aircraft instrument lighting is based largely on dark adaptation experiments with uniform preadaptation fields and relatively high luminance values. Results of such experiments have questionable validity for the low luminance levels and patterned fields characteristic of instrument panels. This paper reports experiments in which a simulated instrument panel was used for preadaptation, and luminance values corresponded to those used by pilots in aircraft. A comparison was made of red, white, and blue-filtered white instrument lighting, at several luminance levels. Dark adaptation thresholds were measured as quickly as possible after subjects scanned the panel. The results show a relatively small superiority of red over white instrument lighting in terms of preserving dark adaptation. An additional finding was that, when adjusted for equal luminance, the red lighting gives somewhat better instrument legibility. Author

N68-29250# France. Ministere des Armees, Paris.
LIGHTING PROBLEMS IN COCKPITS [LES PROBLEMES D'ECLAIRAGE DES POSTES DE PILOTAGE]

Lise D. Heynemann *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 13 p *In* FRENCH (See N68-29237 17-05)

In examining the problems, consideration is given to the choice of color or colors, the mode of producing the illumination, the required level of luminance, and the evenness of lighting for each instrument, and for the interior of an instrument or a panel. For good legibility, design, dimension, and lighting are considered three inseparable parameters. The use of electroluminescence is foreseen for lighting the instrument panels in the cockpit and for interior lighting of the instruments. Transl. by M.G.J.

N68-29251# Naval Air Development Center, Johnsville, Pa. Life Sciences Research Group.

HUMAN FACTOR ASPECTS IN AIRCRAFT INTERIOR LIGHTING

John Lazo *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 14 p refs (See N68-29237 17-05)

In the development of modern aircraft weapon systems, there is an increased emphasis on the utilization of design criteria based on the capabilities and limitations of the aviator. With respect to current aircraft interior lighting, the basic visual variables relating to the display design and lighting of aircraft informational presentation systems are discussed in detail. The development of current red and white lighting system designs, based on the application of data derived from the continued study of these variables, is presented. The need for specific information on the aviator's visual requirements, both within and external to the aircrew station, in modern aircraft is discussed. A systematic investigation which includes a complete operational analysis of the aviator's visual tasks to permit the establishment of valid lighting design criteria compatible with the aviator's needs on a mission requirement-time structure is proposed. Author

N68-29252# Air Force Systems Command, Wright-Patterson AFB, Ohio. Systems Engineering Group.

WHITE LIGHTING OF INSTRUMENTS IN USAF AIRCRAFT

Clifford J. Jolley and James M. Planet *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 16 p (See N68-29237 17-05)

Aircraft instrument lighting history is traced from 1917 to the present in this paper along with making predictions of future methods of instrument lighting. Through color slides and photographs actual aircraft instrument panels are pictured from white unfiltered incandescent lighting, ultraviolet (black lighting), red lighting, incandescent white lighting, and ending with the recently developed application of electroluminescent lamps to instrument lighting. Associated areas, such as the effect on cover glass reflections from multi-layer anti-reflection coatings are also described. Author

N68-29253# Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Personnel Subsystems Branch.

OPERATIONAL EVALUATION OF FILTERED AND UNFILTERED WHITE AIRCRAFT INSTRUMENT LIGHTING

Cletus J. Muick *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 12 p (See N68-29237 17-05)

This study was initiated at the request of the Society of Automotive Engineers A20A Committee on Flight Crew Station Lighting, because there were instrument manufacturers who felt that the Air Force specification for white integrally lighted aircraft instruments was too difficult to meet. Arrangements were made with the USAF Instrument Pilot Instructor School, Randolph AFB, Texas, to provide the best vehicle, a T-38 trainer, and the subjects. The manufacturers supplied the modified (unfiltered) white instruments, and the Air Force supplied filtered white instruments ranging in age from six months to four years, with the exception of two new instruments. Nineteen subject pilots flew both the filtered and unfiltered panels during scheduled night missions. The preference was significantly in favor of the Air Force filtered white lighting system. Author

N68-29254# Centro di Studi e Recherche di Medicina Aeronautica e Spaziale, Rome (Italy).

RED LIGHT FOR COCKPIT LIGHTING. RESULTS OF AN INQUIRY AND OF SOME INVESTIGATIONS

A. Scano and C. Terrana *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 11 p refs (See N68-29237 17-05)

An inquiry made among pilots and flight specialists of the Italian Air Force has been carried out to find, on the basis of personal experience, which was the preferable system for cockpit and flight instruments lighting during night flight. Fighter pilots, in particular, were in favor of indirect illumination by ultra-violet rays for the instruments and phosphorescent indicators, and almost the same number of pilots were in favor of red light (16.90% and 17.30% respectively). A greater preference went to the combination of these two systems (32%). But the vast majority (89%) voted for the combination of one of the two systems with the other and/or with the adjustable white light. The latter was esteemed necessary in the case of thunderstorm so as to prevent glare from lightning and for map reading. The inquiry, taken generally, pointed out the usefulness of a dual type of lighting in the aircraft cockpit. Experimental tests carried out on pilots of different ages showed the effects of red glasses on the eye's power of adaptation at different lighting levels. Author

N68-29255# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

ADMISSIBLE WHITE PREADAPTATION LEVELS COMPARED WITH RED PREADAPTATION

H. J. Leebeek *In* AGARD Aircraft Instr. and Cockpit Lighting by Red or White Light Oct. 1967 11 p (See N68-29237 17-05)

In practice, there is a need of general rules for the specification of a definite illumination that has to be suited for dark adaptation preservation. The first aspect is that of the visual task analysis. One of the questions then is: What degree of dark adaptation is necessary for this task? The second aspect is that of the choice of correct illumination levels related to the time they have to be used. General rules were found to describe the relations between recovery time after light exposure and the illumination levels and exposure times. The range of levels was 1–1,000 lux, and the range of times was 1–30 minutes. The recommended levels can be read from graphs plotting the recovery time versus the product of illumination level and time, for red and white lighting. Author

N68-29316*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.

PLANETARY QUARANTINE PROGRAM Quarterly Progress Report, Period Ending Jun. 30, 1968

Jun. 1968 36 p refs

(NASA Order R-09-019-040; NASA Order H-13245A)

(NASA-CR-95705; QR-9) CFSTI: HC\$3.00/MF\$0.65 CSCL 06T

Dry heat sterilization experiments were conducted on bacillus spores to establish basic parameters for use in model validation and in planned laboratory and computer experiments with variable temperature profiles. To provide the outputs necessary for meeting planetary quarantine lunar responsibilities, a lunar information system was designed which is comprised of four major portions: a file preparation subsystem, data storage subsystem, lunar inventory subsystem, and communications subsystem. In conjunction with this system, a lunar inventory model for automated missions was developed consisting of initial burdens, burden change in cislunar space, dissemination mechanisms at the lunar surface, bioburden changes on the lunar surface, and probability of sample contamination. A model for the optimal identification of bacteria is being developed. Techniques for producing, disseminating, and detecting particles are being assessed, along with the performance of an electrostatic deposition device for producing a monolayer of bacterial spores. M.G.J.

N68-29344*# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.

MICROBIAL DECONTAMINATION AND SAMPLING PROGRAM FOR ANCHORED INTERPLANETARY MONITORING PLATFORM (AIMP-E) SPACECRAFT

F. N. Le Doux *In* Sandia Corp. Contamination Control: Current and Advanced Concepts in Instrumentation and Automation Sep. 1967 p 244–267 (See N68-29324 17-14)

A requirement of the Office of Planetary Quarantine, NASA Headquarters for biologically clean spacecraft operating in the near vicinity of the moon necessitated the development of a decontamination program for the AIMP-E spacecraft. Decontamination was effected with chemical solutions of isopropyl alcohol and acetone. To determine effectiveness of decontamination process two methods of recovering viable micro-organisms were used. One method employed control strips with detachable coupons for monitoring the electronic circuit modules and the other method employed sterile swabs and templates to monitor other surface areas. Coupons and/or swabs were immersed in a 1% peptone wash solution and sonicated at 25 kc/sec for 12 minutes. Aliquots of the sonicated solution were plated out on agar, incubated and colony counts made. Records were made of the numbers of aerobic and anaerobic spore and vegetative organisms remaining on a surface after the decontamination process. All assembly and test operations were conducted in controlled and/or clean-room facilities. Author

N68-29345*# Public Health Service, Phoenix, Ariz.

ASSAY TECHNIQUES FOR PLANETARY QUARANTINE

M. S. Favero *In* Sandia Corp. Contamination Control: Current and Advanced Concepts in Instrumentation and Automation Sep. 1967 p 268–270 (See N68-29324 17-14)

Maximum contamination levels for the Lunar program, sterility requirements for the Voyager project, and assaying techniques for estimating spacecraft microbial loads are discussed. The assays are considered in two general areas: the spacecraft itself, and the environments in which the spacecraft is assembled. Ultrasonic energy is used in the assaying because it is felt that ultrasonic energy is the best means of removing microbial contaminants from a surface, and of breaking up clumps of microorganisms into much smaller colony sizes. The latter effect is deemed necessary since contamination is measured in terms of colonies, and it is felt that smaller colony size gives a more representative estimate of contamination. Once the contamination factor is known, it is considered a short step to the proper heat cycle for sterilizing the spacecraft. Clean room treatment of the spacecraft, and the effects of dry heat on the resistance of spores are discussed. M.W.H.

N68-29346*# Sandia Corp., Albuquerque, N. Mex.

THE VACUUM PROBE FOR REMOVING ORGANISMS FOR COUNTING

M. E. Morris *In* its Contamination Control: Current and Advanced Concepts in Instrumentation and Automation Sep. 1967 p 271–286 (See N68-29324 17-14)

The recovery of micro-organisms from surfaces has been studied by microbiologists since the early part of this century. During this period, four basic methods have evolved: the agar overlay method, the agar contact method, the swab-rinse method, and the rinse method. Each method has individual disadvantages in addition to a common disadvantage of not being designed for use in situations involving small numbers of microbes on large surfaces. The agar overlay method and the agar contact method (Rodac plate method) have been shown to deposit residual nutrient materials on the surface being assayed. Use of the swab-rinse method and the rinse method is limited to surfaces which are not moisture sensitive. The rinse method may also leach toxic substances, producing bacteriostatic or bacteriocidal conditions in the culture medium. Since no method was available which would accurately assay small numbers of microorganisms on large test surfaces in ultra-clean environments, a development project was started to provide an instrument with the desired capabilities. The device developed is based on gas dynamics and has been named the vacuum probe. Author

N68-29347*# Public Health Service, Phoenix, Ariz.

THE PROBABILITY OF RELEASING MICRO-ORGANISMS ON FRACTURE FROM SOLIDS

N. J. Peterson *In* Sandia Corp. Contamination Control: Current and Advanced Concepts in Instrumentation and Automation Sep. 1967 p 287–288 (See N68-29324 17-14)

The probability of releasing a viable microorganism from a fracture in a solid material, such as might occur in a spacecraft landing on a planetary surface, is discussed. Mathematical models were developed and laboratory experiments were performed, with a polymerized leucite plastic model system being the basis of the experimentation. The leucite plastic was considered to be contaminated by spores which had become entrapped in the plastic. The level of contamination was measured by dissolving the plastic in acetone, which is not lethal to the spores. The plastic was then filtered, and the number of spores per unit volume measured. Curves were obtained relating the concentration of the spores to the probability of release when the solid surface fractured. M.W.H.

N68-29348*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

LIFE DETECTION EXPERIMENTS

G. L. Hobby *In* Sandia Corp. Contamination Control: Current and Advanced Concepts in Instrumentation and Automation Sep. 1967 p 289–299 (See N68-29324 17-14) (Contract NAS7-100)

Three life detection experiments for unmanned planetary probes to Mars are discussed. These experiments are schemes for

testing soil samples for organic compounds of biological origin, and for active processes such as metabolism, photosynthesis, or replication. The first experiment is a combined gas chromatographer and mass spectrometer for separating and identifying volatile components of the planetary atmosphere as well as the soil. The second and third experiments are met for searching for evidence of physiological processes in Martian soil samples. One tests for carbon 14 assimilation by incubating soil samples in chambers containing carbon dioxide labeled with carbon 14, and under both natural Martian illumination and complete darkness for long periods of time. The remaining experiment tests for heterotrophic metabolism in the soil by inoculating a nutrient broth containing one or more simple carbon compounds labeled with carbon 14. It is felt that if Martian organisms are capable of metabolizing these constituents, they may form labeled carbon dioxide as a metabolic end product. M.W.H.

N68-29351# Utah Univ., Salt Lake City. Radiobiology Div.
RESEARCH IN RADIOBIOLOGY Annual Report, 1 Apr. 1966-31 Mar. 1967

Thomas F. Dougherty 31 Mar. 1967 268 p refs
(Contract AT(11-1)-119)
(COO-119-236) CFSTI: HC \$3.00/MF \$0.65

A series of radiobiological studies on dogs are performed. The clinical and pathological aspects of toxicity is investigated. The incidence of various diseases following irradiation of the dogs is studied. Also the effects of radiation on the synthesis of sex hormones, and its effect on a dog's enzymes are analyzed. The amount of potassium in a man with muscular dystrophy is found. Also the effects of diet and drug on neoplastic diseases in mice is discussed. NSA

N68-29371*# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

INDUCED RADIONUCLIDES IN ASTRONAUTS Second Quarterly Activity Report, 1 Oct. 1967-1 Jan. 1968

R. W. Perkins 12 Jan. 1968 18 p refs Sponsored by NASA
(Contract AT(45-1)-1830)
(NASA-CR-95722; BNWL-531-2) CFSTI: HC \$3.00/MF \$0.65
CSCL 06R

Tissue equivalent solutions containing H, O, C, N, Na, K, Cl, Rb, and Cu near the concentrations present in a standard man were prepared and placed in lucite target boxes. The solutions were irradiated with protons and fast and thermal neutrons. The experiments were designed to measure radioinduced activity in tissue media of known elemental concentration and changes in radionuclide production rate as the proton beam was degraded through a tissue equivalent material. The tissue was irradiated with protons. It was demonstrated that the production of ⁷Be and ²⁴Na from proton irradiation was a function of depth through muscle tissue media. Sodium-22 was also produced from proton irradiation. In flight in an Air Force plane at 60,000 to 63,000 ft., sodium fluoride monitors were placed at various locations on the pilot and in the fuselage of the aircraft. Flux monitors were placed on the thigh and ankle of both pilot and navigator. The results showed that the neutron flux at the surface of the pilot was three-fold higher than that on the navigator. NSA

N68-29394# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

DETERMINATION OF INORGANIC RADIUM IODIDE IN COMPOUNDS LABELLED WITH I-131 FOR CHROMATOGRAPHY IN THIN LAYERS [DETERMINACION DE RADIOYODURO INORGANICO EN COMPUESTOS MARCADOS CON I-131 FOR CROMATOGRAFIA EN CAPA DELGADA]

L. L. Camin, Maria L. P. de Troparesvsky, G. N. B. de Salas, and A. E. A. Mitta 1968 9 p refs In SPANISH
(CNEA-224) CFSTI: HC \$3.00/MF \$0.65

A method for quick detection of inorganic radioactive iodine by chromatography in compounds containing iodine 131 is presented. Quantitative determination is made with a radiation detector on a moving tape. Transl. by F.O.S.

N68-29461# Royal Aircraft Establishment, Farnborough (England).
THE MEASUREMENT OF VISIBILITY ON AERODROMES [MESURE DE LA VISIBILITE SUR LES AERODROMES]

M. Cecchini Mar. 1968 8 p Transl. into ENGLISH from a paper presented at the 8th Intern. Aeron. Congr., Paris, 29-31 May 1967
(RAE-LIB-TRANS-1295) CFSTI: HC \$3.00/MF \$0.65

The note lists the various factors affecting the visual range of lights in fog and points out the variability of ranges measured by human observers. An alternative method of visual range estimation using transmissometers is explained and leads to a description of an apparatus which accepts transmissometer outputs, converts the signals to runway visual range and displays the reading to air traffic controllers on an airfield. Author

N68-29475*# Mathematics and Biology Corp., Benton, Kans.
THE SIGNIFICANCE OF VISCOUS FLOW PROPERTIES IN THE THEORY OF OPERATION OF A NEPHRON

H. M. Lieberstein (Wichita State Univ.) Wichita State Univ. Mar. 1968 73 p refs
(Contract NSR-39-080-001)
(NASA-CR-95707) CFSTI: HC \$3.00/MF \$0.65 CSCL 06P

The salient feature of a nephron is its tiny size, six to ten microns radius, since the fourth power law requires a tiny flow rate even from a large pressure gradient. Along closely folded hairpin loops, present in the nephrons of birds and mammals and called loops of Henle, a salt concentration gradient forms in the ambient medullary tissue. Urine collects in this tissue in ducts, equilibrates with it osmotically, and produces a final product hypertonic to blood. Other authors explain the mechanism of this loop in terms of a hypothesis of active extrusion of a small amount of sodium from one branch of the loop and operation of a countercurrent multiplication principle. By close attention to realistic physical principles we construct a model that does not use this hypothesis but produces in numerical studies the observed concentration gradient and an amplification of this effect with length. Author

N68-29512# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

PACIFIC NORTHWEST LABORATORY. VOLUME 2: PHYSICAL SCIENCES. PART 3: EARTH SCIENCES Annual Report, 1966

D. W. Pearce, ed. and M. R. Compton, ed. Jan. 1968 104 p refs
(Contract AT(45-1)-1830)
(BNWL-481-3) CFSTI: HC \$3.00/MF \$0.65

Continuing research programs in the physical sciences with emphasis on the earth sciences of geology, hydrology, geophysics, seismology, mineral chemistry, and particle and aerosol studies are described. A.L.

N68-29518*# Illinois Univ., Urbana. Dept. of Physiology and Biophysics.

THE PHYSICAL AND CHEMICAL PROPERTIES OF HUMAN SWEAT AND FACTORS AFFECTING THE WATER BALANCE IN CONFINED SPACES Final Report, 1 Jul. 1965-30 Jun. 1968

Robert E. Johnson and Frederick Sargent, II 30 Jun. 1968 24 p refs
(Grant NGR-14-005-050)
(NASA-CR-95492) CFSTI: HC \$3.00/MF \$0.65 CSCL 06S

Summary information is given on a study which was concerned with two aspects of the physiology of eccrine sweating. Correlations were made between the rate of sweating and the

concentration of the various constituents, and the effect of daily cholinergic stimulation at a single area of skin in the forearm was studied. Details are given on procedures for estimating inorganic, hydrolyzable, and total sulfur content of sweat. The literature pertaining to the cholinergic or denervated sweat glands is summarized in relation to two main problems: (1) acclimatization, training, and the ionic composition of sweat produced during these processes, and (2) the responses of denervated sweat glands to cholinergic stimulation. B.S.D.

N68-29546*# Stanford Univ., Calif. Instrumentation Research Lab.

CYTOCHEMICAL STUDIES OF PLANETARY MICROORGANISMS—EXPLORATIONS IN EXO BIOLOGY Status Report, 1 Oct. 1967—1 Apr. 1968

Joshua Lederberg Apr. 1968 59 p refs
(Grant NsG-81)

(NASA-CR-95718; IRL-1076) CFSTI: HC \$3.00/MF \$0.65 CSCL 06C

Summarized are results of continuing research projects in the following areas: (1) gas chromatography and optical resolution; (2) mass spectral microanalysis of organic solids; (3) computer managed instrumentation; and (4) cell separation. S.C.W.

N68-29553*# California Univ., Los Angeles. Space Biology Lab. **CHEMICAL AND METABOLIC CHARACTERISTICS OF BRAIN TISSUE. ELECTRICAL IMPEDANCE CORRELATES**

R. T. Kado and W. R. Adey [1968] 29 p refs
(Grant NsG-237)

(NASA-CR-95628) CFSTI: HC \$3.00/MF \$0.65 CSCL 06P

Measurement methods for directly assessing electrophysiological properties of brain tissues are described. Proposed methods include: (1) the use of a Wheatstone bridge circuit, (2) the use of chronically implanted electrodes, and (3) the application of a known voltage to a pair of electrodes which pass a known electric current through the tissue and noting what the tissue has done to the current. Impedance changes with physiological manipulation; during sleep; and during learning are assessed. Results are discussed in view of their significance to understanding the nature and contributions of EEG in individual neuronal wave generators to the ensemble or population characteristic recorded as the gross EEG (electroencephalogram). S.C.W.

N68-29556*# California Univ., Los Angeles. Human Communication Lab.

A CONFUSION-CHOICE STIMULUS RECOGNITION MODEL APPLIED TO WORD RECOGNITION

Lloyd H. Nakatani 15 Jul. 1968 130 p refs
(TR-31)

To provide a quantitative description of articulation testing phenomena, a mathematical stimulus recognition model was formulated in which perceptual processes are distinguished from response processes. The model postulates an activation process, incorporating concepts from signal detection theory, and a decision process in which Luce's choice axiom is applied. It can also factor a confusion matrix into two matrices of evocation and bias parameters corresponding to the activation and decision processes. An evaluation is presented to show how the model can account for the effects of varying signal-to-noise ratio levels, uncertainty, predictability, confusability, and response bias in word recognition based on fits of the model to previously published data. Intelligibility and predictability were shown theoretically and empirically to be linearly related on a normal-normal plot instead of a log-log plot. Word probability experiments conducted to test the decision process show the importance of relative probabilities among mutually confusable words compared to the unimportance of absolute word probability as a variable affecting recognition performance, and the independence between articulation scores and absolute word probability. M.G.J.

N68-29593*# Naval Air Development Center, Johnsville, Pa. Aerospace Crew Equipment Dept.

COMPARATIVE STUDY OF BODY DISPLACEMENTS IN BOTH HUMANS AND ANTHROPOMORPHIC DUMMIES WHEN SIMULTANEOUSLY SUBJECTED TO CONTROLLED VERTICAL IMPACT TYPE DECELERATIONS Interim Report

Marcus Schwartz 8 Apr. 1968 185 p /ts Found. Res. Proj. No. 15

(NADC-AC-6808; AD-669466)

The report concerns Phase I of a research program to determine if a correlation in displacements exists between humans and anthropomorphic dummies of like proportions when subjected to vertical crash type forces for extrapolation into the high impact region where only dummies can be utilized. Although similarities were found when comparing the displacements in the leg area, the upper torso could not be correlated in any but a highly complex way. Although direct correlation is not practical, much useful information has been gained. The dynamics of the human body as it affects the performance of pilot ejection systems is considered to be very significant, and as yet undetermined. Author (TAB)

N68-29601*# Michigan Univ., Ann Arbor. Center for Research on Utilization of Scientific Knowledge.

ORGANIZATIONAL BEHAVIOR RESEARCH UTILIZATION PROCESSES. A STUDY OF PROCESSES FOR THE UTILIZATION OF SCIENTIFIC FINDINGS FROM ORGANIZATIONAL BEHAVIOR RESEARCH Final Report

27 Oct. 1967 196 p

(Grant NGR-23-005-116)

(NASA-CR-89837) CFSTI: HC \$3.00/MF \$0.65 CSCL 05J

Seminars, individual questionnaires, evaluation sheets, and assessment sheets are employed as techniques for utilization of organizational behavior research knowledge by a specific complex organization element. The organizational research material selected for use pertained to promotion of new patterns of management and motivational approach to supervision, personnel performance and productivity, and most effective practices of supervision and management of professional and scientific personnel. Problems of supervision and management in the specified organization element are identified, described, and assessed. Feasibility of applying research knowledge to such problems is determined. Alternative methods which could be used to transfer and apply research knowledge to management problems are developed and evaluated. Summary conclusions offered are that the seminar approach is an effective method of transferring behavioral science research knowledge to managers, and that the several utilization techniques must be viewed in terms of characteristics of the using organization and its leadership. D.H.B.

N68-29665* Pennsylvania Univ., Philadelphia.

THE DISRUPTIVE EFFECTS OF UNPREDICTABLE SHOCK

Martin Elias Peter Seligman (Ph.D. Thesis) 1967 123 p

Available from Univ. Microfilms: HC \$6.00/MF \$3.00 Order No. 67-12802

A review of the effects of electric shock presentations which organisms cannot predict reveals four major findings: 1) Organisms choose signalled over unsignalled shock. 2) Organisms choose immediate over delayed shock. 3) Response-independent shock disrupts behavior more than response-contingent shock. 4) Stomach ulceration may increase with increasing unpredictability of shock. A "safety signal" hypothesis is proposed to unify these findings. When shock is reliably predicted for an organism, the absence of shock (or safety) is also predicted. The disruptive effects of unpredictable shock are attributable to the absence of a safety signal, for when an organism has no predictor of safety it will be in chronic fear. The safety signal explanation of the deleterious effects of unpredictable shock generates many predictions for conditioned emotional response (CER) procedures. These predictions were tested and confirmed in the main experiment of this dissertation, and implications discussed. Dissert. Abstr.

N68-29694# American Inst. for Research, Pittsburgh, Pa. Team Training Lab.

INCREASING TEAM PROFICIENCY THROUGH TRAINING Final Summary Report No. 8, Dec. 1960-Aug. 1967

David J. Klaus and Robert Glaser May 1968 65 p refs
(Contract Nonr-2551(00))
(AIR-E1-6/68-FR; AD-669688)

The report summarizes the results of research at the Team Training Laboratory from December 1960 until August 1967. During this time seven technical reports were issued by the laboratory. This summary report briefly describes each of these seven studies and reviews their purpose and major results. The final section of this report identifies some practical implications of this research and relates the underlying concepts to the broader context of social behavior. Author (TAB)

N68-29695# American Inst. for Research, Pittsburgh, Pa. Team Training Lab.

INCREASING TEAM PROFICIENCY THROUGH TRAINING 7: THE SIMULATION OF TEAM ENVIRONMENTS

Jerry G. Short, Timothy Cotton, and David J. Klaus May 1968 65 p refs
(Contract Nonr-2551(00))
(AIR-E1-5/68-TR; AD-669687)

Three studies of simulated team environments are described in the report. Each study dealt in some way with the transition performance decrement that occurs when individuals are placed in teams. Study 1 found that this decrement was, in a large part, a function of the change in reinforcement ratio that occurred between individual and team training. Study 2 showed that reinforcement in the team environment was a function of characteristics of the team members themselves--their number and the proficiencies. An increase in the number of team members or a decrease in their proficiency produced lower reinforcement ratios and these in turn produced larger decrements in performance and increased the time required for teams to reach high levels of proficiency. Study 3 showed that the transition performance decrement could be reduced by certain training strategies notably those involving a simulation of the team environment during individual training. Author (TAB)

N68-29720# School of Aerospace Medicine, Brooks AFB, Tex.
ENDOCRINE-METABOLIC EFFECTS OF UNUSUALLY LONG OR FREQUENT FLYING MISSIONS IN C-130E OR C-135B AIRCRAFT Final Report, Nov. 1964-Dec. 1967

Henry B. Hale, Clarence A. Anderson, Edgar W. Williams, and Emanuel Tanne Mar. 1968 23 p refs
(SAM-TR-68-24; AD-669346)

Flight-stress appraisal was made by means of a battery of urinary determinations (epinephrine, norepinephrine, 17-OHCS, urea, uric acid, phosphorus, magnesium, sodium, and potassium) for flyers who participated in (a) 20-hour missions in C-130E aircraft (flights from New Zealand to Antarctica, and back), (b) 6-day missions in C-135B aircraft (earth-circling missions), or (c) 7-week missions in C-135B aircraft (over-frequent transoceanic and transcontinental flying). The adrenal medulla (as judged by urinary epinephrine) consistently showed flight-sensitivity, but other endocrine-metabolic functions varied in ways indicative of adaptation. With flight circumstances standardized (particularly with respect to time of day), flight effects tended to be reproducible. With crew rest limited to 2 days, recovery from flight-stress tended to be incomplete. Sleep deprivation and crew position were shown to be factors which modify flight-stress reactions. Eastbound and westbound earth-circling missions did not induce different degrees of flight-stress, as judged by these endocrine-metabolic indices. Author (TAB)

N68-29786 West Virginia Univ., Morgantown.
MYOCARDIAL METABOLIC ADAPPTIONS IN RESPONSE TO REPEATED EXERCISE

James Leroy Poland (Ph.D. Thesis) 1967 92 p
Available from Univ. Microfilms: HC \$4.80/MF \$3.00 Order No. 67-11797

Populations of trained albino rats were produced by daily running on a treadmill. Aerobic activity, measured by oxygen consumption using conventional Warburg techniques, tended to be depressed in heart homogenates from the trained rats. Production of lactic acid by heart homogenates under anaerobic conditions also tended to be depressed in trained animals. However, a more severe training program was needed to produce the depressed anaerobic activity than the depressed aerobic activity. Hearts hypertrophied by 5 days of aortic coarctation did not show the same depressed aerobic activity as that found in the trained heart. Trained animals compared to the untrained showed greater glycogenesis during a 24 hour fast and greater glycogenolysis during 15 minutes of exercise. Change in glycogen concentration occurred predominately in the TCA-soluble glycogen in both trained and untrained animals. This increased activity in trained animals during a physiological stress indicates that the metabolic response of the heart *in vivo* must not be governed by the maximal activity of the myocardium since training tended to depress the maximal activity. Dissert. Abstr.

N68-29813# General Precision, Inc., Glendale, Calif. Librascope Group.

MODELS OF NEUROELECTRIC INTERACTIONS Technical Report, 15 Apr. 1965-15 Jul. 1967

Edwin R. Lewis Wright-Patterson AFB, Ohio AMRL Dec. 1967 152 p refs
(Contract AF 33(615)-2464)
(AMRL-TR-67-132; AD-669574)

The Hodgkin-Huxley descriptions of electrically excitable conductances are combined with Eccles descriptions of synaptic conductances to provide the basis of an electronic analog of nerve cell membrane. A neural simulation facility is constructed, comprising ten pairs of these analogs with associated input and output equipment. A detailed description of the simulation facility is presented, including design philosophy, circuit, system and mechanical details. The simulation facility is used to model spatially distributed neuroelectric phenomena. Significant results include resetting of potentials in integrative regions by spikes generated at a remote site, stable spike synchrony in independently driven, mutually inhibiting distributed neural models, burst formation in mutually exciting neural models, and various nonuniformities of wave shape and velocity in conduction along a distributed axon. In addition, the facility is used in a simulation study of the lobster cardiac ganglion. As results of this study, mechanisms are proposed for ganglion operation and specific neuronal connectivities are predicted. Author (TAB)

N68-29838# Allied Chemical Corp., Morristown, N. J. Industrial Chemicals Div.

EXPERIMENT OF DAMAGE CONTROL MATERIALS AND METHODS FOR FLEET HANDLING OF PACKAGED LIQUID PROPELLANTS Quarterly Report, 1 Jan.-31 Mar. 1968

R. J. Foley 31 Mar. 1968 10 p
(Contract N00019-67-C-0538)
(QR-3; AD-669437)

An investigation is being conducted to evaluate the compatibility of certain damage control materials and equipment with chlorine trifluoride (CTF), a liquid propellant. The trace gas analyzer previously tested and approved for CTF service was calibrated for MHF-3 in the range of 0 to 20 ppm. The analyzer was calibrated under stable and shipboard-like conditions and produced protective responses. The prototype protective suit made of the neoprene-coated nylon cloth was received from the manufacturer, but was rejected because it did not comply with our specifications. Exposure tests were conducted on the skin of live rabbits with low concentrations of CTF. It was found that a 30 minute exposure of CTF even as dilute as 0.1% had an adverse effect on this skin. TAB

N68-29872# Duke Univ., Durham, N. C.
**THE EFFECT OF THE LABORATORY SITUATION ON
 EXPERIMENTAL DISCUSSION GROUPS**

Stephen R. Wilson Nov. 1967 40 p refs
 (Contract Nonr-1181(11))
 (TR-26; AD-669467)

The study attempts to determine the effect of the presence of an observer and the saliency of the experimental task upon laboratory discussion groups. Five groups of five subjects each were assigned to each cell of a two by two design (1. observer present versus observer absent; and 2. task used versus task not used). The observed-task not used condition was designed to resemble the typical experimental situation. The strongest differences were found across the observed-not observed conditions. Observed groups had higher rates of task-oriented interaction and lower rates of task-irrelevant interaction, but no difference was found in actual productivity. Differentiation between the sociometric dimensions of best idea rankings and liking rankings was greater in the not observed condition. This was attributed to the greater variation in interaction content in this condition. The methodological implication of the results is discussed and the results are used to interpret the findings of other studies dealing with the development of experimental discussion groups over time. Author (TAB)

N68-29948*# Massachusetts General Hospital, Boston.
 Neurophysiology Lab.

**A STUDY OF TOPOLOGICAL CHARACTERISTICS IN
 PATTERN PERCEPTION PHYSIOLOGY IN MAMMALIAN
 CORTEX**

Howard T. Hermann [1968] 19 p

(Grant NGR-22-016-005)

(NASA-CR-95811) CFSTI: HC \$3.00/MF \$0.65 CSCL 05J

Experimental methods and techniques were developed with the ultimate objective being the simultaneous recording from a number of single neuronal units involved in mediating the perception of a stimulating sensory pattern. Input stimuli are purposely restricted to simple, hand manipulated dark objects (3° to 5°) on a white field, normal sounds, and manual touching. Anesthesia preparations and surgical techniques are discussed, along with the criteria for stereotactic, electrode placement control, micromanipulator and microelectrode designs, and the adaptation of a cross-slide carrier for X-Y stereotactic electrode implantation. The implantation of the plastic guide tube assembly into the cortical region and the removal of the overlying dura are described. The data analysis system plan is outlined, with the capabilities defined as single-channel, assembly language programmed, on-line analysis and display of pulse interval statistics and pulse interval histograms and their moment, post-stimulus histograms, and pulse rate averages. A figure is included to depict a typical recording taken during an initial probing of occipital cortex in the rat. M.G.J.

N68-29984* TRW Systems, Redondo Beach, Calif.
**THERMAL PROPERTY MEASUREMENTS OF MANNED
 SPACECRAFT CENTER SPACESUIT MATERIALS
 Measurements Reports**

F. J. Turnbow May 1968 4 p ref

(Contract NAS9-3670)

(NASA-CR-92198; TRW-68-3346.11ja-38) CFSTI: \$3.00 CSCL 06Q

Near-normal emittance properties of a face shield and a test chip were determined from reflectance data measured with an infrared reflectometer. Results are tabulated for the measurements taken at 13 positions on the external surface of the shield, and at 3 test chip positions. Author

N68-29985# Air Force Systems Command, Wright-Patterson
 AFB, Ohio. Foreign Technology Div.

**PSYCHOPHYSIOLOGICAL FEATURES OF FLIGHT OVER
 WATER [PSIKHOFIZIOLOGICHESKIYE OSOBENOSTI
 POLETA NAD MOREM]**

I. D. Dolinskiy 22 Sep. 1967 13 p refs Transl. into ENGLISH
 from Morskoi Sb. (Moscow), no. 8, 1965 p 44-50
 (FTD-MT-24-124-67; AD-669269)

The difficulties associated with long flights over the sea stem from the lack of visual orientation and from the extreme meteorological conditions encountered. Since the interaction of physiological and psychological factors, not yet fully understood, may result in illusions, flight must be conducted by instruments. Instrument flying requires experience before pilots gain confidence in the instrument indications and accept them in lieu of erroneous sensations. Trained pilots can scan the instruments, correlate the readings to detect malfunctions, and analyze data. Standardization of the instrument panel facilitates training, and automation of the instrumentation simplifies the technique. In one automation system the images of the instruments are projected on the front cabin window, enabling the pilot to maintain visual contact with his environment while surveying the instruments. It has been noted that certain physical activities during flight reduce the illusion effect and that physically fit crews are less susceptible to illusions. For this reason a well planned and executed program of athletics and sports would be instituted for all air crews. The added danger of flying over water gives rise to fears which can aggravate the illusion effect. This fear can best be overcome by intensive rescue training, which gives the crews confidence in their own survival ability, in the rescue equipment, and in the search and rescue procedure. Since crews are scattered over wide areas when bailing out of fast, high flying planes, the rescue training must emphasize the individuals battle with the elements. Author (TAB)

N68-30021*# National Aeronautics and Space Administration,
 Washington, D. C.

**BLASTOPORE AND SPINA BIFIDA. A COMPARATIVE
 MORPHOLOGICAL, TERATOLOGICAL STUDY ON
 MALFORMED FROG'S EGGS [URMUND UND SPINA BIFIDA.
 EINE VERGLEICHEND MORPHOLOGISCHE, TERATOLOGI-
 SCHE STUDIE AN MISSGEBILDETEN FROSCH-EIERN]**

Oscar Hertwig Jun. 1968 120 p refs Transl. into ENGLISH
 from Arch. Mikroskop. Anat., V. 39, 1892 p 353-503

(Contract NASw-1695)

(NASA-TT-F-11688) CFSTI: HC \$3.00/MF \$0.65 CSCL 06C

A comparative morphological, teratological study is presented on malformed frog's eggs. Studies were made of disorders of the fertilization process; disorders in the gastrulation process and the malformations resulting from these disorders. A critical examination and evaluation of the findings are given, and similar malformations in other classes of vertebrates are also discussed. Malformation in the three higher vertebrate classes are studied and the findings are applied to basic questions of vertebrate animal morphology. The coelmic theory and relation of the blastopore to difference forms of malformations are discussed. The conditions under which multiple rediments can arise from a single egg cell are given. Author

N68-30029*# Stanford Univ., Calif. Dept. of Aeronautics and
 Astronautics.

**EFFECTS OF VISCOSITY AND EXTERNAL CONSTRAINTS
 ON WAVE TRANSMISSION IN BLOOD VESSELS**

Everett Jones, I-Dee Chang, and Max Anliker May 1968 157 p
 refs

(Grants NGR-05-020-223; NSF GK-537)

(NASA-CR-95802; SUDAAR-344) CFSTI: HC \$3.00/MF \$0.65
 CSCL 06P

The propagation of sounds and pulse waves in the cardiovascular system is subject to strong dissipative mechanisms. A parametric study was conducted of the effects of viscosity on dissipation as well as dispersion of small pressure signals in arteries and veins. A linearized analysis of pressure waves in a cylindrical membrane containing a viscous fluid and having an isotropically viscoelastic wall indicates that there are two families of axisymmetric waves: a family of slow waves and one of fast waves. These two families of waves are examined for: (1) sensitivity

to variations in elastic properties of the medium surrounding the blood vessels; (2) attenuation due to fluid viscosity at different Reynolds numbers; (3) radial and axial displacements; and (4) phase angles between pressure, radial wall displacement, and fluid velocity. The theoretical predictions for an elastic membrane are in good agreement with limited quantitative experimental results for a latex rubber tube. A comparison with in vivo data shows that the dissipation due to fluid viscosity alone cannot account for the observed attenuation and lacks the proper frequency dependence. For physiologically meaningful parameter values and high frequencies, the theoretical analysis confirms that the damping due to blood viscosity is much less than that due to the viscoelasticity of the wall material for both families of waves. K.W.

N68-30074 Iowa State Univ. of Science and Technology, Ames.
DYNAMIC SENSITIVITY LYAPUNOV STABILITY ANALYSIS OF THE HUMAN RESPIRATORY CONTROL SYSTEM

Barry Lee Johnson (Ph.D. Thesis) 1967 210 p
 Available from Univ. Microfilms: HC \$9.45/MF \$3.00 Order No. 67-12972

The purpose of this study was to study the regulatory effectiveness of the human respiratory control system. A mathematical model of the respiratory control system was developed assuming that the predominant factor in the regulation of minute ventilation is the carbon dioxide tension in the brain respiratory center. A set of two nonlinear differential equations was developed to describe the carbon dioxide regulator. The model was made applicable to both an adult and a neonatal control system. A stability analysis of the respiratory control system was effected using Lyapunov stability theory. It was found that the neonatal control system is inherently more stable than is the adult system. An analysis of the contribution that individual respiratory parameters have on respiratory stability revealed that the respiratory control system was driven in the direction of instability whenever the tissue level of carbon dioxide was decreased. Dissert. Abstr.

N68-30107# General American Transportation Corp., Niles, Ill.
 General American Research Div.
AUTOMATIC WATER RECOVERY SYSTEM Final Report, Oct. 1964-Dec. 1966

Phillip P. Nuccio and Walter J. Jasionowski Wright-Patterson AFB, Ohio AMRL Mar. 1968 36 p
 (Contract AF 33(615)-2124)
 (GARD-1271; AMRL-TR-67-155; AD-670178)

A water recovery system for reclaiming potable water from urine and other waste waters was designed, fabricated and tested. The system operates on the vacuum distillation principle with vapor compression for the recovery of latent heat. Chemical pretreatment of the waste liquid is employed and the condensate is post-treated by absorption and filtration. A unique waste-liquid recycle technique was developed. The technique maintains clean evaporator surfaces (thus eliminating the need for periodic cleaning), and permits continuous automatic operation for an indefinite period. The system is designated GARD Model 1271 Automatic Water Recovery System. The materials, finishes, and built-in artificial gravity required for a flight qualifiable system were incorporated into the model which weighs 98 pounds and occupies less than 2.5 cubic feet. Electrical energy consumption varied according to the solids concentration of the feed liquid, and ranged from 34.6 watt-hours per pound of potable water recovered from low-solids urine to 55.4 watt-hours per pound when processing urine concentrated to 32 percent solids. During a 14-day acceptance test performed on the model, 421 pounds of potable water were recovered from 490 pounds of urine for a yield efficiency of 86 percent. Author (TAB)

N68-30118# HRB-Singer, Inc., State College, Pa.
THE DEVELOPMENT OF A DIGITAL HELIUM SPEECH PROCESSOR Final Report, May 1967-May 1968

J. B. Wible May 1968 59 p
 (Contract N00014-66-C-0228)
 (HRB-4007-F-2; AD-669469)

The report describes a development program for a small laboratory processor of speech generated in a hyperbaric helium environment. Prior research shows that distortion associated with this helium speech arises from upward shifted formant frequencies and a decreasing consonant-vowel ratio. These two factors form the basis for the design of the processor which operates in real time using digital techniques. Test and evaluation of the portable processor and associated microphones followed the developmental phase. Improved intelligibility of helium speech was observed with the use of the processor under various combinations of speaker, microphone, and hyperbaric helium atmosphere. Author (TAB)

N68-30135# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

MAN'S TOLERANCE TO TRACE CONTAMINANTS

A. A. Thomas Jan. 1968 45 p refs Presented at the Conf. on Bioastronautics, Blacksburg, Va., 14-18 Aug. 1967; Sponsored by NASA

(AMRL-TR-67-146; AD-669356)

Atmospheric contaminants in sealed cabins originate from a multitude of sources: off-gassing from cabin materials, production of contaminants by the life support system components, and the end products of human metabolism. The scope of the problem increases with progressing mission duration and can become the limiting factor for man's tolerance to extended space flight. Several important aspects must be considered: truly uninterrupted, continuous exposure, a combination of physiological stress from the use of artificial atmospheres and the chemical stress imposed by the trace contaminants, and the great potential of synergistic toxic effect by various constituents of the highly complex mixture of many contaminants. Superimposed on these factors are the other aggravating characteristics of prolonged space flight: logistics problems of life support and psychological effects of isolation on performance. Clearly, these factors must be weighed singly and in combination to allow safe design of future manned systems. Validation of human tolerance to trace contaminants can be accomplished by prolonged animal exposures coupled with mathematical model verification. Tradeoffs in life support system design can extend tolerance to contaminants and long range logistic tradeoffs should be considered by utilizing extraterrestrial resources for contaminant removal purposes. Author (TAB)

N68-30137# Aerojet-General Corp., Dayton, Ohio.
RESPONSES OF ANIMALS TO OXYGEN AT REDUCED PRESSURE

J. D. MacEwen, R. P. Geckler, and K. C. Back (AMRL) Wright-Patterson AFB, Ohio AMRL Feb. 1968 36 p refs
 (Contract AF 33(657)-11305)
 (AGC-3266; AMRL-TR-67-78; AD-669351)

As extensions of previous short-term experiments on the toxicity of oxygen at reduced pressure in animals, long-term continuous exposures of beagle dogs, rhesus monkeys and albino rats and mice were undertaken. The exposures were for 230 days to 100% oxygen at 5 psia. No mortality occurred in the exposed dogs or monkeys. More rats and mice died in the control groups than in the experimental groups, indicating no effects on mortality due to the experimental conditions. The growth rates of control and experimental rats were almost identical, further indicating lack of deleterious effects. Histopathologic examination of tissues was conducted on all four animal species. No differences were observed between exposed animals and their controls in monkeys, rats or mice. Minimal differences consisting of mild bronchitis and mild congestion were seen in the dogs exposed to 100% oxygen at reduced pressure. One exposed dog exhibited severe pulmonary changes associated with acute interstitial bronchial pneumonia. Periodic measurements of blood constituents showed no significant differences attributable to prolonged oxygen exposure at reduced pressure. Author (TAB)

N68-30144# Joint Publications Research Service, Washington, D. C.

PROBLEMS IN CREATION OF CLOSED ECOLOGICAL SYSTEMS

2 Jul. 1968 255 p refs Transl. into ENGLISH of the book "Problemy Sozdaniya Zamknutykh Ekologicheskikh Sistem" Moscow, 1967 p 1-259 (JPRS-45837) CFSTI: HC \$3.00/MF \$0.65

In the articles presented, consideration is given to the possibilities of using closed ecological systems in mastering extraterrestrial space and as models for studying biological phenomena. Attention is focused on the biological and physicochemical aspects of the regeneration of air and water, and on the utilization of excreta in closed systems. Patterns in the development of populations and cenoses in the natural and artificial ambience are discussed in relation to the problem of creating such closed ecological systems. Author

N68-30150*# Life Sciences Research Inst., Inc., Richmond, Va.
VALIDATION OF NEW INDEXES OF MEASUREMENT: RELATIONSHIP OF RATE OF CHANGE PARAMETERS TO TASK PERFORMANCE UNDER STRESS

Robert G. Gibby, Sr. and Robert G. Gibby, Jr. 4 May 1968 104 p refs (Contract NAS9-7142)

(NASA-CR-92203) CFSTI: HC \$3.00/MF \$0.65 CSCL 06P

Rate of change (RC) and rate of rate of change (RRC) of heart rate was related to proficiency in performing perceptual, psychomotor, and cognitive tasks of various levels of complexity; and both psychological and physiological stresses were applied to college students majoring in science or engineering who were at least 19 years of age. Data were collected for 80 students for whom a Pearson product-moment correlation of .97 was obtained for RC stress and RRC stress, .96 for RC nonstress and RRC nonstress, .66 for RC nonstress and RC stress, and .62 for RRC nonstress and RRC stress. Students considered labile on either RC or RRC basis did not perform as well under stress on the perceptual and cognitive tasks as did subjects considered stabile, but there was no significant difference in motor task performance for the two groups. M. W. R.

N68-30186# European Atomic Energy Community, Ispra (Italy). Scientific Information Processing Center.

MACACO—PREST: AN ANALOG MODEL AND A DIGITAL CODE FOR CONTAINMENT STUDIES

G. Gaggero, P. M. Gerini (Centro Informazioni Studi Esperienze), G. Leoni (Centro Informazioni Studi Esperienze), and J. B. van Erp Brussels May 1968 144 p refs Prepared jointly with Centro Informazioni Studi Esperienze, Milan (EUR-3927.E) CFSTI: HC \$3.00/MF \$0.65

A mathematical model is presented for the determination of pressure and temperature transients inside the containment building, following a loss of coolant accident due to a rupture in the primary cooling system of a nuclear power plant having water as the primary coolant. The model includes the calculation of the radiation doses incurred to the thyroid due to inhalation of radioactive iodine released outside the containment building as a function of height of release, time of exposure, distance, etc. The model in its present form is limited as regards its application to dry containment systems without pressure relief (pressure-suppression systems are, e.g., not covered). The mathematical model was first used in conjunction with an analog computer and was subsequently programmed and extended for digital computer use (code: PREST), for more rapid availability as a computation tool for routine evaluations. Author

N68-30189*# National Aeronautics and Space Administration, Washington, D. C.

NEW TECHNIQUES IN INVESTIGATING HANDLING QUALITIES

H. Frohlich, W. Kreif, Schweizer, and K. Stopfkuchen Jul. 1968 35 p refs Transl. into ENGLISH from Aerospace Proc. 1966, Roy. Aeron. Soc., Centenary Congr. and Intern. Council of the Aeron. Sci., 5th Conger., London, V. 2, 12-16 Sep. 1966 p 931-962 (NASA-TT-F-11844) CFSTI: \$3.00 CSCL 05H

The design of the controls of a manned aircraft in the development stage requires knowledge of the dynamic behavior of the pilot-aircraft system with the utmost accuracy possible. While with presently available means it is in general easy to simulate the behavior of an aircraft in a model, the representation by models of the dynamic behavior of man is fraught with considerable difficulties. The model of a pilot generally used heretofore does not always lead to satisfactory results. A new model is thus proposed for discussion; it differs from the conventional concept by the fact that its parameters are not assumed to be constant, but that they are stochastically variable. It is assumed that the stochastic variations of the parameters are stationary. The model proposed can be used both in simulation and in free flight for measurement purposes. Control experiments were performed with the aid of the pilot model both on a VTOL transport and various helicopters. Results are presented for simulated and for free flights. Author

N68-30218*# Scripta Technica, Inc., Washington, D. C.
THE EVIDENCE FOR THE TRANSFORMATION OF FEMALE FROGLETS INTO MALE ONES FOLLOWING UTERINE OVERMATURATION OF THE EGGS [DIE BEWEISE FUR DIE UMWANDLUNG WEIBLICHER JUNGFRASCHE IN MANNLICHE NACH UTERINER UBERREIFE DER EIER]

Emil Witschi Washington NASA Jul. 1968 15 p Transl. into ENGLISH from Arch. Fuer Mikroskopische Anatomie und Entwicklugsmechanik (USSR), v. 102, 1924 p 168-183 (Contract NASw-1694)

(NASA-TT-F-11757) CFSTI: HC \$3.00/MF \$0.65 CSCL 06C

The author shows that uterine overmaturity of eggs has a sex-transforming effect in frogs. Author

N68-30219*# Scripta Technica, Inc., Washington, D. C.
OVERMATURITY OF THE EGG AS TERATOGENETIC FACTOR [DIE UBERREIFE DES EIES ALS TERATOGENETISCHER FAKTOR]

E. Witschi Washington NASA Jul. 1968 3 p refs Transl. into ENGLISH from Zool. Anz. (Germany), 1925 p 91-94 (Contract NASw-1694)

(NASA-TT-F-11755) CFSTI: HC \$3.00/MF \$0.65 CSCL 06C

All manifestations due to overmaturity are due to chemical changes in the ageing egg. The author has investigated the attendant malformations in the three series of experiments. Author

N68-30260*# Techtran Corp., Glen Burnie, Md.
MODERN STATE AND PROSPECTS FOR THE SOLUTION OF THE PROBLEM OF THE ORIGIN OF LIFE [SOVREMENNOYE SOSTOYANIYE I PERSPEKTIVY RESHENIYA PROBLEMY VOZNIKNOVENIYA ZHIZNI]

A. I. Oparin Washington NASA Jul. 1968 17 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 5, 1967 p 656-667 (Contract NASw-1695)

(NASA-TT-F-11800) CFSTI: HC \$3.00/MF \$0.65 CSCL 06A

The appearance of life on earth was the final event of millions of years of prebiological evolution taking place under radiational and chemical conditions no longer existing on the planet. The initial stage of this evolution was the appearance of hydrocarbons, now known to arise spontaneously both on earth and elsewhere in the universe; from these were formed multimolecular compounds, and ultimately more extensive systems capable of self-renewal. The structure and behavior of these early systems can be simulated by physico-chemical objects such as coacervate drops, which react with their environment as open systems, and

which exhibit "protometabolic" activity based on the absorption of catalytic substances. Initial studies made with such models suggest that ultimately the synthesis of protoplasm may become possible with the use of similar techniques. Author

N68-30277# Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

CIRCADIAN RHYTHMS AND THE EFFECTS OF LONG-DISTANCE FLIGHTS

Stanley R. Mohler, J. Robert Dille, and Harry L. Gibbons Apr. 1968 9 p refs
(FAA-AM-68-8)

Air travelers crossing four or more times zones experience significant desynchronization of certain daily biologic rhythms. Until rephasing of the rhythms occurs relative to the solar cycle at the destination, some subjective discomfort and disruption of psychophysiological responses can occur. This paper reviews research on diurnal rhythms, discusses the implications for aircrew and passengers, and makes recommendations for reducing the effects of time zone displacements. Author

N68-30294# Aeronautical Research Labs., Melbourne (Australia). **THE TWO-DIMENSIONAL TRACKING TASK FOR USE IN COMPARATIVE EVALUATION OF INSTRUMENT DISPLAYS**

T. J. Triggs Aug. 1966 11 p
(ARL/HE-20) CFSTI: HC\$3.00/MF\$0.65

Experiments to evaluate visual information displays frequently yield no significant differences between the various presentations considered. In order to minimize the possibility of the type 2 errors (i.e., failing to show statistically significant differences when in fact real differences exist), this project developed a rationale for improving experimental sensitivity by use of an extra loading task. Experiments in the past have used the display reading alone or reading in a highly redundant system operation. The use of the extra task procedure received some justification from the results of this experimental program. Two dimensional compensatory visual tracking with a random-appearing but coherent signal input was used as the extra task. Described here is the equipment designed for this tracking task, the generation of signals, display, and scoring of performance. Also included are some details of equipment used with the altimeter displays. A novel technique was developed for scoring the tracking task. Author

N68-30332# Harvard Univ., Cambridge, Mass. **PERCEIVING VISUAL TEXTURE: A LITERATURE SURVEY Final Report, Aug. 1964 - Aug. 1966**

Ronald M. Pickett Wright-Patterson AFB, Ohio AMRL Mar. 1968 48 p refs
(Contract AF 33 (615)-1815)
(AMRL-TR-68-12; AD-670225)

The visual perception of texture is introduced as a research problem important, in itself, but important also as an entrance into the broader and little understood area of complex pattern perception. Definitions of texture, both from a substantive and an abstract standpoint, are presented and followed by discussions of: (1) the information carried in textures and (2) the possible functions of texture perception in visually controlled behavior. Then a review of laboratory and field studies is presented, followed by a discussion of directions for future research. A functional theory of pattern perception is assumed, in which the processing of substantive information in optical patterns is emphasized. The application of man's natural visual capacities is proposed for scientific imagery analysis. Techniques are suggested for presenting the imagery in an ecologically relevant context of substantive analysis and description. Author (TAB)

N68-30338# Scripta Technica, Inc., Washington, D. C. **THE EFFECTS OF OVERMATURITY ON EGGS OF RANA TEMPORARIA [DIE EINWIRKUNG DER ÜBERREIFE AUF EIER VON RANA TEMPORARIA]**

H. Eidmann Washington NASA Jul. 1968 11 p refs Transl. into ENGLISH from Biol. Zbl. (Leipzig), v. 42, no. 3, Mar. 1922 p 97-108

(Contract NASw-1694)
(NASA-TT-F-11782) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C

The effect of overmaturity on eggs on the sex ratio of resulting *Rana temporaria* was discussed and it was shown that the cytoplasm is the only part affected. Author

N68-30361# General Technical Services, Inc., Upper Darby, Pa. **OSCILLATORY BEHAVIOR OF HEART RATE, VENTILATION AND SKIN TEMPERATURE IN RESTING HUMANS: TOWARDS A SPECTRAL ANALYZER Final Report, 1 May 1966 - 1 Aug. 1967**

M. H. Halpern, E. D. Young, and M. H. Ehrenberg Wright-Patterson AFB, Ohio AMRL Jan. 1968 49 p refs
(Contract AF 33(615)-3917)
(AMRL-TR-67-228; AD-669361)

The physiological responses of human subjects were studied to determine the oscillatory frequencies of these responses. Heart rate, ventilation rate, and surface temperature were monitored from three subjects during quiescence and light exercise under conditions of fasting and immediately after food intake. A pattern of rhythmical oscillations was found for each of the three physiological parameters which varied with the specific experimental conditions. The method of handling the data and extracting the oscillations from the raw data is discussed in detail. The mathematical basis of this method is presented. Possible other applications of these techniques to data handling, compression, and reduction are also examined. Author (TAB)

N68-30376# Michigan Univ., Ann Arbor. Mental Health Research Inst.

THE MAMMALIAN CENTRAL NERVOUS SYSTEM AS A NETWORK Final Report, Jul. 1965 - Aug. 1967

Anatol Rappoport, William J. Horvath, R. Baldwin Small, and Stephen S. Fox Wright-Patterson AFB, Ohio AMRL Apr. 1968 673 p refs
(Contract AF 33(615)-2956)
(AMRL-TR-67-187; AD-670193)

The central nervous system of mammals is described in terms of block diagrams and a 418 x 418 matrix showing the connections between identifiable sites. The terminology is neuroanatomical and the sites are the identifiable cell groupings (nuclei and other structures) in the brain and spinal cord. The connections between these sites were obtained from the published literature on the anatomy of the nervous system. The use of systems notation to describe this rich network of connections leads to a readily available data bank for carrying out various types of mathematical and theoretical studies, as well as a convenient reference and guide for future neurophysiological and anatomical research. Author (TAB)

N68-30399# Scripta Technica, Inc., Washington, D. C. **EXPERIMENTS ON THE FERTILIZATION OF OVERMATURE EGGS [VERSUCHE DER BEFRUCHTUNG ÜBERREIFER EIER]**

E. Pflueger Washington NASA Jul. 1968 2 p Transl. into ENGLISH from Arch. Ges. Physiol. (Berlin), 1882 p 76-77
(Contract NASw-1694)

(NASA-TT-F-11783) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C
The results of several series of experiments on fertilization of overmature eggs in frogs are presented. Author

N68-30400*# Scripta Technica, Inc., Washington, D. C.
RESPIRATORY QUOTIENT AND OXYGEN UPTAKE [V. RESPIRATORISCHER QUOTIENT UND O₂-AUFNAHME]
 E. Hohwu Christensen and Ove Hansen NASA Jul. 1968 9 p refs Transl. into ENGLISH from Scand. Arch. Physiol., v. 81, 1939 p 180-189

(Contract NASw-1694)

(NASA-TT-F-11809) CFSTI: HC\$3.00/MF\$0.65 CSLC 06P

At low exertion levels, blood lactate levels remain the same as at rest. At high (but not maximum) exertion both blood lactate concentrations and lactate metabolism increase. At maximum exertion muscle processes become anaerobic and lactate accumulates. The importance of the liver in the regulation of the respiratory quotient is discussed. Author

N68-30448*# Scripta Technica, Inc., Washington, D. C.
BIO-CYCLERGOLOGY AND ASTRONAUTICS [BIO-CYCLEROGLOGIE ET ASTRONAUTIQUE]

G. Cantoni and J. Borsarello NASA Jul. 1968 10 p ref Transl. into ENGLISH from Rev. Franc. D'Astronautique (Paris), Dec. 1967 p 21-27

(Contract NASw-1694)

(NASA-TT-F-11828) CFSTI: HC\$3.00/MF\$0.65 CSCL 06S

Under the neologism bio-cyclergology the circulation of energy in the system, which cyclic energy may be regulated or re-balanced by acupuncture is considered. This examination leads to an estimation of the consequences which a sudden and prolonged change of magnetic, gravitational or ionic environment may have upon the system, for example, of a cosmonaut. The conclusion is reached, however, that man's prodigious faculty of adaptation will carry him through these stages of progress. Author

N68-30453*# Michigan Univ., Ann Arbor.
SOME MATHEMATICAL MODELS IN BIOLOGY

Robert M. Thrall, ed., James A. Mortimer, ed., Kenneth R. Rebman, ed., and Richard F. Baum, ed. Dec. 1967 524 p refs Revised Sponsored by NIH (Rept.-40241-R-7)

A collection of examples illustrating mathematical applications to biological subjects is presented with the purpose of (1) delineating areas of mathematics that are applicable to modern biology, (2) to provide a source of biomathematical examples for authors of mathematical and biological textbooks, and (3) to be used as a supplement in lectures and course work in cases where standard texts are deficient. The models include a wide spectrum of mathematics, from foundations and elementary calculus to more advanced topics in linear algebra, probability, and differential equations. The models are grouped into four major sections corresponding to the four principal areas of molecular biology, the biology of cells and tissues, the biology of organs and organisms, and population biology. B.S.D.

N68-30457*# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INVARIANCE DURING IDENTIFICATION BY COMPARING A DESCRIPTION WITH A SAMPLE [INVARIANTNOST' PRI OPOZNANII SRAVNIYEM OPISANIYA S OBRAZTSOM]

V. A. Makhonin 30 Aug. 1967 12 p refs Transl. into ENGLISH of "Teoriya Peredachi Informatsii" Moscow, 1965 p 11-15 (FTD-MT-24-192-67; AD-670296)

The modern approach to recognition utilizes an indirect recognition by means of characteristics rather than by direct superposition comparison with the standard pattern. The recognizing characteristics are description functionals which are invariant regarding the permissible transformation of the object. The present author discusses all the elements needed for the establishment of the invariant recognition: the definition of a pattern, the methods for the transformation of such a pattern making the pattern suitable for the description, and the method for the comparison between the description and the reduced pattern. This is followed by a study

of some of the possible criteria for the similarity between the description and the pattern. The article concludes with a discussion of the joint properties of the invariant recognition approach and visual perception. Author (TAB)

N68-30458*# Army Natick Labs., Mass. Technical Library.
LABORATORY ANIMALS: THEIR CARE AND USE IN RESEARCH

Eugene G. Beary Jan. 1968 58 p refs *Its Bibliog. Ser.* 68-1 (AD-669617)

The checklist bibliography contains 484 references to the literature on the care and handling of laboratory animals and their use in research. The time coverage is 1950 to May 1967. The citations are arranged alphabetically by personal author. Subject and author indexes are included. Author (TAB)

N68-30527*# Research Triangle Inst., Durham, N. C. Engineering and Environmental Sciences Div.

BIOMEDICAL APPLICATIONS OF NASA SCIENCE AND TECHNOLOGY Final Report, 15 Jun. 1967-14 Jul. 1968

Jul. 1968 70 p refs

(Contract NSR-34-004-045)

(NASA-CR-95804; RTI-EU-349) CFSTI: HC \$3.00/MF \$0.65 CSCL 06B

Updated data are presented on the various activities conducted by the biomedical applications team. The primary objectives of the applications teams are: (1) to identify problems and needs existing in the medical field which appear to be solvable by the application of aerospace science and technology, (2) to identify the specific technologies or concepts which may lead to solutions of these problems, and (3) to document these transfers of science and technology so as to achieve maximum utilization of the results of the program. The problem and the solution for each transfer are detailed, the searching method and source of solution are identified, the actual or potential benefits resulting from the transfer are discussed, and the status of the transfer is given. Twelve potential transfers of technology which are in various stages of evaluation are assessed. Attention is also directed to problems which are still under consideration and to which solutions are still being sought on some regular review basis or on a continuing investigative basis. B.S.D.

N68-30528*# Notre Dame Univ., Ind. Lobund Lab.
BIBLIOGRAPHY OF GERM-FREE RESEARCH: 1885-1963, 1966 SUPPLEMENT

B. A. Teah 1967 24 p refs

(Contract Nonr-1623(15))

(AD-669964)

The bibliography lists 335 report titles, presented in author-index form, and representing medical research studies performed in connection with germ-free animals. TAB

N68-30530*# Techtran Corp., Glen Burnie, Md.
FURTHER INVESTIGATIONS ON THE SEXUALITY PROBLEM [WEITERE UNTERSUCHUNGEN UBER DAS SEXUALITÄTSPROBLEM]

R. Hertwig Washington NASA Jun. 1968 32 p Transl. into ENGLISH from Trans. of the Ger. Zool. Soc. 16th Ann. Meeting, Marburg, Ger., 5-7 Jun. 1906, Leipzig, Wilhelm Engelmann Press, 1906 p 90-112

(Contract NASW-1695)

(NASA-TT-F-11780) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C

The sexuality problem, as it relates to protozoa, *Dinophilus apatris*, daphnids, and *Rana temporaria*, is discussed from the standpoint of the development of the genital organs of these organisms, by which their sex is identified. The effect of the nuclear-plasmic relationship is also considered, and a mathematical expression is developed for the effect of this relationship on sexual development. Author

N68-30555*# Institute of Modern Languages, Inc., Washington, D. C.

MECHANISM OF INCREASING OSMOTIC RESISTANCE OF ERYTHROCYTES IN RATS ADAPTED TO HYPOXIA [K VOP-ROSU O MEKHANIZME POVYSHENIYA OSMOTICHESKOY REZISTENTNOSTI ERITROTSITOV ADAPTIROVANNYKH K GIPOSKII KRYS]

Z. I. Barbashova NASA Jun. 1968 10 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 50, no. 11, 1964 p 1385-1392

(Contract NASW-1693)

(NASA-TT-F-11410) CFSTI: HC\$3.00 CSCL 06C

On the basis of experimental data, it is determined that the increase in the osmotic resistance of rats adapted to hypoxia is an adaptive reaction which forms a part of the general mechanism of increasing the resistance of the organism. Author

N68-30585# Southampton Univ. (England). Audiology and Human Factors Group.

PHYSIOLOGICAL FACTORS INVOLVED IN THE EVALUATION OF THE LOUDNESS OF SHORT DURATION SOUNDS

A. R. D. Thornton [1968] 18 p refs

CFSTI: HC\$3.00/MF\$0.65

Before the loudness and possible damaging effects of sounds can be calculated, the various physiological mechanisms of the ear, which effect any subjective evaluation, must be taken into account. The physiological mechanisms of integration of energy and post-stimulatory masking are discussed. Recent work has shown that these are not independent phenomena. When a sound is in a post-stimulatory masked state an inhibitory physiological feedback acts to counteract the normal integration of energy contained in a short duration sound. The implication of this is that the total energy in such a sound will not contribute to the overall loudness, and hence calculations of loudness, based on energy integration methods, may have to be modified. Author

N68-30589# Aeronautical Research Council (Gt. Brit.).

THE EFFECTS OF EXTENDED PRACTICE ON PERFORMANCE IN A TRACKING TASK

R. C. Hornby (Queens Univ., Belfast) and R. Wilson (Queens Univ., Belfast) Dec. 1967 23 p
(ARC-29887; AD-670303)

Experimental measurements of human controller performance have been made during extended periods of practice in visual sine-wave tracking tasks. It has been found that, irrespective of task difficulty, RMS error scores decreased to such small magnitudes that differences in scores due to different task variables would have no practical significance. Thus the averaged values of steady scores when tasks are well learnt are meaningless for subject or task difficulty comparisons. It has been shown that the performance scores vary in an exponential manner with the number of task repetitions and it is proposed that an empirical constant related to the rate of decrease of scores be used as a measure of relative task difficulty. Author (TAB)

N68-30602*# Bolt, Beranek, and Newman, Inc., Van Nuys, Calif.

THE NOISINESS OF TONES PLUS NOISE

Karl S. Pearsons, Richard D. Horonjeff, and Dwight E. Bishop Washington NASA Aug. 1968 89 p refs
(Contract NAS1-6364)

(NASA-CR-1117; Rept.-1520) CFSTI: HC\$3.00/MF\$0.65 CSCL 06P

A series of judgment tests were conducted to investigate subjective judgments of single, modulated and multiple tones plus noise. The subjects were asked to judge which of two sounds, tones plus noise or noise alone, was noisier (or in some cases louder). Stimuli included both broadband and octave band noises together with single tones at 250, 500, 1000, 2000, and 4000 Hz. Amplitude and frequency modulated tones of 500 and 2000 Hz

were also employed. Multiple tone stimuli included 2 and 5 tone complexes with overall frequency spacings of 1/10, 1/3, 1, 4/3 and 2 octaves. Analysis of the judgment results were made using calculated perceived noise level and pure tone correction procedures.

Author

N68-30611# Edinburgh Univ. (Scotland). Bionics Research Lab.
VISUAL PERCEPTION IN SIMULATED SPACE CONDITIONS

James A. M. Howe and Richard L. Gregory 4 Jun. 1968 26 p refs

(Grant AF-AFOSR-65-62)

(AFOSR-68-1212; AD-670166)

The stimulus to the research reported was the finding that in complete darkness - the conditions of Space - afterimages can change systematically when their apparent distance alters due to movement of the observer. If the apparent size changes of the afterimage during movement of the observer could be measured, the constancy scaling process could be quantified. Since afterimages cannot be physically controlled, a new method was devised. The logic of the method is that the observer views a luminous object whose size may be varied in a controlled manner related to his movement. The display is made to shrink in size as he approaches it, the rate of shrinkage being adjusted until it is reported as appearing unchanging. A verbal report of an amount of expansion or contraction is unsatisfactory since it cannot reliably be quantified, but an observer can without difficulty state whether or not he can detect a change. This is a null technique which uses the observer as a detector rather than as a calibrated instrument. Author (TAB)

N68-30634# Kansas State Univ., Manhattan. Dept. of Psychology.

PROBLEMS IN THE SPECIFICATION OF LUMINOUS EFFICIENCY: STUDY OF VISUAL PERCEPTION IN HUMANS AND ANIMALS Technical Report, Apr.-May 1968

John Lott Brown May 1968 27 p refs

(Contract Nonr-3634(04))

(TR-5; AD-670053)

Problems of specifying luminous efficiency are considered in relation to the entire range of visual function from scotopic to photopic. The changing spectral response which accompanies changing adaptation and changing nature of the visual task is taken into account. Author (TAB)

N68-30638# Bureau of Social Science Research, Inc., Washington, D. C.

AEROSPACE POWER AND BEHAVIORAL KNOWLEDGE Final Scientific Report

Albert D. Biderman 29 Mar. 1968 18 p

(Contract AF 49(638)-1344)

(AFOSR-68-0631; AD-669837)

A variety of approaches were used to examine ways in which the social and behavioral sciences may be of use to policy, plans and operations of the Air Force. These approaches included documentary analyses, participant observation, interviews of research users and producers, and observations of use in a training program. Special attention was given to the utilization of social science research for dealing with international affairs, the problems of personnel in hostile custody, the selection and assessment of officers for responsible and sensitive roles, and the education of officers. Author (TAB)

N68-30686# Sanders Nuclear Corp., Nashua, N. H.
FEASIBILITY STUDY AND CONCEPTUAL DESIGN FOR A PERSONAL THERMAL CONDITIONING SYSTEM

John J. Sullivan, N. R. Disco, and A. Wong Dec. 1967 327 p; refs

(Contract F41609-67-C-0096)

(AMD-TR-68-1; AD-670212)

An airman forced to eject over Arctic terrain or cold water is faced with a very brief survival period after landing. (Approximately three minutes in 28F water.) This period of time is insufficient to initiate and accomplish a successful rescue mission. A study has been made to determine the feasibility of extending the survival period by warming the airman with heat generated by a radioisotope. A conceptual design has been created consisting of a network of water filled tubes worn beneath an insulated suit. Water in the tubes is heated by a 500 watt radioisotope to warm the pilot during a survival situation (28F water or -65F air), and is cooled by an 825 watt refrigerator to keep the airman comfortable while flying the aircraft with cabin temperatures up to 120F. A thermo-electric power generator supplies 12 watts of power for the water pump. Comparison studies of several radioisotopes have been made. System calculations and component calculations show that the concept is feasible and practicable for extending the survival period indefinitely. The survival system weight is estimated at 80 pounds and is configured to fit in a USAF standard ejection seat kit. Author (TAB)

N68-30708# Tracor, Inc., Austin, Tex.
TOWARDS THE LOGICAL AND METAPHYSICAL FOUNDATIONS OF ORGANISMIC THEORY: A PREREQUISITE TO ARTIFICIAL INTELLIGENCE
 Norman F. Hirst and Caroline Perkins Hirst Feb. 1968 36 p refs
 (Contract DAAB07-67-C-0559)
 (TRACOR-68-252-U; AD-669738)

To build machines which are going to function intelligently we have first to understand the nature of an organism and the nature of value. These two notions have not yet been developed well enough; implicit metaphysical presuppositions at the core of much of our thinking have stood in our way. These presuppositions have been made explicit and have been challenged and replaced in Whiteheads general cosmology. Unfortunately, Whiteheads theory awaits formalization. Its implications cannot be brought out systematically until it is formalized. The usual logical systems, such as the propositional and predicate calculi, are not suited to the formalization of Whiteheads metaphysics; they carry with them metaphysical assumptions which are contrary to his thinking. To produce a formalization of Whiteheads theory we propose to use combinatory logic, which is somewhat more neutral, and in particular theory of functionality. Author (TAB)

N68-30715# Naval School of Aviation Medicine, Pensacola, Fla.
STABILITY OF EDWARDS PERSONAL PREFERENCE SCHEDULE NEED SCALE SCORES AND PROFILES OVER A SEVEN-WEEK INTERVAL
 Lawrence K. Waters 18 Oct. 1967 10 p refs
 (NAMI-1019; AD-669798)

Seven-week test-retest correlations were obtained for need scale scores and individual need profiles for a sample of pre-flight students. The coefficients for need scales were in the 50s and 60s (2 of 15 were below .50). Mean scores on 7 of the need scales changed significantly over the seven-week intertest interval. Of the 74 individual profile correlations, 64 were significant; the median value was .75. There was some evidence that low profile stability was related to a low consistency score on one or both administrations. The test-retest data were compared with other reliability studies of the Personal Preference Schedule. Author (TAB)

N68-30741# Army Medical Research Lab., Fort Knox, Ky.
PULFRICH EFFECT WITH MINIMAL DIFFERENTIAL ADAPTATION OF THE EYES Interim Report
 P. C. Dodwell (Queens Univ., Kingston, Ontario), George S. Harker, and Isaac Behar 5 Apr. 1968 23 p refs
 (USAMRL-773; AD-670011)

Both experienced and naive Ss measured the displacement of a Pulfrich target with a sensitive stereoptometer when only the image of the moving target was filtered. The usual monotonic function of filter density was observed; the calculated retinal latency differences were consistent with those in the literature. Asymmetries in the Pulfrich effect with respect to direction of motion and individual differences were noted. It is suggested that two processes are confounded in the usual Pulfrich situation--contrast of the Pulfrich target and retinal adaptation. Author (TAB)

N68-30752*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Biotechnology Organization.
SIXTY DAY MANNED EVALUATION OF ZERO GRAVITY HUMIDITY CONTROL SYSTEM
 Richard W. Joy and Thomas M. Olcott 31 Jul. 1968 47 p ref
 (Contract NAS1-5622)
 (NASA-CR-66640) CFSTI: HC\$3.00/MF\$0.65 CSCL 06K

A study of the application of hydrophilic and hydrophobic surfaces for phase separation in low gravity environments began in 1963. A humidity control system using these surfaces was fabricated in 1966 and delivered to NASA/LRC. The previous evaluation program consisted of four parts: development of evaluation criteria and test plan, system integration and checkout, initial steady state tests and test plan modifications, final steady state and performance evaluation testing and test data analysis, and development of optimum design criteria. Upon the successful completion of the evaluation testing of the zero gravity humidity control system, NASA Langley Research Center directed development of a humidity control system for the McDonnell Douglas spacecabin simulator to be used during a 60-day manned test in that simulator. The unit was incorporated into the potable water recovery system for urine and atmospheric condensate. This unit included an aluminum plate-fin condensing heat exchanger, a hydrophobic/hydrophilic water separator and a continuous water delivery system. Author

N68-30765*# Techtran Corp., Glen Burnie, Md.
ON THE PROBLEM OF SEX DIFFERENTIATION [UBER DAS PROBLEM DER SEXUELLEN DIFFERENZIERUNG]
 R. Hertwig Washington NASA Jun. 1968 20 p Transl. into ENGLISH from the Trans. of the Ger. Zool. Soc. 15th Ann. Meeting, Breslau, Ger., 13-16 Jun. 1905
 (Contract NASw-1695)
 (NASA-TT-F-11779) CFSTI: HC\$3.00/MF\$0.65 CSCL 06K

The problems of sexual differentiation of daphnids, *Dinophilus apatris*, frogs, *Rano temporaria*, and *Rana esculenta* are experimentally investigated. The important points from two earlier works on protozoa are summarized by way of introduction. The various aspects of cell function affecting sexual differentiation, such as nuclear-plasmic relationships, cell division, assimilatory activity, etc. and environmental factors, such as feeding, temperature and egg size, are considered. It was found, for example, that warmth favors the development of male eggs of *Dinophilus apatris*. Author

N68-30783# Royal Aircraft Establishment, Farnborough (England).
INVESTIGATION OF THE STRESS ON FLIGHT CREWS OF JET AIRCRAFT ON LONG-DISTANCE FLIGHTS [UNTERSUCHUNGEN ZUR BELASTUNG DES BORDPERSONALS AUF FERNFLUEGEN MIT DUESENMASCHINEN]
 K. E. Klein, H. Bruener, and S. Ruff Jan. 1968 30 p refs
 Transl. into ENGLISH from Z. Flugwiss (West Germany), v. 14, no. 2, 1966 p 109-121
 (RAE-LIB-TRANS-1274) CFSTI: HC\$3.00/MF\$0.65

Since the introduction of jet aircraft into the civil air traffic aircrew fatigue has often been discussed but few attempts have been made to measure it practically. It is possible to obtain an estimation of the magnitude of aircrew fatigue by comparative measurements of psycho-physiological parameters in aircrew members during regular transatlantic flights and in a control group during sedentary activity in a fixed location. The results seem to allow a quantitative evaluation of occupational stress in physiological terms on various flight routes, and they add, to the knowledge of possible impairment of flight safety by stressful flights. Author

N68-30796# Texas Christian Univ., Fort Worth.
PARAMETERS OF HUMAN PATTERN PERCEPTION
Semiannual Progress Report, Sep. 1967-Mar. 1968
 Shelby H. Evans 12 Apr. 1968 25 p refs
 (Contract DAAD05-68-C-0176)
 (Rept.-1; AD-669861)

An introduction to the research is presented emphasizing the importance of within class variability and common attributes (schema) of a class in the problem of assigning patterns to recognition classes. It is also noted that this research program includes the development of methodologies to allow control and manipulation of this variability as well as of other relevant pattern variables. Subsequent phases of the research will make use of these methodologies in empirical and theoretical developments leading to basic understanding of pattern perception. An integrative summary of previous, present, and projected research is presented. A review is given of progress toward the creation of a research center capable of conducting further research in this area. Author (TAB)

N68-30832*# Techtran Corp., Glen Burnie, Md.
FURTHER INVESTIGATIONS ON THE SEXUALITY
PROBLEM [WEITERE UNTERSUCHUNGEN UEBER DER
SEXUALITATSPROBLEM]
 R. Hertwig Washington NASA Jun. 1968 28 p Transl. into ENGLISH from the book "Verhandlungen der Deutschen Zoologischen Gesellschaft Auf der Seibzehnten Jahresversammlung zu Rostock und Lubeck, den 21 Bis 23 Mai 1907" Leipzig, Wilhelm Engelmann Press, 1907 p 55-73
 (Contract NASw-1695)
 (NASA-TT-F-11781) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C

Sex determining factors affecting the sexual development of the eggs of *Rana esculenta*, *Rana temporaria*, and frogs are experimentally investigated. The question of whether the sperm of *Rana esculenta* affects the sexual development of the egg is the chief subject of this report. Results of the studies indicate that the sperm indeed does exercise a significant influence on sexual determination. Author

N68-30833*# Scripta Technica, Inc., Washington, D. C.
EXPERIMENTAL INVESTIGATION OF SEX TRANSFORMA-
TION IN THE FROG [EXPERIMENTELLE UNTERSUCH-
UNGEN UEBER DIE UMWANDLUNG DES GESCHLECHTS
GEIM FROSCH]
 K. Wagner NASA Jul. 1968 9 p refs Transl. into ENGLISH from Arch. Entwicklungsmech. Organ. (Berlin), v. 52-97, 1923 p 386-394
 (Contract NASw-1694)
 (NASA-TT-F-11784) CFSTI: HC\$3.00/MF\$0.65 CSCL 06C
 Presented are results of studies on late fertilization of eggs of *Rana fusca* and its effects on the sex ratio. Author

N68-30834*# Scripta Technica, Inc., Washington, D. C.
OXYGEN-GENERATING PROCESS OF A NEW "CHEMICAL"
GAS-PROTECTIVE DEVICE [UBER DAS SAUERSTOFFER-
ZEUGUNGS-VERFAHREN EINES NEUEN 'CHEMISCHEN'
GASSCHUTZGERATES]

Albert Hloch Washington NASA Jul. 1968 5 p refs Transl. into ENGLISH from Z. Angew. Chem. (Germany), v. 43, 1930 p 732-734
 (Contract NASW-1694)
 (NASA-TT-F-11702) CFSTI: HC\$3.00/MF\$0.65 CSCL 06Q

Chemical oxygen-generating devices, employing air regeneration by passage over alkali peroxides or decomposition of alkali chlorates are discussed in connection with their application in gas masks and other breathing apparatus. Author

N68-30845*# Mathematical Sciences Group, College Park, Md.
IDENTIFICATION OF LINEAR SYSTEMS
 Thomas S. Englar [1968] 133 p
 (Contract NAS12-583)
 (NASA-CR-86067) CFSTI: \$3.00 CSCL 05H

The approach taken to linear systems analysis is discussed in the context of identifying the human operator by obtaining a linear constant dynamical system which best approximates the human input-output behavior in a particular job. It is assumed that the system to be identified actually is a linear stationary dynamical system. The mathematical methodology involved in the two basic subdivisions is described. These are (1) obtaining the impulse response by projection onto a subspace, and (2) obtaining a canonical realization of the impulse response by application of the Ho algorithm. Details are given on how these methods are mechanized as computational techniques. Numerical implementation is described, and numerical experiments are analyzed. Computer programs are included. M.G.J.

the sum of the two rates. The data suggest that, in the presence of both organic and inorganic substrates, heterotrophic metabolism functions normally, but autotrophic metabolism is partially repressed.
R. B. S.

IAA ENTRIES

A68-33852

ASSIGNING A VALUE TO HUMAN RELIABILITY.

Herman L. Williams (Martin Marietta Corp., Aerospace Group, Orlando, Fla.).

Machine Design, vol. 40, July 4, 1968, p. 102-110.

Discussion of some of the important factors relating to the predicting of human reliability. Series and parallel block diagrams are discussed on the basis of such data as the exact nature of the task facing the human operator, operating steps, and criteria for correct performance. The inherent difference between dependent and independent events with respect to reliability prediction is considered, methods for setting up probability equations are outlined, and a basic review of the laws of chance is presented. R. B. S.

A68-33867

STOCHASTIC MODELING OF HUMAN LEARNING BEHAVIOR.

Albert E. Preyss (U.S. Air Force Academy, Colorado Springs, Colo.) and Jacob L. Meiry (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).

IEEE Transactions on Man-Machine Systems, vol. MMS-9, June 1968, p. 36-46. 13 refs.

Discussion of a stochastic model of human learning behavior in a manual control task (regulation of the state of a double integral plant to minimize the integrated absolute error). Subjects given this task were instructed to drive the process from an initial state to the null state using a two-position relay controller and a visual display. Response decisions are based on the a priori estimate of the probability that the control polarity should be switched, given the current state of the plant. B. B.

A68-33909 *

REPROGRAMMING OF THE SONIC OUTPUT OF THE DOLPHIN - SONIC BURST COUNT MATCHING.

John C. Lilly, Alice M. Miller, and Henry M. Truby (Communication Research Institute, Miami, Fla.).

Acoustical Society of America, Journal, vol. 43, June 1968, p. 1412-1424. 32 refs.

NIH-USAF-Navy-NASA-supported research.

Demonstration of the reprogrammability of the sonic output of a bottlenose dolphin in the vocal airborne mode and in vocal-acoustic interlock with another species. Human-speech output programs were constructed from randomized vowel consonant and consonant-vowel lists, and simple English words and phrases. The sonic vocal output of the dolphin in response to the human-speech vocal programs demonstrates the dolphin's reprogramming in matching number of and trains of bursts, interburst silences, and latencies; and also in the ability to differentiate between human-speech stimuli and other human-speech emissions or corrections, and to program from natural delphinic sounds to "humanoid" emissions. B. B.

A68-33960 *

AUTOTROPHIC AND HETEROTROPHIC METABOLISM OF HYDROGENOMONAS. I - GROWTH YIELDS AND PATTERNS UNDER DUAL SUBSTRATE CONDITIONS.

B. T. DeCicco and Philip E. Stukus (Catholic University of America, Dept. of Biology, Washington, D.C.).

Journal of Bacteriology, vol. 95, Apr. 1968, p. 1469-1475. 15 refs. Grant No. NGR-09-005-022.

Investigation of an experiment which provides evidence for the simultaneous utilization of H₂ and organic substrates for the growth of auxotrophic mutants of *Hydrogenomonas eutropha* and *H. facilis*. These mutants were studied to enable a precise determination of the cell yield at the point of organic substrate exhaustion. The results using the mutants were correlated with organic substrate consumption and growth patterns of wild-type *H. eutropha*. The growth rate under simultaneous conditions with some organic substrates was faster than either the autotrophic or heterotrophic rate, but was not

A68-33961 *

ELECTRICAL SELF-STIMULATION WITHOUT LEAD WIRES.

L. D. Grant and R. W. Olshavsky (Carnegie-Mellon University, Pittsburgh, Pa.).

Journal of the Experimental Analysis of Behavior, vol. 11, May 1968, p. 303-305.

NIH Grant No. M-1298; Grants No. NsG(T)-41; No. NGR-39-002-002.

Description of a means whereby a subject can activate an electrode to stimulate a region of its brain without lead wires connected to the electrode. Instead of pressing a bar, the subject must raise its head to establish a contact between an overhead conducting plate and the external end of the electrode implanted in its brain. The advantages and disadvantages of this system are briefly compared with those of the usual method. R. A. F.

A68-34043 *#

A STUDY OF THE THERMAL KILL OF VIABLE ORGANISMS DURING MARS ATMOSPHERIC ENTRY.

C. H. Bursey, Jr., W. Doble, Jr., and J. Parker (General Electric Co., Aerospace Group, Missile and Space Div., Re-Entry Systems Dept., Philadelphia, Pa.).

American Institute of Aeronautics and Astronautics, Thermophysics Conference, 3rd, Los Angeles, Calif., June 24-26, 1968, Paper 68-752. 7 p. 8 refs.

Members, \$1.00; nonmembers, \$1.50.

NASA-sponsored research.

Evaluation, by means of an analytical model, of the thermal kill of bacteria entering the atmosphere of Mars. The study was undertaken because indirect contamination is possible by bacteria which are aboard an unsterile parent spacecraft at the time of departure from the earth. To contaminate the planet these bacteria must survive the heating phenomena associated with atmospheric entry. The model discussed is based on free molecular flow, which has been found appropriate for the small particle sizes and the aerodynamic environment considered. The parameters affecting bacteria thermal kill are defined and evaluated, and typical results are presented. F. R. L.

A68-34045 *#

THE THERMAL RADIATIVE CHARACTERISTICS OF VIABLE MICROORGANISMS.

J. E. Leone (General Electric Co., Aerospace Group, Missile and Space Div., Re-Entry Systems Dept., Philadelphia, Pa.).

American Institute of Aeronautics and Astronautics, Thermophysics Conference, 3rd, Los Angeles, Calif., June 24-26, 1968, Paper 68-753. 9 p. 5 refs.

Members, \$1.00; nonmembers, \$1.50.

NASA-sponsored research.

Attempt to define the optical characteristics of a representative test spore (*Bacillus subtilis* var. *niger*), to enable the thermal designer to accurately predict their temperature-time history and subsequent life cycle. A Gier-Dunkle spectral reflectometer was used to determine the reflectance, transmittance, and absorbance of a composite slab containing a deposit of these life cells that would be typical of the most hardy species. A technique was developed to account for the presence of the substrate material, in order to obtain the characteristic solar absorbance and total hemispheric emittance of the microorganisms. It was found that the particular *Bacillus subtilis* spores were, in general, highly transparent to IR radiation, thus lowering the total hemispheric emittance. In addition, the spores exhibited a high sensitivity in the far-ultraviolet region. This sensitivity enhances the probability of an actinistic kill mechanism, and also increases solar absorbance to the point where effective kills can result from the high average temperatures of the viable spores during a sustained orbital or suborbital journey. F. R. L.

A68-34325

THE BUFFERING BEHAVIOUR OF BLOOD DURING HYPOXAEMIA AND RESPIRATORY EXCHANGE - THEORY.

C. C. Michel (Oxford University, Laboratory of Physiology, Oxford, England).

Respiration Physiology, vol. 4, May 1968, p. 283-291. 15 refs.

A68-34326

The buffering of the blood during hypoxaemia and during respiratory exchange in the lungs and in the tissues is considered in the presence of factors known to influence the in vivo buffering of CO₂ alone. It is argued that during systemic hypoxaemia or asphyxia the Haldane effect in the circulating blood has a smaller value than it has in vitro, but during respiratory exchange in the lungs and in the tissues, the Haldane effect retains its full in vitro value. Changes in arteriovenous differences can be shown to appear to alter the acid-base characteristics of the arterial blood. It is concluded that the in vivo CO₂ dissociation curve is the dissociation curve of mixed venous blood and that the arterial blood is related to the mixed venous blood through the in vitro dissociation curve.

(Author)

A68-34326

ALVEOLAR GAS PRESSURES IN MAN WITH LIFE-TIME HYPOXIA. S. Lahiri (Michael Reese Hospital and Medical Center, Cardiovascular Institute, Chicago, Ill.).

Respiration Physiology, vol. 4, May 1968, p. 373-386. 43 refs. Research supported by the Indian Council of Medical Research.

Measurement of alveolar gas pressures in acclimatized highlanders and lowlanders at sea level and at various altitudes in the Himalayas, as well as at 4540 m in the Peruvian Andes. It is shown that both respiratory threshold and sensitivity to hypoxia are lower in the highlanders than in the lowlanders, and that characteristic low respiratory response to hypoxia in highlanders with lifetime hypoxia is irreversible.

M.G.

A68-34327

THE INTERDEPENDENCE BETWEEN THE BIOSPHERE AND THE ATMOSPHERE.

Daniel L. Gilbert (National Institutes of Health, National Institute of Neurological Diseases and Blindness, Laboratory of Biophysics, Bethesda, Md.).

Respiration Physiology, vol. 5, June 1968, p. 68-77. 50 refs.

Outline of a hypothesis relating the origin of life on earth to the interdependence between the biosphere and the atmosphere. According to this hypothesis, life might have occurred when the earth's atmosphere was a reducing one partially composed of hydrogen, and the biosphere developed antireductant mechanisms to resist hydrogen toxicity. As hydrogen escaped from the interior of the earth and photosynthetic production of oxygen began, the atmosphere changed to an oxidizing one, with oxygen contents gradually increasing to the present level. In the presence of oxygen, on the other hand, the organisms in the biosphere developed antioxidant mechanisms to accommodate themselves to the oxygen environment. It is contended that the activity of mankind tends to increase the CO₂ content in the atmosphere, which would eventually result in an atmosphere which consists of only CO₂ and N₂ molecules and is unable to support life on earth.

V. Z.

A68-34328 *

THE MAXIMAL FREQUENCY OF BREATHING OF MAN AT VARIOUS TIDAL VOLUMES.

Arthur B. Otis and Andrew R. Guyatt (Florida, University, College of Medicine, Dept. of Physiology, Gainesville, Fla.). Respiration Physiology, vol. 5, June 1968, p. 118-129. 10 refs. Contract No. AF 41(609)-3158; Grant No. NsG-542.

The relationship between tidal volume (V_T) and period (t) of the breathing cycle during maximal voluntary ventilation was studied by four methods in five subjects. Results conformed to the equation $t = t_0 + bV_T$. Experiments in which gas mixtures of different densities were breathed indicated that b increases with increasing load whereas t_0 is independent of load. It is concluded that t_0 is mainly determined by characteristics of the control system (peripheral and central neural mechanisms) whereas b is mainly a reflection of mechanical and metabolic properties of the motive system (muscles of breathing and the load imposed on them). Our estimates of t_0 indicate that the upper limit of breathing frequency in man is in the order of 5 to 7 cycles per second.

(Author)

A68-34329

THE PRESSURE SURROUNDING THE LUNGS.

Donald F. Proctor, Paolo Caldini, and Solbert Permutt (Johns Hopkins University, School of Hygiene and Public Health, Dept. of Environmental Medicine, Baltimore, Md.).

Respiration Physiology, vol. 5, June 1968, p. 130-144. 34 refs. PHS Grants No. HE-08492; No. AP-00424; No. HE-10342.

Description of a method for measuring pleural and esophageal pressure by using a capsule, operating as a Starling register, as the measuring device. The method is believed to be a more efficient alternative to conventional techniques of measuring pulmonary pressure. The results of the application of the new method on dogs are discussed.

V. Z.

A68-34330

THE ABILITY TO SUSTAIN GREAT BREATHING EFFORTS.

S. M. Tenney (Dartmouth College, Medical School, Dept. of Physiology, Hanover, N. H.) and R. E. Reese.

Respiration Physiology, vol. 5, June 1968, p. 187-201. 21 refs. NIH Grant No. HE-02888(10).

After a period of training, five healthy young adult males voluntarily hyperventilated according to fixed breathing regimes to exhaustion. Alveolar PCO₂ was kept constant, but frequency and tidal volume were prescribed for set fractions (55 to 100%) of maximum breathing capacity (MBC). Analysis is given in terms of endurance time. The logarithm of endurance time varied linearly (negative slope) with percentage of MBC and was independent of frequency, associated exercise (walking), or reduced inspired oxygen (9%). Substitution of He:O₂ mixture gave points on the same percentage of MBC curve, but the absolute values of ventilation were greater than with air. The data are consistent with a simple model in which energy is derived from a fixed finite store and by a steady supply. Exhaustion occurs when the store is depleted. It is deduced that the efficiency of the respiratory apparatus is markedly reduced at the highest minute volumes of ventilation.

(Author)

A68-34336

SOME MEDICAL ASPECTS OF SST OPERATIONS.

G. Bennett (Board of Trade, London, England).

(THE SST; BRITISH AIR LINE PILOTS ASSOCIATION, TECHNICAL SYMPOSIUM, LONDON, ENGLAND, NOVEMBER 28-30, 1967, PAPERS, p. 116-122.)

Flight Safety, vol. 2, June 1968, p. 8, 9.

[For abstract see issue 12, page 2161, Accession no. A68-26743]

A68-34339

PSYCHOLOGIC FACTORS IN "LANDING-SHORT" ACCIDENTS.

Bryce O. Hartman and George K. Cantrell (USAF, Washington, D. C.).

Flight Safety, vol. 2, June 1968, p. 26-32. 18 refs.

Analysis of factors contributing to "landing-short" accidents, designed to determine criteria for predicting such accidents. It is shown that such predictions require a multifactor definition of the situation and the characteristics of pilots, aircraft, airfields, and environments which increase the probability of such accidents. Attention is concentrated on human and biomedical factors approached from a psychological point of view. Studies giving a basis for a multivariable prediction of the probability of a landing-short accident under the most common conditions are discussed.

V. Z.

A68-34345

MECHANICAL IMPEDANCE OF THE SITTING HUMAN UNDER SUSTAINED ACCELERATION.

H. L. Vogt, H. D. Fust (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany), and R. R. Coermann (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany).

Aerospace Medicine, vol. 39, July 1968, p. 675-679. 5 refs.

Research supported by the Bundesministerium für Wissenschaftliche Forschung.

Measurements of the mechanical impedance of the sitting human body under sustained acceleration were conducted to investigate the nonlinearity of the body system. A hydraulically driven shake table was installed on a centrifuge and the transmitted force and the acceleration of the platform, whereon the subjects were sitting, were recorded. The fundamental resonance of the body changes from 5 Hz to 7 Hz and 8 Hz under normal gravity (+1 G_z abs), +2 G_z, and

+3 G_z , respectively. The relative displacement of the effective body mass per g oscillatory acceleration was reduced at resonance from 1.73 to 0.88 and 0.675 mm/g by these + G_z loads. The static deflection of the human body follows the equation $\Delta = F/(34 + 0.5 F)$. The stiffness of the human body increases from 69×10^6 dyne/cm under normal gravity to 164×10^6 dyne/cm under +3 G_z , or generally: $K = (34 + 0.5 F) 10^6$ dyne/cm. The natural frequency of the human body is thus found to be 3.5 Hz for zero gravity. This is in good agreement with previous measurements in the supine position.

(Author)

A68-34346

ELECTRONYSTAGMOGRAPHIC EVALUATION OF THE ANTI-VERTIGINOUS PROPERTIES OF DIPHENIDOL IN THE SQUIRREL MONKEY.

R. A. Cutt, R. J. Wolfson, E. W. Keels, and E. Ishiyama (Presbyterian-University of Pennsylvania Medical Center, Otolological Research Laboratory, Philadelphia, Pa.).

Aerospace Medicine, vol. 39, July 1968, p. 682-685. 22 refs. Research supported by Smith Kline and French Laboratories; NIH Grant No. NB-04627.

The antivertiginous action of diphenidol and dimenhydrinate was evaluated in the squirrel monkey by comparing predrug vs drug and drug vs placebo nystagmus responses. Nystagmus was elicited by irrigating the external canal with 15°C water, and the eye movements were recorded from stainless steel electrodes implanted bilaterally in the lateral orbital walls. Since it has been demonstrated that the squirrel monkey's nystagmus response does not habituate to repeated caloric stimulation of the labyrinth, changes in nystagmus were attributed to drug effect. Statistically significant dose-response relationships were found for each drug; however, assays of the relative potencies of diphenidol and dimenhydrinate showed diphenidol to be significantly more potent than dimenhydrinate. (Author)

A68-34347

LOUDNESS DISPLAY FOR ACCURATE AEROSPACE INSTRUMENT FLYING.

Karl W. Hattler (Oklahoma, University, Speech and Hearing Center, Oklahoma City, Okla.).

Aerospace Medicine, vol. 39, July 1968, p. 688-692. 17 refs.

Ten audiometrically normal young adults were trained to maintain the loudness of 50-dB and 80-dB SPL (sound pressure levels) 1000-cps target tones. Fixed-frequency displays of various temporal parameters were used in search of maximally accurate compensatory loudness-tracking performance. Tracking error varied as a function of the display's duty cycle. Minimal tracking error was attained when the display had on-times of 180 msec and off-times of 20 msec and the target loudness was 80-dB SPL; long-term tracking error was 0.26 dB and the average momentary error was 0.67 dB. Previous inaccuracies in loudness-tracking performance were attributed to the adverse effects of memory on the loudness of tonal targets and displays. It is hoped that a loudness display can be successfully used for the instrumental landing of aircraft, thus reducing the demands placed upon the pilot's visual system. (Author)

A68-34348 *

PHYSIOLOGIC AND METABOLIC CHANGES IN MACACA NEMESTRINA ON TWO TYPES OF DIETS DURING RESTRAINT AND NON-RESTRAINT. I - BODY WEIGHT CHANGES, FOOD CONSUMPTION AND URINARY EXCRETION OF NITROGEN, CREATINE AND CREATININE.

Rudolf A. Hoffman, William N. Hood (NASA, Ames Research Center, Biosatellite Group, Moffett Field, Calif.), Elsa Arciniegas Dozier, Pauline Beery Mack (Texas Woman's University, Research Institute, Denton, Tex.), and Marshall W. Parrott (Tulane University, Delta Regional Primate Center, Covington, La.).

Aerospace Medicine, vol. 39, July 1968, p. 693-698. 13 refs. Grant No. NsG-560.

Four groups of male *Macaca nemestrina* ranging in weight from 7.4 to 8.4 kg were used in this investigation. The primates were fed two diets which were similar in provision of calories, but which differed in content of major nutrients. Diet A surpassed diet B in protein, but was exceeded by diet B in fat, carbohydrate, and major minerals. Calcium was approximately three times as high in the second diet. Two groups of animals were put on the

respective diets and were placed in restraint on couches for 35 days followed by 35 days of reconditioning. One group of animals on each diet was nonrestrained throughout the study. All primates, restrained and nonrestrained, were exposed to a Biosatellite simulated reentry profile with centrifugation to 12 g on the thirty-fifth day of the study. The diet A restrained primates lost a higher percentage of weight during restraint and exposure to the reentry profile than did the diet B animals, although the two groups consumed approximately the same quantity of food and the same amount of energy based on initial body weights of the primates. The four groups of animals differed in urinary excretion of nitrogen, creatine, and creatinine. (Author)

A68-34349 *

PHYSIOLOGIC AND METABOLIC CHANGES IN MACACA NEMESTRINA ON TWO TYPES OF DIETS DURING RESTRAINT AND NON-RESTRAINT. II - BONE DENSITY CHANGES.

Pauline Beery Mack (Texas Woman's University, Research Institute, Denton, Tex.), Rudolf A. Hoffman (NASA, Ames Research Center, Biosatellite Group, Moffett Field, Calif.), and Aliya N. Al-Shawi (Baghdad, University, College of Tahrir for Women, Baghdad, Iraq).

Aerospace Medicine, vol. 39, July 1968, p. 698-704. 18 refs. Grant No. NsG-560.

Four groups of *Macaca nemestrina* were fed two diets which differed in content of major nutrients, with diet A higher in protein and diet B higher in fat, carbohydrate and major minerals. Animals on each diet were held in restraint on couches for 35 days, with exposure to a Biosatellite simulated reentry profile involving centrifugation at 12 g on the day that the restraint period ended. The period of restraint was followed by 35 days of reconditioning of the formerly restrained animals in cages, with the same diets continued. Two groups of unrestrained primates were placed on the respective diets and were kept in cages for 70 days of the experiment except for exposure to the reentry profile on the same day that the restrained primates were exposed. Bone mass was measured periodically in all primates by the method of radiographic bone densitometry, with 17 anatomic sites in the skeletal system evaluated. Bone density was improved significantly in most skeletal sites when the diet containing the higher levels of calcium and phosphorus was the sole experimental factor changed. Restraint had the opposite effect, with loss in skeletal mass found in both dietary groups when this factor was applied. The special diet had a greater effect on improving bone density during the reconditioning period which followed restraint than during the restraint period itself. (Author)

A68-34350 *

PHYSIOLOGIC AND METABOLIC CHANGES IN MACACA NEMESTRINA ON TWO TYPES OF DIETS DURING RESTRAINT AND NON-RESTRAINT. III - EXCRETION OF CALCIUM AND PHOSPHORUS.

Ralph E. Pyke, Walter W. Gilchrist (Texas Woman's University, Research Institute, Nelda Childers Stark Laboratory for Human Nutrition Research, Denton, Tex.), Pauline Beery Mack (Texas Woman's University, Research Institute, Denton, Tex.), Rudolf A. Hoffman, William N. Hood, and George P. George (NASA, Ames Research Center, Biosatellite Group, Moffett Field, Calif.).

Aerospace Medicine, vol. 39, July 1968, p. 704-708. 21 refs. Grant No. NsG-560.

Studies on body weight changes, food consumption, urinary excretion of nitrogen, creatine, and creatinine, and bone densitometry as reported previously have been supplemented by analyses of urinary and fecal excretion of calcium and phosphorus with the results outlined. Although the change to the special diet which provided a higher level of calcium and phosphorus effected an increase in bone density in the majority of the skeletal sites tested, with the imposition of restraint tending to cause a loss in bone density regardless of which diet was fed, urinary calcium excretion did not always follow in a direction opposite from that of the bone density. When the diet change and restraint acted jointly, these antagonistic factors induced no net change in urinary calcium, although the diet change and restraint increased calcium excretion in the feces and phosphorus excretion in both urinary and fecal phosphorus. (Author)

A68-34351

EVALUATION OF THE RAPID RECOMPRESSION-HIGH PRESSURE OXYGENATION APPROACH TO THE TREATMENT OF TRAUMATIC CEREBRAL AIR EMBOLISM.

Larry Van Genderen (Butterworth Hospital, Dept. of Surgery, Grand Rapids, Mich.) and Charles L. Waite (U.S. Naval Hospital, Portsmouth, Va.).

Aerospace Medicine, vol. 39, July 1968, p. 709-713. 5 refs.

Comparison of the Navy conventional recompression treatment tables and the newer rapid recompression-high pressure oxygenation (RR-HPO) method for the treatment of traumatic cerebral air embolism is made. The embolism cases treated were incurred during submarine escape training at the Naval Submarine Base, New London, Conn. In view of its theoretical and proven practical superiority, the RR-HPO approach described in the present paper and in Navy Recompression Tables 5A and 6A is recommended for the treatment of traumatic air embolism. (Author)

A68-34352

CONTRIBUTION OF ACTIVITY TO THE CIRCADIAN RHYTHM IN EXCRETION OF MAGNESIUM AND CALCIUM.

Vincent Florica, Mary Jo Burr, and Russell Moses (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Physiology Laboratory, Oklahoma City, Okla.).

Aerospace Medicine, vol. 39, July 1968, p. 714-717. 14 refs.

Eight subjects were maintained on a standard dietary regimen ingested every 4 hr for 120 hr. Measurements of the magnesium and calcium excretion in these subjects revealed a circadian periodicity with maximal levels of excretion for both ions occurring during the sleeping hours (2200 to 0600) and minimal levels occurring during the mid-day (1000 to 1400). Further studies on the effects of activity (exercise) on the excretion of magnesium and calcium demonstrated a marked decrease during and following exercise accompanied by no significant change in the plasma concentrations of the two ions. These data suggest that the periodicity in excretion reported here reflects an activity cycle generated by alternate periods of sleeping and waking and may not represent an endogenous rhythm of magnesium and calcium excretion. (Author)

A68-34353

EFFECT OF HYPOTHERMIA ON LEUKOCYTIC PHAGOCYTOSIS IN RABBITS.

Harry M. Kaufman (Martin Marietta Corp., Aerospace Group, Sterilization Assurance Dept., Denver, Colo.) and William T. Northey (Arizona State University, Dept. of Microbiology, Tempe, Ariz.).

Aerospace Medicine, vol. 39, July 1968, p. 717-721. 9 refs. USAF-supported research.

In vivo opsonocytaphagic indices were determined for hypothermic immune and nonimmune rabbits challenged with intravenous injection of radioisotopically labeled Type I pneumococcus. Hypothermia was shown to produce a modifying effect on the phagocytic response. (Author)

A68-34354 #

RELATIVE EFFECTIVENESS OF SELECTED SPACE FLIGHT DECONDITIONING COUNTERMEASURES.

Michael McCally, Shirley A. Pohl, and Plummer A. Samson, Jr. (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 39, July 1968, p. 722-734. 63 refs.

Experimental investigation of six protective techniques with respect to their ability to alter or prevent immersion responses from prolonged manned space flight. The techniques included: (1) four extremity venous tourniquets or cuffs; (2) an elastic leotard; (3) antidiuretic hormone (ADH) injection; and (4) cold immersion (30 to 31°C). Chair rest, bed rest and bed rest with lower body negative pressure were studied as nonimmersion controls. Venous blood and urine were collected in six subjects every two hours during each 8-hr exposure. The elastic leotard donned after immersion, just prior to tilt, was the most effective measure tested and restored tilt-table responses to control level. M. M.

A68-34355 *

BEHAVIORAL RESPONSES OF UNRESTRAINED NORMAL AND LABYRINTHECTOMIZED SQUIRREL MONKEYS TO REPEATED ZERO-GRAVITY PARABOLIC FLIGHTS.

John S. Thach, Jr. and Ashton Graybiel (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).

Aerospace Medicine, vol. 39, July 1968, p. 734-738. 11 refs.

NASA-supported research.

Four normal and three labyrinthectomized squirrel monkeys were subjected to repeated parabolic flights while their behavioral reactions were monitored in two enclosures: (1) a large box allowing free floating, and (2) a small box allowing measurement of performance on a VI schedule of reinforcement. Suppression of performance and initial disorientation in normal but not labyrinthectomized animals confirmed the expected transitory effect of weightlessness and delineated the vestibular mechanism as the responsible sensory system. The normal animals eventually showed no more suppression than the labyrinthectomized animals and became better coordinated when free floating. (Author)

A68-34356

SURVIVAL OF RATS EXPOSED TO 10 PSIA OXYGEN TO FURTHER EXPOSURE AT ONE ATMOSPHERE OXYGEN.

George H. Kydd (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).

Aerospace Medicine, vol. 39, July 1968, p. 739-744. 39 refs.

Results of an experiment to determine the effect which prior exposure to a pure oxygen atmosphere at a pressure of less than one atmosphere has on the survival of rats exposed to pure oxygen at atmospheric pressure. Rats exposed first to oxygen at a pressure of 516 mm Hg (2/3 atm) had a higher survival rate when exposed to oxygen at a pressure of 714 mm Hg than did rats not previously so exposed. The following explanation is suggested: assuming that there exists an equilibrium pressure PO_2 at which fluid formation equals fluid clearance (in the tested rats this PO_2 was initially 600 mm Hg), then the effect of preexposure is to effectively increase the PO_2 to a value above the pressure of the second exposure, such that fluid clearance exceeds fluid formation, enabling the animal to survive. It is proposed that the equilibrium PO_2 is raised by the development of maximal lymph drainage. R. A. F.

A68-34357 #

SOME NEW ELECTRODE TECHNIQUES FOR LONG-TERM PHYSIOLOGIC MONITORING.

Philip C. Richardson, Franklyn K. Coombs, and Robert M. Adams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).

Aerospace Medicine, vol. 39, July 1968, p. 745-750. 17 refs.

Results of investigations dealing with the use of lithium chloride balsa electrodes, subcutaneous stainless suture electrodes, and a new anodized aluminum insulated-type electrode. The data presented indicate that with proper placement, LiCl electrodes deliver an ECG of at least 3 to 1 SNR and permit automatic instantaneous heart-rate measurement. The system is advantageous because it is easy to apply to the body, is essentially "dry," and requires no electrolyte paste or skin preparation. Fine stainless-steel sutures make electrically acceptable electrodes for long-term ECG recording. With insulated electrodes, it is possible to record an ECG of clinical quality without making ohmic contact with the skin. P. v. T.

A68-34358

THE IDENTIFICATION DILEMMA.

Albert C. Jerman and John J. Tarsitano (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Experimental Dentistry Branch, Brooks AFB, Tex.; USAF, Hospital Chanute, Chanute AFB, Ill.).

Aerospace Medicine, vol. 39, July 1968, p. 751-754. 9 refs.

Discussion of the essential problem of positive identification of victims of mass casualty situations. In the future the number of victims of aircraft accidents is likely to be greater, and the victims may become more difficult to identify than at present. New methods must be developed. The use of panoramic radiographs and intraoral photography is suggested for both premortem and postmortem records. P. v. T.

A68-34359**CHOLINESTERASE INHIBITION IN RELATION TO FITNESS TO FLY.**

Paul W. Smith, William B. Stavinoha, and Leonard C. Ryan (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Aeronautical Center, Oklahoma City, Okla.).

Aerospace Medicine, vol. 39, July 1968, p. 754-758. 14 refs.

The characteristics of acute and chronic poisoning by organophosphorus cholinesterase inhibitors are described. Case histories representing acute poisoning episodes superimposed on a state of chronic cholinesterase inhibition are presented. It is shown that the acetylcholine content of the brain of chronically-poisoned animals is high during the acute phase of poisoning and returns to control levels as tolerance develops, while the cholinesterase activity of brain tissue remains markedly depressed. The insidious and dangerous nature of chronic poisoning is emphasized. (Author)

A68-34428 #

CHANGE IN THE RESISTANCE OF THE ORGANISM TO OVERLOADS AFTER PROLONGED EFFECTS OF SMALL CARBON DIOXIDE CONCENTRATIONS [IZMENENIE USTOICHIVOSTI ORGANIZMA K PEREGRUZKAM POSLE DLITEL'NOGO VOZDEISTVIA NEBOL'SHIKH KONTSENTRATSII UGLEKISLOFY].

V. P. Zagriadskii and Z. K. Sulimo-Samuillo.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 6 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 6].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1967, p. 234-241. 19 refs. In Russian.

Discussion of experiments in which 21 rabbits were exposed to accelerations from 4.5 to 7 g for periods up to 60 sec. After 15 min, the rabbits were kept for 5, 10, 24, 49, 96, 120 and 240 hr in a chamber with an atmosphere containing 3 to 5% CO₂. The following functional changes were observed: inhibiting of the bioelectric activity of the brain, pronounced changes in the respiration and cardiac-contraction rates, changes in the EKG, rupture of the myocardium, paresis, and paralysis. The mechanisms which produce the functional changes are still not clear; however, it seems that inhibition of higher central nervous system activity, a decrease in the circulatory reserves due to cardiovascular changes, and inhibition of the activity of hormones and of the oxidative enzyme systems play a significant part. It is found that the organism adapts itself to the conditions under study much better during prolonged exposures than during short ones. V. P.

A68-34429 #

ADAPTIVE MECHANISM OF SYSTEMIC AND CEREBRAL CIRCULATION OF TRAINED SUBJECTS (DIVERS) IN VOLUNTARY APNEA [SU DI UN MECCANISMO DI ADATTAMENTO DELLA CIRCOLAZIONE SISTEMICA E CEREBRALE DURANTE L'APNEA VOLONTARIA IN SOGGETTI ALLENATI (SUBACQUEI)].

C. Vacca (Napoli, Università, Istituto di Fisiologia Generale e Speciale degli Animali Domestici e Chimica Biologica, Naples, Italy), A. La Tessa, and L. Vacca.

Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jan.-Mar. 1968, p. 3-33. 11 refs. In Italian.

Experimental investigation of cerebral and systemic circulation in 16 normal untrained subjects and four divers. The study was made by means of rheographic records taken simultaneously in the right upper limb and encephalon during repeated periods of voluntary apnea spaced out with rest periods of at least ten minutes. A quantitative analysis of the data showed that the divers, who are capable of long voluntary apnea, can separate the behavior of cerebral and systemic circulation. On the contrary, in normal subjects, both cerebral and systemic circulations behave consistently, even though their percentage changes, both from the vasoconstriction and the vasodilation standpoints, are not significant. M. M.

A68-34430 #

RED LIGHT FOR COCKPIT LIGHTING - RESULTS OF A SURVEY AND SOME EXPERIMENTS [LUCE ROSSA PER L'ILLUMINAZIONE DELLA CABINA DI PILOTAGGIO - RISULTATI DI UNA INCHIESTA E DI ALCUNE INDAGINI].

A. Scano (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) and C. Terrana. (AGARD, Simposio sull'Illuminazione Rosso-Bianca della Cabina di Pilotaggio, Brussels, Belgium, Oct. 30, 31, 1967.)

Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jan.-Mar. 1968, p. 34-47. 10 refs. In Italian.

Description of a survey of pilots and flight specialists of the Italian Air Force, to establish, on the basis of individual experience, the preferred lighting system for the cabin and instruments during night flight. The pilots of fighter planes were in favor of indirect lighting with UV rays for instruments and phosphorescent needles and, in nearly equal number, of red light (16.90 and 17.30%, respectively). A larger number of preferences was recorded for a combination of the two systems (32%), while an overwhelming number were in favor of a combination of one of the two with the other or with white light of variable intensity (89%). The last type is considered necessary in case of storms to guard against dazzling from lightning and for brief consultation of navigation charts. The pilots of all classes (639) and specialists (240) surveyed declared that they preferred combined systems in, respectively, 55.5 and 53.4% of replies. M. M.

A68-34431 #

PSYCHOPATHOLOGICAL SYNDROMES OF AIR FORCE FLIGHT INSTRUCTORS [SINDROMI PSICOPATOLOGICHE NEGLI ISTRUTTORI DI VOLO DELL'A. M.].

L. Longo.

Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jan.-Mar. 1968, p. 56-87. 25 refs. In Italian.

Description of the frequency of psychotic syndromes of flight instructors in Italian Air Force Schools during the period from 1961 to 1966, as ascertained in medicolegal institutes. General considerations are presented concerning the relations between the psychotic syndromes and the particular operational and instructional activity of the different flight schools. Clinical and nosographic considerations are also presented concerning the psychopathological classification of these syndromes. The low frequency of these syndromes is pointed out, together with their responsible factors, as well as factors deemed suitable for the further reduction and maintenance of this frequency. M. M.

A68-34432 #

PATHOGENESIS OF THE WOLFF-PARKINSON-WHITE SYNDROME [SULLA PATOGENESI DELLA SINDROME DI WOLFF-PARKINSON-WHITE].

S. Castorina.

Rivista di Medicina Aeronautica e Spaziale, vol. 31, Jan.-Mar. 1968, p. 88-98. 15 refs. In Italian.

Investigation of the pathogenesis of a Wolff-Parkinson-White syndrome, which was unsuspectingly found in a helicopter pilot with long normal flight activity and previous normal electrocardiographic and clinical records, during the annual ordinary checkup. The syndrome was alternating and afterwards transitory. This variety of WPW syndrome, per se very rare, has a particular character due to the paradoxical effect of the effort test: disappearance of normal-conduction QRS complexes, instead of the anomalous-conduction complexes, as was expected because of neurovegetative mechanisms, favoring the normal conduction of the stimulus, and activated by the effort test. The pathogenesis of the WPW syndrome is studied in the light of this observation, and the better qualified theories on it are mentioned, together with a personal interpretation of the case studied. M. M.

A68-34679

THE BIOSPHERE: SELECTED WORKS ON BIOGEOCHEMISTRY [BIOSFERA: IZBRANNYE TRUDY PO BIOGEOKHIMII].

V. I. Vernadskii.

Moscow, Izdatel'stvo Mysl', 1967. 377 p. In Russian.

This book contains a recent edition of the book "The Biosphere" and a collection of selected chapters from the book "Essays on Geochemistry" written in 1926 and 1927 by a noted Russian geochemist who died in 1945. "The Biosphere" consists of two treatises - "Biosphere in Space" and "The Region of Life" - in which the author sets forth his views on the geological meaning of biological processes and uses empirical generalizations as a basis

A68-34729

for describing the interrelation between geology and life on earth. Chapters of "The Biosphere" deal with cosmic-energy conversion, living matter, and its geochemical energy, limits of life in the biosphere, and the biosphere evolution. The past of geochemistry, the chemical elements and their occurrence in the earth's crust, and carbon and living matter in the earth's crust are the topics discussed in the chapters of "Essays on Geochemistry." The book is intended for specialists in natural sciences. V. Z.

A68-34729 ***ANALYSIS OF METHODS FOR GROWTH DETECTION IN THE SEARCH FOR EXTRATERRESTRIAL LIFE.**

Edward L. Merck and Vance I. Oyama (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Applied Microbiology*, vol. 16, May 1968, p. 724-731. 15 refs.

In the search for life on other planets, experiments designed to detect the growth of microorganisms may prove to be definitive when coupled with chemical characterization and metabolic experiments. If organisms are not abundant, growth provides the only means for obtaining a large mass of biological material suitable for chemical compositional analyses and metabolic assays. Several methods of monitoring growth are described. Of these, optical monitoring in a unique system free of soil particles is advanced as the most appropriate. Theoretical problems related to the formulation of culture media are discussed, and several possible solutions are proposed. The sampling system, the type of monitoring, the size and placement of inoculum, and the medium volume and composition are contingent upon one another and must be integrated without sacrifice to the biological demands. (Author)

A68-34763**SUBCORTICAL-STEM FUNCTIONS UNDER THE ACTION OF IONIZING RADIATION ON THE ORGANISM [PODKORKOVO-STVO-LOVYE FUNKTSII PRI DEISTVII IONIZIRUIUSHCHEI RADIATSIONA ORGANIZM].**

G. Z. Abdullin, V. N. Patalova, V. V. Petelina, and E. K. Shkhinek. Leningrad, Izdatel'stvo Meditsina, 1967. 164 p. 454 refs. In Russian.

This book deals with the damage inflicted by ionizing radiation to the higher nervous system and with the part played by functional disorders of the subcortical-stem formations in the control of certain vegetative and endocrine functions. Particular attention is given to the changes in the functional state and central control of the hypophysis-adrenal system which accompany radiation sickness. Some results obtained from a pharmacological analysis of functional disorders of the subcortical-stem portions of the brains of irradiated animals and the role played by subcortical-stem control mechanisms and restoration processes in the radiation sickness are discussed. The book is expected to be of interest to physical pathologists, radiologists, radiobiologists, and endocrinologists. V. P.

A68-34861**THE AUTOMATED BIOLOGICAL LABORATORY - A PROPOSAL.**

G. C. Sponsler (International Business Machines Corp., Federal Systems Div., Center for Exploratory Studies, Rockville, Md.). IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, 7TH, TOKYO, JAPAN, MAY 15-22, 1967, PROCEEDINGS. [A68-34777 17-30]

Edited by Yasuhiro Kuroda.

Tokyo, AGNE Publishing, Inc., 1968, p. 811-818.

Conceptual description of an automated biological laboratory (ABL) intended to determine whether or not there is life on Mars. Because of the number and complexity of the experiments which might be required for such an investigation, the ABL would not carry a predetermined set of experiments to perform, but would rather be capable of performing a large number of experimental functions. These functions would be adaptively combined on the spot, under the guidance of the ABL's own computer, to perform whatever experiments might be necessary. R. A. F.

A68-34862**WASTE MANAGEMENT FOR PROLONGED MANNED SPACE FLIGHT.**

R. W. Lawton and E. A. Miller (General Electric Co., Aerospace Group, Missile and Space Div., Philadelphia, Pa.). IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, 7TH, TOKYO, JAPAN, MAY 15-22, 1967, PROCEEDINGS. [A68-34777 17-30]

Edited by Yasuhiro Kuroda.

Tokyo, AGNE Publishing, Inc., 1968, p. 819-824.

Future long-term space flight by man will require a careful understanding of the metabolism and nutrition of man and the alterations in the intestinal micro-flora which may occur in biological isolation. The mechanization of waste collection and sampling will be an early requirement if this understanding is to be achieved. For later prolonged flights the conversion of waste to useful products in the closed ecology will be required. Many such conversion processes have been discussed elsewhere. It appears, however, that there is much to be learned about man in the closed ecology. In particular, the requirements for the control of all the biological components of the spacecraft ecology will require intense study if astronaut health is to be preserved. (Author)

A68-34863**BIOCHEMICAL BALANCE OF ENVIRONMENTAL CLOSED CYCLE SYSTEM BY USING NEW EXCRETA-FERMENTATION PROCESS AND ALGAE.**

Masahito Takahashi (Kobe University, Biological Dept., Kobe, Japan).

IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, 7TH, TOKYO, JAPAN, MAY 15-22, 1967, PROCEEDINGS. [A68-34777 17-30]

Edited by Yasuhiro Kuroda.

Tokyo, AGNE Publishing, Inc., 1968, p. 825-832. 8 refs.

Introduction of a new environmental closed life-support system and an approach for estimating a possibility of realizing a cycle system of this type. The processes of this system were studied experimentally and their metabolites at all stages were analyzed and estimated. This system, which consists of an excreta acid fermentation process and algae cultivation, is of interest in anticipation of future space travel. P. v. T.

A68-34864**A THEORETICAL APPROACH TO THE HUMAN LOCOMOTION AT REDUCED GRAVITY.**

R. Margaria, G. Cavagna (Milano, Università, Istituto de Fisiologia Umana, Milan, Italy), and H. Saiki (Tokyo Jikei University, School of Medicine, Tokyo, Japan).

IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, 7TH, TOKYO, JAPAN, MAY 15-22, 1967, PROCEEDINGS. [A68-34777 17-30]

Edited by Yasuhiro Kuroda.

Tokyo, AGNE Publishing, Inc., 1968, p. 833-838. 7 refs.

Theoretical analysis of walking and running on the moon. It is found that men will be able to walk only about 5 km/hr on the moon, that running will be nearly impossible, but that men may be able to jump (or lope) faster than they can run on earth. R. A. F.

A68-34865**BODY SWAY FROM THE STANDPOINT OF SUBGRAVITY.**

O. Okai and M. Oshima (Tokyo, University, Institute of Medical Electronics, Tokyo, Japan).

IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, 7TH, TOKYO, JAPAN, MAY 15-22, 1967, PROCEEDINGS. [A68-34777 17-30]

Edited by Yasuhiro Kuroda.

Tokyo, AGNE Publishing, Inc., 1968, p. 839-842.

Experimental investigation of the effect of increased and decreased weight on the body sway of human subjects standing with feet together in a relaxed position. Subjects partially immersed in water (to simulate the effects of low gravity) showed less body sway, while subjects with weights hung on them (to simulate high gravity) showed more body sway, than control subjects at normal gravity. R. A. F.

A68-34866

EEG AND CARDIOVASCULAR CHANGES INDUCED BY THE LOWER BODY NEGATIVE PRESSURE EFFECTS OF LBNP ON EEG AND HEART RATE.

G. Mitarai, T. Nagasaka, S. Mori, and S. Takagi (Nagoya University, Research Institute of Environmental Medicine, Dept. of Aviation Medicine, Nagoya, Japan).

IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, 7TH, TOKYO, JAPAN, MAY 15-22, 1967, PROCEEDINGS. [A68-34777 17-30]

Edited by Yasuhiro Kuroda.

Tokyo, AGNE Publishing, Inc., 1968, p. 843-847. 5 refs.

Results of observations of the variations in EEG and heart rate induced by lowered body negative pressure (LBNP) in 30 unanesthetized rabbits. The LBNP was attained by removing part of the air from a box in which the lower half of the rabbit's body was sealed. At LBNP < -40 mm Hg, the EEG shifted abruptly to the arousal pattern, and the heart rate increased by 50%. Both returned to normal after LBNP ceased. At LBNP > -50 mm Hg, high-voltage slow bursts of 600 to 800 μ V, with a frequency of 2 to 3 cps, were observed either ~10 sec after onset of LBNP or immediately after LBNP ceased. It is suggested that the slow-wave bursts were induced by a sudden rush of blood to the anoxic central nervous system. R. A. F.

A68-35018

PRECAMBRIAN MARINE ENVIRONMENT AND THE DEVELOPMENT OF LIFE.

Peter K. Weyl (New York, State University, Dept. of Earth and Space Sciences, Stony Brook, N. Y.).

Science, vol. 161, July 12, 1968, p. 158-160. 10 refs.

The tropical thermocline must have existed since the ocean's depth exceeded 300 m. The density gradient in this layer concentrated organic aggregates formed abiologically near the surface of the sea, and the low rates of diffusion across this layer permitted the accumulation of oxygen once the layer was populated by blue-green algae; thus the evolution of eukaryotes became possible within the layer. Because of rapid mixing over the shelves, the eukaryotes were restricted initially to the thermocline over deep water. The shelves could not be permanently inhabited by organisms requiring respiration until the oxygen level of the atmosphere was adequate. At this stage, the swimming Metazoa of the thermocline could adapt to a benthic environment on the shelves by developing exoskeletons. (Author)

A68-35019 *

EYE TRACKING OF OBSERVER-GENERATED TARGET MOVEMENTS.

Martin J. Steinbach and Richard Held (Massachusetts Institute of Technology, Dept. of Psychology, Cambridge, Mass.).

Science, vol. 161, July 12, 1968, p. 187, 188. 7 refs.

NIH Grant No. MH-07642; Grant No. NSG-496.

Comparison of the accuracy of visual tracking of a self-produced target motion and that of independent motion. It is pointed out that when an observer moves his arm, he shows more precise visual tracking of a target mounted on his fingertip - the eye lags behind the target less and makes fewer corrective saccades - than when he relaxes his arm and the experimenter moves it in a similar manner. Apparently, the control system for eye movements can use outflow (efferent) signals in order to anticipate motion of the self-moved target. M. F. J.

A68-35062

CONCISE HANDBOOK ON SPACE BIOLOGY AND MEDICINE [KRATKII SPRAVOCHNIK PO KOSMICHESKOI BIOLOGII I MEDITSINE].

Edited by A. I. Burnazian, Ju. G. Nefedov, V. V. Parin, V. N. Pravetskii, and I. M. Khazen.

Moscow, Izdatel'stvo Meditsina, 1967. 367 p. In Russian.

This compact reference book contains a comprehensive glossary of terms, concepts, and subjects commonly used in space biology and medicine as well as in associated sciences and technologies, including physics, chemistry, mathematics, cybernetics, electronics, aeronautics, and astronautics. Extensive tabulated data for respiration, water metabolism, biological energy conversion, and diets as well as a large number of tables of physical, astrophysical, astronomical, chemical, and radiation data and unit-conversion coefficients, and a listing of the accomplished space flights are appended.

The book is designed to assist a rapidly growing number of biologists, physicians, design engineers, and other space-minded specialists in obtaining quick references given in uniform standardized terminology. V. Z.

A68-35530

OPERANT CONTROL OF EYE MOVEMENTS DURING HUMAN VIGILANCE.

Stephen R. Schroeder and James G. Holland (Pittsburgh, University, Learning Research and Development Center, Pittsburgh, Pa.).

Science, vol. 161, July 19, 1968, p. 292, 293. 16 refs.

Research supported by the U.S. Office of Education.

Description of an experiment in which eye movements were used as a criterion of observing responses in a vigilance task. Time on watch and signal rates similarly affected both eye-movement rates and percentage of detections. Observing rate may account for detection data, and may be a more stable measure of vigilance than detection rate is, especially when very few signals occur. M. F. J.

A68-35587

BRITISH INTERPLANETARY SOCIETY, INTERNATIONAL SUMMER SCHOOL ON BIOLOGY IN SPACE, CAMBRIDGE, ENGLAND, JULY 1967, PROCEEDINGS.

British Interplanetary Society, *Journal*, vol. 21, June 1968. 96 p.

CONTENTS:

EVOLUTIONARY BIOCHEMISTRY. M. H. Briggs (Schering Chemicals, Ltd., Burgess Hill, Sussex, England), p. 113-121. 17 refs. [See A68-35588 18-06]

THE MICROBIOLOGY OF SPACE. John Hotchin, p. 122-130. [See A68-35589 18-04]

STERILIZATION AND DECONTAMINATION TECHNIQUES FOR SPACE VEHICLES. C. W. Craven (California Institute of Technology, Pasadena, Calif.), p. 131-135. 12 refs. [See A68-35590 18-05]

BIOSATELLITE PROJECT. Pierre M. Hahn (California, University, Los Angeles, Calif.), p. 136-147. [See A68-35591 18-05]

BIOSATELLITE EXPERIMENTS. Donald R. Ekberg (General Electric Co., Philadelphia, Pa.), p. 148-153. 5 refs. [See A68-35592 18-04]

PHYSIOLOGICAL PROBLEMS ASSOCIATED WITH ACCELERATION IN SPACE FLIGHT. D. H. Glaister (Royal Air Force, Farnborough, Hants., England), p. 154-165. 11 refs. [See A68-35593 18-04]

HUMAN LOCOMOTION AT REDUCED GRAVITY. Giovanni A. Cavagna (Milano, Università, Milan, Italy), p. 166-170. 5 refs. [See A68-35594 18-05]

LOWER BODY NEGATIVE PRESSURE. P. H. Fentem (St. Mary's Hospital Medical School, London, England), p. 171-180. 22 refs. [See A68-35595 18-04]

A PROPOSED MODULAR ASSEMBLED ANTENNA EXPERIMENT FOR THE SIVB WORKSHOP. Fred W. Forbes, Robert P. Huie, Steven D. Shook, Gary B. Reid (USAF, Systems Command, Wright-Patterson AFB, Ohio), James E. Crawford, and Earl G. Blackwell (Space-General Corp., El Monte, Calif.), p. 181-197. [See A68-35596 18-05]

THE LIL PROJECT OF THE INTERNATIONAL ACADEMY OF ASTRONAUTICS. Frank J. Malina, p. 198-208.

A68-35589 #

THE MICROBIOLOGY OF SPACE.

John Hotchin.

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, *Journal*, vol. 21, June 1968, p. 122-130.

Results of an attempt to search for extraterrestrial life in the micrometeorite population of the near-earth space environment. The discussion is limited to results obtained with spores of the mold *Penicillium roqueforti* Thom and *E. coli* bacteriophage T1. Careful attempts to isolate living agents from the sterilized collection surfaces of the Gemini spacecraft experiments gave entirely negative results. The terrestrial microbial exposure experiments, however, yielded a great deal of data concerning the survival of unprotected microorganisms in space and the nature of the lethal

factors in this environment. It is concluded that microorganisms in a spore-like form, including the viruses, are not rapidly harmed by the space environment if they can be screened from solar UV radiation. The implications of this conclusion are discussed.

M. F. J.

A68-35590 *

STERILIZATION AND DECONTAMINATION TECHNIQUES FOR SPACE VEHICLES.

C. W. Craven (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 131-135. 12 refs.

In maintaining quarantine of the planets during the period of biological exploration, prime concern must be directed to the prevention of contamination caused by the transport of microbes. In the case of probes or soft-landing automated surface laboratories, it is expected that this can be prevented by dry-heat sterilization. The duration of heat exposure required to achieve the desired level of sterility is dependent on the amount of space vehicle contamination. Thus, it is of importance to be able to control and define contamination loading during assembly and test so that the sterilization cycle can be adequately specified. Treatment of the contaminated space vehicle with ethylene oxide would reduce the amount of contamination on exposed surfaces, thereby shortening the required heating time to achieve sterility. The latter procedure might be employed in cases where total surface contamination is excessive. (Author)

A68-35591

BIOSATELLITE PROJECT.

Pierre M. Hahn (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 136-147.

Discussion of the Biosatellite project including a description of the launch vehicle, the spacecraft and its subsystems, the experiments, and the experiment hardware. A series of six earth-orbiting flights are currently approved for the Biosatellite project. Orbital flight time will vary from 3 to 30 days. The primary scientific objectives of the Biosatellite project are: (1) to determine certain quantitative effects of weightlessness on primates, small animals, plants, and varied microbiological material; (2) to determine the biological effects of the combination of weightlessness and a known source of gamma radiation to determine if there are any synergistic or antagonistic effects or if there are no effects; (3) to determine the effects on the biological rhythms of living organisms when removed from the earth's rotational influences. M. F. J.

A68-35592

BIOSATELLITE EXPERIMENTS.

Donald R. Ekberg (General Electric Co., Aerospace Group, Missile and Space Div., Philadelphia, Pa.).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 148-153. 5 refs.

Summary of the requirements and nature of the controlled experiments included in the Biosatellite Program initiated in 1962. It is pointed out that in addition to weightlessness and radiation, a major factor in the choice of experiments was the possible influence of space flight on biological rhythms. The orbital requirements for the Biosatellite are tabulated. The testing of the prototype hardware and the manufacture of the flight hardware are discussed. A descriptive table of the general-biology and radiation experiments is included. M. F. J.

A68-35593

PHYSIOLOGICAL PROBLEMS ASSOCIATED WITH ACCELERATION IN SPACE FLIGHT.

D. H. Glaister (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 154-165. 11 refs.

Discussion of the factors which determine human tolerance to acceleration. It is pointed out that if the exposure to acceleration is very brief, the important factor is the overall velocity change. If the exposure to acceleration is relatively long, the tolerance to acceleration will depend on the peak acceleration imposed and on its duration. The effect of small changes in posture on human tolerance to transverse acceleration is discussed, and three-stage rocket acceleration patterns sufficient to exceed orbital velocity but which are tolerable to man are plotted. The effect of a transverse acceleration of 4 g lasting for 6 min on vital capacity, the concentration of carbon dioxide in the exhaled air, heart rate, and blood pressure are also plotted. Various physiological effects of acceleration, such as dizziness, are discussed. M. F. J.

A68-35594

HUMAN LOCOMOTION AT REDUCED GRAVITY.

Giovanni A. Cavagna (Milano, Università, Laboratorio di Fisiologia Umana, Milan, Italy).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 166-170. 5 refs.

Study of the effect of decreased gravity on the mechanics of walking. A schematic representation of a mechanism of compensation when walking in subgravity is shown. By leaning forward, the deceleration at each step is decreased, and the action of gravity in accelerating the body forward is made more effective. The mechanics of running or jumping under subgravity conditions are also briefly discussed. M. F. J.

A68-35595

LOWER BODY NEGATIVE PRESSURE.

P. H. Fentem (St. Mary's Hospital Medical School, Dept. of Physiology, London, England).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 171-180. 22 refs.

Research supported by the British Heart Foundation.

Study of lower-body negative pressure - a technique for assessing man's ability to tolerate the circulatory stress of gravity (orthostatic tolerance) which is independent of gravity and therefore particularly well suited to the investigation of the circulation of man while he is weightless. This technique must be considered as one of the countermeasures that could be adapted to in-flight use in the prevention of deconditioning of the circulation. The effects of lower-body negative pressure on the cardiovascular system, respiration, and fluid and electrolyte balance are discussed. This technique could be used to counter the effects of weightlessness on the circulation. M. F. J.

A68-35596

A PROPOSED MODULAR ASSEMBLED ANTENNA EXPERIMENT FOR THE S IVB WORKSHOP.

Fred W. Forbes, Robert P. Huie, Steven D. Shook (USAF, Systems Command, Research and Technology Div., Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio), James E. Crawford, Earl G. Blackwell (Space-General Corp., El Monte, Calif.), and Gary B. Reid (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

(British Interplanetary Society, International Summer School on Biology in Space, Cambridge, England, July 1967.)

British Interplanetary Society, Journal, vol. 21, June 1968, p. 181-197.

During the past decade a great deal of modular structure research has been conducted. The paper summarizes present work in the form of a proposed space experiment for the Saturn IVB Orbital Workshop. This experiment consists of manned assembly of a 10-ft-diam parabolic antenna. The nonfunctional antenna will

be assembled by an astronaut in a pressurized and unpressurized state inside the S IVB Workshop. The successful completion of this experiment will demonstrate the feasibility of manual assembled modular structures in space and will provide a needed foundation for future more ambitious applications of modular structure technology. The paper outlines the development of this experiment to its present form and proposes future application of this technology.

(Author)

A68-35769

CONCERNING PULSE RATE INCREMENTS OF HELICOPTER PILOTS AS A MEASUREMENT OF THEIR STRESS [ÜBER PULS-FREQUENZSTEIGERUNGEN BEI HUBSCHRAUBERPILOTEN ALS MASS FÜR IHRE BEANSPRUCHUNG].

H. Kötz.

Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 14, June 1968, p. 65-70. In German.

Study of electrocardiogram data taken during the testing of 45 helicopter flight instructors for the purpose of observing the pulse rate increment during flight maneuvers. The pulse rate increment noted ranged from 50 to more than 100%, depending on the difficulty of the flight maneuver. Average values were calculated based on age, flying experience, and vegetative constitution. A lower pulse rate increment was clearly noticeable with pilots showing increased vegetative excitability as compared to the group without these symptoms.

R. B. S.

A68-35770

THE SIGNIFICANCE OF EFFECTS ASSOCIATED WITH FLIGHTS IN HIGH-PERFORMANCE AIRCRAFT WITH RESPECT TO MECHANISMS FOR THE ETIOLOGY AND GENESIS OF SPONTANEOUS PNEUMOTHORAX [DIE BEDEUTUNG DER MIT DEM FLIEGEN IN HOCHLEISTUNGSFLUGZEUGEN VERBUNDENEN EINFLÜSSE UND WIRKUNGEN FÜR ÄTIOLOGIE UND ENTSTEHEN EINES SPONTAN-PNEUMOTHORAX].

Heinz Fuchs (Bundesministerium der Verteidigung, Luftwaffenamt, Porz-Wahn, West Germany).

Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 14, June 1968, p. 71-78. 34 refs. In German.

Investigation of some of the causes of spontaneous pneumothorax as found in operators of high-performance aircraft. Although it is pointed out that such an ailment is a rarity, such factors as the reduction of atmospheric pressure at high altitudes, rapid decompression, inhalation of compressed pure oxygen, increased g loads, and the reduction of the volume of the chest cavity due to the wearing of anti-g suits do pose a danger to the pilot who is continually exposed to such environments.

R. B. S.

A68-35895

THE EFFECT OF SIGNAL RATE ON PERFORMANCE IN TWO KINDS OF VIGILANCE TASK.

Jane F. Mackworth (Radcliffe College, Radcliffe Institute, Cambridge, Mass.).

Human Factors, vol. 10, Feb. 1968, p. 11-17. 23 refs.

Signal rates of 180 or 30/hr are presented to 80 subjects in two kinds of vigilance task, the Continuous and the Jump Clocks. In the former, signals are brief pauses in the steady movement of the clock hand, in the latter they are double jumps of the clock hand. The signal rate has little effect on the percentage of signals detected but more false alarms were given at the slow signal rate, so that the detectability (d') or sensitivity for the signals and the criterial level (β) tended to be lower. The Continuous Clock with its high required rate of observing shows significant decrements in d' during the session, but the Jump Clock does not. Increases in β during the session are greater with the fast signal rate. The results are discussed in terms of habituation and observing behavior. (Author)

A68-35896

IMPROVING TIME-SHARING PERFORMANCE OF PILOTS THROUGH TRAINING.

Richard F. Gabriel and Alan A. Burrows (McDonnell Douglas Corp., Douglas Aircraft Co., Aircraft Div., Long Beach, Calif.).

Human Factors, vol. 10, Feb. 1968, p. 33-40. 6 refs.

Experimental evaluation of time-sharing training as a means of improving the performance of pilots. Even with special display devices in gestation, a pilot must satisfy his complete visual information needs by "time-sharing" between the intra- and extracockpit data sources. A sample of 60 military attack pilots, selected with the variable of flying experience in view, was divided into control and trainee groups. Using simple generalized but adaptive simulation devices, the trainee group was trained over an eight-week period in display reading and in hazard detection. A comparison of the trainee group with the control group in a highly specific and complex simulated flying task showed that hazard detection (such as collision) was improved significantly without in any way compromising other flying tasks. The results of the experiment support the use of training as an effective method of improving time-sharing performance.

M. F. J.

A68-35897

HUMAN FACTORS EVALUATION OF HEAD-UP DISPLAY AND FLIGHT PERFORMANCE BY PHOTOGRAPHY AND DATA-REDUCTION METHODS.

Isaac Debotton (Bendix Corp., Navigation and Control Div., Electronic Systems Laboratory, Teterboro, N. J.).

Human Factors, vol. 10, Feb. 1968, p. 41-51. 5 refs.

Presentation of a photographic method that can determine flight parameters and the quality of an electronic Head-Up Display. In conjunction with pilot input factors, and pilot acceptance and evaluative factors that can be obtained through other means, there are enough parameters to relate the quality of the display to good flight performance. One method proposed involves the taking of motion pictures through the head-up display while the pilot is using it to fly the airplane. With the use of a film reader, the x and y coordinates of 12 points are obtained as the raw data. This, in turn, through simplified approximate formulas, can be converted to flight parameters and quality of the display which can be related to flight performance.

(Author)

A68-35898

ENERGY CONSIDERATIONS AS DETERMINANTS OF SYSTEM DESIGN.

Irving Streimer (San Fernando Valley State College, Northridge, Calif.).

Human Factors, vol. 10, Feb. 1968, p. 53-56. 23 refs.

Development of a methodological approach to the sizing of man-machine systems which is predicated upon the efficiency of conversion of available system energy into useful goal directed work. Systems are generically categorized into two classes as a function of their energy replacement characteristics. Four classes of energy-conversion efficiency degradations are delineated that can adversely affect system capability, reliability, and cost. The effects of alterations in operator performance characteristics upon system design are detailed in terms of engineering changes, and suggestions are advanced as to the nature of the future research necessary to obtain maximum cost effectiveness in future systems.

(Author)

A68-35899

INCREASED CREW ACTIVITIES SCHEDULING EFFECTIVENESS THROUGH THE USE OF COMPUTER TECHNIQUES.

Wilton W. Murphy, Ronald W. Moyer (General Electric Co., Aerospace Group, Missile and Space Div., Apollo Systems Dept., Human Performance Assessment Group, Daytona Beach, Fla.), and Keith A. Krusemark (General Electric Co., New York, N. Y.).

Human Factors, vol. 10, Feb. 1968, p. 57-62.

Description of an automated Crew Activities Scheduling Program (CASP) developed to make optimum use of crew time in space and oceanic missions and simultaneously to eliminate the laborious manual task of crew scheduling. The purpose of the program is to provide an effective technique for scheduling crew activities in accordance with mission objectives, events, constraints, and systematic consideration of crew and vehicle requirements and capabilities. The program gives consideration to vehicle operations, work/rest cycles, geophysical events, experiments, and other crew functions, as well as to the associated constraints. Rapid and convenient means are provided for tradeoffs, rescheduling and parametric analysis of crew involvement. Typical computer printouts of detailed crew-scheduling data are presented.

M. F. J.

A68-35900**HUMAN FREQUENCY RESPONSE AS A FUNCTION OF VISUAL FEEDBACK DELAY.**

John M. Leslie and David A. Thompson (Stanford University, Stanford, Calif.).

Human Factors, vol. 10, Feb. 1968, p. 67-77. 20 refs.

Application of a light-matching tracking study to the determination of the human frequency bandpass characteristics in the presence of significantly large external transmission delays which are introduced into the stimulus-response information loop. Such delays occur in real-time operation of vehicles and other equipment which is at some distance from the operator. When information in the visual sensory channel is delayed because of transmission times between man's controlling action and the displayed results, this interacts with the relatively short normal delay of the other sensory feedback loops such as tactual and kinesthetic information loops, causing substantial phase interference problems between otherwise in-phase parallel sensory information channels. A representative model was used for the human transfer function for the system studied, which matched the experimental data reasonably well. The maximum frequency at which a person could meaningfully accept and act on random inputs (where the cutoff point was defined as the 3-dB down point) is $f_{CO} = 0.16/(T + 0.15)^{0.85}$ for a T-second transmission delay. M.F.J.

A68-35901**A SYSTEM OF NOTATION AND MEASUREMENT FOR SPACE SUIT MOBILITY EVALUATION.**

John A. Roebuck, Jr. (North American Rockwell Corp., Space and Information Systems Div., Downey, Calif.).

Human Factors, vol. 10, Feb. 1968, p. 79-93. 24 refs.

Proposal of an integrated system of mobility notation and standard techniques for measurement of spacesuit mobility. New terminology is presented to describe human body movements for engineering workspace analysis and suit mobility specifications. Vector and link concepts are combined in a simplified model of man to describe body positions in terms of orientation of limbs with respect to a triplanar angular coordinate system conceived as attached to the pelvic region. Numerical coding of the body links and joints is described. The notation system may be used as a basis for mathematical modeling for computer analysis of vehicle workspace geometry and control locations. The system is independent of gravitational reference semantic implications and sufficiently general for a wide range of complexity in kinesiological, medical, and human engineering applications. (Author)

A68-36376**LABOR PROTECTION IN CIVIL AVIATION [OKHRANA TRUDA V GRAZHDANSKOI AVIATSII].**

L. A. Burichenko, D. I. Tiurii, E. N. Bondarenko, and V. F. Dokin.

Moscow, Izdatel'stvo Transport, 1967. 244 p. 51 refs. In Russian.

This book investigates conditions hazardous to human health in the field of civil aviation and describes means and procedures for their elimination. The main Soviet laws governing labor safety are reviewed, and procedures for their enforcement are outlined, along with the divisions of responsibility. The requirements of industrial sanitation in civil aviation are examined, and attention is given to preventive measures taken against traumatism and professional ailments. Particular techniques of ensuring health safety in the various disciplines and enterprises of civil aviation (airports, maintenance operations, workshops, and agricultural aviation) are described. Preventive measures against fires are examined, along with procedures and equipment used in fire fighting. T. M.

A68-36442 #**RADIATION INTENSITY AND CHROMOSOMAL ABERRATIONS FREQUENCY IN POST-RADIATION PERIOD.**

K. Filev (Bulgarian Academy of Agricultural Sciences, Institute of Genetics and Plant Breeding, Sofia, Bulgaria).

Bolgarskaia Akademiia Nauk, Doklady, vol. 21, no. 2, 1968, p. 159-162. 11 refs.

Continuation of studies by Filev (1966) concerning the quantitative dependence in irradiated seeds of chromosomal aberrations on the dose-rate and the duration of storing. The following conclusions are drawn: (1) chromosomal aberrations are directly

proportional to dose rate; (2) the initial postirradiation processes in the seeds also determine the postirradiation effect; (3) with a modification in the dose rate within the limits of the dose used, the ratio of bridges and fragments also changes; and (4) the postirradiation effect is much more pronounced with a high dose for all dose rates. R. B. S.

A68-36719 #**CHANGES IN BLOOD-SERUM PROTEINS OF INTACT ANIMALS AND THYROIDECTOMIZED OR ADRENOLECTOMIZED ANIMALS DUE TO HYPOXIA [ZMINI BILKIV SIROVATKI KROVI U INTAKTNIKH, TIREO-TA ADRENALEKTOMOVANIKH TVARIN PID VPLIVOM GIPOKSI].**

V. P. Dudarev (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Viddil Patologii Gipo- i Giperoksichnikh Staniv, Kiev, Ukrainian SSR). Fiziologichnii Zhurnal, vol. 14, May-June 1968, p. 339-347. 44 refs. In Ukrainian.

Application of paper electrophoresis to a study of the effect of hypoxia on the blood-serum proteins of groups of intact rabbits and rats and thyroidectomized and adrenalectomized rats at atmospheric pressure and at pressures corresponding to altitudes of 2000, 4000, and 6000 m in a pressure chamber and on Mt. Elbrus. It is found that the albumin content decreases, while the globulin content increases in proportion to the hypoxia level in all experimental animals after prolonged exposures to hypoxia. These changes were less pronounced in intact animals and were not pathological in all the animals. Rats of all groups also developed hypoproteinemia during a long stay under high-mountain conditions. V. Z.

LC ENTRIES

A68-81605

"APPROPRIATENESS" OF THE STIMULUS-REINFORCEMENT CONTINGENCY IN INSTRUMENTAL DIFFERENTIAL CONDITIONING OF THE EYELID RESPONSE TO THE ARITHMETIC CONCEPTS OF "RIGHT" AND "WRONG".

Robert A. Fleming, Louise E. Cerekwicki, and David A. Grant (Wis., U., Madison).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 295-300. 13 refs.

Grant PHS MH 06792 and NASA supported research.

Eyelid responses of 72 subjects to 60 simple solved addition and subtraction problems, presented visually, were instrumentally conditioned with positive reinforcement. Each problem was different and could be correctly (R) or incorrectly (W) solved in the stimulus display. A within-subjects comparison revealed that significantly more eyelid conditioned responses were evoked by the R problems than by the W problems, but there was no difference in a between-subjects comparison, where each subject received only R or only W problems. With intermittent positive and negative reinforcement there was no difference in conditioning to R and W problems. Two additional groups of 18 subjects each were differentially conditioned to 30 R and 30 randomly interspersed W problems. In the R+W-group, responses to R problems were positively reinforced and responses to W problems were negatively reinforced; in the W+R-group, these contingencies were reversed. Better differential responding was obtained in the R+W-group, supporting the preexperimental hypothesis that CS-reinforcement contingencies that were congruent with subjects' past experience would be more effective than contingencies that were incongruent or dissonant. All groups showed considerable transfer to the words "right" or "wrong" as generalization stimuli, but there was no differential generalization even in the two groups that had received differential training.

A68-81606

ARITHMETIC CORRECTNESS AS THE DISCRIMINANDUM IN CLASSICAL AND DIFFERENTIAL EYELID CONDITIONING.

Robert A. Fleming, David A. Grant, Jane A. North, and C. Michael Levy (Wis., U., Madison).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 286-294. 20 refs.

Grant PHS MH 06792 and NASA supported research.

The eyelid responses of 160 subjects were differentially conditioned to simple arithmetic problems presented visually. Each problem conditioning stimulus (CS) was different, and the differential cue was whether the problem was correctly or incorrectly solved. In addition 20 subjects were reinforced with the air puff unconditioning stimulus (UCS) for both right and wrong problems. The "truth value" of the problems served as a good differential stimulus, and the conditioned discrimination transferred differentially to the words "right" or "wrong" which were associated with the reinforced class of problems. Explicit verbalization of the appropriate word, "right" or "wrong," during the differential training had no effect on the transfer to the word as a CS. Verbalization reduced the number of subjects showing the voluntary (V) form of the eyelid CR, and for those showing the conditioning (C) form, conditioned discrimination was significantly better when the wrong problems were reinforced than when the right problems were reinforced with the air puff. This finding was related to the congruency of the

slightly aversive UCS following wrong problems rather than right problems. When both right and wrong problems were reinforced more CRs were evoked by the right problems, confirming Soviet results with true and false sentences.

A68-81607

CONTOUR INTERACTIONS IN VISUAL MASKING.

Kevin Houlihan and Robert W. Sekuler (Northwestern U., Evanston, Ill.).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 281-285. 10 refs. Natl. Inst. of Neurol. Diseases and Blindness and Northwestern U. Res. Comm. supported research.

Gratings of various orientations were used to mask a briefly exposed vertical test bar. The amount of masking decreased as the grating was rotated over a range of 42° from vertical. While the total amount of masking varied with exposure duration of the grating (5, 50, or 500 msec.), the shape of the functions relating masking to grating orientation was unchanged. The decrease in masking with increasing difference in the orientations of grating and test bar may be useful as a measure of the sensitivity functions of mechanisms responsible for the perception of contours.

A68-81608

PAYOFF EFFECTS IN SEQUENTIAL DECISION-MAKING.

Gordon F. Pitz and Helen Reinhold (Southern Ill. U., Carbondale).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 249-257. 10 refs.

Previous studies have found in a decision-making task that subjects are less than optimally responsive to nonsymmetrical, biased payoffs. The hypothesis that subjects attribute a utility to being correct was compared here with the hypothesis that they maintain a constant critical odds regardless of the degree of bias in the payoffs. Three groups of ten subjects each made decisions under symmetrical payoffs and under payoffs with 2° of bias. Two groups used a nonsequential procedure, making decisions only after the presentation of all items of information. The third group revised decisions after each item of information. The utility hypothesis received mild support; the constant critical-odds hypothesis was rejected. Two strong sequential effects were observed that accounted for 81% of nonoptimal responses under unbiased payoffs for the third group.

A68-81609

VISUAL SAMENESS: A CHOICE TIME ANALYSIS OF PATTERN RECOGNITION PROCESSES.

Robert W. Sekuler and Michael Abrams (Northwestern U., Evanston, Ill.).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 232-238. 10 refs.

Grant NIH NB-06354.

Subjects judged the "sameness" of pairs of matrixes, each having several cells blackened at random. One group (Similarity search) classified matrix pairs as "same" if they had even one pair of blackened cells in corresponding locations. A second group (Identity search) classified pairs as "same" that were identical with respect to all blackened cell locations. Decision times of the Similarity-search group were much longer than those of the identity-search group. While the performance of the Similarity-search subjects indicated they were engaged in a serial processing of the stimulus array that of the Identity-search subjects in some conditions closely approximated gestalt processing.

A68-81610

PERCEIVED DEPTH BETWEEN FAMILIAR OBJECTS.

A68-81611

Walter C. Gogal (Calif., U., Santa Barbara) and Henry W. Mertens (Civil Aeromed. Inst., Oklahoma City, Okla.).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 206-211. 9 refs.

The hypothesis is examined that the essential factor in the size cue to depth from familiar objects is the perceived size (S') per unit of retinal size (θ) of each of the objects, with the object having the largest value of S'/θ appearing to be the more distant object. Five familiar objects (a box of cough drops, a half-dollar, a tape dispenser, a door key, and a tube of tooth paste) were simulated. The objects were presented in pairs and the subjects indicated their perceived widths (S'), the perceived distance (D') of each from himself, and the perceived depth (d') between the objects in each pair. In agreement with the above hypothesis, the results indicate that the perceived depth between the objects was a monotonic function of the difference between the values of S'/θ . The average values of d' and D' were similar to the simulated values for distances up to approximately three ft. from the observer. For greater distances the error in the average d' and D' values increased with an increase in the simulated distances. The concept of S'/θ as the significant factor in the familiar size cue to depth permits this cue system to be of significance in a wide variety of naturally occurring situations.

A68-81611

EEG ACTIVATION AND REACTION TIME.

Frank Leavitt (Ill., U., Coll. of Med. and Presbyterian-St. Luke's Hosp., Chicago).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 194-199. 12 refs.

Grant NIMH MH 07140.

The covariation of reaction time (RT) and alpha desynchronization was investigated at foreperiods of 200, 500, 1,500, and 4,000 msec. The results demonstrated that reaction time and alpha desynchronization are significantly influenced by variations in the foreperiod condition. Reliably faster RT and maximal alpha desynchronization occurred 500 msec. after the warning signal; however, within the context of the foreperiod, the two variables did not covary. A unitary underlying arousal process was rejected in favor of multiple neural arousal processes.

A68-81612

HEART RATE AND SOMATIC-MOTOR COUPLING DURING CLASSICAL AVERSIVE CONDITIONING IN HUMANS.

Paul A. Obrist (N. C., U., School of Med., Chapel Hill).

(*Soc. for Psychophysiol. Res., Ann. Meeting, Denver, 1966*).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 180-193. 29 refs.

Grant NIH MH-07995.

Three experiments are reported which provide evidence that anticipatory cardiac changes in human subjects during classical aversive conditioning are coincident with the modification of somatic-motor activity. With a 7.0 sec. interstimulus intervals (ISI), both cardiac activity and bursts of EMG activity measured from three muscle groups are attenuated at about the time the unconditioning stimulus is expected. When respiratory activity is not controlled under these conditions, both the frequency and the magnitude of respiration are similarly attenuated. When the ISI is shortened to 1.0 sec., the acceleration of heart rate, observed on test trials to follow a small deceleratory response, is associated with an increase in EMG and respiratory activity. These data are considered to be consistent with an hypothesis which views cardiac and somatic-motor events as different aspects of the same response process. Implications of this position for behavioral processes are discussed.

A68-81613

CURRENT VIEWS ON CALCIUM METABOLISM.

K. A. K. North (Wellington Hosp., New Zealand).

New Zealand Medical Journal, vol. 67, Feb. 1968, p. 218-220. 30 refs. Wolfson Found. supported research.

Data drawn from recent and established studies were reviewed to provide a summary of current views on calcium metabolism. Included were discussions of calcium absorption, urinary excretion, skeletal calcium and plasma calcium.

A68-81614

RAPIDLY LABELLED RNA IN THE HIBERNATING BAT BRAIN.

M. Satake, S. Matsukawa, and N. Miyazawa (Niigata U., Brain Res. Inst., Dept. of Neurosurg. and Dept. of Neurochem., Japan).

Nature, vol. 218, May 25, 1968, p. 768-769. 9 refs.

The metabolism of rapidly labelled RNA of the brain in hibernating bats (*Rhinolophys ferrum-equinum*) was studied. Both hibernating and artificially awakened bats were injected with $6\text{-}^{14}\text{C}$ orotic acid, and RNA was extracted from the whole brain. Results showed a marked decrease in RNA metabolism in the hibernating brain, especially at the step of transformation of preribosomal RNA to ribosomal RNA that is very necessary for the protein biosynthetic mechanism in the cytoplasm.

A68-81615

EXTRARETINAL LIGHT PERCEPTION IN THE SPARROW, II. PHOTOPERIODIC STIMULATION OF TESTIS GROWTH.

Michael Menaker and Henry Keatts (Tex., U., Zool. Dept., Austin).

Proceedings of the National Academy of Sciences, vol. 60, May 1968, p. 146-151. 12 refs.

Grants AFOSR 637-67, NSF GB 3806, and BS. 1 505 FR 07091-01.

The possibility that an extraretinal photoreceptor might be involved in the response of the reproductive system of the sparrow, *Passer domesticus*, to photoperiod was investigated. Male enucleated house sparrows were maintained in separate light-controlled boxes at $23^{\circ}\pm 2^{\circ}\text{C}$., and perching activity was continuously recorded. The combined weights of the testes from each bird was determined, and histological studies were made. Results confirmed the existence of an extraretinal receptor in the optosexual reflex of house sparrows.

A68-81616

THE EFFECTS OF D-AMPHETAMINE AND CHLORDIAZEP-OXIDE UPON STRENGTH AND ESTIMATED STRENGTH.

P. M. Hurst, R. Radlow, and Sallyann K. Bagley (Inst. for Res., State College, Pa.).

Ergonomics, vol. 11, Jan. 1968, p. 47-52. 8 refs.

Contract Nonr 4423 (00) and Grant PHS MH-11294-02.

Four drug treatments were administered to each of 58 college student volunteers who served as their own controls in a Latin square design. The treatments were d-amphetamine sulphate (11 to 17 mg.), chloridazepoxide HCl (25 mg.), piacabo, and no drug. Grip strength was measured on a Stoelting hand dynamometer three to three and one-half hr. after ingestion. Prior to giving their maximum effort subjects were required to estimate their strengths on the basis of perceived effort required to reach an assigned submaximum value, determined as a percentage of masked pre-test scores. Objective strength was significantly higher under d-amphetamine than under any other treatment condition. The treatments did not differ significantly with respect to estimated strength or estimate bias. These results imply that the increase in objective strength was not mediated by suggestion.

A68-81617
PHYSICAL FITNESS AND SKILLED WORK AFTER EXERCISE.

M. Hammerton and A. H. Tickner (Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 11, Jan. 1968, p. 41-45.

A series of experiments was devised to investigate the effect of a burst of violent exercise upon the performance of a skilled visual motor control task. Groups of subjects were trained to perform an acquisition task of (a) moderate difficulty (first order control) and (b) great difficulty (second order control). It was found that, after a 400 sec. burst of activity at a rate of approximately 0.14 hp., subjects at an ordinary level of fitness showed no decrement on task (a) but a marked decrement on task (b). Very fit subjects, however, showed no decrement on task (b).

A68-81618
THE MAGNITUDE AND INTERCORRELATION OF THREE FOOT MEASURES, HEIGHT AND WEIGHT OF MALE STUDENTS.

P. G. Stone and P. R. M. Jones (Loughborough U. of Technol., Phys. Educ. and Ind. Fitness Unit, Anthropometric Lab., Great Brit).
Ergonomics, vol. 11, Jan. 1968, p. 35-40. 7 refs.

Foot length, foot breadth, foot circumference, height and weight were measured in a student population. Cross-sectional data were collected on 771 subjects aged 18 to 20 yr. From the data it would appear that there is no increase in the foot measures over this age range. Intercorrelations and percentiles were computed and tabulated for these five measures, as one composite group.

A68-81619
INTERACTION BETWEEN SENSORY SPATIAL AFTEREFFECTS AND PERSISTENCE OF RESPONSE FOLLOWING BEHAVIORAL COMPENSATION.

J. K. Collins and G. Singer (Sydney, U., Australia).
Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 301-307. 12 refs.

The sensory spatial aftereffect, due to prolonged stimulation, and response persistence of behavioral compensation, due to transformation of sensory input, were investigated in three experiments. In Experiment I it was shown, by using transformed visual input, that making kinesthetic spatial judgments can be regarded as a training period in the learning of new kinesthetically postexposure period produces experimental extinction of these newly learned responses. In Experiment II, the act of making a single spatial judgment during the period when a kinesthetic system was undergoing adaptation was shown to be sufficient to produce long lasting perceptual distortions, i.e., behavioral compensation persisting after sensory effects dissipate. In Experiment III the results of the previous experiments were confirmed.

A68-81620
SPEED AND ACCURACY IN DECISION RESPONSES OF MEN AND WOMEN PILOTS.

Barbara L. Drinkwater (Calif., U., Dept. of Phys. Educ., Santa Barbara).
Ergonomics, vol. 11, Jan. 1968, p. 61-67. Calif., U. supported research.

The decision response time and accuracy of 54 civilian pilots were measured to determine if there were any differences in the performance of male and female pilots. A series of 30 transparencies required each subject to make a decision regarding aircraft attitude on the basis of information provided by pictures of three flight instruments. No differences of statistical significance

were found between the performance of men and women under any of the experimental conditions. Performance data do suggest, however, that in a task requiring both speed and accuracy, women are more accurate than men initially and gain in speed with experience, while men respond more quickly than women during early trials and improve in accuracy as the trials continue.

A68-81621
SOME RECENT EXPERIMENTS ON LEARNING AND THEIR TRAINING IMPLICATIONS.

W. T. Singleton (Coll. of Aeron., Cranfield, Great Britain).
(Ergonomics Res. Soc., Meeting, London, Jul. 8, 1965).
Ergonomics, vol. 11, Jan. 1968, p. 53-59. 7 refs.

Three experiments involving respectively, a repetitive manual task, a sequential task of keying numbers and a task involving the learning of simple guidance were reviewed. The experiments were consistent with the concept that although all real tasks have perceptual and motor aspects skills are essentially either perceptual or motor, and training techniques for these two fundamental kinds of skill may well be different.

A68-81622
THE TRAINING OF MOBILE BALANCING UNDER A MINIMAL VISUAL CUE SITUATION.

J. Dickinson (Nottingham U., Dept. of Psychol., Great Britain).
Ergonomics, vol. 11, Jan. 1968, p. 69-75. 11 refs. Med. Res. Council supported research.

This is an account of an experiment designed to test the dynamic balance ability of 60 adult males under a minimal visual cue situation. The task consisted of walking along a 12 ft. beam which was two in. wide. The subjects were randomly divided into six groups and each group was given a different form of training. The results indicated that completely blindfold practice produced significantly better results under the minimal cue situation than either sighted or minimal cue practice. The conclusion is drawn that subjects tended to rely heavily on visual information when it was available, and the direction of attention to kinesthetic information by blindfolding produced significantly better results. The relevance of this work to the blind with residual vision is pointed out.

A68-81623
DYNAMICS OF UREA CONTENT IN THE BRAIN TISSUES OF THE HIBERNATING CITELLUS PYGMAEUS PALL [DINAMIKA SODERZHANIYA MOCHEVINY V TKANIYAKH GOLOVNOGO MOZGA MALOGO SUSLIKA, NAKHODIASH-CHEGOSIA V SOSTOIANII ZIMNEI SPIACHKI].

E. Z. Emirbekov.
Biologicheskie Nauki, no. 11, 1967, p. 53-55. 11 refs. In Russian.

The changes occurring in the urea content in the brain of *Citellus pygmaeus* Pall. during hibernation were investigated. It was found that the concentration of urea in the brain was related to the body temperature of the animal and the duration of hibernation. Urea played an active role in the metabolic processes caused by the drop in body temperature and in the adaptation mechanisms in the brain taking place during hibernation.

A68-81624
BEHAVIORAL EFFECTS OF ELECTRICAL STIMULATION OF GROUP I MUSCLE AFFERENTS IN ACUTE THALAMIC CATS.

Alberto Malliani, Giancarlo Carli, Giuseppe Mancina, and Alberto Zanchetti (Consiglio Nazl. delle Ric., Gruppo Nazl. di Med. Sper., Milan and Milan, U., Ist. di Patol. Med., Italy).

A68-81625

Journal of Physiology, vol. 31, Mar. 1968, p. 210-220. 45 refs. Grants AF EOAR 65-6 and 66-47; Consiglio Nazl. delle Ric. supported research.

In acute decorticate cats, outbursts of sham rage could often be evoked by high-rate electrical stimulation of a hamstring nerve at voltages exciting group I fibers only. Selective activation of group I afferents without contamination of slower conducting fibers (group II) was controlled by recording from the ipsilateral L₇ dorsal root. Effective voltages were, in some animals, as low as 1.36 times the threshold for the most excitable fibers. Excitation of sham rage was not dependent on mechanisms involving the cerebellum, as it was obtained in completely cerebellectomized cats also. Stimulation of group I fibers that could produce sham-rage behavior still caused visceral reactions such as blood pressure increase and pupillary dilatation, after all somatic movements were blocked by injection of a muscle-blocking agent. These visceral responses disappeared after decerebration.

A68-81625

EFFECTS OF SENSORY ADAPTATION ON THE FORM OF THE PSYCHOPHYSICAL MAGNITUDE FUNCTION FOR CUTANEOUS VIBRATION.

George A. Gescheider (Hamilton Coll., Clinton, N. Y.) and John H. Wright (Va. Polytech. Inst., Blacksburg).

Journal of Experimental Psychology, vol. 77, Jun. 1968, p. 308-313. 7 refs.

Grant NINDB NB-07620.

The form of the psychophysical magnitude function for 60-c.p.s. cutaneous vibration was found to be influenced by the state of adaptation of the stimulated skin area. Through the use of a combination of intensity-matching and magnitude-estimation procedures the relationship between sensation magnitude and vibration amplitude was examined following 5, 60, 120, 180, and 360 sec. of recovery from ten-min. of continuous and intense vibrotactile stimulation of the fingertip. For each recovery period sensation magnitude on the fingertip was found to increase as a power function of vibration amplitude according to the general formula $\psi = K(\phi - \phi_0)^\eta$, where ψ is sensation magnitude, K is a constant, ϕ is stimulus amplitude, ϕ_0 is the absolute threshold, and η is the power exponent. Recovery from adaptation had the effect of increasing the value of K and reducing the values of ϕ_0 and η . The results provided further support for the general applicability of Stevens' revised power law.

A68-81626

TELEMETRIC MEASUREMENT OF THE RESPIRATORY FUNCTION.

L. Lewillie and R. Sneppe (Free U., Higher Inst. of Phys. Educ., Brussels, Belgium).

Ergonomics, vol. 11, Jan. 1968, p. 77-81.

A telemetric apparatus for the transmission of the characteristics of respiration now in full use was described. It enables the transmission of information regarding the frequency, the flow and the volume of respiration. The experimental control confirms the precision of this technique. The lack of weight of the apparatus and the regularity of its reaction make its use possible in the study of respiration in all types of human physical effort.

A68-81627

A REMOTE CONTROL BRAIN TELESTIMULATOR WITH SOLAR CELL POWER SUPPLY.

Harold Warner, Bryan W. Robinson (Emory U., Yerkes Reg. Primate Res. Center, Atlanta, Ga.), H. E. Resvold (Natl. Inst. of Mental Health, Lab. of Psychol., Bethesda, Md.), Lawrence D. Wechsler, and J. J. Zampini (Gen. Elec. Electron Lab., Syracuse, N. Y.).

IEEE Transactions on Bio-Medical Engineering, vol. BME-15, Apr. 1968, p. 94-101.

NASA Grant NGR 11-001-012 and Grant NIH FR-00165.

A brain telestimulator system is described which can be used with primates weighing 3.0 kg. or more. The $3 \times 6 \pm 7$ cm., 200 g. head-mounted receiver employs solar cells to maintain the charge on its battery, thereby permitting experiments to continue undisturbed for many months. The head unit develops across its output a cathodal, monophasic pulse whose duration, rate, and constant current are remotely controlled from the transmitter. Subject to a duty cycle of 0.1, these parameters are continuously and remotely variable: pulse repetition rate, 0 to 200 pulses/sec.; pulse duration, 0.1 to 3.0 msec.; pulse current intensity, 0 to 1.0 mA with less than $\pm 3\%$ variance for loads between 2,500 and 10,000 ohms. Output pulse rise time is 30 μ sec. Any one of 12 electrode channels can be selected for stimulation by remote control activation of an electromechanical stepping switch in the head unit. Utilization of crystal control in the frequency modulated transmitter and head units permits multi-animal operation by providing separate bands in the 138 MHz region for independent stimulation of up to four animals. The sensitivity of the receiver has purposely been designed low (-35 dBm). Thus, with the present transmitter the system has a range of about 0.2 mi., which extends beyond the normal visual limits of observation of primate groups.

A68-81628

THE INFLUENCE OF CARBON DIOXIDE CONCENTRATIONS ON THE PHOTOSYNTHESIS OF ASTEROMONAS GRACILIS ARTARI AND DUNALIELLA SALINA TEOD [VLIJANIE KONTSENTRATSII UGLEKISLOGO GAZA NA FOTOSINTEZ ASTEROMONAS GRACILIS ARTARII DUNALIELLA SALINA TEOD].

E. V. Iurina (M. V. Lomonosov Moscow State U., Zool.-Entomol. Lab., USSR).

Biologicheskie Nauki, no. 11, 1967, p. 72-75. 12 refs. In Russian.

Pure algal cultures of two species of haplobiont unicellular algae, *A. gracilis* Artari and *D. salina* Teod., were used in the experiments. The photosynthesis rate was measured by the Warburg method using carbonate-bicarbonate mixtures (no. 1-11). The algae were centrifuged (2,000 r.p.m.), then washed with appropriate buffers and transferred into a manometric container with the same buffer solution, with the addition of sodium chloride (60 g./liter), to maintain the integrity of the algal cells. The experiments were carried out at 25°C. with a light intensity of 34,000 ft.-c., and a suspension density of one million cells per one ml. It was determined that with the increase of carbon dioxide (CO₂) concentration in the media there was also an increase in photosynthesis, the highest rate was obtained with no. 9 buffer, with the media CO₂ content averaging $78.7 \cdot 10^{-6}$ M/liter, CO₂ saturation of the media above this amount produced a decrease in photosynthesis. A wide range of CO₂ concentrations was found favorable for photosynthetic activity in the algae studied. The photosynthesis rate decreased with increase of density in the cultures as a result of poor lighting conditions.

A68-81629

REPPRESSED AND DEREPRESSED SYNTHESIS OF PHOSPHATASES DURING SYNCHRONOUS GROWTH OF CHLORELLA PYRENOIDOSA.

Gjert Knutsen (Bergen, U., Dept. of Biochem., Norway).

Biochimica et Biophysica Acta, vol. 161, Jun. 18, 1968, p. 205-214. 23 refs.

Synchronized cultures of the green alga *Chlorella pyrenoidosa* were used to study the repressed and derepressed synthesis of acid and alkaline phosphatases. These enzymes were synthesized

step-wise during the cell's life cycle, the synthesis being derepressed after removal of orthophosphate from the growth medium. Derepression of enzyme synthesis at different times during the life cycle showed that the rates of derepressed enzyme synthesis varied with cell age. A decrease in rate parallel with the mitotic activity was observed.

A68-81630**CHANGES OF HEMODYNAMICS IN MAN IN AIR FLIGHT [IZMENENIIA GEMODINAMIKI U CHELOVEKA V POLETE].**

A. Z. Kotenko and L. A. Fel'dman.

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 65, Apr. 1968, p. 20-23. 5 refs. In Russian.

Changes of arterial blood pressure were studied during airflight. Sixty-nine investigations were made in seven pilots, calculating figures of systolic and minute volumes according to Starr. It was found that pilots react to flight by a considerable acceleration of pulse and moderate increase of systolic, diastolic and pulse pressure. Systolic volume drops somewhat or remains unaltered. Minute volume rises as a rule, but in 90% of the cases does not exceed 71. Apparently a balance struck between the intensity of circulation and energetic demands of the body with increased pulse rate in air, caused by emotional factors, is attained through decrease of the systolic volume.

A68-81631**MAN'S REACTION TO LONG-LASTING OVERPRESSURE EXPOSURE EXAMINATION OF THE SATURATED ORGANISM AT A HELIUM PRESSURE OF 21-22 ATA.**

W. Waldvogel and A. A. Bühlmann (Zürich, U., Med. Klin., Switzerland).

Helvetica Medica Acta, vol. 34, Mar. 1968, p. 130-150. 16 refs.

Four subjects breathing a mixture of 2.0 to 3.5% O₂, 93 to 94% He and 3.0 to 3.5% N₂ were exposed in a pressure chamber for 66 hr. with a pressure of 23.0 ata, and there was a practically complete saturation of the organism with a He pressure of 21 to 22 ata. The experiment was well tolerated. Decompression followed without complication and lasted 64 hr. No important changes as to body temperature, blood pressure, pulse rate, hemoglobin concentration, serum electrolytes and serum proteins, ferment activity, blood corticosteroids and catecholamine excretion were observed either during or immediately after exposure. It was noticed, however, that an increase of the urea-concentration without hemoconcentration, a negative fluid balance and an increased leucocyte count occurred in all four subjects.

A68-81632**THE POSSIBILITY OF FORMATION OF AN ERYTHROPOIESIS INHIBITING FACTOR IN THE ALPINISTS AFTER DESCENT [OB OBRAZOVANII FAKTORA TORMOZIASHCHEGO ERITROPOEZ, U AL'PINISTOV POSLE SPUSKA S VYSOTY].**

A. G. Velichko and S. I. U. Shekhter (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Exptl. and Clin. Hematol., Leningrad).

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 65, May 1968, p. 24-27. 15 refs. In Russian.

A statistically significant increase of hemoglobin content, reticulocytes and the level of erythropoietic activity of plasma was found in 17 alpinists after a single ascent to a height of 3,900 m. above the sea level. However, 24 hr. after descent the blood plasma of the alpinists was able to inhibit erythropoiesis in the bone marrow culture, as manifested by percentile decrease of the erythroid cells in the metaphase. The same effect was obtained with the urine of the above individuals. The factor inhibiting erythropoiesis passes through the renal filter, as it is present in the urine.

A68-81633**THE INFLUENCE OF RADIOSENSITIVITY OF THE BODY TO THE CHARACTER OF FUNCTIONAL CHANGES OF THE VESTIBULAR ANALYZER AFTER IONIZING RADIATION [VLIANIE RADIOCHUVSTVITEL'NOSTI ORGANIZMA NA KHARAKTER FUNKSIONAL'NYKH IZMENENII VESTIBULIARNOGO ANALIZATORA POSLE VOZDEISTVIA IONIZIRUIUSHCHEI RADIATSII].**

I. V. Farber and L. A. Tabakova.

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 65, Apr. 1968, p. 51-53. 8 refs. In Russian.

Experiments on rabbits showed that changes in the threshold sensitivity of the vestibular analyzer after irradiation with the dose of 50 r from the initial level of stimulation caused a decrease in excitability in animals with a low threshold of nystagmus and an increase in animals with a high threshold. When assessing radio-sensitivity of animals, rabbits with the absence of changes in the vestibular analyzer proved to be less affected than animals with lowered excitability.

A68-81634**EVOKED RESPONSES IN THE AUDITORY CORTEX OF THE SQUIRREL MONKEY.**

L. C. Massopust, Jr., L. R. Wolin, and S. Kadoya (Cleveland Psychiat. Inst., Lab. of Neurophysiol., Ohio).

Experimental Neurology, vol. 21, May 1968, p. 35-40. 7 refs.

Grant NIH NBO4990-05.

Using a semimacroelectrode, the contralateral and ipsilateral surface auditory cortices and insular cortices were mapped using 500 c.p.s. four-cycle "click" stimuli. The evoked responses were largest in amplitude and shortest in latency in the contralateral insular cortex. The crest of the contralateral superior temporal gyrus had the next highest amplitude and the next shortest latency. These two areas were considered as primary auditory input regions. The secondary areas consisted of the superior bank of the sylvian fissure lying within the precentral and postcentral gyri and the inferior temporal gyrus. The contralateral auditory surface cortex, based on the extent of evoked potentials recorded, was twice as large as the ipsilateral auditory cortex.

A68-81635**MODIFICATION OF ACUTE RADIATION EFFECT ON CEREBELLAR NEURONS OF MICE BY ACTINOMYCIN D.**

W. Zeman, J. M. Ordy, and T. Samorajski (Ind. U., Med. Center, Indianapolis and Cleveland Psychiat. Inst., Ohio).

Experimental Neurology, vol. 21, May 1968, p. 52-57. 9 refs.

Grants NIH NB-02960 and NIH NB-03021; AEC supported research.

Six days after absorption of 66 krad 20 Mev. deuterons delivered by a 0.025 mm.-wide beam to the cerebellar cortex of the mouse, practically all granule cells were destroyed, but 88% of the Purkinje cells survived. A dose of 0.1 µg./g. body weight of actinomycin D given one hr. after irradiation modified this response to the extent that only 22% of the exposed Purkinje cells remained morphologically intact. After 24 days the respective survival rates were 48 and 17%. When actinomycin was given 24 hr. after the exposure, the rate of surviving Purkinje cells was 73% at six days and 49% at 24 days, respectively. These findings suggest that a certain type of acute lethal radiation damage to these neurons is repaired within a few hours following the irradiation.

A68-81636**AN EVALUATION OF VIBROTACTILE SIGNALLING APPARATUS.**

A68-81637

D. D. Diespecker (Newcastle, U., Great Britain). *Australian Journal of Psychology*, vol. 20, Apr. 1968, p. 19–24. 11 refs.

Apparatus for studying vibrotactile communication is described. Five electromechanical transducers were used to transmit coded signals to the subject. A modified Howell (1956) system was used. Five body loci not previously used with this system and a 50-trial program showed that the subject was able to receive signals with a high degree of accuracy. Significant increases in learning occurred between the first five and the second five trials. The findings of Howell who used a similar display but five different body loci under more exacting conditions were confirmed.

A68-81637**NOCTURNAL SLEEP IN RHESUS MONKEYS.**

D. F. Kripke, M. L. Reite, G. V. Pegram, L. M. Stephens, and O. F. Lewis. (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.). *Electroencephalography and Clinical Neurophysiology*, vol. 24, Jun. 1968, p. 582–586. 16 refs.

In 71 nocturnal sleep recordings of ten juvenile rhesus monkeys, a cyclic pattern of alternating awake, rapid eye movement (REM) and non-REM sleep was demonstrated. Sleep occurred at an average of 80% of the recording periods and REM occupied 15% of the sleep time. The average duration of the REM episodes was six min. and they occurred cyclically every 51 min. throughout the night. A significant positive correlation was demonstrated between the duration of a REM episode and the succeeding non-REM sleep interval. The monkey patterns were quite similar to those of man.

A68-81638**AFTERNOON SLEEP IN CERTAIN HYPERSOMNOLENT STATES: "INTERMEDIATE SLEEP".**

B. A. Schwartz (Hop. Broussais, Serv. Explorations Fonctionnelles, Lab. d'EEG, Paris, France). *Electroencephalography and Clinical Neurophysiology*, vol. 24, Jun. 1968, p. 569–581. 42 refs.

Spontaneous afternoon sleep was studied polygraphically and clinically in 11 patients with diverse types of diurnal hypersomnolence and in four controls (three of whom were not recorded). All the tracings showed normal electroencephalographic sleep patterns. Sleep stages 11 and IV were rarely reached and rapid eye movement (REM) sleep only appeared in a cataplectic-narcoleptic and in a patient under light barbiturate sedation. All the tracings showed predominance of intermediate sleep, composed of light slow wave sleep and accompanied by slow or, especially, medium fast eye movements and the presence of twitches and jerks. The nature and importance of intermediate sleep and its relationship to slow wave sleep on the one hand and to REM sleep on the other is discussed. A hypothesis is proposed whereby there is a constant potential possibility for REM sleep to appear but this possibility, under normal conditions, is totally inhibited by wakefulness and slow wave sleep and only partly inhibited by light slow wave sleep.

A68-81639**WAVES ASSOCIATED WITH EYE MOVEMENT IN THE AWAKE AND SLEEPING CAT.**

Dana C. Brooks (Cornell Med. Coll., Dept. of Anat., New York, N. Y.).

Electroencephalography and Clinical Neurophysiology, vol. 24, Jun. 1968, p. 532–541. 19 refs.

Grants PHS NB 02091 and NYCHRC I-439.

The spontaneous electrical activity in the dorso-medial region of the pons, the lateral geniculate nucleus and the marginal gyrus of the cerebral cortex (PGO waves) was studied in a series of 40

experiments on the cat. The results include the following: (1) PGO waves were observed in each of these three structures during wakefulness as well as during rapid eye movement (REM) sleep. (2) In the alert animal, lateral geniculate PGO waves were greatly reduced in amplitude and in a few instances impossible to detect. Cortical waves showed a similar but less pronounced attenuation. Pontine waves during wakefulness, however, appeared identical with those during REM sleep. (3) PGO waves were shown to occur synchronously in each of the three structures and the characteristics of this synchrony have been described. Bilateral wave synchrony at both the lateral geniculate and cortical levels also was observed. (4) A close correlation between PGO waves and eye movement during wakefulness and REM sleep was demonstrated. The results suggest the PGO waves represent mutually independent responses in the three structures studied to some triggering event in a common pacemaker. The constant association between PGO waves and eye movement, during both wakefulness and REM sleep, suggests that these potentials are related to some central mechanism of oculomotor-visual integration.

A68-81640**COMPONENT ANALYSIS OF HUMAN AVERAGED EVOKED POTENTIALS: DICHOPTIC STIMULI USING DIFFERENT TARGET STRUCTURE.**

D. Lehmann and D. H. Fender (Presbyterian Med. Center, Inst. of Visual Sci., San Francisco, Calif. and Calif. Inst. of Technol., Pasadena).

Electroencephalography and Clinical Neurophysiology, vol. 24, Jun. 1968, p. 542–553. 26 refs.

Grants PHS NB 06038 and PHS NB-03627.

In dichoptic viewing conditions, human subjects were shown subjectively superposed targets for the left and right eye. The left eye saw a steadily illuminated field containing different amounts of structure, and the right eye saw repetitive light flashes of constant parameters. Averaged electroencephalogram evoked responses were recorded from occipito-parietal electrodes; mean responses and their standard deviations were computed for each subject; weighted average responses were computed for the whole subject population. It was found that the root mean square value of the evoked responses decreased monotonically with increase in target structure. An analysis of the average responses into Gaussian components showed that peak latencies and relative peak amplitudes did not change; i.e., that no change in shape of the responses occurred. The Gauss analysis applied to responses of individual subjects, however, leads to the conclusion that shape changes do occur; but these changes are different from one subject to another and are not characteristic of the entire subject population. The reduction of the evoked responses was interpreted as a consequence of increased informational load upon the neural populations whose activity is synchronized by the flash stimulus to produce the evoked response.

A68-81641**USE OF AN ELECTROCHEMICAL AND RHEOGRAPHICAL METHOD FOR SIMULTANEOUS DETERMINATION OF OXYGEN TENSION AND BLOOD CIRCULATION IN BRAIN TISSUES [PRIMENENIE ELEKTROKHMICHESKOGO I REOGRAFICHESKOGO METODA DLIA ODNOVREMENNOGO OPREDELENIIA NAPRIAZHENIIA KISLORODA I KROVOBRASHCHENIIA V TKANI MOZGA].**

A. I. Beketov, D. I. Sapegin, and I. P. Fomochkin (Crimean Med. Inst., Dept. of Pharmacol., Simferopol, Crimean SSR).

Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, vol. 11, Nov.–Dec. 1967, p. 82–85. 18 refs. In Russian.

An experimental method combining simultaneously electrochemical determination of oxygen tension and rheographical

recording of blood circulation in the brain tissues was described. This method was used to determine the changes in the oxygen usage of brain tissues and the relationship between oxygen tension and regional blood circulation.

A68-81642

METHOD TO ASSESS THE ADEQUACY OF RADIATION PROTECTION [K METODIKE OPREDELENIIA EFFEKTIVNOSTI RADIOPROTEKTOROV].

P. D. Gorizontov, S. A. Davydova, and A. B. Tsylin.

Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, vol. 11, Nov.-Dec. 1967, p. 80-82. In Russian.

The method and instruments used to study the chemical protection of some compounds, particularly beta-mercaptoethylamine and di(3-aminopropyl) ethyl cyanamidodithioformate, against radiation damage were described. In experiments conducted on rats anesthetized with ether, the beta-mercaptoethylamine was found to be effective against radiation. The animals injected with this solution showed a decreased permeability of cells and tissue to irradiation, precluding the appearance of alterations in loose connective tissues and in vascular walls. The method presented could be of use for the study of different pathological conditions associated with a disruption of the connective tissue permeability processes. It could also be utilized for an objective evaluation of the prophylactic and therapeutic effects of different drugs influencing the connective tissues system.

A68-81643

THE EFFECT OF STRESS ON THE CHANGE OF THE MINERAL AND AMINO ACID METABOLISM IN THE CALCIFIED TISSUES OF RATS [VLIIANIE STRESSA NA IZMENENIE MINERAL'NOGO I AMINOKISLOTNOGO OBMENA V OBYZVESTVLENNYKH TKANIAXH KRYSA].

Z. V. Zakharova (Moscow Med. Stomatol. Inst., Dept. of Pathol. Physiol., USSR).

Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia, vol. 11, Nov.-Dec. 1967, p. 59-63. 14 refs. In Russian.

The effect of measured electro-stimulation on glycine- ^{2-14}C and $Ca^{45}Cl_2$ incorporation into the calcified tissues of animals was studied on 88 rats for 36 days. Glycine- ^{2-14}C incorporation into molars increased for 24 days; this was followed by a depression phase. Incorporation into molars increased from the third to the 15th day, and into the mandible from the third to the 24th day, being followed by depression. Radioactive glycine accumulation proved to be depressed in the femoral bones almost all the time. Radiocalcium incorporation was similar to that of glycine- ^{2-14}C , but less pronounced.

A68-81644

CONDITIONED REFLEX AND STRUCTURAL ORGANIZATION OF THE SIGNAL STIMULUS ANALYZER [USLOVNIY REFLEKS I STRUKTURNAIA ORGANIZATSIIA ANALIZATORA SIGNAL'NOGO RAZDRAZHITELIA].

O. S. Adrianov (USSR, Acad. of Med. Sci., Inst. of Brain, Moscow).

Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 17, Sep.-Oct. 1967, p. 847-858. 67 refs. In Russian.

Some of the characteristics of structural-functional correlation of sensory stimulus analyzers and the importance of these characteristics for the evaluation of specific conditioned reflex activity evoked by auditory and visual stimulation are analyzed. The problem of relating visual and auditory perception to the cortical structure or subcortical formations are discussed taking into account the fact that the first stage of this process starts at the sensory organs (receptors) in the form of perception of different modalities. The study of this process could not be confined only to specific

cortical-subcortical mechanisms of analyzers; the question of what parameters in the auditory or visual conditioned signal could be instrumental in the activity evoked at different levels of the analyzers units is raised. The attempts to analyze morpho-physiologically the brain activity present promising perspectives for solving the problem of the relationship of dynamic response to the finest structural details of the brain.

A68-81645

EVALUATION OF THE HEAT LOAD OF MAN. II. PRACTICAL APPLICATION.

M. Jokl and J. Roubal (Inst. of Ind. Hyg. and Occupational Diseases, Prague, Czechoslovakia).

Journal of Hygiene, Epidemiology, Microbiology, and Immunology, vol. 11, no. 4, 1967, p. 483-510. 20 refs.

Possibilities of practical application of the complex system for the evaluation of the heat load of man, suggested in part I, are presented using two examples: (1) the determination of the period of tolerable stay in the hot environment at a work-place of an atomic power station and of the necessary length of the rest periods. In this connection the question is solved of the necessity for the installation of an air-conditioned cabin for the rest of workers; (2) the measurement of the increase in heat load of man due to the increase of the relative humidity of the air.

A68-81646

SYNCHRONIZED RETINAL AFTERDISCHARGE AND NEURAL DARK ADAPTATION IN THE MONKEY (*CEBUS ALBIFRONS*).

Pablo Pacheco, David Bear, and Frank R. Ervin (Harvard Med. School, Mass. Gen. Hosp., Dept. of Psychiat. Stanley Cobb Labs. for Psychiat. Res., Boston).

Experimental Neurology, vol. 20, Apr. 1968, p. 635-654. 17 refs. Contracts AF 33(615)-5453, ONR 1866(41), and Grant NIMH MH 19434-04.

The relationship between the duration of synchronized after-discharge (30/sec.), recorded from the optic chiasm of monkeys following cessation of illumination, and the intensity and duration of an immediately preceding test light; intensity and duration of prior conditioning illumination; duration of dark adaptation between conditioning and test lights; wavelength of test light; and intensity of background illumination following test light were studied. Observations were made under similar conditions of barbiturate anesthesia on animals with chronically implanted electrodes. Unanesthetized animals, however, demonstrated the synchronized afterdischarge, but at a higher characteristic frequency (50 to 60/sec.). Antidromic stimulation of fibers in the optic tract failed to initiate or block the ganglion cell "oscillation." The monotonic logarithmic relationships holding between the intensity or duration of the test light, and the duration of the after-discharge suggest the existence of a physiological "capacitance" in the retina. The association of this response with the photopic system, its hypothetical role in the mechanism of neural dark adaptation, and its relation to the genesis of light-sensitive seizures are discussed.

A68-81647

THE EFFECTS OF WEIGHTLESSNESS ON PLANT GROWTH.

H. M. Conrad and S. P. Johnson (North Am. Aviation, Inc., Columbus, Ohio).

Journal of Environmental Sciences, vol. 11, Apr. 1968, p. 17-24. 15 refs.

NASA Contracts NAS 2-3321 and NASA NAS 2-3323.

Preliminary studies on biological specimens chosen for Biosatellite flights were carried out to obtain background data for the establishment of experimental parameters demonstrating the

A68-81648

effects of weightlessness on plant growth. A horizontal clinostat was used to simulate weightlessness, special experimental hardware was designed and fabricated, by studying the requirements of the specimens and the constraints imposed by the spacecraft. Experiments conducted on pepper plants studied the response of the plant leaves to horizontal rotation on a clinostat, to vibration, and to temperature and humidity effects. The minimum age at which the plants would respond adequately, was investigated and metabolic and other energy pathways were chemically analyzed. Other experiments carried out with wheat seedlings investigated the growth response to wheat seedlings rotated on a horizontal clinostat, gas exchange requirements, oxygen consumption and carbon dioxide absorption rates as well as enzymatic activity were studied.

A68-81648

PROGRESS AND RESULTS OF RESEARCH ON NOISE AND VIBRATION IN RAILROAD TRANSPORTATION [RAZVITIE I REZULTATY ISSLEDOVANIY SHUMA I VIBRATSII NA ZHELEZNODOROZHNOY TRANSPORTE].

A. M. Volkov.

Gigiena Truda i Professional'nye Zabolevaniya, no. 11, Nov. 1967, p. 58-60. In Russian.

An account is given of the research on the effects of noise and vibration on humans carried out during the last decades in the USSR. The investigations were primarily concerned with physical disorders encountered in railway workers. The results of the laboratory studies and the data collected provided basic guidelines for the improvement of working conditions. Well equipped laboratories conducted research on noise and vibration, the use of complex and electrographic methods in physiological investigations, the fatigue observed in railway workers, the large amount of experimental research allowed to resolve some theoretical problems on fatigue and to regard them as a phasic development process related to the load, stress, length of work, amount of information processed, and the initial body responses to the influence of environmental physical factors.

A68-81649

EXAMINATION OF BACTERICIDAL AND SPORICIDAL PROPERTIES OF THE AEROSOLS OF NEW DISINFECTANTS [ISSLEDOVANIYE BAKTERITSIDNYKH I SPORITSIDNYKH SVOISTV AEROZOLEI NOVYKH DEZINFYKANTOV].

M. P. Veselov and A. I. Osipova (Kirov Mil.-Med. Acad., Leningrad, USSR).

Zhurnal Mikrobiologii Epidemiologii i Immunobiologii, vol. 44, Dec. 1967, p. 83-87. 13 refs. In Russian.

Experiments were carried out to test the bactericidal and sporicidal properties of iodinol, beta-propiolacton, dichlorhydantoin, and peracetic acid aerosol solutions on test-objects made out of fabric. The objects were disinfected and sterilized first then infected with golden staphylococcus (*Staphylococcus aureus* ?) and spores of the anthrax bacillus vaccine strains. The experiments were carried out in a chamber of 240 l. in volume, and the aerosols were produced by a room vaporizer. The tests showed that only iodinol lacked adequate strength as a disinfectant.

A68-81650

STUDIES ON THE INFLUENCE OF LOW-FREQUENCY MECHANICAL VIBRATION ON EXCRETION OF PROLINE AND HYDROXYPROLINE IN RATS [BADANIA WPPLYWU DRGAN MECHANICZNYCH O NIEWIELKIEJ CZESTOTLIWOSCI NA WYDALANIE PROLINY I HYDROKSYPROLINY U SZCZURIOW].

Włodzimierz Tyburczyk, Jolanta Borkowska, and Tadeusz Wesolowski.

Acta Physiologica Polonica, vol. 19, Mar.-Apr. 1968, p. 237-243. 14 refs. In Polish.

Levels of proline and hydroxyproline were assayed in the blood serum and urine of white Wistar rats subjected to mechanical horizontal vibrations of seven mm. amplitude and nine c.p.s. frequency three hr. daily over a period of three wk. Throughout the experiments, the animals received a diet with low gelatin content. Toward the end of the experiments, 24-hr. urine portions were collected twice, and after anesthetizing the rats, blood samples were drawn from the heart. Raised levels of free and peptide-bound hydroxyproline were found in the blood serum, and raised levels of proline in the serum but lowered levels in the urine.

A68-81651

THE INFLUENCES OF ULTRAVIOLET RAYS ON THE NUMBER AND LIFE SPAN OF ERYTHROCYTES IN RABBITS [WPPLYW PROMIENI ULTRAFIOLETOWYCH NA LICZBE I CZAS ZYCIA KRWIENIK CZERWONYCH KROLIKA].

Eugeniusz Mietkiewski, Bogumił Kosmicki, and Kazimierz Naroznik. *Acta Physiologica Polonica*, vol. 19, Mar.-Apr. 1968, p. 171-179. 14 refs. In Polish.

Experiments were carried out on six rabbits irradiated with ultraviolet rays (UV) and six unirradiated control rabbits. In all rabbits the number of erythrocytes in one mm.³ of venous blood was determined five times a weekly intervals; hematocrit values, mean volume of erythrocytes and mean life span of erythrocytes were also studied. After four wk., reticulocyte counts were made. Chronic irradiation of 100 cm.² of the skin on the back of the rabbits with UV radiation of 405 to 289 mμ. energy 134,000 ergs/sec./cm.² and maximum intensity of 366 mμ caused an increase in the mean number of erythrocytes from 5.06 to 5.58 million/mm.³. Hematocrit indices increased from 33 to 37, while the mean erythrocytic volume remained unchanged at about 66 μ³. Reticulocyte counts increased from 14 to 32%. The life span of erythrocytes was prolonged from 40 to 53 days. It was concluded that ultraviolet light stimulates the hematopoietic system in rabbits and prolongs the life span of erythrocytes.

A68-81652

THE INFLUENCE OF VOLUNTARY HYPERVENTILATION ON REFLEX CHANGES IN RESPIRATORY FUNCTION [WPPLYW DOWOLNEJ HIPERWENTYLACJI PLUC NA ODRUCHOWE ZMIANY ODDYCHANIA].

Ireneusz Malarecki.

Acta Physiologica Polonica, vol. 19, Mar.-Apr. 1968, p. 217-224. 20 refs. In Polish.

Changes in reflex respiratory function after voluntary hyperventilation of the lungs were studied in physical education students. The results indicated a pronounced relation between these changes and intensity of the hyperventilation. After 30 sec. of moderate hyperventilation (14.5 to 29.6 l./30 sec.) no changes in respiration or only slight hyperpnea were observed. After 30 and 60 sec. of intensive hyperventilation (62 to 94 l./min.) hyperpnea was noted in all cases. In the interpretation of these changes, the analogy between this phenomenon and exercise hyperpnea connected with compensation of the oxygen debt is pointed out.

A68-81653

THE INFLUENCE OF VIBRATION ON METABOLISM OF ³⁵S METHIONINE IN THE CENTRAL NERVOUS SYSTEM [WPPLYW WIBRACJI NA PRZEMIANE ³⁵S-METIONINY W OSRODKOWYM UKLADZIE NERWOWYM].

Marek Eugeniusz Jurczak.

Acta Physiologica Polonica, vol. 19, May-Jun. 1968, p. 329-335. 8 refs. In Polish.

Biochemical and isotopic studies were carried out in 44 guinea pigs subjected to vertical vibration ($f=50$ c.p.s., $a=1$ mm.) for periods of one, three and six days, three hr. daily. A single exposure of the animals to vibration caused an increase in the rate of ^{35}S metabolism in the protein and lipid fractions in the central nervous system. Chronic, repeated exposure to vibration, on the other hand, resulted in markedly decreased incorporation and metabolism of ^{35}S .

A68-81654

THE INFLUENCE OF AN ANTIHISTAMINIC DRUG ON BLOOD HISTAMINE CONCENTRATION AND HEMODYNAMIC CHANGES IN HUMANS UNDER CONDITIONS OF HIGH AMBIENT TEMPERATURE [WPLYW PODAWANIA LEKU PRZECIWHISTAMINOWEGO NA ZACHOWANIE SIĘ STEZENIA HISTAMINY WE KRWI ORAZ ZMIANY HEMODYNAMICZNE U LUDZI PRZEBYWAJĄCYCH W WYSOKIEJ TEMPERATURZE OTOCZENIA].

Romuald Kobza.

Acta Physiologica Polonica, vol. 19, May–Jun. 1968, p. 317–327. 20 refs. In Polish.

Sixty-eight miners aged 21 to 39 yr. were subjected to a two-hr. stay at rest in a thermal chamber at an average temperature of 45°C . and relative humidity of 80%. One group received the antihistamic drug Allercur orally before entering the thermal chamber, and the control group a placebo. In the group which received the antihistamic drug, systolic pressure remained unchanged, whereas in the control group a significant decrease occurred. Diastolic pressure in the experimental group showed a significantly smaller drop than in the control group. In the group treated with the drug, blood histamine levels were not significantly changed under the influence of hyperthermia. The beneficial effect of Allercur on blood pressure in persons under the influence of hyperthermia can be taken advantage of in cases of exogenous overheating of the body, as well as in endogenous overheating in states of perturbed thermoregulation during fever.

A68-81655

STUDIES ON THE INFLUENCE OF HYDROCORTISONE ON COLLAGEN METABOLISM IN EXPERIMENTAL ANIMALS. I. URINARY EXCRETION OF HYDROXYPROLINE AFTER ADMINISTRATION OF HYDROCORTISONE TO RATS [BADANIA NAD WPLYWEM HYDROKORTYZONU NA PRZEMIANE KOLAGENU U ZWIERZĄT DOSWIADCZALNYCH. I. WYDALANIE HYDROKSYPROLINY W MOCZU PO PRZEDŁUŻONYM PODAWANIU HYDROKORTYZONU SZCZUROM].

Maria Sanecka-Obacz.

Acta Physiologica Polonica, vol. 19, Mar.–Apr. 1968, p. 245–253. 15 refs. In Polish.

In six wk. old white rats hydrocortisone was injected intramuscularly in daily doses of two mg./100 g. body weight. Control animals were injected with physiologic saline solution. After four wk., diuresis, total nitrogen, α -amino nitrogen, free and total hydroxyproline were determined in both groups of animals. Prolonged administration of hydrocortisone in rats caused a fall in body weight, increased diuresis, raised levels of total and α -amino nitrogen and proline in the urine and decreased excretion of free and total hydroxyproline.

A68-81656

THE INFLUENCE OF ULTRAVIOLET RAYS ON ACTIVITY OF THE RETICULOENDOTHELIAL SYSTEM IN RABBITS [WPLYW PROMIENI ULTRAFIOLETOWYCH NA AKTYWNOŚĆ UKŁADU SIATECZKOWO-SRÓDBŁONKOWEGO KROLIKÓW].

Eugeniusz Mietkiewski and Bogumił Kosmicki.

Acta Physiologica Polonica, vol. 19, Mar.–Apr. 1968, p. 163–169. 19 refs. In Polish.

By a modification of the Adler–Reimann method, with Congo red the activity of the reticuloendothelial system (RES) was studied in three groups of six rabbits each: (1) in unirradiated control animals; (2) after a single irradiation of 100 cm^2 of skin on the back of the animal with ultraviolet (UV) rays of 405 to 289 $m\mu$ with highest intensity in the 366 $m\mu$ range; and (3) after daily irradiations lasting 20 min. for six wk. The experiments showed that the colloidal activity of the RES in rabbits decreases after a single UV irradiation and increases and decreases after chronic irradiation. The rate of disappearance of Congo red from the plasma was slowest in those animals which were irradiated once, 30 min. before injection of the dye. In chronically irradiated animals, the plasma cleared much more quickly at first and later more slowly than in unirradiated controls.

A68-81657

A STUDY OF BILATERAL AND UNILATERAL SPATIAL DISCRIMINATION ON THE SKIN.

I. D. John (Adelaide, U., Australia).

Australian Journal of Psychology, vol. 20, Apr. 1968, p. 35–37. 7 refs.

Accuracy of two-point tactile discrimination was determined for 27 male subjects at two locations, the forehead and the thoracic region of the back. The effect of two variables was investigated; presentation of the two points bilaterally (i.e., across the body mid-line) v. unilaterally, and stimulation of homologous (i.e., bilaterally symmetrical) v. non-homologous points. Results showed markedly greater accuracy of discrimination under bilateral than unilateral conditions on the back, but no such difference was demonstrated for the forehead. There was some evidence of reduced accuracy of discrimination when homologous points on the forehead were stimulated in comparison with non-homologous points.

A68-81658

THE INFLUENCE OF ENTERAL VACCINATION ON THE RADIORESISTANCE OF MICE [VLIANIE ENTERAL'NOI VAKTSINATSII NA RADIOREZISTENTNOST' MYSHEI].

L. I. Murav'eva.

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 65, May 1968, p. 44–46. 12 refs. In Russian.

The influence of enteral vaccination was studied with a heat killed culture of *Salmonella breslau* on the radioresistance of mice. Mice received the vaccine once (10 billion) and several times one to two hr., 1, 4, 7, 15 and 20 days prior to irradiation (X-rays–550 r, gamma rays–725 r) and after irradiation (30 min., 1, 5, and 10 days). In some experiments the survival of experimental mice exceeded the control group by 10–80%. The best results after vaccination were obtained when vaccination was made four and seven days prior to irradiation.

A68-81659

A SCALE FOR THE DEGREES OF VIBRATION PERCEPTIBILITY AND ANNOYANCE.

J. I. Soliman (Queen Mary Coll., Dept. of Mech. Eng., London, Great Britain).

Ergonomics, vol. 11, Mar. 1968, p. 101–122. 61 refs.

Criteria for permissible vibrations with regard to their effect on human beings (thresholds of perception and annoyance) were suggested. Dimensionless units for degrees of perceptibility and annoyance were introduced. It was suggested that the criteria could serve as a basis for a British Standard Specification.

A68-81660

A68-81660

IDENTIFICATION OF SHORT-TERM OPTICAL AND ACOUSTIC SIGNALS IN NOISE [UBER DIE ERKENNEBARKEIT VERRAUSCHTER KURZZEITIGER OPTISCHER UND AKUSTISCHER SIGNALE].

Grete Junge (Berlin, Humboldt-U., Inst. für Psychol., East Germany).
Studia Psychologica, vol. 10, no. 2, 1968, p. 153-158. 7 refs. In German.

The results of the tests brought confirmation to hypotheses formulated by other workers on the action of signal thresholds which depend on time. Even in the presence of noise, the results closely resembled those obtained with undisturbed observation tasks. The best signal times with this presentation of stimuli in observers engaged on this task were between one sec. and 30 msec.

A68-81661

SIZE CONSTANCY AND ITS RELATION TO GEOMETRIC-OPTICAL ILLUSIONS [DIE GROSSENKONSTANZ UND IHRE BEZIEHUNG ZU GEOMETRISCH-OPTISCHEN TAUSCHUNGEN].

Gert Haubensak (Münster, U., Psychol. Inst., West Germany).
Studia Psychologica, vol. 10, no. 2, 1968, p. 147-152. 9 refs. In German.

If two objects are presented at different distances from O, the farther one looks more or less like the nearer one, but not the reverse. Size constancy in the author's view is bound to this functional inequality rather than to depth perception itself. If this view is correct, size constancy should not be limited to depth perception, but should occur whenever the functional inequality between stimuli exists. Some geometrical optical illusions are shown to represent such cases. For example, the over-estimation of the middle segment of a three-sected line proves to be a function: (1) of strength of functional inequality; and (2) of size constancy. The implications of these results on functionalistic constancy theories are discussed.

A68-81662

NEURAL MECHANISMS OF SYNCHRONIZATION AND DESYNCHRONIZATION OF CEREBRAL ELECTRIC ACTIVITY [NEIRONNYE MEKHAUZMY SINKHRONIZATSII I DESINKHRONIZATSII ELEKTRICHESKOI AKTIVNOSTI MOZGA].

Nina N. Danilova (Moscow State U., USSR).
Studia Psychologica, vol. 10, no. 2, 1968, p. 130-138. In Russian.

Nervous mechanisms which form the basis of reaction to sensory stimuli and their manifestation in electroencephalographs (EEG) were investigated. Simultaneous recordings were made in different sites of the central nervous system of rabbits. In addition the activity of particular cells were recorded with the aid of microelectrodes in the nonspecific thalamic system. A considerable number of neurons were found in the non-specific thalamic system, in approximately 50% of all cases, which reacted in sleep, rest and in the extinction of the orienting reflex with the activity of the combined discharges of spikes. These discharges showed a growing tendency to combine under conditions mentioned above. In the end, the neurons showed only the more strongly combined spikes. The electric activity of the occipital lobe, thalamus and hippocampus showed only slow waves which correlated with the increased combination of discharges of individual cells of the thalamus. It was stressed that these slow waves may be considered as post-synaptic potentials which are evoked by means of the combined discharges of the neurons of the nonspecific thalamic nuclei. Following the sensory stimuli, this combination of neuron discharges of nonspecific thalamic nuclei ceased and reaction occurred only with individual

discharges. This desynchronization reaction has all the properties of the orienting reflex component. When desynchronization of individual cells sets in, the slow waves of the occipital region and the other cerebral structures disappear. The essence of EEG reaction to sensory stimuli has to be looked for in various neuronal mechanisms: the basis for the neuronal frequency of discharges along with their increase or decrease is also given by the different tendency of combination of individual neurons. As a result of the sensory stimuli, desynchronization ensues here, and the combination of the discharges of individual neurons is suppressed.

A68-81663

PERCEIVED DISTANCE AS A FUNCTION OF VISUAL CUES.

Teodor Künnapas (Stockholm, U., Psychol. Labs., Sweden).
Studia Psychologica, vol. 10, no. 2, 1968, p. 124-129. 7 refs. Swed. Council for Social Sci. Res. supported research.

Four reduced-cue conditions and one full-cue condition were used to investigate subjective distance as a function of perceptual cues. It was found that: (a) accommodation does not permit any accurate perception of distance; (b) retinal-image size is one of the most important cues for the judgment of distance; (c) with successive increase of the number of visual cues, the range and the discrimination of perceived distances increase and improve in accuracy; and (d) with increase of number of cues the certainty of the judgment of distance increases.

A68-81664

TIME CONSTANTS OF OPTICAL PERCEPTION [UBER DIE ZEITKONSTANTEN DER OPTISCHEN WAHRNEHMUNG].

Zsolt Tánzos (Hungarian Acad. of Sci., Inst. of Psychol., Budapest).
Studia Psychologica, vol. 10, no. 2, 1968, p. 110-123. 58 refs. In German.

Tests with threshold sensitivity of intermittent light stimuli have shown that extreme time values below 300 to 500 msec. are found also in the order of the threshold magnitude when the impulse lasts less than 20 to 30 msec. i.e. below the total duration of summation. In this case a minimum sensitivity occurs with a repeated stimulus for 60 msec., a maximum at 100 msec. and again a minimum at 300 msec. The occurrence of extreme time values may be ascribed to a contest between the mechanisms of a time summation and a time resolution, or to the pattern of their mutual interaction. In the case of colors specific time values or on- and off-reactions may be involved as a subjective color effect similar to the dynamics of time summation or resolution. Tests relating to dichoptic masking have proved that the central factor consists in the first place of a specific production of simultaneous perception. Stroboscopic and induced movement experiments conducted under similar conditions pointed to a significant increase in the time range of simultaneous perception during a dichoptic exposition. The analytic aspect of the test investigated what determines, in the case of an exposition of a spatially changing successive order of points, the ensuing change of localization, or assimilation and contrasting shifting, and what is the relation between both the types of shifting and the forms of eye movements. It was found that in contrasting shifting, the function of a central after-system (the system of reference transmission) is to be assumed which is related with perception of the field while in the determination of the assimilation shifting, the decisive factor is the ensuing interference between the stimuli or a delay in the reference transmission. In long term stimuli, the contrast shifting is for the most part associated with a saccadic eye movement or a nystagmoid reaction, and the assimilation shifting is related to following eye movements.

A68-81665

OPTICAL-HAPTIC ILLUSIONS OF DIMENSIONS IN THREE-DIMENSIONAL OBJECTS [OPTISCH-HAPTISCHE MASSTAUSCHUNGEN AN DREIDIMENSIONALEN GEGENSTANDEN].

Wolfgang Metzger (Münster, U., Psychol. Inst., West Germany).
Studia Psychologica, vol. 10, no. 2, 1968, p. 91-103. 23 refs.
In German.

It is contrary to facts that optical-haptic illusions of dimensions occur only in artificial laboratory situations. It is contrary to facts that they occur only in specially prepared drawings. Frequently, these illusions occur with the most diverse three-dimensional objects which have a similar structure and analogous properties as two-dimensional shapes for illusions. Illusions in the case of these three-dimensional objects are generally even more marked than in analogous two-dimensional figures. Optical-haptic illusions cannot result from an impaired activity of some mechanism which, out of a two-dimensional representation on the retina, creates three-dimensional objects of vision. Such an assumption was unacceptable at the time Révész discovered haptic variants of a whole series of illusions. The above holds equally true in the case of Tausch's Kristof's and Klix's tendencies. Naturally, illusions of perspective exist further, and in the case of some other illusions accounts must be taken of the effects of the perspective, or at least of partial factors of the perspective. This may, for instance, hold for Sander-Ipsen's illusion which, as the only one so far, is essentially more expressive in a two- than a three-dimensional shape. However, a safe judgment on these matters will be possible only after new empiric findings are made. Signs of a more appropriate general theory on optical-haptic illusions of dimensions are contained in Rausch's voluminous monograph: structure and metric figural-optical perception. At any rate, the starting point in this theory will not be given by the relations of tension in two-dimensional optical projection of objects, but simultaneously, at least, by the relations of fully concrete objects of vision, regardless of whether they be two-dimensional flat patterns or three-dimensional objects.

A68-81666

RESPONSES OF CAT PALLIDAL NEURONS TO CORTICAL AND SUBCORTICAL STIMULI.

H. Noda, S. Manohar, and W. R. Adey (Calif., U., Dept. of Anat., Brain Res. Inst., Space Biol. Lab., Los Angeles).
Experimental Neurology, vol. 20, Apr. 1968, p. 585-610. 38 refs.
Grant PHS MH-03708.

Discharge patterns of pallidal neurons of the cat were studied during single-shock and sustained high-frequency stimulation of sensorimotor cortex (SMC), caudate nucleus, nonspecific thalamic nuclei (CM), subthalamus, midbrain reticular formation (MRF) and amygdaloid complex. Three types of spontaneous discharge pattern were found in pallidal neurons: high discharge rate (HDR), low discharge rate (LDR) and repetitive burst patterns were observed. The LDR and repetitively discharging units generally responded to a limited number of the stimulus sites, occasionally to one site exclusively, whereas HDR units generally showed a high degree of convergence. The response patterns of units responding to single-shock stimulation of MRF, CM, and subthalamus were similar. A marked facilitation lasting 20 to 50 msec. was a consistent response which in some units was followed by a prolonged facilitation or inhibition. Sustained high-frequency stimulation always resulted in a net facilitatory effect. Single-shock stimulation of caudate nucleus and SMC generally produced a powerful inhibition. In some units facilitation preceded this inhibition, and in a small number of units, only facilitation was observed. Sustained high-frequency stimulation produced either inhibitory or facilitatory effects. Single-shock stimulation applied to amygdala caused an initial facilitation, followed in some units by inhibition or facilitation.

High-frequency stimulation produced either facilitatory or inhibitory effects. The variation in response patterns to stimulation of each stimulus site was dependent upon the individual neuron and not upon the stimulus site. Analyses of the responses to a test stimulus following a conditioning stimulus suggest that the excitability changes of the neuron following single-shock stimulation are well represented by the poststimulus time histogram.

A68-81667

STIMULUS-RANGE AND MAGNITUDE ESTIMATES OF DISTANCE BASED ON OBJECT-SIZE.

Gordon Stanley (New England, U., Armidale, Australia).
Australian Journal of Psychology, vol. 20, Apr. 1968, p. 67-69.

Varying heights of vertical lines were presented to subjects one at a time at a fixed distance of 1.5 ft. Subjects were randomly assigned to one of four conditions. According to experimental condition, the heights decreased in equal intervals, and subjects estimated either height or distance based on relative height. Height estimates were a power function of stimulus height. Distance estimates for the unequal size stimuli were a linear function of apparent size, but distance estimates for the equal size stimuli showed a compromise between a linear and a reciprocal function of apparent size.

A68-81668

CHRONIC TRICHLOROETHYLENE INTOXICATION.

Thomas H. Milby (Bur. of Occupational Health, Dept. of Public Health, Berkeley, Calif.).
Journal of Occupational Medicine, vol. 10, May 1968, p. 252-254.
7 refs.

A case history of a 39 yr. old female industrial worker with chronic trichloroethylene intoxication was presented. Three aspects of trichloroethylene intoxication were illustrated by the case: (1) urinary trichloroacetic acid; (2) liver damage; and (3) cardiovascular effects.

A68-81669

STUDIES ON THE INFLUENCE OF TETRACYCLINE AND ITS DERIVATIVES ON THE BLOOD PROTEIN SYSTEM IN RABBITS [BADANIA WPLYWU TETRACYKLINY I JEJ POCHODNYCH NA UKLAD BIALKOWY SUROWICY KRWI KROLIKA].

Wawrzyniec Chojnowski.
Acta Physiologica Polonica, vol. 19, May-Jun. 1968, p. 429-436.
16 refs. In Polish.

The influence of piperazinemethyltetracycline, pyrolidinemethyltetracycline and tetracycline on blood levels of nonprotein nitrogen, alanine, lysine, total protein and serum protein fractions was investigated. Differences in the effect of the different preparations were not found. On the other hand, it was found that tetracyclines administered in large doses accumulate in the body (in cases with renal or hepatic insufficiency) causing disorders in intracellular processes which are reflected in the nitrogen-protein system changes in the blood. In the blood serum of rabbits increased content of nonprotein nitrogen and glycine, a decrease in total protein and albumin levels, and increased content of postalbumin, α_2 -globulin, post- β_1 , post- β_3 and α -macroglobulin fractions were observed.

A68-81670

THE EFFECT OF GAMMA RADIATION ON PLASMA ALKALINE PHOSPHATASE ACTIVITY [WPLYW PROMIENIOWANIA GAMMA NA AKTYWNOŚĆ FOSFATAZY ZASADOWEJ W OSOCZU].

A68-81671

Antoni K. Gajewski, Jolanta Raczyńska-Gajewska, Tadeusz Majle, and Jerzy Krawczyński.

Acta Physiologica Polonica, vol. 19, May-Jun. 1968, p. 367-373. 7 refs. In Polish.

Wistar rats were irradiated with lethal and sublethal doses of gamma radiation. The animals were divided into six experimental groups. Four groups, numbering ten animals each, were irradiated with doses of 250, 500, 1,000 and 1,500 r. In these groups, blood samples were obtained from the tail vein before irradiation and 11 times in the course of 30 days after irradiation. Two groups numbering five animals each were irradiated with doses of 250 and 1,500 r, and blood samples were obtained before irradiation and six times in the course of 24 hr. after irradiation. Alkaline phosphatase activity was assayed in a total of 432 blood samples. Alkaline phosphatase activity was decreased within minutes or hours after irradiation. Lowest levels of activity in the plasma were observed on the fourth or fifth day after irradiation. After that, the enzyme's activity increased. In animals irradiated with sublethal doses, alkaline phosphatase activity returned to the normal level two or three weeks after irradiation. The drop in enzymatic activity was not proportional to the dosage of radiation applied.

A68-81671

THE INFLUENCE OF GRADED PHYSICAL EXERCISE ON EXCRETION OF DONAGGIO-POSITIVE SUBSTANCES [WPLYW DAWKOWANEGO WYSILKU FIZYCZNEGO NA WYDZIELANIE SUBSTANCJI DONAGGIO-DODATNICH].

Jolanta Borkowska and Włodzimierz Tyburczyk.

Acta Physiologica Polonica, vol. 19, May-Jun. 1968, p. 345-350. 15 refs. In Polish.

In nine male white Wistar rats, the relation between levels of urinary excretion of Donaggio-positive substances and degree of physical exercise was studied. The animals were compelled to swim in a tank containing water of temperatures 30 to 36°C. for periods of 15, 30, 45 and 90 min. In 24-hr. portions of urine from each rat, levels of creatinine and Donaggio-positive substances were determined by the test described by L. Roche. After 90 min. of exercise, levels of hydroxyproline and total hexosamine contained in fractions precipitated with 95% ethanol were assayed in the urine hydrolysates. The Donaggio fatigue test gave positive results only after marked physical exertion. The increased levels of urinary mucoproteins giving a positive Donaggio test were accompanied by a rise in urinary levels of hydroxyproline and hexosamines, indicating that collagen is their source.

A68-81672

STUDIES ON THE INFLUENCE OF HYDROCORTISONE ON COLLAGEN METABOLISM IN EXPERIMENTAL ANIMALS. II. COLLAGEN CONTENT IN THE TENDONS OF RATS AFTER PROLONGED ADMINISTRATION OF HYDROCORTISONE [BADANIA NAD WPLYWEM HYDROKORTYZONU NA PRZEMIANE KOLAGENU U ZWIERZAT DOSWIADCZALNYCH. II. ZAWARTOSC KOLAGENU W SCIEGNACH SZCZUROW PO PRZEDUZONYM PODAWANIU HYDROKORTYZONU].

Maria Sanecka-Obacz.

Acta Physiologica Polonica, vol. 19, May-Jun. 1968, p. 337-344. 27 refs. In Polish.

Hydrocortisone was injected intramuscularly in six wk. old white rats in daily doses of two mg./100 g. body weight. Control rats were injected with physiologic saline solution. After four wk. the rats were killed by decapitation, and collagen soluble in neutral salts, soluble in alkalis, acid-soluble and insoluble collagen were prepared from the tendons of the hind limbs of the rats. Significant

differences in collagen content were observed in the soluble fractions, while content of insoluble collagen was unchanged. The results indicate that hydrocortisone has antianabolic, rather than catabolic, action on collagen.

A68-81673

CHANGE OF CONTENT AND OF THE RATE OF PHOSPHOLIPID METABOLISM OF RAT ENDOCRINE GLANDS IN EXPERIMENTAL HYPOXIC HYPOXIA [IZMENENIE SODERZHANIIA I SKOROSTI OBMENA FOSFOLIPIDOV ENDOKRINNYKH ZHELEZ KRYV PRI EKSPERIMENTAL'NOI GIPOKSICHESKOI GIPOKSII].

G. A. Gribanov (Kalinin Med. Inst., Dept. of Biochem., USSR).

Patologicheskaiia Fiziologia i Eksperimental'naia Terapiia, vol. 12, Mar.-Apr. 1968, p. 32-34. 14 refs. In Russian.

The effect of acute (185±5 mm. Hg for one hr.) and of chronic (250±10 mm. Hg for three to four wk., 8-10 hr. daily) hypoxic hypoxia was studied on the content and the rate of phospholipid metabolism of rat thyroid and adrenal glands and testes. Acute hypoxia led to an increased content of phospholipids in the thyroid and adrenal glands. Phospholipid content decreased in the testes. No significant changes in the rate of P³² incorporation into the phospholipids of the glands were revealed in acute hypoxia. In chronic hypoxia the phospholipid content in the adrenal glands remained unchanged, decreased in the testes and increased in the thyroid glands. The rate of phosphatide metabolism in the thyroids remained unchanged, increased in the testes and exhibited a marked fall in the adrenal glands.

A68-81674

THE HYPOTHERMIC EFFECT OF COMBINED ADMINISTRATION OF CHLORPROMAZINE AND PURAMIDON IN EXPERIMENTAL THYROTOXICOSIS [GIPOTERMICHESKII EFEKT KOMBINIROVANNOGO PRIMENENIIA AMINAZINA I PIRAMIDONA PRI EKSPERIMENTAL'NOM TIREOTOKSIKOZE].

V. Z. Blankleder (Sverdlovsk Med. Inst., Dept. of Fac. Therapy and Dept. of Pathol. Physiol., USSR).

Patologicheskaiia Fiziologia i Eksperimental'naia Terapiia, vol. 12, Mar.-Apr. 1968, p. 61-63. In Russian.

Low chlorpromazine and pyramidon doses potentiate each other, when administered together, and prove to be more effective than in separate use of much greater doses of these preparations. Simultaneous administration of these preparations to rats with experimental thyrotoxicosis provoked a marked reduction of body temperature accompanied by a fall of thermoproduction, the greatest at the lowest fall of the body temperature. The development of postoperative hyperthermic reaction is completely prevented for 24 hr. in rats with experimental thyrotoxicosis, given single doses of chlorpromazine and pyramidon at the immediate periods after thyroidectomy.

A68-81675

HUMAN COLOR PERCEPTION: A CRITICAL STUDY OF THE EXPERIMENTAL FOUNDATION.

Joseph J. Sheppard, Jr. (RAND Corp., Santa Monica, Calif.).

New York, Am. Elsevier Publishing Co., 1968, xvii+192 p. 245 refs.

The book is an attempt to provide an introduction to the critical study of the experimental foundation of human color perception. It is an ordered discussion of experimental results selected from physics, physiology and psychology. Principal conclusions are

discussed in relation to the three distinct fields of color vision: colorimetry, visual biophysics and visual psychophysics. Topics included are: (1) the process of color perception; (2) the standard observer; (3) retinal sensitivity; (4) retinal physiology; (5) cerebral physiology; (6) psychophysiology; (7) temporal phenomena; and (8) conclusions and recommendations. Appendices include the terminology of luminous energy and radiant energy and a list of photometric units and symbols used.

A68-81676**THE USE OF A FORCE PLATFORM IN THE STUDY OF ATHLETIC ACTIVITIES. A PRELIMINARY INVESTIGATION.**

A. H. Payne, T. Telford (Birmingham, U., Great Britain), and W. J. Slater (Liverpool, U., Phys. Educ. Dept., Great Britain). *Ergonomics*, vol. 11, Mar. 1968, p. 123-143. 9 refs.

A force platform was used in conjunction with a ciné camera to investigate the mechanics of several different kinds of athletic activity. Records of the components of thrust at the feet of an athlete were obtained for the vertical jump, the sprint start, the second step of a sprint run, constant-speed running, hurdling, shot putting and weight-lifting. Subsequently the records were related to the body movements as shown on the film. Results show, among other things: (1) the contribution of the arm action in the vertical jump; (2) two distinct peaks in the forces evoked during the sprint start; (3) the absence of a braking thrust during the early strides of a sprint run and, in contrast, the relatively large braking force inherent in constant-speed running and hurdling; (4) the change in direction of the horizontal thrust during shot putting; and (5) the exploitation of excess bar momentum in weight-lifting.

A68-81677**DUAL VERSUS SOLO PILOT NAVIGATION IN HELICOPTERS AT LOW LEVEL.**

R. E. F. Lewis, W. D. de la Riviere, and D. M. Sweeney (Defence Res. Estab., Toronto, Canada). *Ergonomics*, vol. 11, Mar. 1968, p. 145-155. 6 refs.

This study, using CH112 light helicopters and experienced pilots, was aimed toward answering two questions. Can the Army helicopter pilot navigate and simultaneously fly very low when, without the opportunity for briefing, he must fly between successive points in unfamiliar, relatively featureless terrain? Is navigation accuracy improved when the task is shared by two pilots forming a pilot and navigator team? Six pilots participated in a comparison of solo and dual performance, in which 358 short tracks were flown in the course of 36 sorties. Each track could be described as a short flight in itself, since each was terminated by a landing. In the dual sorties, the task was shared by two pilots, one responsible for flying the helicopter, the other concerned solely with navigation. No difference was found between dual and solo performance in terms of the numbers of endpoints reached (entering a circle of one-eighth mile radius at the endpoints). Advantages of a secondary nature, however, were shown for the dual terms, e.g., smaller errors in landings beyond the criterion circle, fewer initial heading errors and enroute 'sit downs'. At the conclusion of the main trial a small test was conducted in which dual teams were permitted to fly routes of their choice as opposed to straight tracks. Although no statistical validity can be attached to the meagre post-trial data, it appears that improved performance is possible, but the duration of sorties may be greatly increased. Conclusions and recommendations are presented.

A68-81678**NITROGEN NARCOSIS AND PERFORMANCE UNDER WATER.**

A. D. Baddeley (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain), J. W. de Figueredo, J. W. Hawkswell Curtis, and A. N. Williams (Cambridge U., Underwater Exploration Group, Great Britain).

Ergonomics, vol. 11, Mar. 1968, p. 157-164. 13 refs.

Med. Res. Council, Shell Intern. Petrol. Co., and G. W. H. Rylands Fund supported research.

Eighteen divers were tested four times under water, twice at a depth of five ft. and twice at 100 ft. They performed three tests—digit copying, a sentence comprehension test and a manual dexterity test. All three showed a significant drop in efficiency at depth. This was small for digit copying (7.9%) and manual dexterity (3.5%), and somewhat larger for sentence comprehension (15.3%). In all three cases the drop in efficiency was approximately the same as found at the equivalent pressure in a dry pressure chamber. This contrasts with previous results where impairment in the open sea has been considerably greater than in a dry chamber. Possible reasons for this discrepancy are discussed and it is suggested that level of anxiety may be a crucial factor.

A68-81679**A NOTE ON THE SLEEP OF SHIFT WORKERS.**

G. S. Tune (Med. Res. Council, Liverpool, U., Dept. of Psychol., Unit for Res. on Occupational Aspects of Ageing, Great Britain). *Ergonomics*, vol. 11, Mar. 1968, p. 183-184. 6 refs.

The sleep patterns of 14 male shift workers were compared with 14 male non-shift workers over a period of eight wk. The two groups were found to take about the same amount of sleep which was no more disturbed in one group than the other.

A68-81680**EFFECT OF HYPOXIA ON HEART RATE DYNAMICS IN MAN [L'INFLUENCE DE L'HYPOXIE SUR LA DYNAMIQUE DE LA CONTRACTION CARDIAQUE CHEZ L'HOMME].**

N. R. Zamfirescu, B. Felberg, Rodica Turleanu, C. Teodorescu, I. Pintilie, and T. C. Popescu.

Revue Roumaine de Physiologie, vol. 5, no. 1, 1968, p. 73-79. 38 refs. In French.

The effects on cardiac contraction dynamics of acute hypoxia produced by the inhalation of a gas mixture with 10% oxygen, were studied in 20 healthy subjects. Electrocardiographic, sphygmographic, phonocardiographic, and ballistocardiographic recordings were carried out before and during inhalation of the hypoxic gas mixture. Analysis of the data obtained showed that hypoxia had an adrenergic effect revealed by the reduction of the tension phase and increase of the myocardium contractility.

A68-81681**RATE OF DISAPPEARANCE OF LABELED CARBON DIOXIDE FROM THE LUNGS OF HUMANS DURING BREATH HOLDING: A METHOD FOR STUDYING THE DYNAMICS OF PULMONARY CO₂ EXCHANGE.**

Richard W. Hyde, Ricardo J. M. Puy, William F. Raub, and Robert E. Forster (Pa., U., Dept. of Med. and Dept. of Physiol., Div. of Graduate Med., Philadelphia).

(*Am. Physiol. Soc., Fall Meeting, Buffalo, Aug. 30, 1962*).

Journal of Clinical Investigation, vol. 47, Jul. 1968, p. 1535-1552. 48 refs.

Grants PHS HE-10324 and PHS HE-4108.

The dynamics of CO₂ exchange in the lungs of man was studied by observing the rate of disappearance of a stable isotope of CO₂ (¹³CO₂) from the alveolar gas during breath holding. Over 50% of the inspired isotope disappeared within the first three sec. followed by a moderately rapid logarithmic decline in which

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one-half of the remaining $^{13}\text{CO}_2$ disappeared every ten sec. The large initial disappearance of $^{13}\text{CO}_2$ indicated that alveolar $^{13}\text{CO}_2$ equilibrated in less than three sec. with the CO_2 stored in the pulmonary tissues and capillary blood. The volume of CO_2 in the pulmonary tissues calculated from this initial disappearance was 200 ml. or 0.33 ml. of CO_2 /ml. of pulmonary tissue volume. The alveolar to end-capillary gradient for $^{13}\text{CO}_2$ was calculated by comparing the simultaneous disappearance rates of $^{13}\text{CO}_2$ and acetylene. At rest and during exercise this gradient for $^{13}\text{CO}_2$ was either very small or not discernible, and diffusing capacity for CO_2 (DL_{CO_2}) exceeded 200 ml./min. \times mm. Hg. After the administration of a carbonic anhydrase inhibitor the rate of disappearance of $^{13}\text{CO}_2$ decreased markedly. DL_{CO_2} fell to 42 ml./min. \times mm. Hg and at least 70% of the exchange of $^{13}\text{CO}_2$ with the CO_2 stores in the pulmonary tissues and blood was blocked by the inhibitor. These changes were attributed to impairment of exchange of $^{13}\text{CO}_2$ with the bicarbonate in the pulmonary tissues and blood. The pH of the pulmonary tissues (V_{tis}) was determined by a method based on the premise that the CO_2 space in the pulmonary tissues blocked by the inhibitor represented total bicarbonate content. At an alveolar P_{CO_2} of 40 mm. Hg pH of V_{tis} equalled 6.97 ± 0.09 .

A68-81682

ENERGY EXPENDITURE OF INDUSTRIAL WORKERS IN DIFFERENT OCCUPATIONAL GROUPS. VI. DEDUCTION AND OUTLOOK [DER ENERGIEVERBRAUCH VON INDUSTRIEARBEITERN VERSCHIEDENER BERUFSGRUPPEN. 6. MIT. SCHLUSSFOLGERUNG UND AUSBLICK].

H.-A. Ketz and R. Maune.

Ernährungsforschung, vol. 13, no. 1, 1968, p. 47-51. 19 refs. In German.

For the relationship between caloric expenditure during the working period and the work energy equivalents for all occupational groups, there exists a linear regression. The computer equations of the regression line were given.

A68-81683

AN ANALOGUE ANALYSIS OF LUNG VENTILATION DISTRIBUTION.

A. C. Young (Wash., U., Dept. of Physiol. and Biophysics, Seattle) and G. Brandt (Firland Sanat., Inst. of Respirat. Physiol., Seattle, Wash.).

Bio-medical Engineering, vol. 3, May 1968, p. 211-214.

An electrical model of the distribution of ventilation within the lungs has been constructed. From this the wash-out of an inert gas from the lungs can be determined in terms of six evenly ventilated compartments. Highly ventilated units of small volume are commonly seen that are missed by other techniques. Any open loop wash-out phenomena for which a dilution equation can be constructed may be analyzed by this technique. Other applications of this unit could be in radioactive or dye tagging work. By monitoring the change in concentration of the tagged material (i.e., iron, calcium, iodine, CO_2 , etc.) at either end of the system, at fixed intervals, a wash-out or wash-in curve may be obtained. This data can then be analyzed on this or a similar model. It can yield information concerning the number and relative size of the pools as well as the rate of usage in the pools.

A68-81684

EFFECT OF HIGH ALTITUDE ON RESISTANCE TO INHALATION VEE VIRUS INFECTION.

R. Ehrlich and S. Miller (IIT Res. Inst., Technol. Center, Life Sci. Res. Div., Chicago, Ill.).

Archives of Environmental Health, vol. 16, Apr. 1968, p. 469-471. 10 refs.

Army. Dept. supported research.

Cages containing six guinea pigs each were placed in a chamber and maintained continuously at 12,000 ft. altitude for seven or 14 days. Then these animals were challenged with airborne Venezuelan equine encephalomyelitis (VEE) virus by the respiratory route. Control animals challenged simultaneously with VEE virus were maintained at ambient atmospheric conditions before and after infectious challenge. The following were used to define changes in resistance to infection from exposure to altitude stress: guinea pig respiratory LD_{50} measured in plaque-forming units, overall mortality, and survival time. The results suggest that exposure of guinea pigs to a simulated altitude of 12,000 ft. did not reduce resistance to infection produced by airborne VEE virus. The results agree with those reported by other investigators.

A68-81685

METHOD TO INCREASE ACCURACY IN OPHTHALMOGRAPHY [SPOSOB POVYSHENIIA TOCHNOSTI OKULOGRAFI].

A. D. Vladimirov.

Voprosy Psikhologii, no. 1, Jan.-Feb. 1968, p. 117-118. In Russian.

A technique to adjust electrically the eye potentials is presented. It will improve the regulation of the recording of light movements and of eye movements on the screen of an electroretinograph.

A68-81686

THE EFFECT OF STIMULUS VELOCITY ON THE RESPONSE OF MOVEMENTS SENSITIVE NEURONS OF THE FROG'S RETINA.

O.-J. Grüsser, D. Finkelstein, and U. Grüsser-Cornehls (Freie U., Dept. of Physiol., Berlin, East Germany).

Pflügers Archiv für die gesamte Physiologie, vol. 300, Apr. 8, 1968, p. 49-66. 31 refs.

Grant PHS 5T5-GM 408; NSF, NIH, Found. Fund for Res. in Psychiat., and Deut. Forschungsgemeinschaft supported research.

By means of metal-filled micropipettes the action potentials of four different classes of optic nerve fibers were recorded in *Rana esculenta*. The relationship between the angular velocity of the stimuli and the neuronal response was determined. If an object smaller than the excitatory receptive field (ERF) was moved through the receptive field of the different classes of retinal units the response depended on the angular velocity, contrast and size of the stimulus. The response was measured as the average impulses frequency (R) during the traverse of the ERF. Between R and the angular velocity (v) the equation $R = k \cdot v^c$ [impulses \cdot sec. $^{-1}$] was found. The exponent c was 0.5 for class 1 neurons, 0.7 for class 2 neurons, and 0.95 for class 3 neurons. In class 4 neurons the response to large stimuli increased linearly with the increase of the angular velocity, while no systematic relationship between R and v was valid for small moving stimuli ($<5^\circ$). If the contrast or the size of the stimuli was changed the exponent c was not changed; but k depended on both parameters and on the direction of the contrast against the background. The power function was no longer valid if stimuli considerably larger than ERF were used. The exponent c was independent of the type of the movement (linear, non-linear, irregular movement); it was also independent of the direction of the motion. A model of the receptive field is demonstrated. In this model and RC-filter function within the bipolar cells is assumed. The bipolar cells with different filter function activate different classes of ganglion cells. Different time constants of the bandpass filter at the bipolar cell level are the main cause for the different exponents of the power function between angular velocity and neuronal response.

A68-81687

THE INFLUENCE OF CHANGES IN OXYGEN SATURATION OF THE BLOOD ON THE EUGLOBULIN FIBRINOLYTIC ACTIVITY [VPLYV ZMIEN KYSLIKOVEJ SATURACIE KRVI NA EUGLOBULINOVU FIBRINOLYTICKU AKTIVITU].

A. Lesko, J. Paulik, and F. Cernik.

Bratislavské Lekárske Listy, vol. 49, Apr. 1968, p. 426-432. 11 refs. In Czech.

In experiments on dogs the evolution of the changes in euglobulin fibrinolytic activity was studied in relation to the values of blood gases in late embolism of the femoral artery. In arterial occlusion by the embolus the regional fibrinolytic activity below the obstruction rises. Twenty-four hr. arterial occlusion raises the fibrinolytic activity in the whole organism. Following intraarterial oxygenation perfusion it falls to the initial value. The most pronounced drop is observed at the end of 24 hr. after perfusion, i.e. at the time critical for the arisal of thrombosis at the site of the embolism. These observations justify the conclusion that once the oxygenation perfusion is terminated, one must help the organism retrieve the equilibrium in its blood coagulation system by applying anticoagulants.

A68-81688

CHANGES IN SERUM PROTEINS FOLLOWING HIGH MOUNTAINS CLIMATIC TREATMENT OF CHRONIC BRONCHITIS [ZMENY SEROVYCH BIELKOVIN PO VYSOKOHORSKEJ KLIMATICKEJ LIECBE PRI CHRONICKEJ BRONCHITIDE].

J. Kolesár and M. Matej.

Bratislavské Lekárske Listy, vol. 49, Apr. 1968, p. 413-418. 10 refs. In Czech.

A group of 79 patients with chronic bronchitis were submitted to high mountains climatic treatment in a sanatorium of (1,351 m.); the treatment lasted 42 days. The patients received no medicaments. In the group of patients with asthmoid bronchitis a significant increase in gamma globulins and a decrease in albumins were found, total proteins remaining unchanged. In the group of patients with simple bronchitis a similar trend was found, the changes, however, did not reach statistical significance.

A68-81689

ENERGY EXPENDITURE OF INDUSTRIAL WORKERS IN DIFFERENT OCCUPATIONAL GROUPS. V. THE AVERAGE DAILY ENERGY EXPENDITURE IN THE DAILY ACTIVITIES OF DIFFERENT OCCUPATIONAL GROUPS DURING WORK TIME AND FREE TIME [DER ENERGIEVERBRAUCH VON INDUSTRIEARBEITERN VERSCHIEDENER BERUFSGRUPPEN. 5. MITT. DER DURCHSCHNITTLICHE TAGLICHE ENERGIEVERBRAUCH VON WERKTATIGEN VERSCHIEDENER BERUFSGRUPPEN IN DER ARBEITSZEIT UND IN DER FREIZEIT].

R. Maune and H.-A. Ketz.

Ernährungsforschung, vol. 13, no. 1, 1968, p. 41-46. 6 refs. In German.

From time distributions and average energy equivalents for basic daily activity and for typical occupational daily activity, caloric expenditure during work and during free time from the daily activity of 53 occupational groups was calculated. The evaluation of the overall results was presented. The average daily caloric expenditure, regardless of differential work load, was within relatively narrow limits.

A68-81690

ENERGY EXPENDITURE OF INDUSTRIAL WORKERS IN DIFFERENT OCCUPATIONAL GROUPS. IV. MEASUREMENT OF ENERGY EXPENDITURE IN DAILY

ACTIVITIES OF DIFFERENT OCCUPATIONAL GROUPS DURING SITTING, STANDING AND WALKING WITHOUT LOADING AS DURING OCCUPATIONAL ACTIVITY [DER ENERGIEVERBRAUCH VON INDUSTRIEARBEITERN VERSCHIEDENER BERUFSGRUPPEN. 4. MITT. ENERGIEVERBRAUCHSMESSUNGEN BEI WERKTATIGEN VERSCHIEDENER BERUFSGRUPPEN BEIM SITZEN, STEHEN UND GEHEN OHNE BELASTUNG SOWIE BEI DER BERUFSTÄTIGKEIT].

R. Maune and H.-A. Ketz.

Ernährungsforschung, vol. 13, no. 1, 1968, p. 25-40. 5 refs. In German.

Basic daily activity and occupational daily activity were investigated in men and women of different occupational groups during sitting, standing and walking using the indirect calorimetric method. The method involved the complex application of a respiration gas meter, the portable capacity analyzer "Spirolyt", and a nomographic calculation of the results. The average values were given for all investigated occupational groups as kcal./min. and as kcal./min./kg. (energy equivalents). Statistically established differences between men and women were shown for basic daily activity. The numerical values of the energy equivalents for women were somewhat lower than those for men.

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ENERGY EXPENDITURE OF INDUSTRIAL WORKERS IN DIFFERENT OCCUPATIONAL GROUPS. III. INVESTIGATION OF TIME DISTRIBUTION OF DAILY ACTIVITY OF DIFFERENT OCCUPATIONAL GROUPS DURING WORK TIME AND FREE TIME [DER ENERGIEVERBRAUCH VON INDUSTRIEARBEITERN VERSCHIEDENER BERUFSGRUPPEN. 3. MITT. UNTERSUCHUNGEN UBER DIE ZEITAUFTeilUNG BEI WERKTATIGEN VERSCHIEDENER BERUFSGRUPPEN WAHREND DER ARBEITSZEIT UND DER FREIZEIT].

R. Maune and H.-A. Ketz.

Ernährungsforschung, vol. 13, no. 1, 1968, p. 17-23. In German.

Seven representations served as profiles of a week obtained from time distribution studies of 1,046 working days (24-hr. days) from 421 women in 55 different occupational groups. The type of distribution was based on a comprehensive study of similar activity in individual persons. It was shown that more than 90% of the day was spent in work, sitting, standing, walking and sleeping. The numerical values for the respective activities were always of an equal order of magnitude. The ranges of variation were relatively small; and for individual activity, they were extremely small.

A68-81692

THE PRECEPTION OF VERTICALITY FOLLOWING SHORT-TERM SENSORY DEPRIVATION.

Giuseppe Girotti, Angelo Beretta, Paolo Renzi (Milan, U., Fac. Med., Ist. di Psicol. and Milan, U. Cattolica, Ist. di Psicol., Italy). *Archivio di Psicologia Neurologia e Psichiatria*, vol. 29, Mar.-Apr. 1968, p. 129-157. 65 refs.

Grants CNR N 04/130/5/3080 and CNR 04/76/4/3650/A.

In order to investigate the effects of short-term sensory deprivation on apparent verticality, 24 male subjects from 19 to 25 yr. old, were randomly assigned to four different durations of exposure to deprivation: i.e., five min. (control group), two, three, and four hr. (experimental groups). The subjects lay on a bed, which was swiftly converted into an easy-chair at the end of deprivation session. This chair could be tilted sidewise to obtain five different body positions: 28° and 14° body tilt to the left; 0° (body erect); 14° and 28° body tilt to the right. Under every body position, each subject was tested on the task of adjusting a faintly luminous rod so that it appeared vertical, in an otherwise dark room. Experimental design took also into account the starting

position in which the rod was set up at the beginning of a trial: 28° in a counterclockwise direction; 0° (plumb line); 28° in a clockwise direction. In every instance, the subject's performance was evaluated by measuring, in extent (angular degrees) as well as in direction, the departure of the apparent vertical from the true vertical. On the basis of a 4×5×3 three-factor design (with repeated observations on the last two factors), analysis of variance was carried out on the experimental data. Apparent verticality appears to be affected by body tilt as well as by starting position of the rod. As regards the former variable, departures from the physical vertical occur in the sense of the E-effect: the apparent vertical shifts relatively opposite to the side of body tilt. Because of the significant interaction with deprivation period, the E-effect may be regarded as increasing after three and four hr. of sensory deprivation: while in the latter conditions the phenomenon becomes clearly evident, only a slight tendency to the E-effect emerges after five min. or two hr. On the other hand, the apparent vertical is relatively close to the starting position of the rod. This starting position effect arises under body tilt conditions, while it does not hold with body erect. In connection with a review of the pertinent literature, the findings were discussed and interpreted in relation to the sensory-tonic field theory and its developmental principles. Within this context, short-term sensory deprivation can be conceived to cause a rather specific effect; i.e., a disturbance in functioning of hierarchically higher psychophysiological mechanisms which control perceptual constancy of vertical direction.

A68-81693**ALTERATIONS IN THE MOUSE CECUM AND ITS FLORA PRODUCED BY ANTIBACTERIAL DRUGS.**

Dwayne C. Savage and René Dubos (Rockefeller U., New York, N. Y.).

Journal of Experimental Medicine, vol. 128, Jul. 1, 1968, p. 97-110. 9 refs.

Grant PHS AI 05676 and Health Res. Council supported research.

Addition of penicillin, Terramycin, or kanamycin to the drinking water of adult mice rapidly induced in them an enlargement of the cecum. In all animals, this occurred within 12 hr. after the beginning of drug administration, the effect being most pronounced with penicillin. The cecums remained enlarged and generally continued to increase in size as long as the antibacterial drugs were administered. The increase in wet weight of the cecums was due primarily to an accumulation of water in the lumens during the first 24 to 48 hr. of drug administration. At that time, there were no detectable histological changes in any case, but the bacteriological picture differed from drug to drug. The cecums were free of bacteria in animals receiving penicillin, fusiform-shaped bacteria and bacteroides were present in those receiving terramycin, and lactobacilli and bacteroides in those receiving kanamycin. After the initial 48 hr., an abundant complex secondary microflora developed in all treated animals, its composition being characteristic for each type of antibacterial drug. When penicillin was administered for two wk., the cecal weights and microbial populations did not return to normal levels for over 14 days after discontinuance of the drug. This recovery period could be shortened to ten days by giving the mice food contaminated with cecal homogenates prepared from normal animals. A period of seven or eight days was required for the cecal weights and microflora to reach normal levels when the administration of penicillin lasted only 24 hr.; this period could not be shortened by giving the animals contaminated food. The effects of drugs on the size and bacterial contents of the cecum have been discussed in the light of earlier findings concerning the characteristics of the huge cecums uniformly found in germfree mice. Taken together, these observations support the hypothesis that certain elements of the intestinal microflora, not yet completely identified, play an essential role in maintaining the integrity of the water-transport mechanism in the intestinal epithelium.

A68-81694**MEDICAL APPLICATIONS OF RADIONUCLIDE INSTRUMENTATION TECHNIQUES. PART FIVE. PART A: PROTECTION AGAINST IONIZING RADIATION.**

C. F. Barnaby (Med. Res. Council, U. Coll. Hosp. Med. School, Dept. of Clin. Res., London, Great Britain).

World Medical Electronics, vol. 6, Apr. 1968, p. 94-100.

Radiation exposure and radiation protection were discussed for various environments and situations. Sources of radiation in everyday life were given along with their approximate dosages in some cases. Standards for occupational exposure to radiation were recommended, and measures were suggested for the protection of workers. Uses of radiation in medicine were also given with precautions for their use. Monitoring of the environment and of the workers using or exposed to radioactive materials was described. Special precautions for handling sealed and unsealed radioactive sources were given, and the problem of storage was discussed. Procedures for emergencies were also given.

A68-81695**EFFECT OF CALCIUM AND VITAMIN D₃ UPON THE FECAL EXCRETION OF SOME METALS IN THE MATURE MALE RAT FED A HIGH FAT, CHOLESTEROL DIET.**

Alan I. Fleischman, H. Yacowitz, Thomas Hayton, and Marvin L. Bierenbaum (St. Vincent's Hosp., Atherosclerosis Res. Center, Montclair and Fairleigh Dickinson U., Health Res. Inst., Madison, N. J.).

Journal of Nutrition, vol. 95, May 1968, p. 19-22. 20 refs.

Grant NIH H-5905; N. J. State Dept. of Health, Morris County Heart Assn., and Sandoz Corp. supported research.

The effect of elevated dietary calcium upon the excretion of ten metals was studied in 400-day-old male rats. Increasing dietary calcium from 0.08% to 1.2% increased excretion of lead, nickel, copper, cadmium, chromium, iron, manganese, zinc, cobalt and magnesium when the rats were fed a corn-soya diet containing 18% added fat as USP cocoa butter and two percent added cholesterol. Inclusion of 25 units of vitamin D₃/g. of feed partially or completely inhibited the ability of elevated dietary calcium to cause increased excretion of these metals. Although supplementation of a diet with some essential metals may possibly be required, elevated levels of dietary calcium appear to entail the dual effects of lowered serum lipids, without deposition in tissue, and of increased fecal excretion of some potentially deleterious metals.

A68-81696**CONTRIBUTIONS TO THE RADIOPROTECTIVE EFFECT OF SUBSTANCES ACTING UPON THE CENTRAL-PERIPHERAL AND VEGETATIVE NERVOUS SYSTEM [BEITRAGE ZUR STRAHLENSCHUTZWIRKUNG DER AUF DAS ZENTRAL-PERIPHERE UND VEGETATIVE NERVENSYSTEM EINWIRKENDEN SUBSTANZEN].**

Z. Uray and T. Holan (Inst. Med.-Farm., Sect. de Med. Nucl., Cluj, Rumania).

Radiobiologia Radiotherapia, vol. 9, no. 2, 1968, p. 135-140. 10 refs. In German.

The radioprotective effects of drugs on the central, peripheral and vegetative nervous system were reported. The radioprotective effect of the various drugs was established on mice pretreated and irradiated with lethal doses, on the basis of 30 days survival rate, survival time and the changes in body weight.

A68-81697**THE EFFECT OF THE TIDAL VOLUME ON PULMONARY DIFFUSING CAPACITY [VPLYV DYCHOVEHO OBJEMU NA DIFUZNU KAPACITU PLUC].**

I. Pavlik.

Bratislavské Lekarske Listy, vol. 49, Apr. 1968, p. 389–398. 20 refs. In Czech.

The possibilities are considered in explaining the increase in pulmonary diffusing capacity (D_L) by an increase in the tidal volume. The conclusion is made that it is due to changes in the size of the surface on which diffusion occurs. This view is in agreement with other phenomena, e.g. with the imperfect exponential relationship of CO-uptake from the alveolar content. From this concept it follows that also respiratory frequency should influence not only the percentage of CO-uptake in the lungs, but also the value of D_L measured. This circumstance explains also the differences in D_L measured by the single-breath method and by the method of steady state.

A68-81698

ENERGY EXPENDITURE OF INDUSTRIAL WORKERS IN DIFFERENT OCCUPATIONAL GROUPS. I. SIGNIFICANCE, PROBLEMATICS, METHOD [DER ENERGIEVERBRAUCH VON UNSTRIEARBEITERN VERSCHIEDENER BERUFSGRUPPEN. 1. MITT. BEDEUTUNG, PROBLEMATIK, METHODIK].

H.-A. Ketz and R. Maune.

Ernährungsforschung, vol. 13, no. 1, 1968, p. 1–6 15 refs. In German.

The significance of energy expenditure measurements in representative subjects of economically important occupational groups for practical, normal nutritional requirements was presented with particular consideration for rationalization and automation of work processes. After a brief explanation of the problematics, existing investigations of methodic and systematic procedures for the determination of energy expenditure of industrial work in typical occupational groups were reported in the scope of more joint work between the Institute for Nutrition of DAW and 12 industrial plants of the DDR.

A68-81699

POST-IRRADIATION DECREASE IN OXYGEN TENSION IN THE MUSCLE-TISSUE OF MICE, ITS DYNAMICS AND DOSE DEPENDENCE.

E. Davidová (Czech. Acad. of Sci., Inst. of Biophysics, Brno).

Radiobiologia Radiotherapia, vol. 9, no. 2, 1968, p. 167–172. 16 refs.

Oxygen tension in mouse muscle tissue was measured after irradiation with lethal and sublethal X-ray doses. It was found that after lethal irradiation with X-rays a significant decrease of oxygen tension in the muscle tissue can be observed at early post irradiation intervals, i.e. in the period where the amount of erythrocytes and hemoglobin does not show any substantial changes. A greater decrease in oxygen tension occurs before death. When lower radiation doses are used, a diminution in oxygen tension also occurs, manifesting itself in the second or third wk. after irradiation, i.e. in the period of developed post-irradiation anemia. Post-irradiation tissue hypoxia cannot be explained by the changes in the amount of erythrocytes and hemoglobin. These changes can be only a contributory factor in the period of development of post-irradiation anemia. Complex disturbance of the circulatory and blood systems is assumed.

A68-81700

SYNAPTIC INPUTS TO CELLS IN THE MEDIAL VESTIBULAR NUCLEUS.

V. J. Wilson, R. M. Wylie, and L. A. Marco (Rockefeller U., New York City, N. Y.).

Journal of Physiology, vol. 31, Mar. 1968, p. 176–185. 25 refs. Grants PHS NB 02619 and PHS 5T01 NB 05463

The properties of the vestibular input to cells in the medial vestibular nucleus, and the distribution of this input within the nucleus, was studied in decerebellated cats anesthetized with chloralose-urethan. Fifty-eight (22%) of the 264 cells studied fired monosynaptically in response to stimulation of the labyrinth, at a latency of 0.8 to 1.5 msec.; 86 (33%) fired polysynaptically; and 34 (13%) fired mono- and polysynaptically. The average threshold for monosynaptic firing was 1.7 ± 0.8 times the stimulus needed to produce a visible postsynaptic focal response (N_1 threshold) and the average threshold for polysynaptic firing was 2.8 ± 1.6 times N_1 threshold. Very little spatial summation was needed to produce monosynaptic firing of a medial nucleus cell. Cells fired monosynaptically by stimulation of the labyrinth were found mainly in the rostral 60% of the nucleus, in agreement with anatomical findings. Within this area they were found both laterally and medially. There was no preferential distribution of cells fired polysynaptically: the percentage of cells so driven was roughly the same at all rostrocaudal levels. Cells with axons in the medial longitudinal fasciculus (MLF) or descending medial longitudinal fasciculus (DMLF), as well as cells lacking such axons, were driven monosynaptically or polysynaptically by stimulation of the ipsilateral labyrinth with single shocks. Eighty percent of cells with axons in the DMLF were driven monosynaptically, compared to 37% of cells with axons in the MLF and 25% of nondriven cells. Vestibular excitation of projecting cells provides a short-latency pathway from the labyrinth to eye muscle motoneurons and to spinal segmental mechanisms. A number of cells in the medial nucleus were driven by stimulation of the contralateral labyrinth, and the latency of this firing was frequently shorter than 2.5 msec. Many of these cells received excitatory inputs from the ipsilateral labyrinth as well as other synaptic inputs. Stimulation of one labyrinth often produced inhibition of cells in the contralateral medial nucleus, as described by previous workers. Latency measurements reveal that the latency of this inhibition ranged from 1.6 to 3.7 msec. It is suggested that the inhibitory pathway usually consists of one excitatory commissural cell, and one inhibitory cell ipsilateral to the target cell. It is likely that in some instances there may be only one cell in the pathway, and that this is an inhibitory commissural cell. Transsynaptic excitation by MLF or DMLF stimulation was seen in many cells. Most of these could not be driven antidromically, and they often received inputs from the ipsilateral and contralateral labyrinth. It is suggested that some of these cells are excitatory and inhibitory interneurons exerting their actions in the ipsilateral and contralateral vestibular nuclei.

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ORGANIZATION OF THE MEDIAL VESTIBULAR NUCLEUS.

V. J. Wilson, R. M. Wylie, and L. A. Marco (Rockefeller U., New York City, N. Y.).

Journal of Physiology, vol. 31, Mar. 1968, p. 166–175. 29 refs. Grants PHS NB 02619 and PHS 5T01 NB 05463

The projection of cells in the medial vestibular nucleus was studied in decerebellated cats anesthetized with chloraloseurethan, by means of extracellular recording with the electrodes filled with fast green and 2 M NaCl. Cells were located by their antidromic responses to stimulation in the region of the ascending medial longitudinal fasciculus (MLF) rostral to Deiters' nucleus, or of the descending MLF at C_3 : by synaptic responses to this stimulation or to stimulation of the labyrinth, and by the presence of spontaneous activity. Forty-one percent of the cells could be fired antidromically by stimulation of the MLF, and very few of these cells were in the caudal third of the nucleus. Cells projecting into the MLF were found in medial, lateral, dorsal, and ventral areas and were intermingled with cells that did not project. Only 17% of the cells tested were fired antidromically by stimulation of the descending medial longitudinal fasciculus. Very few cells in the caudal third of the nucleus were driven antidromically, and the

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percentage of cells driven antidromically grew steadily in more rostral regions, reaching 50% in the most rostral area tested. The spinal projection of the medial nucleus is very modest compared to that of the lateral vestibular nucleus. Relatively few descending fibers were branches of dichotomizing axons that had a long branch projecting rostrally in the MLF. A substantial number of cells could not be driven antidromically by either stimulus. It is likely that among these cells were many inter-neurons, which are known to exist in the medial nucleus.

A68-81702

DISCHARGE PATTERNS OF BRAIN-STEM RESPIRATORY NEURONS IN RELATION TO CARBON DIOXIDE TENSION.

Morton I. Cohen (Albert Einstein Coll. of Med., Dept. of Physiol., New York City, N. Y.).

Journal of Physiology, vol. 31, Mar. 1968, p. 142-165. 72 refs. Grants PHS 2M-6418, PHS NB-3970, and Contract HRC I-292.

The effects of changes in alveolar CO₂ tension on discharge patterns of medullary and pontine respiratory neurons were studied in cats having bilateral vagotomy, pneumothorax and neuromuscular block; efferent phrenic nerve discharge served as an indicator of central respiratory periodicity. In all neurons lowered CO₂ level resulted in reduction of respiratory oscillation of discharge frequency. On the basis of direction and degree of change in discharge the responses to lowered CO₂ level were classified into three major types: (a) the type one response, which was shown mainly by inspiratory, expiratory and inspiratory-expiratory neurons, consisted of reduction of discharge frequency in all portions of the cycle; and at sufficiently low CO₂ levels the discharge disappeared (approached zero frequency); (b) the type two response, which was shown mainly by several kinds of expiratory neuron and by expiratory-inspiratory neurons, consisted of increase of discharge frequency in some portions of the cycle, together with reduction in other portions. As a result, any preexisting discharge gap (silent period) was eliminated, and discharge became continuous in character; at sufficiently low CO₂ levels the continuous discharge lost its respiratory modulation; and (c) the type three response, shown by neurons with continuous discharge modulated in phase relation to the respiratory cycle, consisted of reduction of discharge frequency in all portions of the cycle; in contrast to type one responses, discharge did not disappear at the lowest CO₂ levels but remained continuous and lost its respiratory modulation. The functional significance of these responses were discussed, with the aid of comparisons with CO₂ responses in respiratory nerves and muscles. On the basis of the occurrence of reciprocal responses to change of CO₂ level, it was suggested that respiratory periodicity arises from the activity of systems of reciprocally discharging neurons: (1) a pair of reciprocal systems consisting of expiratory-facilitatory neurons with type two responses and inspiratory-facilitatory neurons with type one responses; and (2) a pair of reciprocal systems consisting of inspiratory-facilitatory neurons with type two responses and expiratory-facilitatory neurons with type one responses. Several lines of evidence suggest that both pairs of systems are involved in the genesis of respiratory periodicity.

A68-81703

EXPERIENCE WITH ANTIRADIATION PROTECTION OF THE CENTRAL NERVOUS SYSTEM DURING ANTENATAL IRRADIATION OF RATS [OPYT PROTIVOLUCHEVOI ZASHCHITY TSENTRAL'NOI NERVNOI SISTEMY PRI ANTENATAL'NOM OBLUCHENII KRYS].

I. A. Pointkovskii and M. B. Gol'dberg (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Lab. of Neuropathol., Moscow).

Bulleten' Eksperimental'noi Biologii i Meditsiny, vol. 65, May 1968, p. 41-44. 8 refs. In Russian.

The conditioned reflex method was used to study the antiradiation effect of aminoethylisothiuronium BrHBr (AET) on the higher segments of the central nervous system of antenatally irradiated rats. One group of rats not subjected to ionizing radiation and administration of a protector served as control. Another group was irradiated on the 16th day of embryogenesis by X-rays (150 r). The third group was irradiated under the same conditions by the same dose, but pregnant females received the protector agent AET 15 min. prior to irradiation. AET toned down the radiation reaction and improved the conditioned reflex activity of the antenatally irradiated rats in the postnatal ontogenesis.

A68-81704

COMMUNITY AIR QUALITY GUIDES.

American Industrial Hygiene Association.

American Industrial Hygiene Association Journal, vol. 29, May-Jun. 1968, p. 299-303. 14 refs.

An ambient air quality guide for ozone, a photochemical oxidant was presented. The physical and chemical properties of ozone and its harmful effects, both to humans and animals, were reviewed. Air quality values and limits for exposure in various concentrations of ozone were also given.

A68-81705

HUMAN FOREARM MUSCLE METABOLISM DURING EXERCISE. I. CIRCULATORY ADAPTATION TO PROLONGED FOREARM EXERCISE.

J. Wahren and L. Hagenfeldt (Karolinska Inst., Serafimerlasarettet, Dept. of Clin. Physiol. and Dept. of Clin. Chem., Stockholm, Sweden).

Scandinavian Journal of Clinical Laboratory Investigation, vol. 21, no. 3, 1968, p. 257-262. 17 refs.

Grant SMRC 19X-722.

Forearm muscle blood flow, oxygen uptake and net production of lactate and pyruvate were determined during 60 min. forearm exercise periods in 17 healthy young men. Brachial artery blood flow rose at the onset of exercise and at ten min. had risen slightly more than five-fold. At the same time the forearm muscle oxygen uptake had increased 12-fold. During the rest of the exercise period there occurred a further small rise in blood flow and an increase in deep venous oxygen saturation, so that the oxygen uptake was unchanged. At the same time the forearm muscle lactate production and the lactate/pyruvate production ratio declined. These changes are taken to indicate that an adaptive reaction occurred in the forearm muscle vascular bed resulting in an improved muscle cell oxygenation.

A68-81706

HUMAN FOREARM MUSCLE METABOLISM DURING EXERCISE. II. UPTAKE, RELEASE AND OXIDATION OF INDIVIDUAL FFA AND GLYCEROL.

L. Hagenfeldt and J. Wahren (Karolinska Inst., Serafimerlasarettet, Dept. of Clin. Chem. and Dept. of Clin. Physiol., Stockholm, Sweden).

Scandinavian Journal of Clinical Laboratory Investigation, vol. 21, no. 3, 1968, p. 263-276. 39 refs.

Grant SMRC 19X-722.

The uptake, release, and oxidation of individual free fatty acids (FFA) in the human forearm were studied during a 60 min. exercise period. Muscular uptake of FFA rose with the arterial concentration. The muscle showed a slight preference for linoleic and oleic acid compared to palmitic acid. The forearm respiratory quotient indicated a constant fat oxidation during the period of exercise. The uptake of FFA covered about 50% of the fat oxidation. On the average 60% of the muscular FFA-¹⁴C was oxidized to

$^{14}\text{CO}_2$. The remaining radioactivity left the muscle as water-soluble metabolite(s). B-Hydroxybutyrate leaving the muscle was shown to be labeled. No release of glycerol accompanied the release of FFA during exercise. Glycerol- ^{14}C was oxidized by the exercising muscle. Glycerol dehydrogenase activity was demonstrated in human skeletal muscle.

A68-81707

A METHOD OF ISOLATING STIMULATION-INDUCED CHANGES IN HEART RATE. AUTOMATIC ANALYSIS OF INTERVALS AND AVERAGING [EINE METHODE ZUR ISOLIERUNG REIZABHÄNGIGER VERÄNDERUNGEN DER HERZSCHLAGFOLGE. AUTOMATISCHE INTERVALANALYSE UND MITTELWERTBILDUNG].

D. Krell, G. Rabending, and K. H. Parnitzke (Med. Akad., Nervenclin., Magdeburg, East Germany).

Acta biologica et medica germanica, vol. 20, no. 1, 1968, p. 7-12. In German.

A method of automatic and averaging of sequential time interval histograms under the influence of stimulation is described. Its application is confined to the analysis of mean values of R-R intervals of electrocardiograms under transient influence of photostimulation. It permits reduction of random components and a more clear expression of the systematic stimulation-released response.

A68-81708

STRUCTURAL CHANGES OF LIVER MITOCHONDRIA AFTER SHORT-TIME WARMING UP TO 50°C. IN VITRO AND IN VIVO [STRUKTURVERÄNDERUNGEN VON LEBERMITOCHONDRIEN NACH KURZFRISTIGER ERWÄRMUNG BIS 50°C IN VITRO UND IN VIVO].

H. David and I. Uerlings (Humboldt-U., Pathol. Inst., Abt. für Elektronenmikroskop, der Charité, Berlin, East Germany).

Acta biologica et medica germanica, vol. 20, no. 1, 1968, p. 65-76. 33 refs. In German.

If liver tissues are placed for three to seven min. in physiologic solutions of 37 to 50°C. the first structural changes take place at 42°C. Temperatures up to 45°C. produce slight swelling of the mitochondria and partial disintegration of the cristae. Temperatures of 47 to 49°C. bring about irreversible changes of mitochondria with destruction of the cristae and formation of osmiophilic matrix foci which are otherwise observed only after several hours of autolysis. The survival of liver tissue heated to 48 to 49°C. *in vivo* for more than one hr. shows that the cells in general and the mitochondria in particular exhibit signs of irreversible damage. Deposits of calcium salts in the mitochondria are also seen. Although with extreme hyperthermia *in vitro* temperatures of only 43.5 to 44°C. can be reached, where liver mitochondria *in vitro* are not yet damaged with certainty after three to seven min., the considerably longer duration of 30 to 50 min. has to be taken into account. Therefore investigations are necessary which examine the structural changes more closely under *in vivo* conditions.

A68-81709

THE INFLUENCE OF PROTECTION OF A SMALL PORTION OF BONE MARROW AND OF THE ERYTHROPOIETIC STIMULUS UPON THE HEMATOPOIESIS OF IRRADIATED RATS [VLIV OCHRANY MALE CASTI DRENE KOSTNI A ERYTHROPOETICKEHO PODNETU NA HEMATOPOEZU OZARENÝCH KRYS].

T. Trávníček, J. Neuwirt, J. Táborský, and E. Táborská.

Ceskoslovenska Patologie, vol. 4, May 1968, p. 78-87. 5 refs. In Czech.

The protection of a small portion of bone marrow from the influence of ionizing radiation leads to a slightly indicated favorable influence upon hematopoiesis injured by ionizing radiation. Blood loss, as well as administration of hemolysate of the animal's own red blood cells, and feeding raw beef liver exerts a distinct favorable influence upon erythropoiesis as well as upon leukopoiesis in irradiated animals with partial preservation of bone marrow. High doses of ionizing radiation will cause such a severe and irreparable damage to hematopoiesis that any stimulation of hematopoiesis in animals with partial preservation of bone marrow appears as ineffective. The hematopoietic stimulus as well as the protection of a small portion of bone marrow contribute to the more intense development of extramedullary hematopoiesis in the spleens and livers of irradiated rats.

A68-81710

FILTERS USED BY DRIVERS AT NIGHT.

A. J. Phillips.

Ophthalmic Optician, vol. 8, Jun. 22, 1968, p. 707-708, 713.

This paper is concerned with the filters which may be used intentionally or unintentionally by drivers at night. Various types of car windshields and glasses worn by drivers are described. The windshield utilizing heat absorbing tinting is discussed and its use is criticized for the decrease in visibility.

A68-81711

ANATOMIC, PHYSIOLOGIC, AND PHARMACOLOGIC FACTORS GOVERNING LIMB CIRCULATION.

John T. Shepherd (Mayo Clin., Sect. of Physiol. and Minn., U., Mayo Graduate School of Med., Rochester).

(*Am. Acad. of Phys. Med. and Rehabil.*, 29th Ann. Assembly, Miami Beach, Aug. 28, 1967).

Archives of Physical Medicine and Rehabilitation, vol. 49, Jun. 1968, p. 303-307. 14 refs.

The caliber of resistance vessels in skeletal muscles is controlled predominantly by chemical changes within the muscles. The noradrenergic nerves to muscle vessels act to regulate the total systemic vascular resistance; the cholinergic fibers are activated by emotional stress. During strong muscle contractions flow is mechanically restricted. In occlusive vascular disease, the maximal blood flow to the limb is limited by the caliber of the collateral vessels; the factors responsible for opening these vessels have not been determined. During exercise there is a pressure drop across the collateral vessels because of the marked dilation of the distal vessels. This explains many of the hemodynamic changes including the disappearance of the foot pulses.

A68-81712

PANOREX RADIOGRAPHY AND POLAROID PHOTOGRAPHY—DENTAL APPLICATIONS.

Lee M. Lightner and Arden G. Christen.

(*Federation Dentaire Intern., Comm. on Armed Forces Dental Serv., Paris, Jul. 1967*).

Revue Internationale des Services de Sante des Armees de Terre de mer et de l'Air, vol. 41, Mar. 1968, p. 231-236. 22 refs.

Results of studies were reported that have been conducted at Lackland Air Force Base, Texas, on the dental uses of panorex radiography and polaroid photography. The dental processing procedure described will improve the quality accuracy and scope of the initial dental examination when an individual enters on active duty with the United States Air Force. It will reduce the time required to process each individual. Savings will be effected in the utilization of professional manpower resources. Further savings will accrue from the early detection of pathological problems that would eventually entail the expenditure of disability benefits for

A68-81713

conditions that existed prior to service. It will provide a valid identification record as well as identify the treatment requirements as the individual enters the service. The procedure will assist in channeling special treatment cases to professional specialty care sections in those installations which have intern and resident training.

A68-81713

THE PROBLEM OF ESTABLISHING AN INTERNATIONAL CODE FOR MARKING DENTURES.

S. Golditz.

(*Federation Dentaire Intern., Comm. on Armed Forces Dental Serv., Paris, Jul. 1967*).

Revue Internationale des Services de Sante des Armees de Terre de mer et de l'Air, vol. 41, Mar. 1968, p. 239-241.

Increasing frequency of aircraft crashes has demonstrated the value of dental data in identifying the victims. The German Air Force has started a program in which an initial dental examination is performed on its flying personnel. A full mouth X-ray with panorex apparatus, and a photographic record of the palate relief form a good baseline survey of the individual's dental condition. In addition the marking of dentures with a personal code number will be a useful means for identification purposes when stainless steel is used instead of acrylic in dentures. The apparatus used by the German Air Force for engraving dentures is described. To be most effective the compilation of dental data, relevant to the living and particularly to those at above average risk, should be standardized on an international basis. It is suggested that some form of international working group be set up for this purpose.

A68-81714

GENERAL ASPECTS OF DENTAL IDENTIFICATION.

S. Keiser-Nielsen.

(*Federation Dentaire Intern., Comm. on Armed Forces Dental Serv., Paris, Jul. 1967*).

Revue Internationale des Services de Sante des Armees de Terre de mer et de l'Air, vol. 41, Mar. 1968, p. 219-225.

Among the numerous methods of post-mortem identification permitting the legal establishment of identity, the dental identification system was one of the few that survived practical testing. The teeth and the surrounding structures by their relatively great resistance and the individuality of their components are one of the more reliable methods of identification. Dental identification procedures based on pre- and post-mortem data when properly arranged provide easy data for comparison. Identification in case of mass disaster may be difficult by the lack of adequate facilities, qualified personnel and the time necessary to carry out the examinations. The problem of identification is very important in military personnel. Teeth by the resistance of their structure present a combination of individual features sufficient for positive identification of mutilated bodies. A system of pre-mortem dental recordings is already in use in many armies.

A68-81715

IDENTIFICATION OF THE INDIVIDUAL IN THE ARMED FORCES [L'IDENTIFICATION INDIVIDUELLE DANS LES FORCES ARMEES].

Clauco Martins Santos.

(*Federation Dentaire Intern., Comm. on Armed Forces Dental Serv., Paris, Jul. 1967*).

Revue Internationale des Services de Sante des Armees de Terre de mer et de l'Air, vol. 41, Mar. 1968, p. 227-228. In French.

After a brief review of the different identification procedures in use, a system which combined dental and rugopalatine characteristics to the dactyloscopic record of each individual was

presented. Identification by means of lips was also considered. It is suggested that the Armed Forces should use for the individual identification of its personnel, the trilogy of human identification: dactylo-odonto-rugopalatoscopy.

A68-81716

THE INFLUENCE OF CHLORPROMAZINE ON VISCERO-VISCERAL REFLEXES FROM THE GALL BLADDER OF CATS, CONSIDERING THE BIOELECTRICAL ACTIVITY OF THE CEREBRAL CORTEX (ECG) [DER EINFLUSS VON CHLORPROMAZIN AUF VISZERO-VISZERALE REFLEXE DER GALLENBLASE DER KATZE UNTER BERUECKSICHTIGUNG DER BIOELEKTRISCHEN AKTIVITAT DER HIRNRINDE (ECG)].

W. Rüdiger, M. Lindemann, W. Lahl, and K.-D. Noll (Humboldt-U., Physiol. Inst., Berlin, East Germany).

Acta biologica et medica germanica, vol. 20, no. 4, 1968, p. 473-481. 53 refs. In German.

In chronic experiments with cats the action of chlorpromazine was tested on viscerovisceral reflexes, considering the cortical macropotentials. In all animals fistulae were operated into the fundus of the gall-bladder. Epidural electrodes were implanted in the premotoric and occipital region. In the normal state the influence of the mechanical stimulation of the gall bladder, on the heart rate, and on respiratory movements, on the electroencephalogram (EEG) and behavioral concomitants was studied. After administration of chlorpromazine the changes of the vegetative reactions and of the cortical electrical activity, which could be observed before administration of the drug, were inhibited or vanished completely. When the action of the chlorpromazine was gone, the influence of the distention of the gall bladder on the vegetative functions and the EEG reappeared.

A68-81717

THE INFLUENCE OF WEARINESS ON THE OPTICAL REACTION TIME OF MAN [UBER DEN EINFLUSS DER ERMUDUNG AUF DIE OPTISCHE REAKTIONSZEIT DES MENSCHEN].

M. Bradl (Friedrich-Schiller-U., Physiol. Inst., Jena, East Germany).

Acta biologica et medica germanica, vol. 20, no. 4, 1968, p. 489-493. 5 refs. In German.

The influence of fatigue on the optical reaction time of man was investigated. Physiologically caused symptoms of fatigue considerably reduced reaction time. The effect was drastically enhanced by administration of the hypnotic methaqualon (2-methyl-3, o-toly-4-chinazolinon) and can be completely suppressed by ephedrine hydrochloride. Measurements of the reaction time appear to be an appropriate methodic means for testing drugs affecting the central nervous system.

A68-81718

METHOD FOR EVALUATION OF MUSCLE FATIGUE AND ENDURANCE FROM ELECTROMYOGRAPHIC FATIGUE CURVES.

Herbert A. deVries (Southern Calif., U., Dept. of Phys. Educ. and Rossmoor-Cortese Inst., Physiol. of Exercise Res. Lab., Los Angeles).

American Journal of Physical Medicine, vol. 47, Jun. 1968, p. 125-135. 15 refs.

Five experiments were performed in an effort to further elucidate the nature of the electromyographic fatigue curve and its potential use as a practical, objective, non-traumatic measure of muscular fatigue or endurance in normal humans. In almost all cases the first four to six values (0 to 70 or 110 sec.) of integrated electromyogram (EMG) voltage plotted linearly as a function of time during isometric contraction of the elbow flexors at 30, 40 and

50% of maximal voluntary contraction (MVC). When the MVC was measured directly, the correlations between measured endurance time (MET) and the log slope coefficient of the EMG fatigue curve were -0.625 , -0.680 and -0.474 for 30, 40 and 50% MVC, respectively. When the MVC was estimated from submaximal contractions (eliminating motivational factors) by EMG procedures, the relationships between MET and log slope coefficient of the EMG fatigue curve were enhanced; $r = -0.789$ and -0.817 for 40 and 50% MVC, respectively. The test-retest reliability of the method was found to be $r = -0.934$. The consistency of the fatigue level as determined by test-retest with one to three wk. intervening was found to be $r = -0.827$. When fatigue was brought about experimentally by isometric and isotonic methods, and in the elbow flexor and knee extensor muscle groups, the expected change in slope coefficient was clearly demonstrated in each case. Circulatory arrest was found to bring about marked changes in the nature of the isometric fatigue curve produced by the elbow flexor group at 20% of MVC. This finding lends further support to the hypothesis of previous workers that rapidly induced fatigue is a peripheral effect.

A68-81719**DECISION MAKING IN SMALL GROUPS: A SIMULATION STUDY.**

Geoffrey P. E. Clarkson (Manchester Business School, Great Britain). *Behavioral Science*, vol. 13, Jul. 1968, p. 288-305. 25 refs. Grant NIH MH-07722; NASA, MIT, Ford Found., and CIT supported research.

The objective of this research was to develop and test an information-processing theory of group decision behavior. The individual was taken as the basic unit. It was hypothesized that if an adaptive model of individual behavior were developed, then a group's behavior would be a predictive result of the interaction of models of its participants. The theoretical scheme chosen was that of an information-processing theory of individual decision behavior. To construct such a theory three important problems had to be resolved: (1) how to determine the decision processes of individual subjects; (2) how to identify the leader-follower relationship and its effects on group decision processes; and (3) how to generate the requisite empirical data to test the predictive ability of the proposed theory. The solutions were, first, to construct an experimental task which permitted both individuals and groups to generate observable, sequentially linked, task-dependent behavior. Second, an adaptive information-processing program was written which was capable of learning to behave like the observed behavior of individual subjects. Third, hypotheses were introduced concerning the leader-follower relationship in two-person groups so that interactions in dyads could be represented. The theory was tested by having subjects perform a number of trials, first as individuals and then as members of two-person groups. During the group phase, subjects had to agree on what to do on each trial before proceeding to the next. Data from the individual phase were used to build programs that mimicked the decision behavior of each subject. These programs were then employed as the basis of the group model, which predicted the observed behavior of each member as well as the resulting behavior of the group, trial by trial. The tests were successful in that the theory's performance was statistically superior to that of a number of alternative models based on data provided by 15 subject groups.

A68-81720**THE CURRENT IMPORTANCE OF THE QUANTITATIVE DETERMINATION OF THE CALCIUM CONTENT OF THE SKELETON [AKTUELLE BEDEUTUNG DER QUANTITATIVEN BESTIMMUNG DES SKELET-KALZIUM-GEHALTES].**

E. Krokowski and E. Haasner (Berlin, Freien U., Strahleninst./-klin., Stadt. Krankenhaus Westend, East Germany). *Wehrmedizinische Monatsschrift*, vol. 12, Apr. 1968, p. 229-232. 11 refs. In German.

Determination of the calcium content of every skeletal segment, which can be easily performed by radiological substance analysis, is of current importance because of American and Russian reports which indicate a decrease of bone calcium after space flights of astronauts. The reports present the determination of the normal values of the skeletal calcium and studies on changes of the calcium concentration during immobilization of extremities and also discuss the qualification of the relationships between the risk of fracture and the physiological decrease of the amount of bone calcium due to age.

A68-81721**THE ROLE OF THE ADRENAL CORTEX IN PATIENTS WITH SINGLE AND COMBINED TRAUMATIC LESIONS [DIE ROLLE DER NEBENNIERENRINDE BEI EINZEL- UND KOMBINATIONSTRAUMEN].**

D. von der Nahmer and E. Sprenger.

Wehrmedizinische Monatsschrift, vol. 12, May 1968, p. 241-244. 12 refs. In German.

The daily profile of the plasma corticosterone level of male albino mice shows a pronounced day-night rhythm. Low values exist during early morning and the peak is reached on hr. prior to the onset of darkness. It is also possible to demonstrate a rhythm of corticosteroid secretion in humans. The minimum level occurs around 10:00 p.m. and the maximum around 6:00 a.m. Thus, in humans, as well as in mice, the peak of the corticosteroid concentration occurs one hr. prior to the onset of the waking period. Single noxious factors, such as ether anesthesia, skin wound and x-ray irradiation produced a definite increase of the plasma steroid level and eight hr. after the stress, the plasma steroid levels decreased below the levels of the daily profile. In these tests the trauma combination consisted of a skin wound with subsequent total body x-ray irradiation with 250 r. In this test a skin wound which was produced 24 hr. prior to irradiation, resulted in a stronger and more protracted steroid release than a skin wound which was produced 96 hr. prior to irradiation, or an entire body irradiation. The decrease of the radiation mortality which was confirmed for trauma combinations with a 24 hr./interval between the mechanical injury and irradiation could be explained by the increased corticosteroid release which was observed.

A68-81722**AN EXPERIMENTAL SYSTEM FOR AEROSOL RESEARCH.**

Francis J. Haughey and Raymond M. Manganelli (Rutgers-The State U., Dept. of Environ. Sci., New Brunswick, N. J.).

(Am. Ind. Hyg. Assn., Ann. Meeting, Chicago, May 1967).

American Industrial Hygiene Association Journal, vol. 29, May-Jun. 1968, p. 268-278. 13 refs.

An aerosol test system which permits the study of the interactions between aerosol particles, carrier gas, and various pollutants, including radioactive atoms and ions, is described. The system includes aerosol generator, contact and retention chambers, scattered light sensor units and multichannel analyzer, and cascade impactors. Aerosol flow is controlled by means of solenoid valves. Read-out of particle data from the multichannel analyzer is by typewriter, recorder, and punched paper tape for input to an IBM 1620 or 7040 computer for calculation of particle distribution parameters. The flexibility of the system has been shown in studied involving carbon, titanium dioxide, and fly-ash particles in nitrogen, argon, and argon plus water vapor carrier gases and the daughters of radon-220.

A68-81723

A68-81723

VISIBLE DISTANCES AND SAFE APPROACH SPEEDS FOR NIGHT DRIVING.

G. Johansson and K. Rumar (Uppsala, U., Dept. of Psychol., Sweden).

Ergonomics, vol. 11, May 1968, p. 275-282. 15 refs.

Swed. State Traffic Safety Board supported research.

The purpose of this investigation was to demonstrate the visible distances that can be considered realistic during night driving on non-illuminated roads. From the experimental data the approach speeds were calculated that can be considered as safe for various conditions and states of the driver, the car and the road. Four-hundred-thirteen drivers volunteered to participate in their own cars in 14 different places in Sweden. Each driver's task was to drive his car toward a stationary car, both cars with dipped headlights, and to brake as soon as he was aware of a dark-clothed dummy that was placed in the middle of the lane beside the stationary car. A special experiment compared the results of this semi-dynamic test with those of a fully dynamic test. The median visible distance was 23 m. and the tenth percentile 15 m. The calculated safe approach speeds for the tested drivers varied between 25 km./h. and 50 km./h. depending on the conditions chosen. A simplified parallel investigation with 974 participating drivers did not show any marked divergencies.

A68-81724

EFFECT OF TASK COMPLEXITY AND STIMULUS DURATION ON PERCEPTUAL-MOTOR PERFORMANCE OF TWO DISPARATE AGE GROUPS.

P. Tolin and J. R. Simon (Iowa, U., Dept. of Psychol., Iowa City).

Ergonomics, vol. 11, May 1968, p. 283-290. 22 refs.

This study was concerned with two task dimensions, complexity and stimulus duration, which previous research had shown to accentuate or reduce performance differences between age groups. Young and old groups made an unguided movement at the onset of one stimulus light in a four-light display. Task complexity was varied by altering the number of response alternatives (one or two) while holding the display constant. Two stimulus durations were used: 0.110 sec. and 2.0 sec. Old subjects reacted 30% slower and moved 76% slower than young. Both reaction time and movement time were slower for the complex task than for the simple. The difference between simple and complex movement time was significantly greater for old subjects than for young. Young subjects moved faster with the 0.110 sec. stimulus while old subjects moved faster with the 2.0 sec. stimulus.

A68-81725

DO IRRADIATED FOODSTUFFS HAVE A RADIOMIMETIC EFFECT? II. NUTRITION TESTS ON MICE WITH WHEAT FLOUR IRRADIATED WITH UP TO FIVE MEGARAD [LES ALIMENTS IRRADIES EXERCENT-ILS UN EFFET RADIOMIMETIQUE? II. ESSAIS D'ALIMENTATION DE LA SOURIS AVEC UNE FARINE DE FROMENT IRRADIEE A 5 MEGARAD].

L. Bugyaki, A. Thijs, A. Lafontaine (Inst. d'Hyg. et d'Epidemiol., Brussels, Belgium), A. R. Deschreider (Min. des Affaires Econ., Lab. Central, Brussels, Belgium), J. Moutschen, and M. Moutschen-Dahmen (Liege, U., Lab. de Gen., Belgium).

Atompraxis, vol. 14, Mar. 1968, p. 112-118. 23 refs. In French.

A series of physicochemical modifications were observed in flour irradiated with gamma-rays of Co⁶⁰ in doses of five Megarad. When 50% of the diet of mice consisted of this freshly irradiated flour, certain physiopathologic changes, affecting in particular the longevity and fertility of the animals, were observed. The frequency of tumor occurrences seemed to increase in animals

fed on irradiated diet. An important fact revealed was that though the easily detected anatomicopathological lesions increased very slightly, and examination of the livers, kidneys, spleen, lungs, and gastro-intestinal tract showed no characteristic lesions, the study of meiotic chromosomes revealed certain markedly increased alterations when 50% of the animal diet consisted of irradiated flour. Without inferring that diets including small amounts of lightly irradiated food would have harmful effects, it seemed that high irradiation in the amount of five Megarad of a large portion of the diet could produce disturbances worthy of special attention.

A68-81726

THE EFFECT OF 2-(2,6-DICHLOROPHENYLAMINO)-2-IMIDAZOLINE HYDROCHLORIDE (ST 155) ON THE ARTERIAL OXYGEN TENSION AND THE BLOOD PRESSURE AT REST AND ON PHYSICAL EXERTION [DIE WIRKUNG VON 2-(2,6-DICHLOROPHENYLAMINO)-2-IMIDAZOLIN HCL AUG DIE ARTERIELLE SAUERSTOFFSPANNUNG UND DEN BLUTDRUCK IN RUHE UND BEI BELASTUNG].

Martin Stauch (First Med. Universitätsklinik., Frankfurt/Main, West Germany).

Arzneimittel-Forschung, vol. 18, May 1968, p. 597-600. 13 refs. In German.

In 29 patients with coronary and pulmonary diseases and hypertension and in normal individuals, the arterial blood gases were determined after oral or intravenous administration of 2 (2, 6 dichlorophenylamino) 2 imidazoline hydrochloride (ST 155) under control of pulse and blood pressure. A statistically significant drop of the oxygen tension, which reached a degree of possibly clinical consequences, was found only in the group with cardiac and pulmonary diseases. The minute volume of respiration of 20 other patients not purposely selected was decreased to a statistically significant degree by St 155. With eight patients, tests under stress conditions were performed with St 155 and without. During medication the systolic values of blood pressure and the pulse frequency remained markedly below the control values while the oxygen tension was not changed. A decrease of capacity under stress or orthostatic dysregulations were not observed. The possible causes for the reduction of the oxygen tension are discussed.

A68-81727

EXPERIMENTAL STUDIES WITH IRRADIAN, AN ANTIRADIATION DRUG [EXPERIMENTELLE UNTERSUCHUNGEN MIT EINEM NEUEN STRAHLENSCHUTZPRAPARAT].

E. Szirmai, B. Berkada, S. Hajdukovic, and J. M. Lopez-Gonzalez (Inst. of Nucl. Engr., Med. Sect., Dept. of Nucl. Hematol., London, Great Britain and Stuttgart, U., Inst. fur Kernenergetik, Abt. Strahlenhamatol. und-biol., West Germany).

Arzneimittel-Forschung, vol. 18, May 1968, p. 625-628. 20 refs. In German.

The antiradiation drug Irradian, which contains 50 µg. vitamin B₁₂, 200 mg. vitamin C; 100 mg. ferrosulfate; 0.8 mg. folic acid; 50 mg. L-cysteine; 100 mg. D-fructose; 40 mg. N-acetyl-DL-homocysteinethiolactone; 50 mg. *ulva lactuca*, and 50 mg. *faex torulae* shows low toxicity (experiments in mice and rats). In rats it displays marked antiphlogistic and choleric properties as well as a remarkably good curative effect on experimentally applied wounds. The effect on the blood pressure (cats) is essential. It has no diuretic effect in rats. Its spasmolytic activity (guinea pigs) is greater than that of papaverine. It has an effect similar to atropine but smaller by three-tenth powers. There is not the least mydriatic effect to be noted. Its antihistamine activity in the ileum of guinea pig is low compared with other antihistamine substances, but unmistakable. Low doses of Irradian have no influence on the central nervous system, but after administration of subtoxic doses it can be observed. Remarkable is the potentiation of the analgesic

activity of morphine as well as its prolongation by additional application of Irradian in mice and rabbits. Low doses of Irradian show a positively inotropic effect, the substance enhances the increase of coronary circulation, depresses the vascular resistance and increases the oxygen transport through the coronary vessels.

A68-81728**PERCEPTION OF APPARENT MOTION AND DEGREE OF MENTAL PATHOLOGY.**

J. L. Chambers (Fla. State U., Tallahassee) and W. T. Wilson (Minn., U., Minneapolis).

(*Southeastern Psychol. Assn., Meeting, New Orleans, Apr. 1, 1968*). *Perceptual and Motor Skills*, vol. 26, part 1, Jun. 1968, p. 855-861. 7 refs.

Grant NIMH MH-10332-02.

Measures of apparent motion discrimination ability, memory, and intertrial variability were obtained for groups of 54 normal, 32 neurotic, 54 alcoholic, 54 admission schizophrenic, 108 chronic schizophrenic, and 103 geriatric subjects. The groups differed on all three apparent motion measures, with the greatest impairment manifested by groups with the most severe mental pathology. Low intercorrelations of the apparent motion tasks, differences in correlations with Inpatient Multidimensional Psychiatric Scale items, and differences among the groups supported the hypothesis that apparent motion perception and memory processes are independent functions which are impaired to different degrees by different types of mental pathology.

A68-81729**AN ALTERNATIVE METHOD OF TESTING DIFFERENTIAL RECOGNITION THRESHOLDS IN A TACHISTOSCOPE.**

Douglas W. Bethlehem (London, U., Goldsmiths' Coll., Great Britain).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 868.

Ten words following congruous or incongruous contexts of different lengths were presented tachistoscopically to 10 undergraduate subjects at a constant duration of 15 msec. at a level of illumination of 100 millilumens/ft.² repeated at three-sec. intervals. The threshold was the number of exposures up to the first of three consecutive correct responses. An important disadvantage of the method stems from the fact that inter-subject thresholds differ considerably. The experiment indicates that this method is useful for measuring differential thresholds to stimuli which are differentially set, emotional, taboo, etc.

A68-81730**PERCEPTION BIBLIOGRAPHY: LVII. PSYCHOLOGICAL ABSTRACTS, 1939, VOLUME 13, SECOND HALF.**

C. H. Ammons and R. B. Ammons (Mont., U., Missoula).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 879-882. 96 refs.

Ninety-six references to work on perceptual phenomena are listed alphabetically.

A68-81731**INFLUENCE OF TYPE OF STRESSOR AND SEX OF SUBJECT ON TIME ESTIMATION.**

Roger P. Greenberg and Ronald B. Kurz (Syracuse U., N. Y.).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 899-903. 7 refs.

Ninety subjects estimated a fixed period of time under a no-stress condition and either a failure, pacing, or another no-stress condition. The results showed that men under failure reduced their estimates of the passage of time significantly more

than women under failure and significantly more than men under pacing. These results were discussed primarily in terms of differential arousal of achievement motivation by the two stressors and differences between the sexes in achievement motivation. Results seem to support the hypothesis that unique stress-producing operations lead to unique effects on estimation of time. Further, the results highlight the role of sex in such research.

A68-81732**EFFECTS OF AUTONOMIC AROUSAL LEVEL, SEX AND FRUSTRATION ON PERFORMANCE.**

Michael M. Burgess (Kan., U., Med. Center, Lawrence) and Jack E. Hokanson (Fla. State U., Tallahassee).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 919-930. 15 refs.

This paper investigates the effects of initial heart rate level (Drive), sex and frustration on symbol-matching performance. Low (LD), moderately low (MLD), moderately high (MHD), and high (HD) heart-rate subjects worked on a modified digit-symbol problem before and after a frustration or no-frustration manipulation which raised heart rate on the average 20.6 and 2.96 beats/min. respectively. The results show that MHD and HD subjects complete significantly more matches initially than LD and MLD subjects by manifesting both shorter response and inter-trial interval latencies. Furthermore, frustration induced autonomic arousal facilitates performance improvement for LD and MLD subjects and decelerates performance improvement for MHD and HD subjects. Frustration-induced arousal exerts this effect by altering latency only. No sex differences were observed.

A68-81733**APPARENT SIZE-APPARENT DISTANCE RELATIONSHIPS IN FLAT STIMULI.**

Roy B. Mefferd, Jr. and Betty A. Wieland (Houston, U.; Baylor U., Coll. of Med.; and Veterans Admin. Hosp., Psychiat. and Psychosomat. Res. Lab., Houston, Tex.).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 959-966. 15 refs.

Subjects judged the apparent sizes of the "near" and "far" faces of A Necker cube and a "cylinder" percept formed stereokinetically from a pair of overlapping flat circles rotating in the frontal plane. The "near" face with both stimuli was judged to be smaller than the "far" one. This was a constant property of the "near" face regardless of perspective reversals. These results suggest that there is a physiological mechanism for the organization of size-distance relationships.

A68-81734**INTERMODAL PERCEPTION OF TEMPORAL ORDER AND MOTOR SKILLS: EFFECTS OF AGE.**

Albert J. Dinnerstein and Phyllis Zlotogura (New York Med. Coll., N. Y.).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 987-1000. 21 refs.

Grants VRA RD 1372-P and PHS MH-07656.

Employing visual, auditory, and tactile stimuli, intermodal differences in perceptual latency were inferred by means of perception of temporal order (PTO) and by varieties of serial reaction times (RT) to the same stimuli. Skill at reading, peg board, tapping, and tracking was also determined for the same subjects. Mean intermodal differences in latency inferred from PTO were significantly different from those obtained from mean RTs. A correlation matrix showed that individual differences in visual, auditory and tactile latencies inferred from PTO were relatively independent of latencies inferred from RT. Consonant with previous studies, PTO scores

A68-81735

correlated with reading rate and also with peg board speed. Taking age of subjects into account, the latter correlations were seen to be due exclusively to the presence of older subjects, who did show a correlation between PTO and RT. It was hypothesized that aged subjects showed a decrease in perceptual "channel capacity" and a resulting overloading of short-term memory when faced with a complex perceptual and motor task.

**A68-81735
STRENOUS MUSCULAR EXERTION IN THE POLAR CLIMATE.**

K. L. Andersen, B. Hellstrom, and R. Eide (Bergen, U., Physiol. Inst. and Inst. of Work Physiol., Oslo, Norway).

Ergonomics, vol. 11, May 1968, p. 261-274. 23 refs.
AFOSR supported research.

Work capacity and cold tolerance were studied in 12 subjects who attempted to cross the Polar ice-cap on skis. The principal changes observed were an increase in body weight and skinfold thickness, a drop in the resting and working heart rates, a slight decrease in the maximum oxygen uptake, a marked increase in the basal metabolic rate and an increase in tissue conductance. Most of these changes seem related to increased physical activity, and perhaps to associated increases in protein intake.

**A68-81736
FINE STRUCTURE OF THE CAROTID BODY OF NORMAL AND ANOXIC CATS.**

Fadhil Al-Lami and Raymond G. Murray (Ind. U., Dept. of Anat. and Physiol., Bloomington).

Anatomical Record, vol. 160, Apr. 1968, p. 697-717. 56 refs.
Grants NIH HE 06958 and NIH NB 07472.

Certain modifications and clarifications of current concepts of the fine structure of the carotid body are described. The two principal cell types are here designated "enclosing" and "enclosed" to emphasize the enveloping nature of the former. The enclosed cells have numerous processes, contain lysosome-like bodies which are sometimes related to crystals with a period of about 100Å. In addition to the typical dark-cored vesicles, a few with lighter content are always present. The enclosing cells are in most respects similar in their contents to the enclosed, even to the presence of occasional dark-cored vesicles, a few with lighter content are always present. The fenestrations of the blood vessels apparently are closed by thin diaphragms. In addition to the type of nerve endings previously described, there is a second type which extensively surrounds the enclosed cells, in the manner of a basket, and differs from the first type in having relatively empty cytoplasm with a few synaptic vesicles or mitochondria. It is postulated that this is the afferent ending, while the former may be efferent. Severe anoxia rendered both cell types more dense than normal. In contrast to previous reports, the dark-cored vesicles of the enclosed cells did not disappear but rather increased in relative number, and their mitochondria were less opaque. No comparable changes were noted in control anoxic tissues of liver, kidney or adrenal medulla. The possibility is discussed that the enclosing cell has more than a simple supportive function, as the usual name "sustentacular" seems to imply.

**A68-81737
CONTROL LAW OPTIMIZATION IN SIMULATED VISUAL TRACKING OF AIRCRAFT.**

L. R. Speight (Army Personnel Res. Estab., West Byfleet, Surrey, Great Britain) and J. S. Bickerdike (Roy. Radar Estab., Malvern, Worcs., Great Britain).

Ergonomics, vol. 11, May 1968, p. 231-247. 9 refs.

This paper is concerned with simulated aircraft tracking using a pressure joystick and a control law which contains position,

velocity and acceleration terms. Two experiments are described in which optimum values for these terms are derived for different target motions. Two different control laws are then defined. From the evidence of the experiments one would expect one of these laws to be well suited to targets with small angular accelerations, and the other to targets with accelerations which are relatively large. This expectation is confirmed when the two control laws are compared under normal laboratory conditions and under conditions of extra task loading. It is concluded that the optimum values of control law constants depend on target motion characteristics, and some general relationships between the former and the latter are pointed out.

**A68-81738
THE EFFECTS OF HEAT, COLD, AND EXERCISE ON THE PERIPHERAL CIRCULATION.**

John A. Downey, Robert C. Darling, and John M. Miller (Columbia U., Coll. of Physicians and Surgeons, Dept. of Rehabil. Med., New York, N. Y.).

(*Am. Acad. of Phys. Med. and Rehabil.*, 29th Ann. Assembly, Miami Beach, Aug. 29, 1967).

Archives of Physical Medicine and Rehabilitation, vol. 49, Jun. 1968, p. 308-314. 62 refs.

The physiologic effects of heat, cold, and exercise are discussed in relation to their local and systemic reactions within the peripheral circulation. The knowledge of these reactions is suggested as a basis for appropriate use and understanding of physical and therapeutic modalities in the care of patients.

**A68-81739
TELEMETRIC RECORDING OF GAIT PHASE ACTIVITY IN MUSCLE.**

Otto Goldkamp (Hartford Hosp., Conn.).

Archives of Physical Medicine and Rehabilitation, vol. 49, Jun. 1968, p. 349-352. HEW, Dept. and Hartford Hosp. supported research.

A system capable of telemetering the electromyogram of an ambulating subject was described. Bilateral and unilateral recording of gait phase and muscle activity could be obtained without undue encumbrance of the subject. The method seemed reliable and yielded the desired information at a minimal cost, but nevertheless further development toward a more compact unit was deemed desirable.

**A68-81740
INVESTIGATIONS ON THE BIOGENESIS OF CHLOROPHYLL A. III. BIOSYNTHESIS OF Mg-VINYLPHEOPORPHINE A₅ METHYLESTER FROM Mg-PROTOPORPHINE IX MONOMETHYLESTER AS OBSERVED IN CHLORELLA MUTANTS.**

R. K. Ellsworth and S. Aronoff (Iowa State U., Dept. of Biochem. and Biophysics, Ames).

Archives of Biochemistry and Biophysics, vol. 125, Apr. 1968, p. 269-277. 20 refs.

Grant NSF GB 3935 and PHS supported research.

Ultraviolet *Chlorella* mutants are described. Structures are suggested for the porphyrins which they accumulate and which appear to complete the gap in the proposed biosynthetic pathway of chlorophyll a between Mg-protoporphine IX monomethyl ester and vinylpheoporphine a₅ methyl ester. In this sequence, formation of the isocyclic ring is preceded by reduction of the 4-vinyl side chain. Structure assignments were made primarily by mass spectrometry of a mixture of the esterified porphyrins, oxidation of the mixtures, and identification of the products (maleimides).

A68-81741

STORAGE STUDIES ON PRESERVATIVE SOLUTIONS IN GLASS AND PLASTIC BOTTLES.

F. Neuwald and G. Schmitzek (Hamburg, U., Inst. für Pharm. Chem., West Germany).

*(Intern. Congr. of Pharm. Sci., 28th, Montpellier, Sep. 1967).**Journal Mondial de Pharmacie*, vol. 11, Jan.-Mar. 1968, p. 5-8.

Preservative solutions (benzalkonium chloride, Bronopol, chlorhexidine diacetate, chlorhexidine gluconate, chlorhexidine hydrochloride, domiphen bromide, hexachlorophane, potassium sorbate, methylparaben, mixture of methyl- and propylparaben 2:1, phenylmercuric acetate phenylmercuric borate, phenylmercuric nitrate, sorbic acid, and thimerosal) in the usual concentration were stored in containers made of different plastic materials and ordinary medicine bottles made of colorless hydrolytic glass for comparison. The containers (glass and plastic) were stored up to six months at different temperature and atmospheric conditions. Results of the experiments showed that the reduction of the concentration of different preservatives, especially at temperatures of 40°C. were not due to absorption into the plastic materials. The losses in strength may be explained by the high permeability of the plastic containers to oxygen, by the instability of the preservatives in aqueous solutions, by changes of pH, and by the addition of stabilizers, plasticizers, etc.

A68-81742

THE TEMPERATURE OPTIMUM OF THE INTESTINAL FLORA OF THE RAT.

Stephen D. Allen and Thomas D. Brock (Ind. U., Dept. of Microbiol., Bloomington).

Canadian Journal of Microbiology, vol. 14, Jun. 1968, p. 699-704. 12 refs.

Grant NSF GB-5258.

Two types of experiments were performed to determine if the microbial flora of the intestinal tract of the rat was optimally adapted to body temperature. The first involved the preparation of agar-spread plates from dilutions of intestinal material and incubation at a variety of temperatures. The temperature optima of the colonies which arose were then determined by replica plating. The second procedure involved the measurement of the temperature optimum for the incorporation of radioactive isotopes into the mixed microbial flora taken directly from the intestinal tract and studied without culture of preincubation. One series of experiments involved measurement of the rate of incorporation of $^{32}\text{PO}_4$ into ribonucleic acid and deoxyribonucleic acid. In another set of experiments, the temperature optimum for the incorporation of ^{14}C -glucose into the mixed microbial flora was measured. All of these studies showed that the optimum temperature of the microbial flora was indeed similar to the temperature of the habitat. Preliminary studies were also done with a dog and with red squirrels, with similar results.

A68-81743

HYPEROXIA AND LOCOMOTOR ACTIVITY IN RATS.

Martin J. Gerben.

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 745-746.

Exposure to an eight percent O_2 atmosphere (hypoxia) reduced activity-wheel running of rats approximately 50% with respect to a 21% O_2 (normoxia) control condition. Exposure to 30, 60, and 100% O_2 (hyperoxia) did not affect locomotor activity.

A68-81744

EFFECT OF SET ON THE FADING OF LUMINOUS IMAGES.

David Ryback (McGill U., Montreal, Canada).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 781-782.

The effect of set on the perception of fading luminous images was investigated and found to exist. The sets employed were those previously used in research involving stabilized retinal images, part-line vs. whole-line disappearance.

A68-81745

MOTIVATIONAL FACTORS IN VIGILANCE: EFFECTS OF INSTRUCTIONS ON PERFORMANCE IN A COMPLEX VIGILANCE TASK.

Luigi F. Lucaccini, Amos Freedy, and John Lyman (Calif., U., Biotechnol. Lab., Los Angeles).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 783-786. 10 refs Calif., U. supported research.

Pre-task instructions have been a neglected source of motivation in vigilance. In the present study, 32 subjects monitored a complex visual vigilance display for 40 min. with a signal rate of 60/hr. Sixteen subjects were told that such tasks are usually challenging (positive set) and 16 were told such tasks are usually monotonous (negative set). Performance was significantly better throughout the session by subjects with the positive set and decrements did not occur with either group. The results indicate the importance of motivational factors in vigilance. Implications for vigilance research are discussed.

A68-81746

PERCEPTION BIBLIOGRAPHY: LVI. PSYCHOLOGICAL ABSTRACTS, 1939, VOLUME 13, FIRST HALF.

R. B. Ammons and C. H. Ammons (Mont., U., Missoula).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 811-814. 97 refs.

Ninety-seven references to work on perceptual phenomena are listed alphabetically.

A68-81747

AGREEMENT BETWEEN THE SPATIAL SENSES.

Gerald H. Fisher (Newcastle upon Tyne, U., Great Britain).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 849-850.

Upon requiring subjects to judge the relative positions of stimuli in different modalities, appreciable constant errors were found. This implies that the agreement between the spatial senses is apparent rather than actual.

A68-81748

ECOLOGY AND BIOGEOGRAPHY OF HIGH ALTITUDE INSECTS.

M. S. Mani (St. John's Coll., School of Entomol., Agra, India).

The Hague, The Netherlands, Dr. W. Junk N.V. Publishers, 1968. xiv+527 p. 1141 refs.

A description is given of the distinctive characters of the high altitude environment, the ecological specializations of high altitude insects and their biogeography. The principle mountain ranges are discussed in light of their orogeny, geology and vegetation. The main emphasis of the book is on the evolution of the high altitude ecosystem as an integral part of the orogeny. Other arthropods such as the chilopoda, arachnida and Diplopoda are discussed. A bibliography of over 1,100 titles is included.

A68-81749

EXTREME BODY COOLING AND PSYCHOMOTOR PERFORMANCE.

J. M. Lockhart (U.S. Army Natick Labs., Pioneering Res. Div., Natick, Mass.).

Ergonomics, vol. 11, May 1968, p. 249-260. 14 refs.

A68-81750

In a series of experiments on the effect of body cooling (the lowering of mean weighted skin temperature (MWST) while maintaining normal hand skin temperature (HST) on psychomotor performance, the following results were obtained. (1) Block-stringing (BS) and block-packing (BP) performance decreased linearly across levels of body cooling (MWST's of 78°, 74°, 70°, and 66°F.). (2) Body cooling (MWST-70°F.) affected steadiness-aiming (SA) performance, but did not affect performance on the Craik screw task, the Purdue pegboard assembly (PA) task and the two-plate-tapping task. (3) The effect of level of body cooling on SA performance was similar for fast and slow cooling rates. Significant BS and PA performance decrements occurred only under the low level (70°F. MWST) and slow rate (90 min. exposure) condition. (4) Increasing the duration of exposure for 20 and 40 min. after a given MWST condition was attained resulted in significant decreases in BS performance. (5) Practice resulted in improved BS performance under body cooling conditions, but did not alter the decremental effect of body cooling on performance relative to the control condition. The significance of the above findings to the problem of alleviating cold-exposure-induced performance decrements is discussed.

A68-81750**WEIGHING EVIDENCE: AN ATTEMPT TO ASSESS THE EFFICIENCY OF THE HUMAN OPERATOR.**

H. C. A. Dale (Hull, U., Dept. of Psychol., Great Britain). *Ergonomics*, vol. 11, May 1968, p. 215-230. 14 refs.

A diagnostic task was constructed in which there were four hypotheses. Subjects had to assess the probable truth of each hypothesis and revise their assessments as evidence accumulated. Previous investigations have indicated that subjects are inefficient in tasks of this kind because they undervalue evidence. It is shown that although this is generally true a few subjects make accurate probability revisions. A primary effect was demonstrated and it was also shown that subjects find it difficult to combine evidence from two sources when these appear to be disparate.

A68-81751**THE EFFECTS OF WATER AND FOOD DEPRIVATION ON THE HEART RATE OF RATS.**

Sachio Ashida (Mich., U., Dept. of Psychol., Ann Arbor).

Psychonomic Science, vol. 11, Jul. 5, 1968, p. 245-246. 7 refs.

The heart rate (HR) of male hooded rats was recorded in a nonhome cage for three wk. Then they were deprived of water (Group 1, N=6) or food (Group 2, N=6) up to 96 hr. HR was recorded at 8 hr., 24 hr., 48 hr., 72 hr., and 96 hr. of deprivation. The HR of Group one increased linearly with the duration of water deprivation, while that of Group two showed an inverse U-shaped function. These functions suggest that HR is influenced by two concomitant conditions: dehydration and metabolism.

A68-81752**KINETIC MEASUREMENTS ON RHODOPSIN SOLUTIONS DURING INTENSE FLASHES.**

Theodore P. Williams and Sandra J. Breil (Fla. State U., Inst. of Mol. Biophys. and Dept. of Biol. Sci., Tallahassee).

Vision Research, vol. 8, Jul. 1968, p. 777-786. 16 refs.

Grant PHS NB-07140 and AEC supported research.

Kinetic spectroscopy is used to investigate the rate at which metarhodopsin II (meta II) accumulates during (and, in some cases, after) flash photolysis of rhodopsin solutions. This process is studied as a function of flash intensity, temperature, and extracting medium. It is shown that the rate at which meta II accumulates is photo-limited at high temperatures but thermo-limited at low

ones. Photoequilibria are shown to exist, under certain circumstances, during the course of a flash. The quantum efficiency of meta II production is shown to be time dependent when intense flashes are used but not when weak flashes are used. It is suggested that kinetic spectroscopy may be useful in investigating the chemical basis of the early receptor potential.

A68-81753**SINGLE UNIT ANALYSIS OF BACKWARD VISUAL MASKING AND METACONTRAST IN THE CAT LATERAL GENICULATE NUCLEUS.**

Peter H. Schiller (Mass. Inst. of Technol., Cambridge).

Vision Research, vol. 8, Jul. 1968, p. 855-866. 33 refs.

NASA Grant NsG 496 and Grant NIH NB 07456.

Microelectrode recordings in the cat lateral geniculate nucleus were undertaken under conditions of visual stimulation corresponding to those which in the human observer would lead to masking and metacontrast. Successive stimuli falling on the same receptive field produced results at the unit level which were parallel to the perceptual masking effects obtained in man. However, stimulus conditions corresponding to metacontrast, where the second stimulus occupies an area adjacent to the first, did not have clear parallels at the unit level.

A68-81754**THE DEPENDENCE OF CRITICAL FLICKER FREQUENCY AND THE ROD THRESHOLD ON THE STATE OF ADAPTATION OF THE EYE.**

W. Ernst (Nottingham, U., Dept. of Psychol., Great Britain).

Vision Research, vol. 8, Jul. 1968, p. 889-900. 20 refs. Med. Res. Council supported research.

New evidence is presented for the human eye showing that the effects of background lights and the after-effects of an intense field, while very similar, do not always act in an identical manner. A subject's critical flicker frequency (c.f.f.) for a fixed intensity light and his scotopic threshold both depend on the state of adaptation of his eye. If background effects and after-effects acted through a common mechanism to determine the state of adaptation a unique relation would exist between c.f.f. and threshold. In fact, the relation depends on whether measurements are made in the presence of backgrounds or in the presence of after-effects. Attention is drawn to the significance of this finding for an analysis of adaptation experiments.

A68-81755**A PNEUMATIC CONTROL DEVICE FOR PREPARING AND DISPENSING GAS MIXTURES.**

J. Brennan Gisclard (AF Flight Dyn. Lab., Environ. Control Branch (FDFE), Wright-Patterson AFB, Ohio).

American Industrial Hygiene Association Journal, vol. 29, May-Jun. 1968, p. 248-251.

A pneumatically operated piston device was developed which can be used to prepare gas mixtures in volumes up to one l. and dispense them at selected and controlled rates. It can be used to dispense liquids at constant rates from a glass or plastic syringe of any size. It is also useful for calibration of low-flow-rate rotameters. The device is built from commercially available metal cylinders and valves and is operated by compressed air or inert gases through a simple level mechanism. A variable check valve controls the forward movement of the piston through a vernier which assures delivery of any flow rate. The unit operates in a horizontal plane, making it convenient for use from a bench top or mounted on a cart containing a small cylinder of nitrogen with a regulator.

A68-81756**THE EFFECT OF MOVEMENT ON THE PERCEIVED BRIGHTNESS OF CHROMATIC AFTERIMAGES.**

John G. Seamon and Leon W. Teft (Bridgeport, U., Conn.).
Psychonomic Science, vol. 11, May 15, 1968, p. 43-44.

The present study explored the effects of adaptation to static and moving chromatic stimuli on the perceived brightness of afterimages projected on static and moving achromatic test stimuli. The subjects were presented with two stimuli of the same color to which they adapted for one min. The subjects then reported the brightness of their afterimages when viewing achromatic stimuli. A rotating stimulus, viz., 16, 56, or 78 r.p.m. was compared with a stationary stimulus. Results indicate that (a) the introduction of movement detracts from the brightness of an afterimage, and (b) a speed of 45 r.p.m. affects the afterimage more than 16 or 78 r.p.m.

A68-81757**JUDGED COMPLEXITY AS A FUNCTION OF SCHEMA RELATED VARIABLES.**

Sam H. Lane and Selby H. Evans (Tex. Christian U., Fort Worth).
Psychonomic Science, vol. 11, May 15, 1968, p. 45-46. 7 refs.
Contract DOD DAADO5-68-C-0176 and Grant RSA RSAORH2.

The present study is an application of schema theory to complexity judgments. Three schemata, varying in regularity, and three levels of redundancy were combined to form nine conditions of stimulus complexity. The results indicate that the schema rule and redundancy level additively influence judged complexity.

A68-81758**A NOTE ON LONG-TERM RECOGNITION MEMORY FOR PICTORIAL MATERIAL.**

Raymond S. Nickerson (Bolt Beranek and Newman Inc., Cambridge, Mass.).
Psychonomic Science, vol. 11, May 15, 1968, p. 58.

In an earlier experiment subjects examined an extended sequence of photographs attempting to identify those photos that were occurring for the second time within the sequence. This note describes the results obtained when, after periods ranging from a day to a year, the same subjects were asked to distinguish between new photos and photos that they had seen while participating in the original experiment.

A68-81759**EFFECTS OF INCREASING SUCCESS AND FAILURE ON PERCEIVED INFORMATION QUALITY.**

Siegfried Streufert (Purdue U., Dept. of Psychol., Lafayette, Ind.) and Carl H. Castore (Rutgers-The State U., Dept. of Psychol., New Brunswick, N. J.).
Psychonomic Science, vol. 11, May 15, 1968, p. 63-64. 5 refs.
ONR supported research.

The effect of experimentally-induced success and failure in a complex decision-making task on subjective estimates of information quality was obtained for information relevant to subjects' own decision-making area and that of a marginal group member. It was found that quality initially is perceived to improve. Estimates of quality for success and failure conditions do not differ until success and failure levels are quite high. Once high levels of success are reached, subjects in the success condition consider information was further improving, while subjects in failure conditions maintain previous perceptions. The implications of this result for complexity theory are considered.

A68-81760**THE LETTER SPAN IN SPACE AND TIME.**

James W. Mathewson, Jr., John C. Miller, Jr. (Duke U., Durham, N. C.), and Herbert F. Crovitz (Durham V. A. Hosp., N. C.).
Psychonomic Science, vol. 11, May 15, 1968, p. 69-70. 11 refs.

The subjects had to report as many as they could of eight letters which were arranged in a line or a circle around the fixation point and which were flashed for a duration of 20 to 120 msec. The subjects were not told which arrangement of letters or duration of exposure would occur on any trial. The likelihood that a given letter will be reported depends on time and on the position it has in the particular configuration of which it is a part, but does not significantly depend on an interaction of position and exposure duration.

A68-81761**AVERAGED EVOKED POTENTIALS TO CLASSES OF VISUAL STIMULI.**

H. Weinberg and R. E. Cole (Simon Fraser U., Dept. of Psychol., Burnaby, Brit. Columbia, Canada).
Psychonomic Science, vol. 11, May 15, 1968, p. 71-72. 6 refs.

Evoked potentials were averaged from different visual stimuli within the same class. Classes of stimuli were: Taboo words, Neutral words, Letters, and Blank flashes. Stimuli within classes were randomized and sequence of classes balanced within a group of six male and six female subjects. Estimates of spectral components showed that the frequencies 2-16 c.p.s. contributed significantly more to the averaged evoked response recorded from the class of neutral stimuli than it did any of the other classes when compared with all other classes. Differences between spectral components of other stimulus classes (Taboo, Letters, and Blank) were not significant. An interpretation of the results involving active suppression of the effects of Taboo words is discussed.

A68-81762**OCCURRENCE AND INCIDENCE OF SPONTANEOUS PNEUMOTHORAX IN THE FLYING PERSONNEL [AUFRETEN UND HAUFIGKEIT DES SPONTANPNEUMOTHORAX BEIM FLIEGENDEN PERSONAL].**

H. Fuchs.

Wehrmedizinische Monatsschrift, vol. 12, May 1968, p. 225-259. 25 refs. In German.

The occurrence of a spontaneous pneumothorax (spnph) in apparently healthy members of the flying personnel of the USAF, RCAF, RAF and the German Air Force is studied critically. The support apparently does not occur more frequently among flying personnel under the usual flying conditions in high performance aircraft than in other professions and activities unless pulmonary diseases exist which predispose individuals to the occurrence of a spnph. On the ground a spnph generally is not dangerous; however, among flying personnel it becomes a far more serious problem because of the additional dangers and risks of flying. If a pilot is readmitted to flying service by special permit, he, nevertheless, should not fly either one-seat high performance craft nor other types of airplanes without a co-pilot and should avoid flying maneuvers with high stresses if he did not undergo surgical treatment. The modern surgical treatment of spnph not only reduces the duration of the illness but also reliably eliminates the possibility of the relatively frequent relapses. Therefore, flying personnel who have or had a spnph should be cured reliably by surgical treatment and become fit for service in the air forces.

A68-81763**SEXUAL DIMORPHISM OF THE PROPRIOCEPTIVE AND EXTEROCEPTIVE REFLEXES IN THE NORMAL SUBJECT**

A68-81764

[POLOVOI DIMORFIZM PROPRIOTSEPTIVNYKH I EKSTEROTSEPTIVNYKH REFLEKSOV V NORME U CHELOVEKA].

P. S. Babkin (Second Moscow Med. Inst., Dept. of Nervous Diseases and Krasnodar Med. Inst., Dept. of Nervous Diseases, USSR).

Zhurnal Nevropatologii i Psikiatrii, vol. 67, no. 10, 1967, p. 1481-1487. 27 refs. In Russian.

The development with age of certain reflexes produced by exteroceptors and proprioceptors was studied in 1,168 healthy subjects aged one to 30 yr. Clinical methods, electromyography and cinematography were used. It was found that in the normal subject besides the individual and age factor variations, certain reflexes such as the abdominal, laryngeal, Mayer's, and leg flexor, showed a sexual dimorphism. Hyporeflexia was observed more frequently in adult females than in adult males. By the means of the finger flexor reflex produced by the Rusetskii method, sexual dimorphism was determined. The reflex was observed more frequently in female than male subjects.

A68-81764

SURGERY DURING WEIGHTLESSNESS [OSOBENOSTI OPERATIVNOGO VMESHATEL'STVA V USLOVIAKH NEVESOMOSTI].

G. L. IAroshenko, V. G. Terent'ev, and M. N. Mokrov.

Voenna-Meditsinskii Zhurnal, no. 10, Oct. 1967, p. 69-70. In Russian.

The purpose of the investigation was to solve some of the problems that would arise during surgery in future space flights. Experiments were carried out in a specially designed transparent enclosure. The surgeon strapped to his seat performed a laparotomy on rabbits anesthetized locally. The operation lasted ten min. in the condition of weightlessness. The experiment showed that: surgical intervention in weightlessness presented no particular difficulties. The possibility of the scattering of biological fluids under relatively high pressure, i.e. arterial blood, must be envisaged. The prevention of contamination of the cabin atmosphere during the incision of richly vascularized tissues could be prevented by applying hemostatic clamps' moderate bleeding did not present great danger. Regional anesthesia was found to be the most favorable method used in weightlessness. During the incision of the abdomen, increased protrusion of the bowels was noted, therefore it would be advisable to perform the operation by stages and to reduce the incision length to a minimum. When opening the large or small intestines no pollution of the cabin atmosphere occurred. The filling of the syringe with the anesthetic solution offered no difficulty, but precautions should be taken not to allow air to enter the syringe with the solution.

A68-81765

STANDARDS FOR AVIATION NOISE EXPOSURE [O NORMIROVANII VOZDEISTVIA AVIATIONNYKH SHUMOV].

I. A. Borshchevskii, V. S. Kuznetsov, and E. V. Lapaev.

Voenna-Meditsinskii Zhurnal, no. 10, Oct. 1967, p. 80-83. In Russian.

Studies were made to establish standards for maximum permissible noise levels in aviation. Investigations on the effects of intermittent and cumulative broadband noise of jet engines on the auditory, cardiovascular and nervous systems were carried out on 15 healthy subjects. The noise spectrum used in the experiments was approximately two units higher than the accepted norms of industrial noise established by the International Standards Organization. The difference may be accounted for by the fact that the experiments were carried out on young healthy subjects under monitored work conditions and diets. The practical application of

the presented standards of maximum permissible noise levels in conjunction with individual and collective protection devices, could be an effective additional contribution to the existing protective measures against noise effects.

A68-81766

EFFECT OF HYPOXIA ON HIGH RATE MENTAL ACTIVITY [VYSOKOTEMPOVAIA UMSTVENNAIA DEIATEL'NOST' CHELOVEKA V USLOVIAKH GIPOKSII].

K. K. Ioseliani.

Voenna-Meditsinskii Zhurnal, no. 10, Oct. 1967, p. 83-86. In Russian.

Experiments were conducted in a low-pressure chamber with a simulated altitude of 5,000 m. on 40 aviators, aged 25-45 yr. Ten of them were suffering from vaso-vegetative disturbances. Their ability to carry out mental tasks under hypoxic conditions was studied by means of a continuous arithmetic test performed at a pre-established rate, which to a certain degree reproduced the most essential characteristics of flight activities, high speed and continuity. The study was carried out before, during the exposure (five to ten min.) in pressure chamber, and after the exposure. Hypoxia caused in all the subjects a significant decrement in mental performance and retardation of intellectual processes, demonstrated by a difficulty in concentrating, slowness in reasoning and difficulty in remembering. The decrement of the performance increased with the time limit. With reduced ability to carry out mental tasks the power of self criticism became impaired. In the subjects suffering from vaso-vegetative disturbances deeper alterations of the intellectual activities were detected under hypoxia, than in healthy subjects. Psychologic studies carried out in limited time conditions appeared to be a convenient method in establishing deterioration of cortical activity in patients suffering from vaso-vegetative disturbances.

A68-81767

THE JUMBO JET AND PUBLIC SAFETY.

Jerome Lederer (NASA, Washington, D. C.).

(Anglo-Am. Aeron. Conf., 10th, Los Angeles, Oct. 20, 1967).

Aeronautical Journal, vol. 72, Apr. 1968, p. 291-298. 8 refs.

The jumbo jet will be an extension of the art of designing and operating current jets. These represent a greater step from the past in passenger load than the transition to the jumbo jet. The accident rate has remained constant for almost 20 yr. despite manifold increase in size and passenger load and in speed of aeroplanes. Nevertheless, sheer numbers of people exposed to an accident, however rare, compels extraordinary attention to accident avoidance and crash survival. The jumbo jet is getting this attention. Industrial morality recognizes its obligations to the public more so than in the past. However, the ground support needed to match the performance and safety of the aeroplane continues to lag and this probably will persist unless the affluent nations provide assistance to the less affluent. Familiar causes of aeroplane accidents should be appreciably reduced with new techniques and procedures which will be available about the time of the introduction of the jumbo jet. These notably involve approach techniques, mid-air collision prevention, training, systems safety engineering, multi-channel flight recorders, explosion suppression and crash survival. The size of the jumbo jet adds to safety by reducing air traffic, by providing greater energy absorption in a crash, multiple undercarriage, reduced effect of explosive decompression and easier evacuation in emergencies. The problems of safety created by a greater size and cabin population result from relatively rare occurrences of panic potential, medical attention in flight, rescue and medical attention following a crash, turbulence, fire associated with ground operations, spread of disease, sabotage, public casualties when crashes occur in densely populated areas.

A68-81768**EFFECT OF CHLORPROMAZINE AND DESMONOMETHYL-CHLORPROMAZINE ON TISSUE MONOAMINES.**

Liisa Ahtee and Matti K. Paasonen (Helsinki, U., Dept. of Pharmacol., Finland).

Annales Medicinæ Experimentalis et Biologiæ Fenniae, vol. 46, no. 1, 1968, p. 45-48. 18 refs.

Sigrid Jusélius Found. and Natl. Res. Council for Med. Sci. supported research.

Desmonomethylchlorpromazine is more potent than chlorpromazine in releasing monamines from platelets and adrenal glands *in vitro*. In *in vivo* experiments these compounds, when given at high doses to rats, did not change the 5-hydroxytryptamine (5HT) and noradrenaline contents in several tissues. In rabbits, however, 10 mg./kg. i.v. of chlorpromazine decreased in three hr. the 5HT content in lungs by 39% and in duodenum by 18%. After a similar dose of desmonomethylchlorpromazine these values were 58% and 38%, respectively. The lung tissues accumulated five to seven times as much of these phenothiazines as the duodenal tissues. In addition, the content of desmonomethylchlorpromazine was higher than that of chlorpromazine in these tissues. Chlorpromazine caused no clear 5HT changes in the portal and arterial blood constituents of rabbits. The results indicate that, as *in vitro*, the phenothiazines can cause also *in vivo* a monoamine depletion which may be correlated to the tissue levels of these drugs.

A68-81769**EFFECT OF CHLORPROMAZINE ON ADIPOSE TISSUE AND PLASMA FREE FATTY ACIDS (FFA) IN THE RAT.**

P. Torsti and H. I. Vapaatalo (Helsinki, U., Dept. of Pharmacol., Finland).

Annales Medicinæ Experimentalis et Biologiæ Fenniae, vol. 46, no. 1, 1968, p. 60-62. 13 refs.

Sigrid Jusélius Found. supported research.

The action of chlorpromazine on plasma concentrations in the rat of free fatty acids and blood glucose were examined after a single dose and after a seven-day treatment. The effect of chlorpromazine and some related agents on the adipose tissue contents of free fatty acids *in vitro* was also studied. A single dose of chlorpromazine caused a significant rise in the plasma level of free fatty acids. The effect of the seven-day treatment was not so strong. In an acute experiment, chlorpromazine did not alter the blood glucose concentration but in the prolonged experiment there was a significant decrease. *In vitro* neither chlorpromazine nor its derivatives changes the adipose tissue content of free fatty acids, but the lipolytic activity of adrenaline was increased by 10^{-5} M chlorpromazine and decreased by 10^{-4} and 10^{-3} M.

A68-81770**HYPERBARIC OXYGEN TOXICITY PREVENTION WITH SUCCINATE.**

Aaron P. Sanders, Richard G. Lester, and Barnes Woodhall (Duke U., Med. Center, Dept. of Surg., Div. of Neurosurg. and Dept. of Radiol., Div. of Radiobiol., Durham, N. C.).

(*Am. Med. Assn., 116th Ann. Conv., Atlantic City, Jun. 20, 1967*). *Journal of the American Medical Association*, vol. 204, Apr. 15, 1968, p. 241-246. 7 refs.

Contract ONR N000 14-67-A-0251-002, NR 102-682 and Grant PHS GM-14226.

Succinate protection against oxygen toxicity in rats was investigated at oxygen pressures of 5, 7, 9, and 11 atmospheres absolute (atm. abs.), and compared with protection given by dextrose and malate. Times to convulsions were used for comparison. Dextrose and malate gave no protection. Succinate provided relatively long-term protection at five and seven atm. abs. oxygen exposures, but showed decreasing protection with increasing

pressure. Succinate provided no protection at oxygen pressures of 12 atm. abs. or higher. A 3:1 sodium succinate:ammonium succinate mixture (0.4M, pH 7.4) solved the problem of alkalosis previously encountered with a sodium succinate solution. The infusion of the 3:1 mixture (six millimols/kg./hr.) in dogs exposed to five atm. abs. oxygen delayed convulsion five to 11 times longer than in controls. Intracellular localization and thin layer chromatography studies with succinate-2, 3 14 C showed that succinate readily penetrated the blood brain barrier.

A68-81771**THE CHARACTER OF COMPENSATORY MOVEMENTS IN STANDING POSITION IN CORRELATION WITH THE INCREASE OF PULSE FREQUENCY FROM PHYSICAL LOAD [DAS VERHALTEN DER AUSGLEICHSBEWEGUNGEN BEIM STEHEN IN ABHANGIGKEIT VOM ANSTIEG DER PULSFREQUENZ BEI PHYSISCHER BELASTUNG].**

G. Rehbert (Inst. für Luftfahrtmed. der Luftstreitkräfte und Luftverteidigung, Königsbrück, East Germany).

Acta biologica et medica germanica, vol. 20, no. 3, 1968, p. 279-288. 18 refs. In German.

The frequency of compensatory movements for balance of a standing person under conditions of rest and of physical load (bicycle ergometer test) using a statokinesimeter of the Electronique Appliquée Co. was studied. The results were put in relation to the increase of pulse rate which took place during physical load from the bicycle ergometer. A significant correlation was observed between the degree of pulse rate increase under physical load and the type of compensatory movements in standing position. Particular attention was drawn to frontal differences and their dynamics noticed during the test. A correlation between these changes and the "leans" in flying is looked for.

A68-81772**BRAIN TEMPERATURES IN AWAKE CHICKEN [GEHIRNTEMPERATUREN BEI HUHNERN].**

Ursula von Saint Paul and Jürgen Aschoff (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen and Erling-Andechs, West Germany).

Pflügers Archiv für die gesamte Physiologie, vol. 301, May 27, 1968, p. 109-123. 30 refs. In German.

In 11 adult cocks, temperatures of the brain and of the neck's skin were recorded continuously for several days under constant conditions in a sound-proof chamber. The deep brain temperature was found to be 2.0 to 2.5° C. higher than the temperature at the surface. All chickens showed marked circadian rhythms of brain temperature, with 1.3° C. as a mean range of oscillation; they were superimposed by minor waves of 15 to 30 min. duration (range 0.2 to 0.4° C.). At different depths of the tissue, from the brain's surface down to 12 mm., these oscillations were synchronized and mainly in phase with each other. Temperature changes in the skin were often mirror-like to the temperature changes deep in the brain. All records support the hypothesis that the temperature changes reflect primarily changes in blood flow; some observations disagree with the assumption that the temperature changes are caused by changes in blood temperature or in tissue metabolism. Concurrent with optical stimulation or with a spontaneous increase in alertness, there was an increase in brain temperature at all depths.

A68-81773**SURFACE AND VOLUME JUDGMENTS OF THREE-DIMENSIONAL SHAPES.**

Richard J. Stanek (Santa Clara, U., Dept. of Psychol., Calif.).

Psychonomic Science, vol. 11, Jun. 5, 1968, p. 121-122. 5 refs. NSF supported research.

A68-81774

Surface and volume judgments of 10 solids were studied in two groups, one having formal knowledge of mathematics and the other having limited acquaintance with mathematics. For both groups, the most marked errors in surface and volume judgments were associated with those solids which departed most from the series. The remaining shapes did not affect volume or surface judgments differentially. Overall comparisons of mean judgments with actual volume and surface magnitudes of the shapes revealed a marked tendency toward underestimation of surface and accurate estimations of the volumes of solids. Subjects with mathematical background appeared to possess no particular advantage in judging volume or surface of solids over subjects with a modicum of mathematical background.

A68-81774

EFFECT OF PHOTIC STIMULATION ON THE BIOELECTRIC ACTIVITY OF THE BRAIN AND MUSCULAR TONUS OF THE SPEECH APPARATUS IN PATIENTS SUFFERING FROM LOGONEUROSIS [VLIIANIE FOTOSTIMULIATSII NA BIOELEKTRICHESKUIU AKTIVNOST' GOLOVNOGO MOZGA I TONUS MYSHTS RECHEVOGO APPARATA U BOL'NYKH LOGONEVROZAMI].

I. M. Cherepanov (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Lab. of Exptl. Pathol. of Central Nervous System, Leningrad). *Zhurnal Nevropatologii i Psikhiatrii*, vol. 67, no. 10, 1967, p. 1477-1481. In Russian.

The effects of photic stimulation of the cerebral cortex bioelectric activity and on the muscular tonus of the speech system were studied in subjects suffering from logoneuroses (50), neuroses (10) and a control group of ten normal subjects. It was established that photic stimulation did not cause stuttering, modifications of temporal speech parameters or augmentation of muscular tonus in the control group. The existing correlation between the electroencephalogram and electromyogram changes was not altered. In the neurotic patients as well as in the logoneurotic there was an augmentation of muscular tonus after photic stimulation. In logoneurotic patients in addition to the increase of muscular tonus, the degree of stuttering increased with photic stimulation in the range of 2-5 c.p.s. and 16-20 c.p.s. In patients with a clonic stuttering condition, the highest degree of stuttering was observed at low-frequencies photic stimulation (2-5 c.p.s.) whereas in patients with a tonic stuttering condition, augmentation in the degree of stuttering occurred at all frequencies except for 8-12 c.p.s. In subjects suffering from other forms of neuroses intermittent photic stimulation did not cause stuttering in spite of the increase in muscular tonus.

A68-81775

CROSS-MODALITY EFFECTS UPON CHOICE REACTION TIME.

Lenore K. Morrell (Stanford U., School of Med., Div. of Neurol., Palo Alto, Calif.).

Psychonomic Science, vol. 11, Jun. 5, 1968, p. 129-130. 8 refs.

NASA Grant NsG 215-62.

Facilitation of reaction time by a second stimulus in another sense modality than the initial signal for response extended over a longer range of interstimulus intervals when the presented sequence was visual-auditory as compared with auditory-visual. The expected difference between visual and auditory reaction times was diminished or eliminated with paired bi-modal stimuli.

A68-81776

THE EFFECTS OF SITUATIONAL AND PERSONAL VARIABLES ON VERTICAL AUTOKINESIS.

Morgan Worthy and Gay Kahn (Ga. State Coll., Dept. of Psychol., Atlanta).

Psychonomic Science, vol. 11, Jun. 5, 1968, p. 144.

Subjects in an autokinetic situation reported after each trial whether the stimulus light had moved up or down. More upward movement was reported following a failure experience than following a success experience. Also more upward movement was reported when the height of the light was about eye level than when it was below eye level. Differences in the name assigned to the stimulus light by the experimenter had no effect on the direction of movement reported.

A68-81777

THE EFFECT OF DRIVE ON ATTENTION.

J. G. Ford, M. D. Morris, and F. J. Bremner (Trinity U., Dept. of Psychol., San Antonio, Tex.).

Psychonomic Science, vol. 11, Jun. 15, 1968, p. 156.

This study demonstrated that differences in drive level resulting from hours of deprivation are measurable by means of power spectral analysis of electroencephalogram data.

A68-81778

THE SIMULATOR SYNDROME OR "WHY NOT TRAIN TO AVOID THAT MID-AIR THAT COULD SPOIL YOUR WHOLE DAY".

Paul Felton.

Air Line Pilot, vol. 37, Jun. 1968, p. 9-10.

A plea is made for greater use of the human eye and visual observation in commercial flying. The overdependence on instrument flying and training is discussed and illustrated by an imaginary accident. Suggestions are made to reorient training to better use the eye as a visual scanner.

A68-81779

GAS CONSUMPTION AND GROWTH RATE OF HYDROGENOMONAS EUTROPHA IN CONTINUOUS CULTURE.

Elizabeth C. B. Ammann, Lawrence L. Reed, and John E. Duricheck, Jr. (Lockheed Missiles and Space Co., Res. Labs., Palo Alto, Calif.).

Applied Microbiology, vol. 16, Jun. 1968, p. 822-826.

The bacterium *Hydrogenomonas eutropha* is under consideration for use in a regenerative life-support system for manned space missions of long duration. A four-liter continuous culture unit containing the organism was operated for a period of 272 days under autotrophic environmental conditions. The best steady-state run achieved with this unit was observed over a 22-day time interval after 181 days of operation. During this time, the culture consumed an average of 22.9 ± 2.0 ml. of carbon dioxide per min., 38.1 ± 3.3 ml. of oxygen per min. and 128.5 ± 10.6 ml. of hydrogen per min. It required 18.7 ± 1.2 liters of fresh nutrient medium per 24 hr. to maintain a constant, preestablished cell population of 1.65 g. (dry weight) per liter. The ratio of consumption of carbon dioxide, oxygen, and hydrogen varied from 1:1.2:4.5 to 1:1.9:6.6, with an average of 1:1.7:5.7. Based on these values, approximately 60 liters of the culture would be necessary to balance the gas exchange of one man.

A68-81780

HYPOXIA AND TEMPORAL ASPECTS OF HYPOTHALAMIC SELF-STIMULATION.

Martin J. Gerben (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.).

Psychonomic Science, vol. 11, Jun. 15, 1968, p. 169-170. 5 refs.

Six rats were trained to operantly control the duration of electrical stimulation to the posterior hypothalamus. The duration of the stimulus was equal to the duration of the lever deflection response. Under normoxic conditions (21% O₂), increasing stimulus current levels yielded increasing response rates, decreasing response durations and decreasing inter-response times. Hypoxia (8% O₂) did not affect response duration at any current level but lengthened inter-response time. The magnitude of this effect was inversely related to current level. Results are interpreted as suggesting that hypoxia does not affect the neural response concurrent with electrical stimulation but affects the after-effects of stimulation.

A68-81781**THE FAILURE OF STIMULUS-REINFORCEMENT SPATIAL DISCONTIGUITY TO INFLUENCE PERFORMANCE UNDER OPTIMAL CONDITIONS OF STIMULUS SAMPLING.**

T. E. LeVere (Henry Ford Hosp., Dept. of Neurol. and Psychiat., Detroit, Mich.).

Psychonomic Science, vol. 11, Jun. 15, 1968, p. 179-180. 11 refs.

Grant HFH 3108.

Under physical conditions which optimize the subject's visual sampling of color discriminanda, monkeys appear to be little influenced by varying degrees of stimulus-reinforcement spatial discontiguity. These results are interpreted as supporting and extending the stimulus sampling explanation of spatial discontiguity effects first proposed for the observed indirect relationship between performance and stimulus-response spatial contiguity.

A68-81782**DOMINANCE IN MONKEYS: EFFECTS OF SOCIAL CHANGE ON PERFORMANCE AND BIOCHEMISTRY.**

W. F. Angermeier, J. B. Phelps (Fla. Presbyterian Coll., Primate Neurosci. Lab., St. Petersburg), H. H. Reynolds (Aeromed. Res. Lab., Holloman AFB, N. Mex.), and R. Davis (VA Res. Center, Bay Pines, Fla.).

Psychonomic Science, vol. 11, Jun. 15, 1968, p. 183-184. 15 refs.

Contract AF29600-67-C-0011.

Twenty-four differentially reared male rhesus monkeys were used in this experiment. The animals were tested on a four choice match-to-sample task. The results indicated that (1) performance of complex discrimination improves for social subdominant animals changed to isolation; (2) performance of the same task shows a decrement for isolated animals which became subdominant after a change to a state of social companionship; (3) control animals and dominant animals were not affected by social changes; and (4) social status along the dominant-subdominant scale seems to be more important for prediction of performance than the perceptual conditions of the living environment.

A68-81783**ESTIMATED DURATION OF AN AUDITORY SIGNAL AS A FUNCTION OF ITS INTENSITY.**

Irving Zelkind and Joseph Ulehla (Denver, U., Colo.).

Psychonomic Science, vol. 11, Jun. 25, 1968, p. 185-186. 20 refs.

Estimates of time intervals ranging from 50 to 800 csec. were made by 36 subjects. The intervals were presented as auditory signals of fixed (1,000 c.p.s.) frequency but of varying intensities (20 to 20 dB). Two methods of measuring the perceived duration were employed, a direct estimate in csec. and a comparison of the test signal with one of fixed duration (200 csec.) and intensity (40 dB). Perceived duration was found to be a positive function of signal intensity.

A68-81784**MESENTERY AND BOWEL INJURY FROM AUTOMOTIVE SEAT BELTS.**

Charles L. Witte (USAF Hosp. Scott, Depts. of Surg., Scott AFB, Belleville, Ill. and City Hosp., St. Louis, Mo.).

Annals of Surgery, vol. 167, Apr. 1968, p. 486-492. 32 refs.

The lap-type seat belt is implicated in perforation and avulsion injuries of bowel and mesentery after automobile collision. Laws of colliding bodies suggest that compressing and shearing forces which develop during sudden deceleration of the crash victim striking the seat belt may account for this injury pattern. Bowel rupture occurs when intestinal wall tension exceeds its bursting potential due to rapidly displaced intestinal contents. Laceration and disruption of relatively inert mesenteric attachments occur when momentum and kinetic energy transmitted by axial forces abruptly displace the intestine itself. No attempt to discredit the value of the seat belt is intended. Rather, the effects of deranged bowel propulsion which may arise from its use during collision suggest that further modification of seat belt design is needed.

A68-81785**AGE DIFFERENCES IN THE URINARY 17-KETOSTEROID RESPONSE TO ENVIRONMENTAL STRESS.**

William P. Paré and Andrew Livingston, Jr. (VA Hosp., Perry Point, Md.).

Psychonomic Science, vol. 11, May 5, 1968, p. 15-16. 15 refs.

Urinary 17-ketosteroid (17-KS) measures were obtained from rats 50, 100, 330 and 600 days old during a normal period and during a shock-stress period. No differences were observed between age groups for the normal period, but 50- and 100-day-old rats manifested significantly greater 17-KS values during stress period as compared to the 330- and 600-day-old rats.

A68-81786**FRAGILITY OF LIVER MITOCHONDRIA IN ETHANOL-FED RATS.**

Samuel W. French (Calif., U., School of Med., San Francisco Gen. Hosp., Dept. of Pathol., San Francisco).

Gastroenterology, vol. 54, Jun. 1968, p. 1106-1114. 37 refs.

Grant PHS AM-05243-06.

Changes in the liver mitochondria of rats after chronic ethanol feeding were studied by manometric assay of succinic dehydrogenase (SD) activity and by electron microscopy of isolated liver mitochondrial fractions. An increase in permeability to phenazine methosulfate was demonstrated. This effect was obliterated by eliminating the membrane barrier to the phenazine. The electron micrographs of assayed mitochondria showed that the chronic ethanol feeding induced an increase in the number of mitochondria which had lost their outer membranes and cristae, compared with the mitochondria in pair-fed control animals. Indirect evidence indicated that neither microsomal contamination nor an increase of lysosomes in the mitochondrial fraction accounted for the ethanol-induced mitochondrial alteration in the ethanol-fed rat liver. It is concluded that the fragility of mitochondria induced by ethanol feeding is probably due to an abnormality in the mitochondrial membrane.

A68-81787**THE DUAL NATURE OF HUMAN EXTRA-OCULAR MUSCLE.**

N. A. Locket (Knt. of Ophthalmol., London, Great Britain).

British Orthoptic Journal, no. 25, 1968, p. 2-11. 10 refs.

New concepts and background material concerning the extra-ocular muscles were presented. The general anatomy and function of the muscles were given. Evidence indicated the existence of a double motor system in the extra-ocular musculature of man,

A68-81788

with characteristics of fast or twitch fibers and slow or tonic fibers. This concept of a double system would have great implications in the treatment of defects and dysfunctions of the ocular musculature.

A68-81788

FIGURE PERCEPTION AND FIGURAL AFTER-EFFECTS [FIGUR-AUFFASSUNG UND FIGURALE NACHWIRKUNGEN]. Heiner Erke and Dietmar Schulte (Münster, U., Psychol. Inst., West Germany).

Psychologische Forschung, vol. 32, May 2, 1968, p. 1-13, 25 refs. In German.

The present study sought to determine whether an inspection-pattern (I-pattern) appearing merely as a structure and not as a figure could produce figural after-effects (FAE), and what influence did structures, phenomenally dichotomized into figure and ground, have on the FAE. The I-pattern was a grid of black lines on a white ground. Following the principle of the Gottschaldt-figures, a small house was hidden in the grid. The FAE of the I-pattern were measured when it was seen as: (1) a simple structure; (2) a structure where the attention was concentrated on the part containing the hidden house; (3) a structured ground for another figure in a different part of the pattern; and (4) a figure (house) with the surrounding structure. In addition the FAE for the isolated house on a white background was measured. The findings indicated that not only a figure but also a structure can produce FAE. The FAE decreases when the structure appears as the ground of a figure. The FAE of figures are also influenced by the surrounding ground. The more clearly figure and ground are differentiated, the stronger are the FAE. The results were interpreted as indicating that the processes responsible for the FAE are located at the cortical level where they can be modified by figural organization and attention. The intensity of the underlying central processes is increased by concentration of attention on parts of the I-pattern; the figure-ground-differentiation is thought to produce a dichotomization of the previously homogeneous physiological process into an increased figure-process and a decreased ground-process.

A68-81789

EFFECT UPON AUDITORY INTERVAL DISCRIMINATION BY PERTURBATIONS IN THE NANOSECOND REGION.

Irwin Pollack (Mich., U., Mental Health Res. Inst., Ann Arbor). *Psychonomic Science*, vol. 11, Jun. 25, 1968, p. 189-190. 11 refs.

Grant NSF GB 2894.

A temporal uncertainty, or jitter, of less than 200 nsec. in the intervals of an auditory pulse train significantly raises the interval (pitch) discrimination threshold. The results suggest a preneural, i.e., cochlear, analysis for high frequency auditory pulse trains.

A68-81790

THE EFFECT OF SHORT-TERM SENSORY RESTRICTION ON THE TACHISTOSCOPIC RECOGNITION THRESHOLD.

S. L. Milstein, D. Oleson, and John P. Zubeck (Manitoba, U., Dept. of Psychol., Winnipeg, Canada).

Psychonomic Science, vol. 11, Jun. 25, 1968, p. 193-194. 8 refs.

Grants DRB, Canada 9425-08 and NRC, Canada APA-290.

Subjects who were exposed to five min. of perceptual deprivation (unpatterned light and white noise) or to a similar duration of visual, or kinesthetic deprivation showed no significant changes in the tachistoscopic recognition threshold for digits relative to two control groups. Similar results were obtained in a second experiment employing a condition of sensory deprivation (darkness and silence).

A68-81791

OPERANT REINFORCEMENT OF A SKELETALLY MEDIATED AUTONOMIC RESPONSE: UNCOUPLING OF THE TWO RESPONSES.

Rochelle J. Gavalas (Calif., U., Brain Res. Inst., Los Angeles). *Psychonomic Science*, vol. 11, Jun. 25, 1968, p. 195-196. 13 refs.

NASA Grant NsG-237-62, Contracts AF 49(638)-1387 and NONR 233(91).

The mediation explanation of the effect of operant reinforcement on autonomic responses assumes that skeletally mediated autonomic responses can be easily and fortuitously conditioned. Galvanic skin response (GSR) deflections elicited by deep respirations were operantly reinforced. The two responses became uncoupled: the skeletal (deep respiration) response showed a classic instrumental learning curve; the autonomic response showed great variability and only marginal (E-C) gains during extinction. It is possible that these marginal gains were artifactual since the per cent of deep respiration eliciting GSRs showed a marked habituation to increasing repetitions of the respiration response.

A68-81792

PRIMING AND THE RETRIEVAL OF NAMES FROM LONG-TERM MEMORY.

Ronald H. Hopkins and Richard C. Atkinson (Stanford U., Inst. for Math. Studies in the Social Sci., Calif.).

Psychonomic Science, vol. 11, Jun. 25, 1968, p. 219-220.

NASA Grant NGR-05-020-036.

Retrieval from long-term memory was investigated in a task in which the subject was shown a series of pictures of well-known people and asked to say the surname of the person pictured. For half of the pictures the subject had learned the correct name in a previous free-recall task, i.e., the name was primed. The results were interpreted to indicate that priming facilitated two aspects of retrieval from memory, search and recovery.

A68-81793

INVESTIGATION ON THE IMPORTANCE AND CONFLICT STRENGTH IN DECISION SITUATIONS [UNTERSUCHUNGEN ÜBER BEDEUTSAMKEIT UND KONFLIKTSTARKE IN ENTSCHEIDUNGSSITUATIONEN].

Hubert Feger (Heidelberg, U., Psychol. Inst., West Germany). *Zeitschrift für Experimentelle und Angewandte Psychologie*, vol. 15, no. 1, 1968, p. 70-87. 9 refs. In German.

The importance of the decisions and conflict strength in decision situations were investigated. For the situations analyzed the following statements were confirmed. (1) A decision situation that concerns a first group of subjects more than a second group of comparable subjects is rated by the first group as more important and more relevant. The first group also indicates a stronger conflict when making this decision. No differences were found in subjective confidence. (2) There are differences in the relevance, the conflict strength and the importance of those situations which differ in the questions to be decided. The different situations were judged by the same subjects. (3) In a real decision situation decision time is longer than in a fictitious one. The real situation is rated as being more important, the conflict as stronger and the confidence is lower than in a fictitious situation in which the subjects have to decide on the same problem. (4) Subjects with a high score in neuroticism rate a decision situation as more important, they experience a stronger conflict and show less confidence in their decision. (5) The relationships between conflict strength and decision time as well as between conflict strength and confidence do not seem to be the same for all subjects and in all situations.

A68-81794
HYPERBARIC OXYGEN, HYPOTHERMIA, AND CEREBRAL ISCHEMIA IN THE DOG.

Russel H. Patterson, Jr., Charles K. McSherry, and Melvin S. Schwartz (Cornell U., Med. Coll., Dept. of Surg. and Lab. of Biometrics; New York Hosp.; and Hosp. for Spec. Surg., New York, N. Y.).

Journal of Surgical Research, vol. 8, Jun. 1968, p. 279-285. 17 refs.

Grant NIH NB03378 and Edward H. Little Fund supported research.

A new method to arrest the cerebral circulation of a dog is described, in which the major intraspinal arteries surrounding the cervical spinal cord are divided or thrombosed in a preliminary operation. After the animal has recovered from the procedure, pneumatic cuffs are inflated about the neck which block the extraspinal arteries and interrupt all flow of blood to the head. The effects of cerebral ischemia were studied in dogs breathing air or oxygen at three ATA at body temperatures of 37°C. and 28°C. and the data subjected to probit analysis. Seven min. of ischemia were followed by a 50% mortality in normothermic dogs breathing air. A period of 94 min. was required to attain the same mortality in hypothermic dogs, regardless of whether air or hyperbaric oxygen was respired. The duration of ischemia required to induce a moderate neurological deficit was six min. in normothermic animals breathing air and eight min. in those administered oxygen. Hypothermic animals sustained a moderate neurological deficit after 29 min. of cerebral ischemia if supplied air and after 34 min. if supplied hyperbaric oxygen.

A68-81795
ELECTRONIC MEASUREMENT OF PULSE RATE IN THE CLINIC [ELEKTRONISCHE PULSFREQUENZMESSUNG IN DER KLINIK].

G. Schreinicke (Karl-Marx-U., Klin. für Herz- und Gefäßschir., Leipzig, East Germany).

Das deutsche Gesundheitswesen, vol. 23, May 30, 1968, p. 1024-1026. 9 refs. In German.

The author briefly points to the importance of patient's electronic control. There are various methods available for the electronic measuring of the pulse rate. The pulse rate may be determined from the electrocardiogram, the rheogram and the photoplethysmogram. Furthermore, piezoelectric pressure converters may be used as pulse recorders. The author considers the photoplethysmogram the best method of recording the pulse rate for prolonged periods. The physical basis of photoplethysmography is explained in brief. A cardiometer developed by the author and applying the photoplethysmogram for measuring the pulse rate is described.

A68-81796
AUDITORILY PACED KEYPRESSING PERFORMANCE DURING SYNCHRONOUS, DECREASED, AND DELAYED VISUAL FEEDBACK.

Raymond S. Karlovich (Wis., U., Madison) and James T. Graham (Purdue U., Lafayette, Ind.).

Perceptual and Motor Skills, vol. 26, part 1, Jun. 1968, p. 731-743. 26 refs.

Twenty young adult female subjects tapped on a tapping key to low, mid, and high sensation-level pure tone auditory-pacing stimuli while being exposed to synchronous visual-feedback, delayed visual-feedback, and decreased sensory-feedback conditions. The stroboscopic visual-feedback stimulus was judged to be as bright as the mid-sensation-level auditory stimulus was loud in a preliminary cross-modality matching study. The dependent variables evaluated were tapping error, temporal deviation of the taps from the onset of the pacing stimuli, and tap duration. Few tapping errors occurred

under any of the conditions which indicated that the auditory sensory modality is effective in regulating motor performance even when temporally distorted visual feedback is associated with the performance. Tapping deviation data strongly suggested that the relative perceptual magnitudes between the auditory pacing stimuli and the delayed visual-feedback stimulus are important factors in determining the speed of motor response. Tap durations were greater during decreased sensory-feedback and delayed visual-feedback conditions than during synchronous visual-feedback conditions, and it was speculated that these changes occurred due to an increase in tactual kinesthetic feedback employed by subjects to counterbalance the distorted and decreased sensory feedbacks.

A68-81797
MOTOR SKILLS BIBLIOGRAPHY: XC. PSYCHOLOGICAL INDEX NO. 33, 1926.

C. H. Ammons and R. B. Ammons (Mont., U., Missoula). *Perceptual and Motor Skills*, vol. 26, part 1, Jun. 1968, p. 723-726. 116 refs.

One-hundred-sixteen references to motor skills are presented alphabetically.

A68-81798
GLYCOLLATE OXIDASE IN CHLORELLA PYRENOIDOSA.

M. J. Lord and M. J. Merrett (Bradford, U., Postgraduate School of Biol. Sci., Great Britain).

Biochimica et Biophysica Acta, vol. 159, July 9, 1968, p. 543-544. 10 refs.

Chlorella pyrenoidosa was grown photoautotrophically, carbon starved, harvested and the glycollate oxidase was assayed. In a typical experiment the oxidation of 340 µg. of glycollate/mg. protein/hr. was accompanied by the formation of 300 µg. glyoxylate/mg. protein/hr. The conclusion of previous workers that in many green algae glycollate excretion results from the absence of glycollate oxidase was supported.

A68-81799
USE OF SIGNAL DETECTION THEORY IN DEPTH PERCEPTION RESEARCH, AN EXAMPLE.

Carl L. Thornton (Goodyear Aerospace Corp., Akron, Ohio). *Perceptual and Motor Skills*, vol. 26, part 1, Jun. 1968, p. 705-706.

Although binocular depth perception is usually better than monocular, responses may overlap greatly in some circumstances. Rather than supplying simply a measure of statistical significance, it is suggested that signal detection methodology be used to provide an index of separation between response distributions. Reanalyzing the data of Barrett and Williamson who used a paired-comparison technique plus confidence of response ratings, a d' value of .5 was obtained. This supports their contention that distribution overlap existed but provides a better quantitative index of the extent of overlap than previously reported.

A68-81800
EARLY ENVIRONMENT AND BEHAVIORAL-BIOCHEMICAL RESPONSE TO TRIFLUOPERAZINE IN MONKEYS.

W. F. Angermeier, J. B. Phelps (Fla. Presbyterian Coll., Dept. of Psychol., St. Petersburg), H. H. Reynolds (Aeromed. Res. Lab., Holloman AFB, N. Mex.), and R. L. Davis (VA Center, Bay Pines, Fla.).

Psychonomic Science, vol. 11, Jul. 5, 1968, p. 231-232. Contract AF 29600-67-C-0011.

Twenty-four differentially reared male rhesus monkeys were used as subjects in this experiment. For 30 days the animals were

A68-81801

injected twice daily with trifluoperazine. The effects of these injections were measured on a match-to-sample task previously learned and on a number of blood biochemical assessments. Results indicated that (1) the drug reduced the sensitivity to shock in a shock-escape match-to-sample task previously learned and on a number of blood biochemical assessments. Results indicated that (1) the drug reduced the sensitivity to shock in a shock-escape match-to-sample task according to degrees of previous environmental stimulation during early rearing; (2) the least affected subjects were the animals reared in enriched environments were greatly affected; (3) these effects could be interpreted to indicate differential early threshold development in the four rearing groups used in this experiment; and (4) drug injections could be considered "therapeutic" in the same sense that social change was thought to be therapeutic in a previous study.

A68-81801**AN ESTIMATE OF THE SURFACE CONDITIONS OF VENUS.**

John S. Lewis (Calif., U., Dept. of Chem., San Diego, La Jolla). *Icarus*, vol. 8, May 1968, p. 434-456. 38 refs. Contract AEC AT(11-1)-34.

Recent spectroscopic observations of the cloud layer region of Venus give good relative pressure data on CO₂, CO, H₂O, HCl, and HF. From these data and the assumption that the atmosphere is in chemical equilibrium with the lithosphere, it is possible to deduce lower limits on the temperature and pressure of the coolest part of the surface of the planet, and to state an upper limit on the temperature in this coolest region. For Venus with an isothermal surface and with an adiabatic atmosphere, the surface pressure is found to be ≥ 1.8 bars and the surface temperature $\geq 514^\circ\text{K}$. for all models considered. For Venus with a maximum surface temperature of 700°K . and an adiabatic lapse rate above the hottest point, a surface pressure ≥ 5.4 bars and a cold-region temperature $T \geq 540^\circ\text{K}$. were found. A probable upper limit on the temperature in the coolest region, derivable from the observational upper limits on COS and H₂S is about 560°K .

A68-81802**PERCEPTION OF DEPTH IN ROTATING OBJECTS: 3. ASYMMETRY AND VELOCITY AS THE DETERMINANTS OF THE STEREOKINETIC EFFECT.**

Betty A. Wieland and Roy B. Mefferd, Jr. (Houston, U.; Baylor U., Coll. of Med.; and Veterans Admin. Hosp., Psychiat. and Psychosomat. Res. Lab., Houston, Tex.). *Perceptual and Motor Skills*, vol. 26, part 1, Jun. 1968, p. 671-681. 9 refs.

When a flat stimulus is rotated in the frontoparallel plane about a horizontal axis that is an extension of the subject's line of regard, the apparent depth of the stimulus is enhanced. The enhancement was entirely a function of peripheral asymmetry. The apparent depth in the static figure, internal structure, or taper in the periphery did not augment the rotation-enhanced depth. The magnitude of the enhancement was constant for any series of stimuli, such as a series of overlapping circles with increasing overlap. The apparent depth also increased as a function of the speed of rotation.

A68-81803**MAGNESIUM PEMOLINE: EFFECTS ON THE LEARNING AND RETENTION OF A CONDITIONED AVOIDANCE RESPONSE BY RATS.**

James E. McCarroll and Susan F. Korbel (Ark., U., Dept. of Psychol., Fayetteville). *Psychonomic Science*, vol. 11, Jul. 5, 1968, p. 233-234.

Thirty-two albino male rats were randomly assigned to four groups which were trained to perform a conditioned avoidance response to a criterion of acquisition. They were tested for retention of at 24 hr., and 72 hr. In acquisition, three of the four groups were given magnesium pemoline (MgPe) while a control group was given a placebo. After 24 hr. two groups were drug-treated and two were placebo-treated. After 72 hr. one group was drug-treated and three were placebo-treated. It was found that MgPe did facilitate learning, but not retention. It was concluded that differences in retention were probably related to the acquisition process and not to MgPe.

A68-81804**BEHAVIORALLY DETERMINED DARK ADAPTATION FUNCTIONS IN THE TURTLE, PSEUDEMYD.**

H. Zwick and A. M. Granda (Del., U., Dept. of Psychol., Newark). *Psychonomic Science*, vol. 11, Jul. 5, 1968, p. 239-240.

Dark adaptation in the turtle, *Pseudemys*, is complete at about 90 sec. in the dark. This figure may be compared to six min. for the cone dominated human fovea.

A68-81805**A DEVELOPMENTAL STUDY OF LONG-TERM MEMORY IN THE PERCEPTION OF APPARENT MOVEMENT.**

Larry M. Raskin (Purdue U., Lafayette, Ind.).

Psychonomic Science, vol. 10, Apr. 25, 1968, p. 397-398. 7 refs.

Grant NICHHHD HD-00098.

The long-term influence of prior experience with either apparent movement of nonmovement on the later perception of movement was studied with groups of subjects aged 6-9, 9-9, 12-9, and 19-7. Significant differences due to type of prior experience were found within each age group. A form previously seen as moving continued to be seen as moving when later presented in sequence with a dissimilar form, a condition in which apparent movement is not usually seen. A form previously seen as stationary continued to be seen as stationary when later presented in sequence with an identical form, a condition in which apparent movement is usually seen. No developmental trends were present.

A68-81806**EFFECT OF FASTING AND REFEEDING ON THE HISTOLOGY AND DISACCHARIDASE ACTIVITY OF THE HUMAN INTESTINE.**

Kermit B. Knudsen, Edwin M. Bradley, Frank R. Lecocq, Henry M. Bellamy, and Jack D. Welsh (Aerospace Med. Div., Wilford Hall USAF Hosp., Dept. of Med., Lackland AFB, Tex. and Okla., U., Med. Center, Dept. of Med., Oklahoma City).

(*Southern Soc. for Clin. Invest., New Orleans, Jan. 28, 1966*).

Gastroenterology, vol. 55, Jul. 1968, p. 46-51. 14 refs.

Grants NIH T1 AM-5179 and NIH IK3-AM09693.

Twenty-six obese volunteers were studied during periods of total caloric deprivation for periods continuing to 28 days. Biopsies of intestinal mucosa were obtained before the fast and at intervals during the fast from similar anatomical locations. Protein concentration and sucrase, maltase, and palatinase activities as early as three days after the start of the fast were significantly less than during the prefast period. Lactase activity after seven days of fasting and alkaline phosphatase activity after 14 days of fasting were also significantly less than during the control period. These changes were not accompanied by significant alterations in the histology of the mucosa, as revealed by light microscopy. After 14 days of fasting, refeeding programs were carried out for ten days in 11 subjects as follows: two individuals were given oral lactose, two oral glucose, two intravenous glucose, and five oral corn oil.

The carbohydrate refeeding represented 480 cal./day and the fat 408 cal./day. The number of individuals fed each carbohydrate were too few to analyze the differences in response between the various programs statistically. However, with either lactose or glucose there was an increase in enzyme activity and protein concentrations. Lactose displayed no specific action on lactase activity. Taken as a whole, carbohydrate refeeding resulted in a significant increase in intestinal protein content and in the activities of sucrase, maltase, and alkaline phosphatase. Fat refeeding had no significant influence on any of the parameters measured.

A68-81807**RESPONSE OF THE CORONARY CIRCULATION TO HYPEROXIA IN THE ANESTHETIZED INTACT DOG.**

J. Lammerant, C. De Schryver, I. Becsei, and J. Mertens-Strijthagen (U. Notre-Dame de la Paix Med. School, Fac., Dept. of Physiol., Namur, Belgium).

Archives Internationales de Pharmacodynamie et de Thérapie, vol. 173, May 1968, p. 244-253. 24 refs.

Fonds Natl. de la Rech. Sci. supported research.

The changes induced in the coronary circulation by arterial hyperoxia were studied in the anesthetized intact dog. Coronary blood flow was determined by measuring precordial radioactivity following the injection of krypton 85 into the left coronary artery through a Sones catheter. Ventilation with 100% oxygen at atmospheric pressure for 30 min. resulted in cardiac slowing, a nonsignificant increase in mean aortic blood pressure, and a lowering of the tension-time index averaging 9.4%. It was associated with a mean 21.5% decrease in coronary blood flow and a mean 34.3% increase in coronary resistance. The coronary arteriovenous oxygen difference increased by an average of 8.2%, without a significant change in the oxygen content of coronary sinus blood. Oxygen transport to the left ventricle and myocardial oxygen consumption decreased by an average of 15.5 and 14.8%, respectively. Internal efficiency of the left ventricle, estimated as the ratio of tension-time index to myocardial oxygen consumption, improved slightly but the change was not statistically significant.

A68-81808**BINAURAL INTERACTION IN THE SUPERIOR OLIVARY COMPLEX OF THE CAT: AN ANALYSIS OF FIELD POTENTIALS EVOKED BY BINAURAL-BEAT STIMULI.**

Joel S. Wernick and Arnold Starr (Stanford Med. School, Dept. of Neurol., Palo Alto, Calif.).

Journal of Neurophysiology, vol. 31, May 1968, p. 428-441. 17 refs.

Grants NINDB NB 05700, NINDB NB 05419, and NINDB NB 31242.

Electrical activity in the superior olivary complex of decerebrate or pentobarbital-anesthetized cats was recorded with bipolar electrodes during the presentation of binaural tones differing slightly in frequency. This stimulus produces the percept, in man, of a single tone which appears to pulsate or beat in the center of the head at a rate equal to the difference in frequency between the tones. This percept is known as "binaural beats" and is related to the constantly changing interaural phase relations of the stimuli. A periodicity at the binaural-beat rate was seen in both the "following" response and slow potentials of the superior olivary complex. To determine what portion of the binaurally evoked following response was due to binaural interaction, the activity evoked by the sum of the two monaural stimuli was subtracted from the binaural response by a small digital computer. A difference between monaural and binaural stimulation (binaural interaction) was restricted to the region of the accessory nucleus and the ventral region of the S segment of the superior olivary complex. Binaural interaction was the result of an amplitude change in the following response

and resembled an amplitude-modulated sinusoid. It had a frequency of approximately $(f_1 + f_2)/2$ and an envelope periodicity corresponding to the binaural-beat rate. It almost always represented a relative decrease in the following response evoked by binaural stimulation when compared with the responses evoked by monaural stimulation. Binaural interaction in the slow potentials evoked by the binaural-beat stimulus was represented as a modulation of the slow potentials at the binaural beat rate. This slow-potential periodicity was generally found throughout the S segment and was not maximal in the same region as the binaural component of the following response or the slow potentials themselves. Changes in the binaurally evoked potentials with changes in base frequency, interaural frequency differences, and interaural intensity differences, were determined and related to the effects of similar stimulus changes on the binaural-beat percept in man.

A68-81809**APPARENT SIZE AND DISTANCE IN VISION THROUGH A MAGNIFYING SYSTEM.**

Robert H. Thouless (Cambridge, U., Great Britain).

British Journal of Psychology, vol. 59, part 2, May 1968, p. 111-118. 7 refs.

An approaching car, seen through binoculars, appears to be travelling very slowly. Experiments with seven subjects on the phenomenal size and distance of a test object looked at through binoculars ($\times 8$ diameters) showed that the general effect was (as earlier reported by Helmholtz) to decrease the apparent distance of the object without increase of its apparent size. This effect could be expressed as a contraction of phenomenal space in the direction between object and percipient. The result of such a contraction would be to produce the illusion of decreased velocity in this direction which is, in fact, observed.

A68-81810**ROLE OF ACETATE IN THE REDUCTION OF PLASMA FREE FATTY ACIDS PRODUCED BY ETHANOL IN MAN.**

John R. Crouse, Charles D. Gerson, Leonore M. DeCarli, and Charles S. Lieber (Cornell U., Med. Coll., Dept. of Med. and Bellevue Hosp., Second (Cornell) Med. Div., Liver Disease and Nutr. Unit, New York, N. Y.).

Journal of Lipid Research, vol. 9, Jul. 1968, p. 508-512. 18 refs.

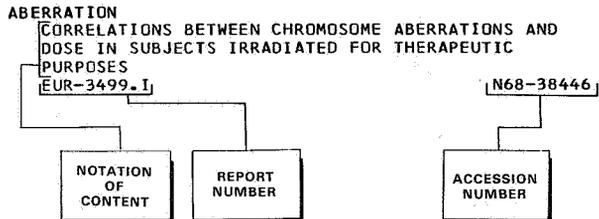
Grants PHS AM 09536, PHS AM 10893, PHS MH 14263, PHS 12-8502, PHS TIAM 5091, and PHS K3-AM-22,590.

To investigate the mechanism by which ethanol lowers plasma free fatty acids, the ability of two products of alcohol metabolism, acetate and lactate, to lower free fatty acids in man was tested. Sodium acetate was given orally to five healthy fasting volunteers and caused a significant fall in plasma free fatty acids. After amounts of ethanol and acetate that produced similar reductions in free fatty acids, plasma acetate increased three- to four-fold within 20 min. In each of three subjects the fall of free fatty acids observed after acetate ingestion occurred at plasma acetate levels less than or equal to those reached after ethanol. In all studies plasma glucose remained stable. Oral administration of sodium lactate to another volunteer in amounts sufficient to raise plasma lactate concentrations to a level similar to that found after ethanol administration failed to lower plasma free fatty acids. Thus acetate, a metabolite of ethanol, reduces plasma free fatty acids at plasma acetate levels comparable to those resulting from ethanol metabolism, which suggests that the lowering of plasma free fatty acids produced by ethanol is mediated, at least in part, by acetate.

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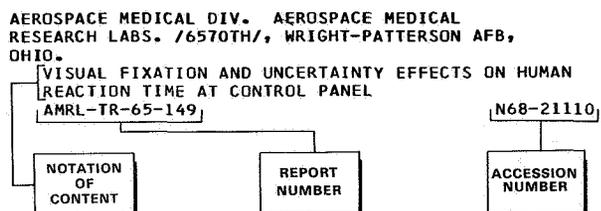
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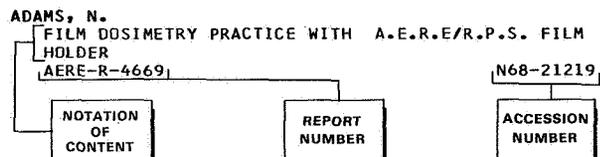
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