NASA SP-7011 (65)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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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 June, 1969.

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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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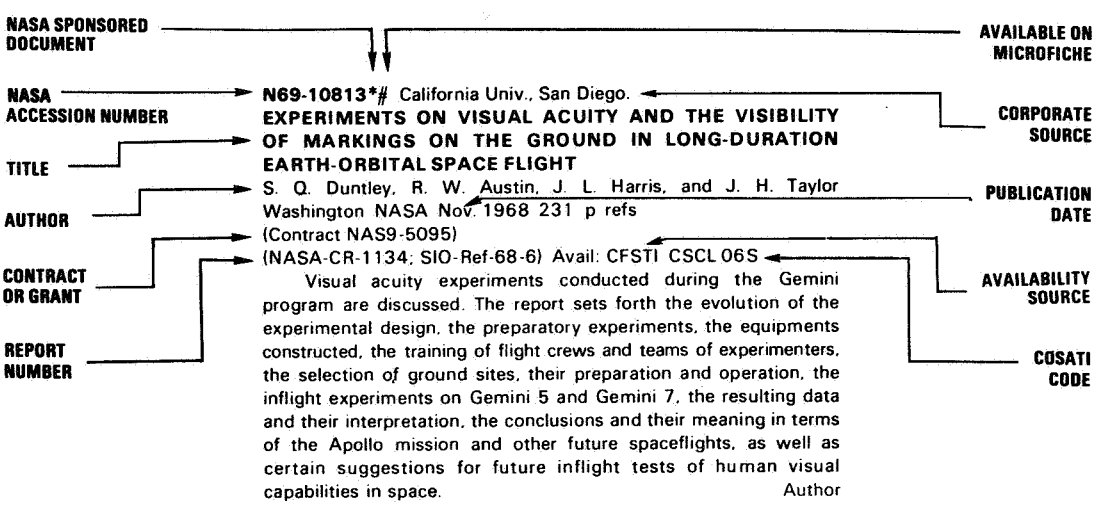
TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography JULY 1969

STAR ENTRIES

N69-22003 Texas Univ., Houston. Graduate School of Biomedical Sciences.
ULTRAVIOLET LIGHT INDUCED MUTATION IN EXTRACTED DNA
Elmer Scheltgen (Ph.D. Thesis) 1968 65 p
Avail: Univ. Microfilms: HC $3.60/Microfilm $3.00 Order No. 68-11227

Ultraviolet light irradiation of extracted DNA was shown to increase frequency of adenine revertants when analyzed by transformation in *B. subtilis* strain Mu8u5u6-S. Statistical analysis of the data revealed that the results were significant at the 93 percent level. An increase in the temperature during transforming DNA uptake and incorporation was found to cause both a decrease in the transformation frequency and a decrease in the transforming activity of irradiated DNA relative to nonirradiated DNA. Attempts were made to induce auxotrophic mutations by ultraviolet light in extracted native and denatured DNA without success. Ultraviolet light irradiation of DNA at 100°C followed by slow cooling was found to produce a marked increase in the number of adenine reversions in DNA as detected by transformation of the adenine B. subtilis strain Mu8u5u6-S cells to prototrophy. Dissert. Abstr.

N69-22008 Arizona Univ., Tucson.
TACTILE PERCEPTION OF ELECTRONICALLY TRANSFORMED AUDITORY SPECTRA
Lorin Post McRae (Ph.D. Thesis) 1968 151 p
Avail: Univ. Microfilms: HC $7.20/Microfilm $3.00 Order No. 68-13675

Tactile communications and efforts at alternate sensory input of auditory type signals have been reviewed. A tentative approach to communication for the deaf has been selected. That part of the approach concerned with the electronic transformation of speech prior to presentation at the interface with the tactile nervous system has been chosen for particular consideration. Tests have been conducted to determine the number of constant-frequency, amplitude varying stimulators required if sufficient information is to be presented at the tactile interface to conceivably allow for adequate speech recognition. The normal hearing process was used for recognition tests. The exact transformed signals to the tactile nervous system were used to resynthesize auditory signals with some resemblance to speech. A variety of filtering systems was evaluated under varying conditions. Procedures are outlined for greater optimization of the filtering systems and electronic transformations. Research is proposed for extending the models and procedures. A model of the speech recognition process is proposed with direct implications of the urgent need for a portable working model of a tactile communication system to evaluate the adaptive capacity of the tactile nervous system. Dissert. Abstr.

N69-22091# University of Southern Calif., Los Angeles.
STRUCTURAL STUDIES ON DEOXYRIBONUCLEIC ACID
Final Report
Jerry Donohue May 1968 11 p refs
(Contract AT(11-1)-113)
(PB-180815) Avail: CFSTI CSCL 06A

A summary is given of studies including general and specialized areas of structural chemistry, with emphasis on the structure of DNA. These areas are not germane to the DNA problem, in that many structures of that molecule are found in simpler, related compounds. Author (USGRDR)

N69-22092# California Univ., Berkeley. Lawrence Radiation Lab.
OPTICAL PROPERTIES OF NUCLEIC ACIDS: 1. SOLVENT EFFECTS. 2. LOW TEMPERATURE, MATRIX ISOLATED BASES
Barrett Lynn Tomlinson (Ph.D. Thesis) Sep. 1968 219 p refs
(Contract W-7405-ENG-48)
(PB-180863; UCRL-18444) Avail: CFSTI CSCL 06A

Evidence is presented indicating that RNA is more strongly hydrated in the stacked than in the unstacked state, and that increasing hydration makes a positive contribution to the stability of the stacked form. A general method is proposed for the experimental determination of solvent contribution to the thermodynamics of stacking and denaturation in RNA and DNA. The utility of aliphatic alcohols as probes of the water-nucleic acid interactions was demonstrated. An n-pi transition was identified as the lowest energy singlet in adenine and 9-methyladenine in some nonpolar matrices. Evidence was presented for the existence of intermediate vibronic coupling between accidentally degenerate electronic states in substituted adenines and 1-methyluracil. Author (USGRDR)

N69-22094# California Univ., Berkeley. Lawrence Radiation Lab.
STUDIES ON THE CONTROL OF RIBOSOMAL PROTEIN SYNTHESIS IN ESCHERICHIA COLI
Harry G. Ungar (Ph.D. Thesis) Sep. 1968 138 p refs
(Contract W-7405-ENG-48)
(PB-180850; UCRL-18450) Avail: CFSTI CSCL 06A

The number of ribosomes in a growing bacterial cell is proportional to the rate of growth and of protein synthesis. When glucose is added to cells growing on a less rapidly metabolized carbon source they eventually achieve a higher growth rate characterized by a higher ratio of ribosomal to total protein. A

technique was developed for following the synthesis of ribosomal protein during the transition from one growth condition to another. By double labeling the cells with 14C- and 3H-phenylalanine it was possible to measure both the cumulative ratio of ribosomal to total protein, and the differential rate of ribosomal protein synthesis, during the transition from the lower to the higher growth rate. Author (USGRDR)

N69-22101# Joint Publications Research Service, Washington, D. C.

SOVIET RESEARCH ON MECHANISMS OF PHOTOSYNTHESIS

17 Mar. 1969 64 p Transl. into ENGLISH from Russian
Avail: CFSTI

CONTENTS:

1. CORRELATION BETWEEN CHEMILUMINESCENCE OF PHOTOSYNTHESIZING ORGANISMS AND LIGHT REACTIONS OF PHOTOSYNTHESIS A. B. Rubin et al p 1–11 refs (See N69-22102 11-04)

2. INVESTIGATION OF PROCESSES OF LIGHT-INDUCED OXIDATION OF CYTOCHROMES IN PHOTOSYNTHESIZING PURPLE BACTERIA, RHODOPSEUDOMONAS SPECIES A. B. Rubin et al p 12–26 refs (See N69-22103 11-04)

3. INVESTIGATION OF KINETICS OF LIGHT-INDUCED REACTIONS OF INTRACELLULAR CYTOCHROMES OF RHODOPSEUDOMONAS SPECIES BACTERIA A. A. Kononenko et al p 27–41 refs (See N69-22104 11-04)

4. MATHEMATICAL DESCRIPTION OF PRIMARY ELECTRON TRANSPORT PROCESSES IN PHOTOSYNTHESIS A. B. Rubin et al p 42–53 refs (See N69-22105 11-04)

5. LIGHT ENERGY STORAGE BY PHOTOSYNTHETIC ORGANISMS AT LOW TEMPERATURES A. B. Rubin et al p 54–61 refs (See N69-22106 11-04) $)

N69-22102# Joint Publications Research Service, Washington, D. C.

CORRELATION BETWEEN CHEMILUMINESCENCE OF PHOTOSYNTHESIZING ORGANISMS AND LIGHT REACTIONS OF PHOTOSYNTHESIS

A. B. Rubin et al *In its* Soviet Res. on Mech. of Photosyn. 17 Mar. 1969 p 1–11 refs Transl. into ENGLISH from Fiziol. Rast. (Moscow), v. 15, no. 1, Jan./Feb. 1968 p 34–40 (See N69-22101 11-04)
Avail: CFSTI

Some of the kinetic distinctions of chemiluminescence were studied under photic stimulation with different spectral compositions, as well as under the effects of photosynthesis inhibitors, such as DCP, diuron, and salicylaldoxime. Afterglow extinction curves, for beam leaves, Vallisneria leaves, and Scenedesmus algae suspensions, were plotted two to three seconds after discontinuation of a thirty second photic stimulus. Excitation spectra were obtained for each of the persistence components of the photosynthesizing organisms. The excitation spectrum of the first component, with a duration in the order of 10^{-} seconds, has a maximum at 675 to 680 mmk; the second, lasting up to one minute, at 645 to 650 mmk; and the third, lasting over one minute, at 695 to 700 mmk. Inhibitor effects are discussed with regard to the three afterglow components. The appearance of a maximum on the afterglow extinction curve during remote red light stimulation (third component) is apparently related to closing of the chain of cyclic electron transfer, sensitizied by the long wave form of chlorophyll. P.A.B.

N69-22103# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF PROCESSES OF LIGHT-INDUCED OXIDATION OF CYTOCHROMES IN PHOTOSYNTHESIZING PURPLE BACTERIA, RHODOPSEUDOMONAS SPECIES

A. B. Rubin et al *In its* Soviet Res. on Mech. of Photosyn. 17 Mar. 1969 p 12–26 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 3, 1968 p 372–381 (See N69-22102 11-04)
Avail: CFSTI

The light-induced reactions of intracellular cytochromes of photosynthesizing purple bacteria, Rhodopseudomonas species (Rh.sp.), were investigated by the method of highly sensitive differential absorption spectrophotometry. Analysis of changes in spectra of cell suspension absorption, induced by close infrared light under controlled change in medium composition and gas phase, led to the conclusion that intracellular cytochromes of Rh.sp. participating in the photochemical reaction can also interact with oxygen. A study was made of the effect of four inhibitors of oxidizing-reducing reactions (potassium cyanide, salicylaldoxime, 2-n-heptyl-4-hydroxyquinoline N-oxide, and antimycin) on light and oxygen activated processes of electron transfer in Rh.sp. Author

N69-22104# Joint Publications Research Service, Washington, D. C.

INVESTIGATION OF KINETICS OF LIGHT-INDUCED REACTIONS OF INTRACELLULAR CYTOCHROMES OF RHODOPSEUDOMONAS SPECIES BACTERIA

A. A. Kononenko et al *In its* Soviet Res. on Mech. of Photosyn. 17 Mar. 1969 p 27–41 refs Transl. into ENGLISH from Molekul. Biol., Akad. Nauk SSSR, Inst. Radiats. i Fiz.-Khim. Biol. (Moscow), v. 2, no. 6, Nov./Dec. 1968 p 807–817 (See N69-22102 11-04)
Avail: CFSTI

Data obtained on the effect of the inhibitor, quinacrine, on light-induced transformations of intracellular type C cytochromes in Rhosopseudomonas species purple bacteria are indicative of the presence of feedback reaction between primary photoreduced products and photooxidized cytochromes. The complex kinetics of the processes observed may be explained by assuming the participation in them of one type C cytochrome which functions in the photosynthetic chain of electron transfer in these bacteria. Author

N69-22105# Joint Publications Research Service, Washington, D. C.

MATHEMATICAL DESCRIPTION OF PRIMARY ELECTRON TRANSPORT PROCESSES IN PHOTOSYNTHESIS

A. B. Rubin et al *In its* Soviet Res. on Mech. of Photosyn. 17 Mar. 1969 p 42–53 refs Transl. into ENGLISH from Biol. Nauka-Selsk. i Lesn. Khoz., Akad. Nauk Latv. SSR, Otd. Biol. Nauk (Latvian), no. 12, 1968 p 59–67 (See N69-22102 11-04)
Avail: CFSTI

Systems of nonlinear differential equations describing electron transfer processes in a photosynthetic chain have been prepared and analyzed. The data on kinetics of oxidizing-reducing conversions of cytochromes in the cells of purple bacteria and correlation between chemiluminescence of Chlorella cells and the effect of inhibitors confirm the conceptions presented in this article as to the nonlinear nature of electron transfer in photosynthesis. Author

N69-22106# Joint Publications Research Service, Washington, D. C.

LIGHT ENERGY STORAGE BY PHOTOSYNTHETIC ORGANISMS AT LOW TEMPERATURES

A. B. Rubin et al *In its* Soviet Res. on Mech. of Photosyn. 17 Mar. 1969 p 54–61 refs Transl. into ENGLISH from Biofizika (Moscow), v. 14, no. 1, Jan./Feb. 1969 p 105–109 (See N69-22102 11-04)
Avail: CFSTI

Photosynthetic organisms showed thermoluminescence (green algae and leaves of higher plants) with maxima at temperatures below $+50^{\circ}$C. Thermoluminescence was stimulated at low temperatures, down to -180°C. Diuron and salicylaldoxime, which

are inhibitors of photosynthesis, alter the location of the peak of thermoluminescence. In the excitation spectrum of thermoluminescence, the peak is located at 680 mmk. It is assumed that thermoluminescence develops in the course of feedback reactions in intermediate carriers located in the photosynthetic chain of electron transport between the first and second photochemical systems. Author

N69-22178*# Franklin Inst., Philadelphia, Pa. Research Labs.
[PART 1: ELECTRODE DESIGN. PART 2: EXPERIMENTAL DESIGN Quarterly Report, Nov. 1968–Feb. 1969]
A. Marmarou Feb. 1969 5 p
(Contract NASw-1841)
(NASA-CR-100533; QR-15G-C2430-1) Avail: CFSTI CSCL 06P

The development of electrodes for long-term implantation and measurement of the evoked response is described. The stimulating electrodes are of the coaxial, concentric bipolar type. The outside pole is a stainless steel tube 0.8 mm thick, the internal pole a .45 mm wire. This wire was factory insulated and protrudes beyond the stainless steel cannula by approximately 0.5 mm. The entire electrode is completely insulated with an epoxy resin. The impedance of the electrode is between 1 and 3 megohms. Insulated copper wire with an exposed tip of .5 mm is used for the recording electrodes. Both types of electrodes were implanted in the hippocampus and cerebral cortex, and typical evoked response data were obtained following a 5-day stabilization period and stimulation of the fornix-septum area. Application of the electrodes and design of a rat experiment are briefly outlined. K.W.

N69-22196*# State Univ. of New York at Buffalo.
INDIVIDUAL AND CORPORATE SOURCES OF MOTIVATION: A PRELIMINARY INVESTIGATION
Raymond G. Hunt and Ira S. Rubin Mar. 1969 30 p refs
(Grant NGR-33-015-061)
(NASA-CR-100556; TR-3) Avail: CFSTI CSCL 05J

Two separate sets of rating scales were administered to a sample of expert judges. The rating scales paired nine individual component motivations and nine corporate motivations with statements reflecting possible conditions for the fulfillment of the tendencies. Responses were factor analyzed to determine underlying motivational dimensions. The results indicated that the dominant sources of motivation for both individuals and industrial organizations were located along four dimensions: external and internal, control, interpersonal concern, security and self-actualization. Author

N69-22198*# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
DEVELOPMENT OF A VERSATILE SYSTEM FOR DETAILED STUDIES OF THE PERFORMANCE OF HEAT PIPES
J. H. Streckert and J. C. Chato Dec. 1968 49 p refs
(Grant NGR-14-005-103)
(NASA-CR-100725; ME-TR-64) Avail: CFSTI CSCL 17Q

A heat pipe with variable dimensions was designed for the study of steady state and transient heat pipe performance using different fluids and wicking materials. An open ended dewar was designed and constructed for housing the heat pipe system. The maximum length of wicking material was 82 cm; this distance was considered the maximum length of heat transfer required in future space suits. Distilled water was the transfer medium used in the wicking chamber. The heat input to the dewar was supplied by electric heaters. Circulation of cool water was used to remove heat from the condenser end of the dewar. Approximately 45 thermocouple points were used for measuring important temperatures in the system. Throughout the entire wicking chamber, a maximum temperature variation of $\pm 1/2^{\circ}C$ was encountered during normal heat pipe operation. No transient temperature lag from one end of the wicking chamber to the other end was observed during heat input changes. Apparently the time constants of the heat input changes were much larger than the temperature equalizing time constant of the wicking chamber. Author

N69-22207*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
FOOD CONSUMPTION ON THE GEMINI 4, 5, AND 7 MISSIONS
Paul A. Lachance, Robert A. Nanz, and Mary V. Klicka (Army Natick Labs.) Oct. 1967 4 p refs
(NASA-TM-X-58010) Avail: CFSTI CSCL 06H

Food for the Gemini IV mission consisted of a 4-day cycle menu which provided four meals per day, for a total of 2550 calories. An average of 2100 calories per day was ingested by the crew in flight. Food for the Gemini V mission consisted of a 3-day cycle menu which provided three meals per day (2650 calories). Because of low food consumption during the flight, the average daily intake for the crew was approximately 1000 calories. Food for the Gemini VII mission consisted of a 4-day cycle menu which provided three meals per day (2450 calories). Average daily intake by the crew during this flight was 1789 calories. The calculated caloric requirements have been compared with the calories and major nutrients actually consumed in flight. The body-weight loss of each crewman is discussed in terms of tissue loss and water loss. Author

N69-22225*# Techtran Corp., Glen Burnie, Md.
HUMAN ENGINEERING INVESTIGATION OF F-104J COCKPIT BY QUESTIONNAIRE
Hiroko Hagihara et al Washington NASA Apr. 1969 23 p refs Transl. into ENGLISH from Japan Air Self Defense Force, Aeromedical Lab. (Japan), v. 8, Sep. 1967 p 1–12
(Contract NASw-1695)
(NASA-TT-F-12137) Avail: CFSTI CSCL 06B

A human factors engineering investigation was completed on 462 pilots, concerning input and output systems, in the cockpit arrangements of the F-104J aircraft. Findings were: (1) Indicators of instrument panel and arrangement of instrument in F-104J aircraft were superior to those in old type aircrafts. (2) Diameter of hyd. oil pressure gauge was too small and cabin pressure altimeter, stand-by compass and accelerometer were not appropriately arranged. (3) Bearing distance heading indicator, hyd. oil pressure meter and cabin altimeter have poor instrument lighting. (4) Warning system in F-104J aircraft was better than all old types, but legends were too small to read quickly. (5) SIF, heater control panel, light control, AARS, both circuit breakers were considered inconvenient in legibility, controlling and lighting. (6) The radar panel is not well designed for manipulations. Author

N69-22257# School of Aerospace Medicine, Brooks AFB, Tex.
INDOLYLALKYLAMINES AS RADIOPROTECTANTS, NOVEMBER 1965–MARCH 1968
Emmett J. Stork, Arthur E. Gass, Jr., and George S. Melville, Jr. Oct. 1968 13 p refs
(AD-681502; SAM-TR-68-114) Avail: CFSTI CSCL 6/18

To determine whether a combination of derivatives causes less toxicity in achieving the radioprotective effect of tryptamine, laboratory rats were injected intraperitoneally with 5-hydroxytryptamine alone, and in combination with 5-methoxytryptamine and sodium hexobarbital, before exposure to 1,200 R gamma radiation. Results show that survival increases when the agents are given in certain combinations. Thirty-day survival (27/30) of rats treated with the triple drug combination was significantly greater than the survival of rats treated with any of the drugs individually. These data suggest that an additive or synergistic effect may be present when the agents are administered

in combination. The data also suggest that radioprotection by indolylalkylamines is more effective against 1,200 R gamma delivered over a short interval than against the same dosage over a more extended interval. The optimum time for drug administration was found to be approximately 15 minutes before irradiation. To extend this radioprotection to primates, Macaca mulatta were injected intraperitoneally with the triple drug combination before exposure to 850 R x-rays. Of the treated primates, 4 out of 15 survived. Author (TAB)

N69-22272# School of Aerospace Medicine, Brooks AFB, Tex.
PSYCHIATRIC STRENGTHS AND WEAKNESSES OF TYPICAL AIR FORCE PILOTS, SEPTEMBER 1965–MARCH 1967
Paul M. Fine and Bryce O. Hartman Nov. 1968 44 p
(AD-681495; SAM-TR-68-121) Avail: CFSTI CSCL 5/10

Fifty pilots were selected at random from a larger group of 250 aircrewmen who participated in research on intensive medical evaluations. Test scores and other data from a comprehensive psychologic test battery and a background questionnaire were analyzed and integrated to yield a picture of the personality structure of the modal military pilot. Author (TAB)

N69-22273# Kansas State Univ., Manhattan. Dept. of Psychology.
SOME PROBLEMS ENCOUNTERED WHILE TRAINING CATS TO PERFORM A VISUAL TRACKING TASK. PHOTOPIC AND SCOTOPIC SPECTRAL SENSITIVITY FUNCTIONS OF THE CAT
Robert Hill Lamotte and John Lott Brown Nov. 1968 28 p refs
(Contract Nonr-3634(04))
(AD-682247; TR-9; TR-10) Avail: CFSTI CSCL 6/3

Data are presented based on a behavioral study of the spectral sensitivity of the cat under both photopic and scotopic conditions. Results are compared with those of electrophysiological studies as well as with other behavioral studies of the cats spectral sensitivity. Author (TAB)

N69-22293# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF LABORATORY REPROCESSING ON SILVER PHOSPHATE GLASS MICRODOSIMETERS, JANUARY 1966–MARCH 1967
Kenneth A. Hardy and Rufus Werts Sep. 1968 12 p refs
(AD-681497; SAM-TR-68-96) Avail: CFSTI CSCL 6/18

The purpose of this three-phase experimental study was to determine the effects of laboratory reprocessing on silver phosphate glass rod microdosimeters. Results show that the microdosimeters may be brought back to their nonirradiated condition by heating at 450C for one hour. According to these studies, a small loss of sensitivity occurs after the initial reprocessing but the linearity does not appear to be affected. Further reprocessing gave no apparent loss in sensitivity even after repeated exposures up to a cumulative dose of 97,500 R. Author (TAB)

N69-22294# School of Aerospace Medicine, Brooks AFB, Tex.
ADAPTATION OF DOGS TO 60 AND 90 MM. HG CO2 AT A TOTAL PRESSURE OF 260 MM. HG Final Report, Oct. 1966–Jan. 1967
William E. Pepelko Aug. 1968 14 p refs
(AD-681496; SAM-TR-68-70) Avail: CFSTI CSCL 6/3

Two groups of 6 dogs were exposed continuously for 9 days to an environment having a total barometric pressure of 260 mm. Hg, a partial pressure of 140 mm. Hg O2, and either 60 or 90 mm. Hg CO2. Arterial samples were collected daily from a previously exteriorized carotid artery. Data from the present experiment were compared with those of previous researchers working with chronic hypercapnic dogs at ground-level pressure. Author (TAB)

N69-22313# School of Aerospace Medicine, Brooks AFB, Tex.
A STANDARD METHOD FOR FE59 FERROKINETICS, JANUARY–MARCH 1968
Donald F. Logsdon, Jr., James F. Green, and Guy M. Strong Sep. 1968 13 p refs
(AD-681498; SAM-TR-68-98) Avail: CFSTI CSCL 6/1

A simple method for performing a 59Fe ferrokinetics study has been developed, combining several procedures already in use. Methods are presented for measuring plasma iron clearance, red cell iron uptake, and the movement of iron through the hematopoietic centers. Formulas are given for calculating plasma and red cell iron turnover, hemoglobin synthesis, mean erythron life-span, and mean effective erythron hemoglobinization time. Author (TAB)

N69-22319*# Wisconsin Univ., Madison.
COMPUTER SIMULATION STUDIES OF THE VENOUS CIRCULATION
M. F. Snyder and V. C. Rideout [1968] 24 p refs
(Grant NGR-50-002-083)
(NASA-CR-100568) Avail: CFSTI CSCL 06P

An analog computer model of the human cardiovascular system has been set up in which detailed attention is given to the representation of pressure—flow events in the veins, including effects of gravity, collapse, breathing, and venous valves. This model, with its only control loop including one for heart rate control, was checked against human venous pressure waveforms and also response of the human to tilt-table experiments as reported in the literature. These comparisons indicate that the model should be valid for study of postulated venous tone control characteristics, and should be useful in the study of mechanisms of venous return and circulatory system response during unusual G-force conditions. Author

N69-22322*# Mississippi Univ., University. Dept. of Physiology and Biophysics.
CONCEPTUAL IDEA OF DIGITAL COMPUTER MODEL OF HUMAN RESPIRATORY SYSTEM Progress Report, 1 Jun.–30 Nov. 1968
H. T. Milhorn, Jr. 30 Nov. 1968 22 p refs
(Grant NRG-25-002-015)
(NASA-CR-100534) Avail: CFSTI CSCL 06P

In the development of a digital computer model of the human respiratory system two types of research are presently being pursued. These are (1) simulation and (2) experimental. The simulation work is primarily to extend and improve the controlled system, specifically the pulmonary system. The experimental work concerns the controller equations for ventilation and cardiac output. A detailed discussion of both of these (simulation and experimental) is impractical, however, some of the more important aspects are discussed. Author

N69-22433# Systems Technology, Inc., Hawthorne, Calif.
PILOT RATING TECHNIQUES FOR THE ESTIMATION AND EVALUATION OF HANDLING QUALITIES Final Technical Report
John D. McDonnell Wright-Patterson AFB, Ohio AFFDL Dec. 1968 214 p refs
(Contract AF 33(615)-3960)
(AD-681845; STI-TR-166-1; AFFDL-TR-68-76) Avail: CFSTI CSCL 05/10

Although rating scales of varied forms have been widely used to estimate and evaluate handling qualities over the past decade, a number of deficiencies in both method and data base have been apparent. The investigation was aimed at overcoming many of these deficiencies by attempting to resolve the difficulties experienced with rating scales themselves, and by extending and adding to already existing relationships between ratings and pilot/vehicle system parameters. Rating scales have come under increasing criticism for problems such as wording ambiguity, the dual mission character of some scales, the nonuniformity in the distribution of descriptors across the scale, and the misuse of scales which has occurred when ratings have been averaged. Psychometric methods provide an approach to these problems, and were used to scale several phrases descriptive of vehicle handling qualities. Thus, quantitative characteristics were derived for contemporary scales through the use of the Method of Successive Intervals. An experiment was conducted which added to available data relating Cooper ratings and pilot/vehicle parameters, and which also tested some potential alternate scale candidates. The correlation results indicate that ratings are probably based on performance and the degree of difficulty experienced in maintaining the performance. The difficulty is most easily represented by the pilot equalization required and the vehicle stick characteristics. Author (TAB)

N69-22466*# Techtran Corp., Glen Burnie, Md.
DEMONSTRATION OF THE OCCURRENCE OF ALBINISM, MELANISM AND NEOTENY IN FROGS, 2. A NEW CONTRIBUTION TO BIO-TECHNOLOGY [2. NACHWEIS UBER DAS ENTSTEHEN VON ALBINISMUS, MELANISMUS UND NEOTENIE BEI FROSCHEN. EIN NEUER BEITRAG ZUR BIOTECHNIK]
Gustav Tornier Washington NASA Mar. 1969 6 p ref Transl. into ENGLISH from Zool. Anz. (Leipzig), v. 32, 1908 p 284–288
(Contract NASw-1695)
(NASA-TT-F-12150) Avail: CFSTI CSCL 06C

To determine to what degree vegetable substances are exclusively suitable for raising Pelobates larvae, numerous specimens were fed exclusively with filamentism algae and algaes and food containing meat was strictly excluded. The experimental animals developed slowly to a certain size by using the remainder of nutritive yolk still in their cells from the egg period and subsequently died. Pelobates larvae which have just left the egg cannot develop on pure vegetable feed and cannot stay alive when fed on algae. When fed on algae and meat they develop to medium size with short rear limbs, and if they are subsequently fed exclusively on filamentous algae they stay alive but do not develop further. Author

N69-22475*# Techtran Corp., Glen Burnie, Md.
THE ASYMMETRICAL DEVELOPMENT AND SITUS INVERSUS VISCERUM IN TWINS AND DOUBLE STRUCTURED ORGANISMS [UBER AYMMETRISCHE ENTWICKLUNG UND SITUS INVERSUS VISCERUM BEI ZWILLINGEN UND DOPPELBILDUNGEN]
Hans Spemann and Herman Falkenberg Washington NASA Apr. 1969 45 p refs Transl. into ENGLISH from Arch. Entwicklungsmech. Organ. (Berlin), v. 45, 1919 p 371–420
(Contract NASw-1695)
(NASA-TT-F-12148) Avail: CFSTI CSCL 06C

From triton embryos which are separated at the median at the beginning of gastrulation, twins are developed with a strongly curved inner side. A number of symmetrically developed twin pairs were kept alive until metamorphosis. The organs of the inner side could be more weakly developed individually or in entirety. In the case of corresponding twins being different sizes due to unequal size of the parts, the smaller twin is behind the larger twin in development. The head of the larvae achieves a much higher degree of symmetry than the trunk and tail, even in cases where the latter are wound into a spiral, the head can be almost normally developed. As a result of this curvature of the inner side the twin larvae can almost be differentiated into right and left. The asymmetry of the situs cannot arise at the moment it first becomes visible. Various points could be determined in this causal framework. Author

N69-22504*# Aztec School of Languages, Inc., Acton, Mass. Research Translation Div.
FURTHER CONTRIBUTIONS TO THE KNOWLEDGE OF GEOTROPIC STIMULUS MOVEMENTS [WEITERE BEITRAGE ZUR KENNTNIS DER GEOTROPISCHEN REIZBEWEGUNGEN]
Fredrich Czapek Washington NASA - Apr. 1969 113 p refs Transl. into ENGLISH from Jahrb. Fur Botanik (Germany), v. 32, 1898 p 174–308
(Contract NASw-1692)
NASA-TT-F-12085) Avail: CFSTI CSCL 06F

Observations are presented on the reaction of plants to stimulating movements and on the manipulation of various factors to influence the reactions. Experiments are discussed which seek to determine the means or the mechanisms through which plants react to external stimuli. Reception and duration of stimulation, magnitude of the stimulus, force and sensitivity, gravity directions, thermal factors, chemical reactions, traumatic stimuli, and transmission of the stimuli within the plant are examined by studying the results obtained in experiments with a wide variety of plants. It is concluded that stimulus movement should be classified as reflex movement; it can be considered in terms not unlike those used in animal physiology, since such processes as perception, ductory functions, central transmission, and motor functions can also be distinguished here. K.W.

N69-22528# Commissariat à l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucléaires.
RADIOPROTECTIVE PROPERTIES OF SOME HETEROCYCLIC NITROGENOUS COMPOUNDS AGAINST CHANGES IN HEMOGLOBIN CONCENTRATION AND HEMATOCRIT VALUE IN X IRRADIATED MICE [PROPRIETES RADIOPROTECTRICES DE CERTAINS COMPOSES HETEROCYCLIQUES AZOTES SUR LES VARIATIONS DU TAUX D'HEMOGLOBINE ET DE LA VALEUR HEMATOCRITE CHEZ LA SOURIS IRRADIEE]
Hamid Rousdhy (CEA, Cairo), Theodore Pierotti, and Michel Polverelli Jan. 1969 22 p refs In FRENCH; ENGLISH summary
(CEA-R-3669) Avail: CFSTI

Radioprotective properties of imidazole and benzimidazole have been proved in previous work. In this study, the radioprotective action of these compounds in comparison with cysteamine upon the hematopoietic system after lethal X-irradiation has been examined. The results show that (1) no drastic variations of the hematologic constants (hemoglobin concentration and hematocrit value) occur after the intraperitoneal injection of radioprotective compounds apart from certain apparent reactions with heterocyclic compounds and (2) the better radioprotective action of benzimidazole. Twenty-five days after irradiation, the hemoglobin concentration and the hematocrit of radioprotected mice return to normal values. Author (ESRO)

N69-22534*# National Academy of Sciences—National Research Council, Washington, D. C. Space Science Board.
PHYSIOLOGY IN THE SPACE ENVIRONMENT. VOLUME 1: CIRCULATION Study Report, 1966–1967
1968 196 p refs Sponsored by NASA
(NASA-CR-100535; Publ-1485A) Avail: CFSTI CSCL 06P

Evaluated are possible effects of prolonged space flight on the human circulatory system by considering: (1) the various parts and functions of the circulatory system; and (2) the various stress factors to which the system may be subjected. A systems approach with computerized models is used to incorporate those nervous, endocrine, and other factors that control and regulate circulatory cardiovascular functions characteristic of manned space flight elements. G.G.

N69-22557# California Univ., Berkeley, Lawrence Radiation Lab.
AMINOACYLIC DERIVATIVES OF NUCLEOSIDES, NUCLEOTIDES AND POLYNUCLEOTIDES. 2: SYNTHESIS OF 3 ' (2 ')–O–AMINOACYLNUCLEOSIDE-5 '-di-AND TRIPHOSPHATES
P. P. Purycin et al 1968 19 p Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Khim. (Moscow), No. 5, 1968 p 1084–1087
(PB-180856T; UCRL-Trans-1381) Avail: CFSTI CSCL 06A

A method was developed for synthesizing 3' (2')-O-aminoacylnucleoside 5'-di-and triphosphates. The method is based on condensing imidazolides of N-tert, butyloxycarbonylamino acids with necleosidedi-and triphosphates and subsequently removing the tert, butyloxycarbonyl protection by treating with hydrogen chloride in abs. ether. Author (USGRDR)

N69-22568# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF RIGHT AND LEFT VAGAL COOLING ON HEART RATE Interim Report, Feb.–Jul. 1968
William G. Davis, Jr. Nov. 1968 11 p refs
(AD-682289; SAM-TR-68-129) Avail: CFSTI CSCL 6/16

A study was made of the heart rate response to blockade of the right and left cervical vagosympathetic nerve trunks. In six dogs, coolers were surgically implanted around both cervical vagosympathetic nerves which permitted us to block the parasympathetic control of the heart in conscious resting dogs. With the left vagosympathetic nerve blocked there was a slight increase in heart rate and the respiratory sinus arrhythmia did not disappear. With blockade of the right vagosympathetic nerve there was a substantial heart rate increase and the respiratory sinus arrhythmia usually disappeared. There was a significant difference in the heart rate with blockade of the right as compared with the left vagosympathetic nerve trunk, indicating that the right trunk is more dominant in the resting dog and more inhibitory impulses travel over this route. The heart rate changes summed together, however, do not equal the rate observed with bilateral blockade. Author (TAB)

N69-22637*# Systems Technology, Inc., Hawthorne, Calif.
DYNAMICS OF THE VESTIBULAR SYSTEM AND THEIR RELATION TO MOTION PERCEPTION, SPATIAL DISORIENTATION, AND ILLUSIONS
Richard A. Peters Washington NASA Apr. 1969 249 p refs
(Contract NAS2-3650)
(NASA-CR-1309; TR-168-1) Avail: CFSTI CSCL 06P

In piloting tasks, visual observation of instrument indicators and of the visual field and sensations of motion, provide the sensible signals upon which the pilot bases his control of the aircraft. Variations of the gravitational-inertial force environment during the flight of an aircraft affect the pilot's motion sensors in his vestibular system and through them affect his control of the vehicle, his visual process, and his sense of orientation. A study is made of the basic physiology of the human vestibular system and its interconnection with the oculomotor system. The dynamic functions of the semicircular canals and utricles (otolith organs) and the relation between subjective perceptions of motion and the accelerations which produce them are studied. Mathematical models of the dynamic functions of the vestibular system are presented. The various illusions experienced by pilots of aircraft are related to the accelerations which produce them and to the dynamics of the vestibular sensors involved. Author

N69-22648# California Univ., Berkeley. Lawrence Radiation Lab.
APPLICATION OF ELECTRON DIFFRACTION TO PROBLEMS IN BIOLOGICAL ELECTRON MICROSCOPY
R. M. Glaeser, G. Thomas, R. Cristensen, and W. G. Brammer (Picker Nucl., White Plains, N. Y.) 12 Jun. 1968 5 p ref Submitted for publication Supported in part by PHS
(Contract W-7405-eng-48)
(UCRL-18293; Conf-680905-1) Avail: CFSTI

The application of selected area diffraction, dark field imaging, and low-angle Fourier contrast to biological materials is discussed. NSA

N69-22755# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
MONOMETHYLHYDRAZINE (MMH) ABSORBING CAPACITY AND INDICATOR EFFICIENCY OF THE MSA ROCKET PROPELLANT CANISTER GMN-SSW Final Report, Sep.–Dec. 1967
Eugene L. Arnold Jul. 1968 22 p refs
(AD-682299; AMRL-TR-68-35) Avail: CFSTI CSCL 6/17

A rocket propellant gas mask canister was tested to determine its effectiveness in removing monomethylhydrazine (MMH) from an airstream. The accuracy of the window indicator incorporated in this canister was also evaluated for MMH exposures. Six canisters were tested in the study. A flow rate of 50 liters/min and concentrations of MMH in air of from 30 to 1200 ppm were used. The effects of both continuous and intermittent exposures were determined. Author (TAB)

N69-22762# Bettis Atomic Power Lab., West Mifflin, Pa.
MEANS OF DETECTING AND PROTECTING AGAINST TRITIUM
Yves Sutra-Fourcade Dec. 1967 100 p refs Transl. into ENGLISH from the French Rept. CEA-R-3350
(WAPD-Trans-102; CEA-R-3350) Avail: CFSTI

An attempt to correlate present data concerning tritium, especially from the health physics points of view, is presented. The various detection and measurement methods are reviewed in turn: measurement of tritium in the atmosphere, in liquids, and on surfaces. The operation of various types of apparatus is analyzed, and the sensitivity limits deduced from laboratory tests are given. Other sections are devoted to the means of protection which can be used against inhalation of tritium (ventilation, protective clothing) and to calculations of the changes in atmospheric pollution in a given place and of the time spent in a contaminated zone. The last part deals with the decontamination of equipment contaminated with tritium. Author (NSA)

N69-22766*# Battelle Memorial Inst., Columbus, Ohio.
SYSTEMS APPROACH TO EVALUATING HYDROGENOMONAS CULTURES
John F. Foster and John H. Litchfield Washington NASA Apr. 1969 48 p refs
(Contract NAS2-4270)
(NASA-CR-1296) Avail: CFSTI CSCL 06M

Cultures of *Hydrogenomonas eutropha* are confirmed as a stable process operating at room temperature for waste conversion, to consume the metabolic wastes carbon dioxide and urea; and the hydrogen by-product from water electrolysis.

Environmental measurements with feedback controls can balance consumption of these wastes by individual makeups at the same rates as consumption. In this manner, a stable culture with constant conversion rates can be maintained in steady state growth for long periods and is suitable for consideration as a continuous waste conversion process. The growth rate indicated by careful experimental measurements is a fractional increase of 0.33 per hour of the weight of bacterial cells in the culture, which is harvested continuously from a cellular culture maintained at a constant concentration of 6.1 g (dry weight) per liter of liquid culture. These values can be used for calculating the maximum production rate of cellular material in evaluating potential practical applications. Author

N69-22771# Atomic Energy Commission, Idaho Falls, Idaho.
SPECIAL APPLICATIONS OF THERMOLUMINESCENCE DOSIMETRY
John P. Cusimana, Foster V. Cipperley, and John C. Culley June 1968 13 p Presented at the 13th Ann. Meeting of the Health Phys. Soc., Denver, 16–20 Jun. 1968
(IDO-12068; CONF-680607-10) Avail: CFSTI

The results of recent experiments in thermoluminescence dosimetry are presented. A good gross integrated exposure correlation was indicated by a year-long exposure comparison field test using lithium fluoride-teflon dosimetry and beta-gamma film packets on ten high-exposure-probability individuals. Intercomparison of film, lithium fluoride-teflon discs, lithium fluoride phosphor, ferric sulphate solution, ionization chambers, R meters, glass dosimeters and electroscopes similarly exposed to a gamma source showed a close correlation for shielded response. The average ratio of shielded film response to shielded lithium fluoride-teflon disc response for various distances from the source was 1.04 while the average ratio of unshielded or open-window film response to the disc was 2.1. Author (NSA)

N69-22783# Milan Univ. (Italy).
BRAIN STEM SYSTEMS AND BEHAVIOR Final Scientific Report, 1 Jun. 1967–31 May 1968
Cesare Bartorelli and Alberto Zanchetti Jul. 1968 48 p refs
(Grant (AF-EOAR-4-67)
(AD-681532; AFOSR-69-0179TR) Avail: CFSTI CSCL 6/16

During the year covered by this report, work has been performed along the following lines: (1) Regulation of circulation during the wakefulness-sleep cycle. Experiments performed in totally sympathectomized cats have shown that the hemodynamic pattern most usually observed during desynchronized sleep is greatly modified by sympathectomy. (2) Regulation of circulation during emotional behavior. (a) Fighting. Fighting was elicited in unanesthetized cats as a natural reaction to another cat, in which attack was induced by brain stimulation. (b) Preparation for fighting. Cardiovascular changes during preparation for lighting have been compared with those during actual fighting in unanesthetized cats. Several of the functions measured changed differently in the two conditions. It is suggested that some of these differences may derive from the exertion component of fighting which may overwhelm other central neural influences common to fighting and preparation for fighting and related to emotion. Author (TAB)

N69-22789# System Development Corp., Santa Monica, Calif.
LINGUISTIC AND TUTORIAL MODELING FOR NATURAL LANGUAGE CAI
F. D. Bennik, R. M. Schwarcz, and H. F. Silberman Dec. 1968 16 p refs
(Contract F33615-68-C-1473)
(AD-681530; SDC-SP-3260) Avail: CFSTI CSCL 5/9

The paper describes research that has as its goal the development of a computer-based tutorial system that can recognize and generate natural English discourse, while providing CAI lesson authors with a meaningful means of lesson preparation. The primary line of research concentrates on natural language data processing and conceptual modeling designed to support a CAI system. This has resulted in computer programs that perform functional operations of syntactic and semantic analysis, inferring answers to questions, generation of coherent discourse, and recognition and generation of paraphrase. A second line of research was initiated to find decision rules for generating and sequencing remedial questions and statements. From a study of verbal data obtained from the recorded messages of tutors, as they monitor and augment the interaction between students and a computer-administered lesson, a set of effective decision rules is sought that can invoke computer generation of remedial feedback from a subject matter data base. Author (TAB)

N69-22850# Colorado Univ., Boulder.
RADIATION EFFECTS IN BIOCHEMISTRY AND ORGANIC CHEMISTRY Technical Progress Report, 15 Oct. 1967–14 Oct. 1968
10 Jul. 1968 49 p refs
(Contract AT(11-1)-690)
(COO-690-32) Avail: CFSTI

The effects of ionizing radiation on purified compounds in biological systems were studied with emphasis placed on the effects of radiation on proteins in the solid state. Phases of study included the effects of gamma radiation on solid state aspartate transcarbamylase from *Escherichia coli*, protein association of aspartate transcarbamylase, radiation scavengers in irradiated lysozyme and denaturation of irradiated lysozyme, and the hydrogen exchange and perturbation spectra of irradiated lysozyme. NSA

N69-22851# Oregon State Univ., Corvallis. Dept. of Botany.
THE ROLE OF NATURALLY OCCURRING QUINONES IN PHOTOSYNTHESIS Yearly Progress Report, Sep. 1967–1 Sep. 1968
Norman I. Bishop 1 Sep. 1968 10 p refs
(Contract AT(45-1)-1783)
(RLO-1783-18) Avail: CFSTI

It is found that uv radiation resulted in the destruction of plastoquinone. It was noted that uv radiation caused a decrease in the variable yield fluorescence. A number of phospholipases and galactolipases were examined for their effect upon inactivation of chloroplast reactions and upon fluorescence for comparison with uv effects; the effects were identical. For studies on the role of plastoquinone in photosynthesis, a series of mutants of the alga, *Scenedesmus obliquus*, were isolated. Analysis of isolated pigments revealed no major change in these fractions nor in the various lipids of the chloroplasts. Electron microscopy revealed no structural alteration of the chloroplasts. However, when a sufficiently refined technique for the separation of the various quinone fractions of these mutants was developed such that plastoquinone could be separated from vitamin K and other substances it became apparent that of ten mutants examined eight had altered ratios of plastoquinone: chlorophyll. NSA

N69-22853# Texas Univ., Austin.
EFFECTS OF RADIATION ON THE GENETIC SYSTEMS OF ORGANISMS IN RELATION TO THEIR PHYSICAL AND BIOCHEMICAL SYSTEMS Progress Report, 1 Sep. 1967–1 May 1968
Mary L. Alexander 1 May 1968 18 p refs
(Contract AT(40-1)-3014)
(ORO-3014-3) Avail: CFSTI

N69-22859

Progress of the programs on dose fractionation studies on spermatogonia of *Drosophila melanogaster* and combined x-ray and ethylenimine treatments for induction of mosaic mutations is reported. Initial studies on mutagenic potentialities of DNA feeding for Drosophila are discussed. NSA

N69-22859# *California Univ., Berkeley, Lawrence Radiation Lab.*
BIOLOGY AND MEDICINE Semiannual Report, Fall 1967
John H. Lawrence, ed. 1967 195 p refs
(Contract W-7405-eng-48)
(UCRL-18066) Avail: CFSTI

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N69-22860*# California Univ., Berkeley. Lawrence Radiation Lab.
THE EFFECTS OF GRADED ERYTHROPOIETIC STIMULATION ON RED BLOOD CELL SURVIVAL IN THE MOUSE AND RAT
Stephen A. Landaw *In its* Biol. and Med. 1967 p 1–14 refs Sponsored in part by NIH, NASA, and AEC (See N69-22859 11-04)
(Contract W-7405-eng-48)
Avail: CFSTI CSCL 06/S

Red blood cell (RBC) survival was studied in LAF_1 mice and Buffalo rats following hypoxia, erythropoietin injection, repeated phlebotomy, or phenylhydrazine induced anemia, using a technique based upon the endogenous production of ^{14}CO in the breath following the injection of glycine-2-^{14}C. Despite estimated hemoglobin synthesis rates 8 or more times normal, in no instances were there any increases in the rate of random destruction of the produced RBC, nor was there the production of a component of extremely short-lived cells. Ineffective hemoglobin synthesis appeared to be either normal or decreased, with the exception of rats studied shortly after injection of phenylhydrazine, suggesting a toxic effect of the drug in this time period. A modest but significant shortening of the mean potential lifespan (senescent destruction) was seen, which increased linearly with increasing hemoglobin synthesis rate. This shortening never exceeded 35% and no shortening of any significant degree was seen unless estimated hemoglobin synthesis rates were more than 2–3 times normal. Author

N69-22861*# California Univ., Berkeley. Lawrence Radiation Lab.
RADIATION INDUCED MITOTIC SEGREGRATION IN YEAST
Sayaka Nakai and Robert K. Mortimer *In its* Biol. and Med. 1967 p 26–37 refs Sponsored in part by AEC and NASA (See N69-22859 11-04)
Avail: CFSTI CSCL 06R

Studies were made on *Saccharomyces cerevisiae* following exposure to doses of 15, 40, or 80 krads of X-radiation or to uv radiation. Results indicated that the principal mechanism of radiation-induced sectoring in diploid yeast was mitotic crossing over. Approximately 80% of the colonies were sectored for all genes distal to one of the seven intergenic regions. Genetic analysis showed that these colonies were reciprocal with respect to the genotypes of opposite sectors. A positive correlation between sectoring frequency and centromere distance was observed, as is expected for mitotic crossing over. It was possible that mitotic gene conversion, that should show no centromere dependence, predominated at these high exposures. If only a fraction of the population of cells was competent for mitotic crossing over, this event could saturate at relatively low doses, allowing other events such as gene conversion to predominate. Author (NSA)

N69-22862# California Univ., Berkeley. Lawrence Radiation Lab
STANDARD BIOLOGICAL TEST SPECIMENS FOR USE IN THE SCANNING ELECTRON MICROSCOPE
Thomas L. Hayes, Ja Rue S. Manning, and Robert M. Glaeser *In its* Biol. and Med. 1967 p 50–57 refs (See N69-22859 11-04)
Avail: CFSTI

Scanning electron micrographs of familiar biological specimens (tobacco mosaic virus, polystyrene latex spheres, lipoprotein macromolecules, and collagen) are presented as reference material for testing the performance of a scanning electron microscope and to demonstrate the kinds of information available at the present time with this instrument. Author

N69-22863# California Univ., Berkeley. Lawrence Radiation Lab.
MICRODOMAIN STRUCTURE-ANALYSIS OF BIOLOGICAL SPECIMENS BY ELECTRON DIFFRACTION
Robert M. Glaeser *In its* Biol. and Med. 1967 p 64–73 refs (See N69-22859 11-04)
(Grant PHS GM-15129-01)
Avail: CFSTI

The current results are described of preliminary studies which are being carried out in order to determine the feasibility of obtaining; (1) diffraction patterns from single cell membranes and (2) high-resolution diffraction data from crystalline macromolecules. Results obtained with model specimens have revealed a number of instrumental limitations of the conventional electron microscope for such studies. The data reported here indicate that one of the most urgently needed improvements would be a data-monitoring device that is significantly more sensitive or more efficient that the conventional fluorescent screen. Author

N69-22864# California Univ., Berkeley. Lawrence Radiation Lab.
A CALCULATION OF THE PHYSICAL CHARACTERISTICS OF NEGATIVE PION BEAMS. ENERGY-LOSS DISTRIBUTION AND BRAGG CURVES

Stanley B. Curtis and Mudundi R. Raju *In its* Biol. and Med. 1967 p 108–122 refs Submitted for publication (See N69-22859 11-04)
(UCRL-17606) Avail: CFSTI

The physical properties of a stopping negative pion beam were studied in connection with dosimetry experiments with such beams at the 184-inch cyclotron. Calculations were made of the dE/dx distribution in the stopping pion region, and central-axis depth-dose curves (Bragg curves) were computed with the assumption of a uniform parallel incident beam with a large enough cross section so that multiple scattering could be neglected. A Gaussianly distributed incident momentum spread was assumed such that the width of the Bragg peak in the stopping region due to momentum straggling was large compared with range straggling effects. This approximated well the experimental situation. Although the calculations were carried out with water as the stopping medium, comparison of the resulting Bragg curve with an experimental curve obtained with a silicon detector showed good agreement. Author (NSA)

N69-22865# California Univ., Berkeley. Lawrence Radiation Lab.
THE MEASUREMENT OF THE EFFECTS OF X-RAYS AND HELIUM IONS ON THE PROLIFERATIVE CAPACITY OF LYMPHOMA ASCITES TUMOR CELLS IN VIVO
Jose M. Feola, John H. Lawrence, and Graeme P. Welch *In its* Biol. and Med. 1967 p 151–165 refs (See N69-22859 11–04)
Avail: CFSTI

The oxygen enhancement ratio and the relative biological effectiveness of 910 MeV helium ions of various linear energy transfer were compared using the growth of transplanted ascites tumor cells in mice following X-irradiation in vitro as the test criteria. Seven days prior to irradiation, mice were injected with tumor cells. Thirty minutes before irradiation the animals were sacrificed and tumor cells in ascitic fluid were removed and irradiated in an atmosphere of either oxygen or nitrogen. A counted number of tumor cells was then injected into mice and the number of tumors that developed during the next eight wks was recorded. Results are presented in graphs and tables and the value of the experimental procedure for measuring the net result of a number of radiation-initiated processes in cells is discussed. NSA

N69-22892# California Univ., Berkeley. Lawrence Radiation Lab.
AMINOACYLIC DERIVATIVES OF NUCLEOSIDES, NUCLEOTIDES AND POLYNUCLEOTIDES. 1. SYNTHESIS OF 3' (2')-O-AMINOACYLNUCLEOTIDES
A. A. Kraevskii, P. P. Purygin, L. N. Rutzite, Z. S. Belova, and B. P. Gottikh Sep. 1968 19 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Khim. (Moscow), no. 2, 1968 p 378–382
(PB-180884T; UCRL-TRANS-1380) Avail: CFSTI CSCL 07C

A new method was developed for the synthesis of 3' (2'(-O-aminoacyl-nucleotides based on the condensation of nucleotides with imidazolides of N-tert. butyloxycarbonyl amino acids followed by removal of the tert. butyloxcarbonyl protection by processing with hydrogen chloride in abs. ether. (Author) USGRDR

N69-22894# School of Aerospace Medicine, Brooks AFB, Tex.
A SIMPLIFIED DETERMINATION OF URINARY TESTOSTERONE UTILIZING COLUMN AND GAS-LIQUID CHROMATOGRAPHY, JULY 1966–JULY 1968
J. Throck Watson and Michael Lofrano, Jr. Oct. 1968 15 p refs
(AD-681503; SAM-TR-68-117) Avail: CFSTI CSCL 6/1

A simplified and reliable assay for urinary testosterone has been established which requires only one purification by silica gel column chromatography prior to quantification by gas chromatography. The procedure avoids most of the enzyme-inhibiting debris in the urine by preliminary precipitation of the steroidal material with ammonium sulfate. Enzyme hydrolysis reaches near-maximum completion in 18 to 24 hours at 37C. with only 10% the normal dosage of enzyme. Author (TAB)

N69-22955# Florida Univ., Gainesville.
COMPARISON OF THE RATE AND EXTENT OF DEOXYRIBONUCLEIC ACID REPAIR AND SEMI-CONSERVATIVE SYNTHESIS IN BACTERIA EXPOSED TO ULTRAVIOLET LIGHT
Daniel Billen 1 Aug. 1968 16 p Presented at the Symp. on the Effects of Radiation on Cellular Proliferation and Differentiation, Monaco, 1–6 Apr. 1968
(Contract AT(40-1)-3596)
(ORO-3596-7; CONF-680413-4) Avail: CFSTI

Using deuterium, ^{15}N, and ^{13}C as a density label and buoyant density centrifugation in CsCl as a means of separating pre- and post-irradiation synthesized DNA strands, the rate and extent of DNA repair synthesis in exponential-phase *Escherichia coli* strain B/r was determined. After uv exposure, ^{3}H-thymine incorporation into the "heavy" parental DNA strands was used to measure repair syntheis; while ^{3}H-thymine incorporation into "light" and newly synthesized DNA strands measured semi-conservative replication. Author (NSA)

N69-22978# Hebrew Univ., Jerusalem (Israel). Dept. of Physical Chemistry.
THE ACTION OF RADIATIONS ON SOME BIOLOGICAL MODEL SYSTEMS Technical Progress Report, 1 Aug. 1967–15 Aug. 1968
Gabriel Stein 15 Aug. 1968 30 p refs
(Contract AT(30-1)-3242)
(NYO-3242-29) Avail: CFSTI

Excitation processes in irradiated systems under the influence of ionizing radiations were investigated. Excitation processes in aromatic systems were examined by studying the temperature dependence of γ-radioinduced trans → cis isomerization of stilbene in toluene. Excitation processes in x-irradiated aqueous solution of sodium salicylate, and the role of free radical processes in the action of ionizing radiation on aqueous solutions of biochemical and biological systems were also studied. A functional correlation between aromatic and divalent sulfur amino acids in ribonuclease was found in reactions with hydrogen atoms in aqueous solutions. NSA

N69-22990*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
THE RELATIONSHIP BETWEEN OPTICAL DISTORTION AND BINOCULAR DEPTH PERCEPTION
L. R. Loper and R. C. Stout Washington Apr. 1969 10 p refs
(NASA-TN-D-5162) Avail: CFSTI CSCL 06B

Binocular depth perception, a vital function during spacecraft docking and lunar landing, could be degraded by any spacecraft system optical transparency. A study of the relationship between binocular depth perception and optical distortion in the Apollo pressure suit helmets and visors was made to aid in setting optical distortion limits for the helmets and visors. Data obtained from the study indicated that all the helmets and visors which were tested degraded binocular depth perception. As measured by the Howard–Dolman apparatus, there is evidently a systematic effect of optical distortion in the Apollo helmets and visors on binocular stereoscopic depth perception. A program for studying this problem in greater depth is outlined. Author

N69-22995# Centre de Recherches Psychopathologique, Paris (France).
STUDY OF PSYCHOLOGICAL ATTITUDES OF NUCLEAR WORKERS TOWARDS RADIOACTIVITY RISK Final Report [L ETUDE DES ATTITUDES PSYCHOLOGIQUES DES TRAVAILLEURS NUCLEAIRES VIS-A-VIS DU RISQUE RADIOACTIF. RAPPORT FINAL]
P. Sivadon and A. Fernandez Brussels 1968 161 p
(Contract EURATOM-002-62-10-PSTF)
Avail: CFSTI

The potential variety of psychological attitudes found among nuclear workers was studied, with stress on their origins and the motivations that change them, such as knowledge acquired, individual integration of safety measures, and influence of surroundings. Several methods of approach were necessary. These included: (1) analysis of personal histories and medico-psychological clinical examination; (2) analysis of responses to certain psychometric tests and personality projection tests; (3) analysis of psychological aspects connected with the job; and (4) a collective approach and study of the dynamics of the working parties and the social circles in which the worker was associated. The final attitudes were characterized by complexity and showed a shifting history. Knowledge of them is considered useful in improving adaptation to radioactive hazards and in obtaining the proper responses to changes in individual and collective safety conditions. Author

N69-23059# Atomic Energy Commission, Idaho Falls, Idaho. Health Services Lab.
APPLIED THERMOLUMINESCENCE DOSIMETRY PROGRAM AT THE NRTS
John P. Cusimano, Foster V. Cipperley, and John C. Culley In its 2d Intern. Conf. on Luminescence Dosimetry [1968] p 722–736 refs (See N69-23005 11-06)
Avail: CFSTI

Procedures for large scale personnel monitoring using thermoluminescent dosimetry are described and evaluated as a result of a two year program to study persons subjected to low background environmental exposure. It was found that gamma exposures in the low mR range can be measured on a routine basis using calcium fluoride–dysprosium extrusions, and data are presented from such measurements. Applications to a national health physics program, involving such subjects as finger and hand dosimetry, shielding measurements, radiation source calibration and thermoluminescent dosimetry for use by doctors and nurses handling radiation accident victims, are also discussed. In addition, the laboratory decontamination facility and shielded operating room are also described, as well as the potential of thermoluminescent methods and their advantages over existing methods and techniques of reactor measurement. Author

N69-23063# Kernforschungszentrum, Karlsruhe (West Germany).
PHOSPHATE GLASS DOSIMETERS FOR THE MEASUREMENT OF ORGAN DOSES WITH REDUCED BODY INFLUENCE
Ernst Piesch *In* AEC 2d Intern. Conf. on Luminescence Dosimetry [1968] p 783–806 refs (See N69-23005 11-06)
Avail: CFSTI

Based on radiation dosage as a function of quantum energy in a given organ at an exposure of 1 R, energy compensation filters for phosphate glasses were developed. These dose readings showed the same energy dependence as the absorbed dose in the critical organ, such as gonads, bone marrow, gastrointestinal tract, and lenses of the eyes. Two possibilities of organ dose indication at the front side of an Alderson phantom were realized: (1) The dosimeter reading is energy independent, at least, for radiation incidence on the front side of the phantom. (2) The dosimeter reading is energy independent for radiation incidence from the front and likewise from behind the phantom. Phosphate glass dosimeters are described directly indicating the absorbed dose in critical organs with reduced influence of body orientation to radiation incidence for quantum energies above 50 keV. For the other organs or for lower quantum energies, detailed statements about radiation quality and radiation incidence were found to be required. Here, the depth dose distribution in phosphate glasses, which can be measured by employing a multiscanning technique, offers the additional advantage of indicating the dose actually absorbed in the body. Author

N69-23064# Isotopes, Inc., Westwood, N. J.
A THERMOLUMINESCENCE PERSONNEL DOSIMETRY BADGE
Douglas Jones and Geoffrey Webb *In* AFC 2d Intern. Conf. on Luminescence Dosimetry [1968] p 807–813 refs (See N69-23005 11-06)
Avail: CFSTI

Since standard definition of maximum permissible exposures are specific to critical body sites, such as skin, gonads, and bone marrow, a badge designed to directly measure the dosage at these organs is described. The relationship between the exposure at the chest wall, which is the normal position for a badge dosimeter, and the dose delivered to the critical sites for various photon energies was previously measured. Based on these values, a material which is approximately tissue equivalent, LiF-Teflon, was used for the badge, and the response was modified by using the appropriate filters to simulate the critical organs. A physical description of the badge is given, as well as the form of information retrieved from it and the routine procedure for its use within a complete thermoluminescence dosimetry system. Author

N69-23072# Leeds Univ. (England). Dept. of Medical Physics.
LiF THERMOLUMINESCENCE DOSIMETRY IN TRABECULAR BONE
G. D. Zanelli and F. W. Spiers *In* AEC 2d Intern. Conf. on Luminescence Dosimetry [1968] p 920–935 refs (See N69-23005 11-06)
Avail: CFSTI

The problems of dosimetry in trabecular bone are discussed with reference to the intricate structure of the bone. Results of experiments on human, dog and pig vertebrae using finely ground LiF, are given, and the results are compared with standard and new methods of calculation. It is shown that calculations based on the linear path method agree well with the experimental findings. Some phenomena relating to very fine LiF which came to light during the course of the experiments are also treated. Author

N69-23074# Jefferson Medical Coll., Philadelphia, Pa. Stein Research Center.
THE TOXICITY OF THERMOLUMINESCENT PHOSPHORS
C. M. Dettmer and B. M. Galkin *In* AEC 2d Intern. Conf. on Luminescence Dosimetry [1968] p 944–950 refs (See N69-23005 11-06)
(Grant PHS CA-5109)
Avail: CFSTI

The toxic effects of thermoluminescent phosphors in rats were investigated by introducing these materials by ingestion, intraperitoneal insertion, and subcutaneous implantation. Ingestion of aqueous solutions of LiF proved fatal to 10 to 15 animals within four weeks. Gross symptoms of poisoning were reversed by allowing the animals to drink distilled water in place of the LiF solution. All of the phosphors tested produced adhesions when placed within the abdominal cavity. Subcutaneously implanted detectors

caused local tissue reaction but did not appear to cause gross ill effects. Hot pressed and extruded forms of LiF were not recoverable 3 weeks after implantation. Author

N69-23077# Oak Ridge Associated Universities, Tenn.
PHANTOM DEPTH-DOSE MEASUREMENTS WITH EXTRUDED LiF IN A LOW-EXPOSURE RATE TOTAL BODY IRRADIATOR
W. L. Beck, E. L. Callis, and R. J. Cloutier *In* AEC 2d Intern. Conf. on Luminescence Dosimetry [1968] p 976–989 refs (See N69-23005 11-06)
Avail: CFSTI

Extruded LiF dosimeters were used to measure the depth-dose distribution in a heterogeneous human-like phantom irradiated in the new low exposure rate total-body irradiator. In addition to the problems generally encountered in making such measurements, the nature of this irradiator posed several new ones because of its low exposure rate, large exposure volume, and multidirectional exposure pattern. To make depth-dose measurements in such a facility, a dosimetry system must be sensitive to small exposures, directionally independent, energy independent, and precise. Extruded LiF dosimeters were found to be well suited for this study. Techniques were worked out for handling, annealing, identifying, and individually calibrating these dosimeters. With these techniques, exposure measurements having standard deviations of about 1% are generally obtained. Isodose lines were determined from the point depth-dose measurements in the midlongitudinal and the midsagittal planes of the phantom. These lines show that the depth dose to the back region of the body is somewhat lower than near the front surface. Author

N69-23078# Jefferson Medical Coll., Philadelphia, Pa. Div. of Radiation Therapy.
THREE DIMENSIONAL DOSE DISTRIBUTION MEASUREMENTS IN THE HEAD AND NECK USING LiF
C. M. Mansfield, B. M. Galkin, M. C. Chow, and N. Suntharalingam *In* AEC 2d Intern. Conf. on Luminescence Dosimetry [1968] p 990–999 refs (See N69-23005 11-06)
Avail: CFSTI

Lithium fluoride powder and extrusions were used in a phantom head to measure dose distributions from typical Cobalt-60 teletherapy techniques. Measured doses in the central treatment plane have been compared with calculated values. Volume dose distributions have been determined. The reliability of thermoluminescent dosimetry for clinical applications has been demonstrated. Author

N69-23111*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Advance Biotechnology and Power Dept.
PARAMETRIC STUDY OF MANNED LIFE SUPPORT SYSTEMS. VOLUME 1: SUMMARY Final Report, Jul. 1967–Aug. 1968
R. S. Barker Jan. 1969 23 p
(Contract NAS2-4443)
(NASA-CR-73282; DAC-56712-Vol-1) Avail: CFSTI CSCL 06K

New analytical tools and a computer program were developed for conducting life support system tradeoffs from a mission analysis standpoint. The scaling laws and characteristics developed for each of many life support system functional methods were confirmed with equipment data obtained from the latest literature and through a vendor survey. The computer program developed can be used to describe and characterize a variety of life support systems. These systems can be identified with respect to such mission analysis variables as mission flight path, mission duration, and crew size, and they can be characterized with respect to life support system variables such as ecological closure and selected types of equipment for performing particular functions. Emergency and spares provisions are determined. Vehicle interactions such as those involving meteoroid and radiation shieldings, electrical power systems, and equipment heat sources can also be computed. The results are given in sufficient depth to provide the spacecraft designer with all the necessary data for sizing and locating the life support system within the vehicle. Provided also are data which define the interfaces of the life support subsystems with interrelated vehicle systems. Author

N69-23112*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Advance Biotechnology and Power Dept.
PARAMETRIC STUDY OF MANNED LIFE SUPPORT SYSTEMS. VOLUME 2: PARAMETRIC RELATIONS AND SCALING LAW Final Report, Jul. 1967–Aug. 1968
M. M. Yakut and R. S. Barker Jan. 1969 388 p refs
(Contract NAS2-4443)
(NASA-CR-73283; DAC-56713-Vol-2) Avail: CFSTI CSCL 06K

Parametric data were prepared for various functional methods involved in defining, describing, and characterizing the life support subsystems. Empirical, analytical, and engineering design techniques were used in obtaining these relations. Sensitivity analyses were performed during the development period to ensure the applicability of the study results to mission analysis studies and to life support system definition and subsystem tradeoff studies. Individual parametric relations, scaling laws, and analytical relationships developed for the component elements and for the eight life support subsystems are presented in terms of equipment weight, volume, size, and required electrical power, cooling, and heating. Author

N69-23113*# McDonnell-Douglas Astronautics Co., Santa Monica, Calif. Advance Biotechnology and Power Dept.
PARAMETRIC STUDY OF MANNED LIFE SUPPORT SYSTEMS. VOLUME 3: COMPUTATIONAL PROCEDURES Final Report, Jul. 1967–Aug. 1968
R. S. Barker Jan. 1969 97 p refs
(Contract NAS2-4443)
(NASA-CR-73284; DAC-56714-Vol-3) Avail: CFSTI CSCL 06K

The intent is to present the scope of the objectives in enough detail to facilitate evaluations of the sophistication of the mathematical models used for life support subsystems and of the capabilities and limitations of the developed computer program. The computer program is described in terms of the input data loadsheets, the computational logic, the output data formats, and special program features. Sample problem specifications and plotted and tabulated computer output data are also presented. Sensitivity evaluations and other observations derived from the output data are included with the discussion of the sample problem results. Through use of computational logic diagrams presented herein, in conjunction with parametric data and subsystem and component details presented in Volume II, hand calculations can be performed. Author

N69-23126*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Mar. 1969 138 p refs
(NASA-SP-7011/61/) Avail: CFSTI CSCL 05B

Subject coverge concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included.

Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry consists of a standard citation accompanied by its abstract. Author

N69-23138*# National Aeronautics and Space Administration, Washington, D. C.
BIOSATELLITE 2
1969 12 p
(NASA Facts 3/10-68) Avail: SOD $0.35 CSCL 06S

Frog eggs, microorganisms, plants, and insects were launched in Biosatellite 2 and orbited for two days. The purpose of the flight was to determine the effects on living things of weightlessness, weightlessness combined with radiation, and removal from the diurnal cycle on earth. Comparisons of the life processes of these plants and animals were made with the life processes of normal plants and animals on earth. Mutations and abnormalities in the Biosatellite plants and animals are explained. B.G.D.

N69-23192*# Whirlpool Corp., St. Joseph, Mich.
RELIEF CONTAINER
George W. Priebe and Francis R. Scroop, inventors to NASA Issued 14 Jan. 1969 (Filed 26 Aug. 1966) 4 p Cl. 128–283
(NASA-Case-XMS-6761; US-Patent-3,421,506; US-Patent-Appl-SN-575475) Avail: US Patent Office

A relief container or colostomy appliance is described. It is intended for use by persons who must remain in confined quarters for relatively long periods of time, for example, astronauts during spaceflight who have need of a relief container which can be used sanitarily and effectively without escape of odors and contents, and which is also adaptable to storage while using very little storage space. It may also be used as a colostomy appliance by patients who have need of a drainage collection appliance. The novelty of the apparatus lies primarily in the finger stall in the side of the collection bag which serves as an aid to the user in locating the bag in its proper position on the body; the outer cuff-like container which serves as a receptacle for cleansing tissue and is provided with adhesive pads whereby it serves as a compact packaging device for the unit; and the particular combination of components including the collection bag, pressure-sensitive adhesive means, finger stall, and outer container. (NASA)

N69-23198*# Naval Aerospace Medical Inst., Pensacola, Fla. Bureau of Medicine and Surgery.
NUCLEAR EMULSION MEASUREMENTS OF THE ASTRONAUTS' RADIATION EXPOSURE ON APOLLO 7
Herman J. Schaefer and Jeremiah J. Sullivan 13 Feb. 1969 15 p refs Supported by NASA
(NASA-CR-100645; NAMI-1060) Avail: CFSTI CSCL 06R

Preliminary results are presented in order to establish a comparative base line for radiation exposure of astronauts in conventional near-earth satellite orbits with the deep space trajectories of later Apollo flights. Such a comparison is of particular interest due to the fact that the Apollo mission made only two very rapid passes through more peripheral regions of the inner radiation belt and avoided the repeated traversals of the South Atlantic anomaly, which accounted for more than 90% of the dose on all Gemini flights. In addition, the Apollo trajectory was nearly outside the magnetosphere, allowing exposure to the full galactic flux with no geomagnetic cutoff, at 4 pi incidence on the ship for most of the mission. Track and grain count analysis of only one of the three G.5 emulsion packs furnished a dose of 122 mrad; the LET distribution was nearly identical to one recorded by Gemini 7. Proton ender counts in all packs showed more uniformity in directional distribution than those on Gemini 7, presumably caused by heavier shielding. A.C.R.

N69-23329# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
THE STRUCTURE AND SYMMETRY OF VIRUS PARTICLES [ARCHITETTURA E SIMMETRIA DELLE PARTICELLE VIRALI]
M. Ageno 18 Oct. 1968 59 p refs in ITALIAN; ENGLISH summary
(ISS-68/37) Avail: CFSTI

Current ideas on the structure of virus particles and the physical principles which underlie the assembly process of protein and nucleic acid components are presented. The validity of these ideas is discussed and the conclusions which might be drawn from the available experimental evidence are considered. Author

N69-23442*# Midwest Research Inst., Kansas City, Mo.
APPLICATION OF AEROSPACE-GENERATED TECHNOLOGY TO WATER POLLUTION AND OTHER PUBLIC SECTOR PROBLEMS Quarterly Report, 1 Sep.–30 Nov. 1968
David Bendersky and Andrew J. Winfrey 30 Nov. 1968 22 p refs
(Contract NSR-26-002-083); MRI Proj. 3217-E)
(NASA-CR-100674; QR-2) Avail: CFSTI CSCL 13B

The definition of medical problems and the identification of potential solutions available in aerospace technology are primary objectives of this contract. Two supplementary tasks are reported here. One task is to conduct a planning study to provide a framework for matching aerospace-generated technology to needs and problems in the area of water pollution. Based on the results of the planning study, a minimum of 12 specific problems in the area of water pollution are to be selected and the applicability of aerospace-generated technology as potential solutions to each of these problems is to be determined. The second task provides five evaluation reports together with retrospective searches for selected public sector problems, solutions to which will be aided by the application of aerospace-generated technology. Author

N69-23494 Oregon State Univ., Corvallis.
THE EFFECTS OF ULTRAVIOLET IRRADIATION ON THE PHOTOSYNTHETIC APPARATUS
Kenneth Edward Mantai (Ph.D. Thesis) 1968 129 p
Avail: Univ. Microfilms: HC $6.20/Microfilm $3.00 Order No. 68-14483

The effects of ultraviolet (UV) irradiation on photosynthesis and various partial reactions involving the individual photoreactions of photosynthesis were examined. These reactions included photoreduction in adapted green algae, Hill reaction, cyclic photophosphorylation, the 520 nm absorbance change and variable-yield fluorescence. The reactions were measured in spinach chloroplasts and isolated chloroplasts or whole cells of green and blue-green algae. The effects of UV irradiation on the 520 nm absorbance change were also examined. Carotenoid, lipid and protein content and complement in irradiated and unirradiated chloroplasts and cells were also compared. Measurements were made of the effects of UV irradiation on the variable-yield fluorescence of isolated chloroplasts and whole cells. Dissert. Abstr.

N69-23507# Institute Rudjer Boskovic, Zagreb (Yugoslavia).
[THE UPTAKE, MAXIMUM CONCENTRATION, AND LOSS OF SELECTED RADIONUCLIDES BY REPRESENTATIVE ORGANISMS IN THE ADRIATIC SEA] Annual Report, Jul. 1965–Jun. 1966
Stjepan Keckes and Zvonimir Pucar Jun. 1966 287 p ref
(NP-17646) Avail: AEC Depository Libraries

Concentrations, uptake, and loss of selected radionuclides by representative organisms in the Adriatic Sea were determined.

Investigations of conditions off the West Istrian coast included determinations of meteorological conditions, temperature, salinity, density, transparency, pH, oxygen, and phytoplankton. Radioecological investigations included determinations of radioisotopes in sediments, sea water, and marine organisms. A table is presented to show gross β radioactivity in species of algae, molluscs, echinoderms, and fish. Activities of ^{60}Co, ^{54}Mn, ^{106}Ru, and ^{65}Zn were determined in plankton. Physico-chemical studies of sea water included characterization and separation of ^{106}Ru by electromigration methods, polarographic investigations of cadmium, indium, and zinc, and precipitation and hydrolysis of thorium, zirconium, yttrium, and rare earths. Studies on uptake, concentration, and loss of radioisotopes by marine animals are included for mussels, shrimps and fishes. NSA

N69-23526# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.

DYNAMICS OF DUST REMOVAL FROM THE LOWER AIRWAYS: MEASUREMENTS AND INTERPRETATIONS BASED UPON RADIOACTIVE AEROSOLS

Paul E. Morrow 14 Aug. 1968 29 p refs Presented at the Symp. on Airway Dyn., Haverford, Pa.

(Contract W-7401-eng-49)

(UR-49-987; Conf-680814-1) Avail: CFSTI

Experimental studies on dust deposition in the respiratory tract are reviewed. It is pointed out that most laboratory studies use monodisperse particles, but such aerosols are rarely found in nature. Problems related to the anatomy and physiology of the respiratory tract, the physical properties and intrinsic instability of aerosols, the relation between particle size and deposition probability, the relation between particle number and mass in heterodisperse aerosols, and the development of suitable models of deposition for dust clouds and therapeutic aerosols are discussed. Two techniques using heterodisperse and monodisperse radioactive aerosols are described. It is concluded that, while both methods usually provide some information on particle clearance in different zones of the respiratory tract, there has been little success in utilizing the clearance of a radioactive aerosol as a bronchial or pulmonary function test. NSA

N69-23527# Washington State Univ., Pullman. Dept. of Agronomy.

FACTORS WHICH GOVERN PLANT RADIOSENSITIVITY Three-Year Summary Report, 1965–1968

R. A. Nilan and C. F. Konzak Nov. 1968 13 p refs

(Contract AT(45-1)-353)

(RLO-353-31) Avail: CFSTI

Progress is reported on studies of mechanisms by which radiation injuries are induced, prevented, and repaired in plant cells. Results are reported from studies on the effects of oxygen on the x-radiosensitivity of dry barley seeds. It was concluded that possible mechanisms by which oxygen pressure may induce biological damage in seeds include the accelerated rate of normal oxidative processes, the formation of peroxides, and the formation of long-lived free radicals. NSA

N69-23534*# Florida State Univ., Tallahassee. Dept. of Statistics.

EVALUATION OF A QUANTAL RESPONSE MODEL WITH VARIABLE CONCENTRATIONS

Richard G. Cornell 31 Mar. 1969 17 p refs

(Grant NGR-10-004-029)

(NASA-CR-100692; TR-17) Avail: CFSTI CSCL 06M

A quantal response model is presented that relates the probability of exposing one or more viable microorganisms, as the result of fracturing plastic rods, to the concentration of microorganisms within the plastic. In the initial analysis a maximum likelihood estimate of the only parameter involved was computed for each of four fracture areas studied using observed proportions of fractured plastic discs showing growth of bacterial spores and corresponding experimentally determined concentrations. The concentrations were assumed to be measured without error. When the model was evaluated using the calculated parameter estimates it was found that it did not describe the data adequately. In this paper an estimation procedure is developed for the concentrations which utilizes the observed proportions as well as the observed concentrations. Subsequent calculations like those carried out initially are illustrated and lead to practically the same estimates of the model parameter and its standard error, but dramatically reduce the chi-square statistic used to test the appropriateness of the model to a value somewhat less than its expectation. Author

N69-23569 North Carolina State Univ., Raleigh.

AN ANALYSIS OF THE CONTRIBUTION OF ALVEOLAR SURFACE PROPERTIES TO THE MECHANICS OF RESPIRATION

Joseph Patrick Archie, Jr. (Ph.D. Thesis) 1968 82 p

Avail: Univ. Microfilms: HC $4.40/Microfilm $3.00 Order No. 68-14642

The mechanics of external mammalian respiration is evaluated. A rationally motivated, one degree of freedom, scalar, mathematical model is developed from a statement of conservation of mass and surface thermodynamics to represent the contribution of pulmonary surfactant to the mechanics of respiration. This model predicts average values of the transalveolar surface pressure as a function of time for the whole lung. The model predicts the present value of pressure to be a function not only of the present lung volume but also the volume history. A computer is used to calculate theoretical pressure versus time and pressure versus volume curves from the programmed model equation with results displayed on an oscilloscope. An analytical tidal volume function is used to demonstrate a predicted rise in transpulmonary pressure and decrease in lung compliance with extended periods of tidal ventilation. Dissert. Abstr.

N69-23622*# Florida State Univ., Tallahassee. Dept. of Statistics.

BIOSTATISTICS AND SPACE EXPLORATION: MICROBIOLOGY AND STERILIZATION

Richard G. Cornell 1 Apr. 1969 12 p

(Grant NGR-10-004-029)

(NASA-CR-100636) Avail: CFSTI CSCL 06M

Statistical models were formulated for spacecraft decontamination and related microbial life studies. Investigated were the following problems: (1) release of bacterial spores from fractured lucite; (2) bacterial spore growth of fractured plaster disks; (3) planetary quarantine probability models; and (4) parameter estimation in exponential decontamination models. G.G.

N69-23665*# Little (Arthur D.), Inc., Cambridge, Mass.

PRELIMINARY DESIGN OF AN EXTRAVEHICULAR TUNNEL-SUIT SYSTEM Final Report, 9 Aug. 1968–9 MAR. 1969

David L. Richardson 10 Mar. 1969 41 p refs

(Contract NAS9-8472)

(NASA-CR-99603; C-70710) Avail: CFSTI CSCL 06K

A preliminary design for an extravehicular tunnel-suit system for use in orbital extravehicular operations is presented. The study included the generation of basic technical concepts and approaches to the design of semi-anthropomorphic tunnel-suit systems for orbital vehicle crew members to perform extravehicular inspection, repair, maintenance, and data pack retrieval, and a determination of their feasibility. Conclusions are: (1) The tunnel-suit system is technically feasible. (2) Fabrication of all components of the

tunnel-suit system is within the present state of the art of soft and hard suit technology. (3) The activity station where the astronaut performs extravehicular activities should be large enough for the astronaut to have access to the inside of the pass-through lock required for passing tools, data packs, and other equipment to the space environment. (4) Insulation and micrometeoroid protection will be required on the tunnel-suit system in order to maintain a comfortable environment and to minimize the heat load imposed on the parent spacecraft environmental control system. Author

N69-23698*# Martin Co., Baltimore, Md.
COMPARATIVE STUDY OF HEAT REJECTION SYSTEMS FOR PORTABLE LIFE SUPPORT EQUIPMENT Final Report
Donald A. Myers and F. Arthur Grossman Apr. 1969 103 p refs
(Contract NAS9-8184)
(NASA-CR-99619; MCR-69-51) Avail: CFSTI CSCL 06K

It was determined that currently available heat rejection system hardware with some improvement should be utilized in the next generation of portable life support systems (PLSS) for missions requiring less than forty hours of either earth orbital or lunar surface EVA per man. For missions of greater than forty hours of EVA per man the development of a regenerative heat storage sink is recommended with the option of a hybrid heat storage/heat rejection sink for some applications. For missions requiring greater than fifty hours per man of lunar surface EVA, serious consideration of the employment of a lunar radiator cart is recommended. Successors to the recommended next generation of PLSS heat rejection system were also considered. A potential candidate in this category is the suit integral diffusion–vaporization system for missions requiring less than forty hours of EVA per man. Author

N69-23650*# Boeing Co., Seattle, Wash.
AUTOMATED PATIENT MONITOR
Huntsville, Ala. NASA. Marshall Space Flight Center [1968] 65 p
(Contract NAS8-20793)
(NASA-CR-100666; MFS-14552) Avail: CFSTI CSCL 06B

The Automated Patient Monitor which is the direct application of telemetry system developed for and in support of the Saturn launch vehicle is described. A multichannel, lightweight telemetering equipment which would free the patient for normal activity was designed. Since the applications and requirements were very similar to existing systems within the launch vehicle telemetry system, it was relatively easy to devise a patient monitor which would satisfy the requirements, and which had the advantage of circuitry which had been proved during actual launches. Miniaturized and repackaged basic Saturn telemetry circuitry are shown. Since only a demonstration of the feasibility of such a system was required, no advantage was taken of the marked reductions in size and weight which can be achieved through modular and LSI techniques. The resulting system has performed well during demonstrations and is currently undergoing comparative tests at the MSFC Medical Center. Author

N69-23678# Gulf General Atomic, San Diego, Calif.
PULSE RADIOLYSIS STUDY OF PROTECTION OF PYRIMIDINE BASE COMPONENTS OF NUCLEIC ACID BY AMINOTHIOLS IN AQUEOUS SOLUTION Annual Summary Report, 22 Jun. 1967–21 Jun. 1968
L. P. Theard and F. C. Peterson 6 Sep. 1968 111 p refs
(Contract AT(OU-3)-167)
(GA-8872) Avail: CFSTI

Studies were made of the mechanisms by which ionizing radiation induces chemical transformation of purine and pyrimidine base components of nucleic acid and aminothiols present in dilute concentration in aqueous solutions. Results are presented for thymine, cysteine, cystine, DNA, and mixtures of DNA and cysteine. Author

N69-23711# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
THE EFFECTS OF ALCOHOL AT THREE SIMULATED AIRCRAFT CABIN CONDITIONS
E. Arnold Higgins, Audie W. Davis, Jr., John A. Vaughan, Gordon E. Funkhouser, and Elinore M. Gallerston Sept. 1968 17 p refs
(AM-68-18) Avail: CFSTI

In a study of 54 human subjects using three alcohol consumption levels and three simulated cabin conditions it was found that alcohol caused an increase in heart rate and an increase in skin temperature. Internal body temperature was lower with alcohol but did increase as blood alcohol levels decreased. The performance tests used apparently were not critical enough to detect differences due to single influences. Blood alcohol determinations for subjects receiving the high level of alcohol yielded significantly higher levels of blood alcohol for subjects at 200,000 ft. than at the other altitudes. However, the readings at 20,000 ft. were not significantly different than readings obtained at the other altitudes for subjects receiving the lower dose of alcohol. Author

N69-23719# Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.
DRUG AND TOXIC HAZARDS IN GENERAL AVIATION
J. Robert Dille and Stanley R. Mohler Sep. 1968 9 p refs
Presented at Tex. Med. Assoc. Meeting, Houston, Tex., 2 May 1968
(AM-68-16) Avail: CFSTI

Pilot factors cause about 80% of general aviation aircraft accidents. Numerous articles have reported a high incidence of drug involvement in automobile accidents, and of alcohol involvement in both automobile and aircraft accidents. Pesticide poisoning has been found in about one-third of aerial application accidents in two small studies. Carbon monoxide is another real, but relatively rare, cause of general aviation accidents. This paper discusses both the potential and the documented roles of drugs, alcohol, pesticides and carbon monoxide in general aviation accidents; the need for further study; and the need for education to reduce the incidence of involvement of these factors. Author

N69-23735 California Univ., Berkeley.
BINOCULAR INTERACTION IN ANIMALS AND MAN
Colin Brian Blakemore (Ph.D. Thesis) 1968 232 p
Avail: Univ. Microfilms: HC $10.60/Microfilm $3.00 Order No. 68-13885

Single neurons were investigated in the cat primary visual cortex. Most of these units are maximally sensitive to an oriented target presented to a limited part of the visual field of either eye. It was shown that for maximal binocular stimulation of any unit the paired retinal images must be positioned rather exactly on the two receptive fields. Human observers made relative depth judgments between two slit targets on the basis of pure disparity cues. Stereoacuity is maximal at fixation and declines if the targets are moved away from the fixation point, either into the periphery or in depth. In the latter case the fall in acuity with absolute disparity of the targets is roughly exponential, confirming an observation of Ogle. Dissert. Abstr.

N69-23752# Joint Publications Research Service, Washington, D. C.
SOME BIONIC ASPECTS OF SELF-ORGANIZATION

Yu. M. Gasparyan et al 26 Mar. 1969 7 p refs Transl. into ENGLISH from Biol. Zh. Arm. (Erevan), v. 21, no. 11, 1968 p 74–78
(JPRS-47724) Avail: CFSTI

Problems related to self-organization of living organisms are considered. Self-organization is defined as the capability of living organisms for adaptation to changing environments. This characteristic depends on the interaction of the organism and the surroundings, and the internal reorganization depends on the expenditure of free energy. The organism must compensate for this loss of energy by absorption of nutrients. A simplified model of the behavior of an organism is presented. An algorithm for the functioning of an automaton, and computer results are included. F.O.S.

N69-23801# Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION Annual Progress Report for the Period Ending 31 Jul. 1968
Oct. 1968 289 p refs
(Contract W-7405-eng-26)
(ORNL-4316) Avail: CFSTI

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1. RADIOACTIVE WASTE DISPOSAL K. E. Cowser p 1–70 refs (See N69-23802 12-04)
2. RADIATION ECOLOGY S. I. Auerbach p 71–160 refs (See N69-23803 12-04)
3. RADIATION PHYSICS R. D. Birkhoff and R. H. Ritchie p 161–230 refs (See N69-23804 12-04)
4. RADIATION DOSIMETRY RESEARCH J. A. Auxier p 231–270 refs (See N69-23805 12-04)
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N69-23802# Oak Ridge National Lab., Tenn.
RADIOACTIVE WASTE DISPOSAL
K. E. Cowser, comp. *In its* Health Phys. Div. Oct. 1968 p 1–70 refs (See N69-23801 12-04)
Avail: CFSTI

Soils and sediments were analyzed for phosphorous content. Hydraulic fracturing methods were investigated for reducing the expense of locating radioactive waste disposal sites. Investigations were carried out on the disposal of radioactive wastes in a salt mine in Kansas. A study was made of the dose equivalents of radioactivity a normal man receives while working at a nuclear fuel reprocessing plant. Research on microscopic measurements of the elastic properties of rocks was carried out to determine the stress conditions on the rocks, thereby enabling earthquake possibility predictions to determine the feasibility of locating nuclear reactor sites. Models were developed and programmed to estimate expected radiation doses to populations in various hypothetical exposure situations related to peaceful uses of nuclear explosives. B.G.D.

N69-23803# Oak Ridge National Lab., Tenn.
RADIATION ECOLOGY
S. I. Auerbach, comp. *In its* Health Phys. Div. Oct. 1968 p 71–160 refs (See N69-23801 12-04)
Avail: CFSTI

Data from radiation and hematological effects studies on mammals were utilized for comparisons of radiation mortality in the hemopoietic death of mammals. Studies of the effects of external beta radiation on higher plants were initiated to determine radiosensitivities of native plant species and to provide estimates of the ecological effects of postattack fallout on plants. A study was carried out on the radioisotope transport in terresterial microcosmic ecosystems of plants and the radioisotope uptake by living and nonliving components of aquatic ecosystems. B.G.D.

N69-23804# Oak Ridge National Lab., Tenn.
RADIATION PHYSICS
R. D. Birkhoff, comp., and R. H. Ritchie, comp. *In its* Health Phys. Div. Oct. 1968 p 161–230 refs (See N69-23801 12-04)
Avail: CFSTI

An evaluation was made of mean excitation energies for some 36 compounds and mixtures of importance in radiation dosimetry. Calculations were made of the ground-state energy eigenvalues for an electron moving in the field of a stationary electric dipole. The optical properties of liquid water in the vacuum ultraviolet spectral region were measured for the first time in the physics of tissue damage program. B.G.D.

N69-23805# Oak Ridge National Lab., Tenn.
RADIATION DOSIMETRY RESEARCH
J. A. Auxier, comp. *In its* Health Phys. Div. Oct. 1968 p 231–270 refs (See N69-23801 12-04)
Avail: CFSTI

A dosimetry study was made for survivors of the nuclear bombings of Hiroshima and Nagasaki, and the energy yield of the Hiroshima bomb was calculated. A health physics research reactor was used for dosimetry, radiobiology, and radiobotanical investigations. A study was made on the accurate and absolute calibration of neutron and gamma-ray spectrometers. B.G.D.

N69-23806# Oak Ridge National Lab., Tenn.
INTERNAL DOSIMETRY
W. S. Snyder, comp. *In its* Health Phys. Div. Oct. 1968 p 271–320 refs (See N69-23801 12-04)
Avail: CFSTI

A study was made of the excretion levels of plutonium in hospital patients receiving a single intravenous injection of plutonium. A computer program was developed for estimating the absorbed fraction of gamma energy in organs of the body. A method was developed for removal of phosphate from solutions of bone ash to facilitate the spectrographic determination of impurities in this material. B.G.D.

N69-23842*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A TECHNIQUE FOR IDENTIFYING PILOT DESCRIBING FUNCTIONS FROM ROUTINE FLIGHT-TEST RECORDS
Rodney C. Wingrove and Frederick G. Edwards Washington May 1969 33 p refs
(NASA-TN-D-5127) Avail: CFSTI CSCL 06B

The problem of identifying the input-output relationship of the pilot by use of measured data from routine flight operations in which the pilot provides feedback control is considered. The problem in using the measured input and output data directly is that any extraneous output noise by the pilot causes an error in identification. This problem is solved by the development of a computer processing technique that, under certain conditions, yields an estimate relatively free from identification error. A theoretical analysis to show that this technique will reduce the identification error is presented. The simulation and identification of several known system elements are included to compare with the theory and to illustrate the use of this technique. Also, results obtained from the retrofire phase of the Gemini X mission are presented to demonstrate the application of this technique to routine flight-test records. Author

N69-23850# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
[BIOCHEMISTRY, BIOPHYSICS, NUCLEAR MEDICINE, ENVIRONMENTAL RADIATION, AND RADIOBIOLOGY] Semiannual Progress Report, Period Ending 30 Jun. 1968

30 Jun. 1968 84 p refs
(Contract AT(04-1-GEN-12)
(UCLA-12-686) Avail: CFSTI

Progress is reported on the development of radioisotope scanning procedures for use in the diagnosis of neoplasms or in physiological studies in patients. Sequential scanning with ^{131}I-rose bengal was of value for the diagnosis of hepatic bile duct obstruction and cirrhosis. The limitations of quantitative lung scanning using using ^{131}I-albumin macroaggregates for measurements of regional blood flow were investigated in dogs. Comparative semiquantitative studies using ^{133}Xe gas indicated that peripheral deposition of inhaled aerosols in the respiratory tract is proportional to ventilation and it was concluded that ventilation studies with ^{133}Xe can be used clinically to differentiate ischemia from primary vascular occlusion from most other causes of regional ischemia. Studies on the uptake of ^{99}Tc-pertechnetate and ^{197}Hg by human brain tumor cells in vitro indicated a possible cell-type specificity for these radioisotopes. NSA

N69-23864# Suffield Experimental Station, Ralston (Alberta).
THE EFFECT OF ILLUMINATION BY PARAFLARES DURING NIGHT FIRING ON NIGHT VISION
J. D. Heine Jan. 1969 7 p
(Suffield-Memo-136/68) Avail: Issuing Activity

An investigation was conducted to determine the effect of miosis on night vision. Light levels were measured during a live firing exercise, involving four 106 mm recoilless anti-tank weapons and four 81 mm mortars providing illumination. The effects of the varyling light conditions were determined by the use of a standard eye chart. No impairment of night vision was shown. Author

N69-23883*# Martin Marietta Corp., Baltimore, Md.
A PARAMETRIC STUDY TO DETERMINE TIME-TEMPERATURE-VACUUM RELATIONSHIPS FOR STERILIZATION OF TERRESTRIAL SPORES, PHASE 1 Summary Report, Period Ending 18 Apr. 1969
James A. Brierley and Stanley E. Podlaseck Apr. 1969 38 p refs
(Contract NAS9-9261)
(NASA-CR-99627; MCR-69-195) Avail: CFSTI CSCL 06M

Spores of *Bacillus* sp. G2, *Bacillus* subtilis var niger, and *Clostridium* sporogenes were exposed to temperatures of 25, 70, 90 and 110°C at atmospheric or vacuum (10^{-6} Torr) pressure for periods of 2 and 20 hours. No effect of vacuum pressure was noted for spore survival at 25°C. At 70°C *bacillus* sp. G2 and *B.* subtilis var niger spores were not affected at atmospheric pressure and *Cl.* sporogenes spores demonstrated slight susceptibility, D-value 13.81. At the vacuum pressure *B.* subtilis spores were not affected, but *Bacillus* sp. G2 spore D-value was 4.31 and *Cl.* sporogenes spore D-value was 4.48. *Cl.* sporgenes had little resistance to 110°C with D-values of 4.34 at atmospheric pressure and 4.51 at vacuum pressure. It may be stated that generally vacuum pressure (10^{-6} Torr) increases the susceptibility of spores to temperature. Author

N69-23890# Bhabha Atomic Research Centre, Bombay (India). Health Physics Div.
A PERSPECTIVE ON CURRENT AIR POLLUTION PROBLEMS
P. K. Zutshi 1968 88 p refs
(BARC-355) Avail: CFSTI

Air pollution sources and its effects on property, vegetation, and public health are discussed. Pollutants and their sources are identified, and wind, diurnal, seasonal, urban, and topographic effects are described. The pollutant concentrations are estimated for India, and the contributions to the problem by industries, transportation, and urbanization are indicated. N.E.N.

N69-23930# School of Aerospace Medicine, Brooks AFB, Tex.
ENDOCRINE-METABOLIC RESPONSES TO PARACHUTING Final Report, Feb.–Jul. 1966
Gordon K. Lochridge, Henry B. Hale, and Edgar W. Williams Aug. 1968 12 p refs
(AD-680400; SAM-TR-68-72) Avail: CFSTI CSCL 6/16

This was a feasibility study in which the usefulness of urinalysis for the assessment of stress in parachutists was tested. Eight sport parachutists were studied, each collecting urine specimens on two separate occasions, with each specimen representing a 2-hour period which included ascent to altitude, the jump, and a postjump rest period. The urinary determinations included epinephrine, norepinephrine, 17-hydroxycorticosteroids, magnesium, potassium, sodium, phosphorus, urea, and creatinine. Creatinine served as the base to which the other eight constituents were referred. The individual urinary constituents, when expressed as percent of respective control values and averaged, gave a single value for the endocrine-metabolic response, the so-called stress index or score. Five of the jumpers were novices whose jumps were made at lower altitudes than were used by the remaining 3 jumpers who were highly experienced. Sympathoadrenomedullary stimulation of high degree was evident for all but one of the jumpers, but few of the jumpers showed evidence of adrenocortical stimulation or of metabolic hyperactivity. The stress score was 162% for the novice group, 225% for the experienced group, and 186% for the entire group. The latter value differed significantly from zero ($P < .001$). Author (TAB)

N69-23937*# Techtran Corp., Glen Burnie, Md.
EVOLUTION OF THE BIOCHEMICAL FUNCTIONS OF THE BIOSPHERE [OB EVOLIUTSII BIOGEOKHIMICHESKIKH FUNKTSII BIOSFERY]
Ye. A. Boychenko Washington NASA Apr. 1969 8 p refs Transl. into ENGLISH from the Publ. "Abiogenez i Nachal'Nyye Stadii Evoliyutsii Zhizn" Moscow, Nauka Press, 1968 p 103–108
(Contract NASw-1695)
(NASA-TT-F-12134) Avail: CFSTI CSCL 06A

The changes which have transformed the ancient anaerobic biosphere into the present oxidized biosphere are examined. The evolution of oxidation-reduction reactions of photosynthesis is traced. Changes in the ratio of metals in plants are discussed as indices of evolutionary progress. Morphological changes which have led from algae to highly differentiated plants are examined. Author

N69-23938*# Techtran Corp., Glen Burnie, Md.
NUCLEIC ACIDS AND EVOLUTIONARY SYSTEMATIZATION [NUKLEINOVYYE KISLOTY I EVOLYUTSIONNAYA SISTEMATIKA]
A. N. Belozerskiy Washington NASA Apr. 1969 11 p refs Transl. into ENGLISH from the Publ. "Abiogenez i Nachal'Nyye Stadii Evoliyutsii Zhizn" Moscow, Nauka Press, 1968 p 81–91
(Contract NASw-1695)
(NASA-TT-F-12145) Avail: CFSTI CSCL 06A

The author discusses experimental data concerning the composition of nucleic acids, specifically DNA, in relation to the evolutionary systematization of microbes, plants, and animals. The main conclusion is that DNA, which forms the basis of the species specificity of organisms, may serve as one of the most important criteria for determining the systematic position of a group of organisms. Author

N69-23948*# Techtran Corp., Glen Burnie, Md.
STATE AND PROBLEMS OF STUDIES OF THE PROBLEM OF THE ORIGIN OF LIFE [SOSTOYANIYE I ZADACHI ISSLEDOVANIY PO PROBLEME PROISKHOZHDENIYA ZHIZNI]

A. I. Oparin Washington NASA Apr. 1969 7 p Transl. into ENGLISH from the Publ. "Abiogenez i Nachal, Nyye Stadii Evoliyustsii Zhizn" Moscow, Nauka Press, 1968 p 5–10
(Contract NASw-1695)
(NASA-TT-F-12186) Avail: CSFTI CSCL 06A

It is contended that the beginning of life on earth should be considered as a process of gradual formation of carbon compounds of increasing complexity which compose multimolecular systems. Stages of this process are outlined as (1) the formation of hydrocarbons and their closest derivatives during the formation of the earth's crust, the atmosphere, and the hydrosphere; (2) the transformation of carbon compounds on the earth's surface into more complex organic compounds; (3) further formation and multiplication of open systems capable of reacting with the ambient medium; and (4) further evolution of carbon compounds into primordial organisms by means of prebiological selection. Author

N69-24005# Advisory Group for Aerospace Research and Development, Paris (France).
BIONICS SYMPOSIUM
Sep. 1968 49 p refs Meeting held at Brussels, 18–20 Sep. 1968
(AGARD-ES-3) Avail: CFSTI

Summary data are presented on biological mechanisms and models to aid in understanding learning processes, sensory perception, and other neurophysiological functions. For individual titles, see N69-24006 through N69-24035.

N69-24006# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
BIONICS AND BIOENGINEERING IN AEROSPACE RESEARCH
Henning E. von Gierke *In* AGARD Bionics Symp. Sep. 1968 1 p refs (See N69-24005 12-04)
Avail: CFSTI

The overall objectives of the program are summarized. Topics included: the principles of locomotion of living systems; principles of advanced information processing in living systems with its enviable properties of reliability and adaptability; learning systems and adaptive control systems; visual pattern recognition; auditory pattern recognition; chemoreception; orientation in force fields; motion control; and energetics. B.P.

N69-24007# Stanford Univ., Calif. Dept. of Electrical Engineering.
ON MODELLING THE NERVOUS SYSTEM
Michael A. Arbib *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

Abstracted data are given on a model for a cybernetic brain. An understanding of the central nervous system was one of the goals of the study. B.P.

N69-24008# Paris Univ. (France). Inst. Marey.
INFORMATION PROCESSING PRINCIPLES USED IN LIVING SYSTEMS [PRINCIPES DU TRAITEMENT DE L INFORMATION PAR LES SYSTEMES VIVANTS]
A. Fessard *In* AGARD Bionics Symp. Sep. 1968 2 p In ENGLISH and FRENCH (See N69-24005 12-04)
Avail: CFSTI

The modus operandi of biological information processing is briefly summarized. The processes are analyzed at each separate level of operation and comparisons are attempted with artificial machines. The biological pattern recognition function is used as the best example for an information processing model. B.P.

N69-24009# Edinburgh Univ. (Scotland). Bionics Research Lab.
PRINCIPLES OF INFORMATION PROCESSING
Richard L. Gregory *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The interpretative aspects or meaning involved in information processing in autonomous systems such as brains is briefly considered. The objective realities and their significance are discussed in relation to their image patterns. B.P.

N69-24010# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
PATTERN RECOGNITION
Hans L. Oestreicher *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The problem areas of pattern recognition are briefly discussed after a review of its present and potential applications. The problem areas considered are: (1) the establishment of classes and significant features; (2) design of proper feature abstraction techniques; (3) design of proper decision making mechanisms; and (4) mechanisms which establish new classes automatically in response to the set of incoming signals. B.P.

N69-24011# California Univ., Los Angeles. Space Biology Lab.
LEARNING FROM THE BIOLOGICAL POINT OF VIEW
W. Ross Adey *In* AGARD Bionics Symp. Sep. 1968 3 p refs (See N69-24005 12-04)
Avail: CFSTI

A survey of the literature on biological learning covered the following topics: (1) the general character of learning processes in biological systems; (2) anatomy and physiology of cerebral ganglia; (3) relationship between EEG wave patterns and learning; (4) new evidence of the nature of the cerebral neuronal membrane; and (4) a model of neuronal organization in learning. B.P.

N69-24012# Sussex Univ., Brighton (England). Lab. of Experimental Psychology.
THEORIES OF LEARNING SYSTEMS
A. Uttley *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The theories involved with the development of learning systems are briefly discussed for binary and analog inputs. Mathematical models describe the logical functions of the two systems. B.P.

N69-24013# Adaptronics, Inc., McLean, Va.
ADAPTIVE FLIGHT CONTROL SYSTEMS
Roger L. Barron *In* AGARD Bionics Symp. Sep. 1968 2 p (See N69-24005 12-04)
Avail: CFSTI

Techniques of engineering bionics were focused on the adaptive flight control problem with considerable success. The key factors in this effort were the realization of guided random search techniques and methods for fast assessment of the results of search experiments. The particular guided random search technique which was developed is known as the probability state variable search algorithm. Author

N69-24014# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
POTENTIAL APPLICATIONS OF LEARNING SYSTEMS

J. F. Schouten *In* AGARD Bionics Symp. Sep. 1968 2 p (See N69-24005 12-04)
Avail: CFSTI

The technological implications of the learning characteristics of animals are assessed with a view towards developing machines which can benefit from experience trials, so called adaptive systems. B.P.

N69-24015# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
NEUROPHYSIOLOGICAL PRINCIPLES OF AUDITORY INFORMATION PROCESSING
J. Ryland Mundie *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The transformation of an auditory signal is traced to better understand the neurophysiological principles of auditory information processing. Auditory mechanisms are time dependent; experiments indicated that very accurate measures of time and periods of time as short as one tenth of a millisecond can be demonstrated. The ability to perform statistical measurement in the dimension of time is the outstanding characteristic of auditory neural function. B.P.

N69-24016# Edinburgh Univ. (Scotland). MRC Speech and Communication Research Unit.
CEREBRAL MECHANISMS OF SPEECH
Richard C. Oldfield *In* AGARD Bionics Symp. Sep. 1968 3 p (See N69-24005 12-04)
Avail: CFSTI

Pathways of speech are catalogued, specifically those directed towards the mechanisms to be found in the cerebral cortex. A distinction is drawn between the form of speech and its linguistic content; disorders or damages to the cortical centers are discussed in relation to their effects on these two aspects. Also considered is the interrelationship and intercommunication of the highest centers of the cortex and peripheral organs in speech acts. B.P.

N69-24017# Centre National d'Etudes des Telecommunications, Issy-les-Moulineaux (France).
SPEECH PROCESSING AND RECOGNITION [TRAITEMENT ET RECONNAISSANCE DE LA PAROLE]
Leonid Pimonow *In* AGARD Bionics Symp. Sep. 1968 1 p In FRENCH (See N69-24005 12-04)
Avail: CFSTI

A comparative analysis is made between hearing mechanisms and technical systems. Emphasis is placed on the frequency thresholds, amplitude, time, and progressive reduction of these data in auditory information processing. Also discussed is the variation of informational delivery in the time allowed by the physiological properties of the ear and the relation of this variation of delivery with intelligibility. Synthetic language techniques are considered and evaluated from the viewpoint of the informational capacity of the hearing vestiges of deaf mutes. Transl. by B.P.

N69-24018# Laboratoire de Physiologie Acoustique, Jouy-en-Josas (France).
BIOLOGICAL ECHOLOCATION [ECHOLOCATION BIOLOGIQUE]
R. G. Busnel *In* AGARD Bionics Symp. Sep. 1968 1 p In FRENCH (See N69-24005 12-04)
Avail: CFSTI

An assessment is made of the points of accord which should exist and the divergences which do exist between the biologist and engineer in problems dealing with echolocation. The traditional barriers between biological and engineering research institutions are discussed with a view to establishing a symbiotic relationship of the two in bionics research. Transl. by B.P.

N69-24019# Syracuse Univ., N. Y. Lab. of Sensory Communication.
VIBROTACTILE INFORMATION TRANSFER
J. J. Zwislocki *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The possibility of integration of vibrotactile characteristics with relevant auditory characteristics was demonstrated as a method of speech communication. Systematic data was collected on vibrotactile detectability as a function of vibration frequency, contactor area, stimulus duration, and variation in temporal pattern. By applying such concepts as spatial and temporal summation, it was possible to show that two functionally different systems respond to vibrotactile stimulation; one integrates over space and time and the other does not. B.P.

N69-24020# Cambridge Univ. (England).
THE ASSOCIATIVE RECALL OF TEMPORAL SEQUENCES
H. C. Longuet-Higgins *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

A device is described for recording a number of time varying signals in such a way that input of a section of any recorded signal will cause the device to emit the continuation of that signal in real time. The name holophone is suggested for such a device. It is essentially a bank of narrow pass filters connected in parallel to an input channel and an output channel, with the special property that the gain of each filter can be increased, after the passage of a signal, by an amount proportional to the energy which it extracted from the signal. The memorization of any signal consists in altering the gains in this manner, and the memory of the system resides in the set of gain values. Author

N69-24021# Institute for Perception RVO-TNO Soesterberg (Netherlands).
THE INTERPRETATION OF COMPLEX VISUAL STIMULI
P. L. Walraven *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The interpretation of TV pictures was examined as a function of image degradation. The pictures were produced with a flying spot scanner system. Degradation was achieved by varying the line frequency and by adding noise. The pictures were vehicles on an uniform background, only one vehicle per picture. The objects were divided into three groups with respect to size. Each group consisted of two real and one pseudo vehicle. Eight subjects were instructed to indicate which objects were imaged on the picture presented. Scores were plotted as a function of line frequency for three signal to noise ratios and three different groups of vehicles. Author

N69-24022# Sheffield Univ. (England).
COMPUTER SIMULTATION OF SOME VISUAL FUNCTIONS
Neville Moray *In* AGARD Bionics Symp. Sep. 1968 1 p refs(See N69-24005 12-04)
Avail: CFSTI

Explanations for the appearance of visual figural after effects are suggested and described by models. A network with lateral inhibition was simulated on a computer. Several inhibitory

distributions were tested, based where possible on plausible extrapolations of reports in physiological or psychological literature. Eye movements were also simulated. B.P.

N69-24023# University Coll., London (England). Dept. of Electrical Engineering.
NEURONAL MODELS OF PATTERN RECOGNITION AND LEARNING MECHANISM IN THE BRAIN
W. K. Taylor *In* AGARD Bionics Symp. Sep. 1968 5 p refs (See N69-24005 12-04)
Avail: CFSTI

The performance of the memory synapse in learning machines is reviewed. An attempt is made to understand and postulate the synaptic transmission or gain changes the basic memory element undergoes in a neuronal model. Mathematical formulae are derived for a memory synapse with transmission to account for saturation, normalization, and prevention of neuron overdrive in the models. B.P.

N69-24024# Technische Hochschule, Karlsruhe (West Germany). Institute fuer Nachrichtenverarbeitung und Nachrichtenuebertragung.
A SPECIAL MACHINE SYSTEM FOR VISUAL PATTERN RECOGNITION
H. Kazmierczak and F. Holderman *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

A Karlsruhe system for image processing was developed; a brief description is given of the system including the scanner and preprocessor. The completion of the computer controlled whole system will be the basis of investigations of appropriate languages and recognition procedures for an efficient object recognition in aerial photographs. B.P.

N69-24025 IIT Research Ins., Chicago, Ill.
OLFACTORY INFORMATION PROCESSING AND MECHANISMS
Andrew Dravnieks *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The physiological role of olfactory organs to deal with the reception of airborne stimuli consisting of molecular species or their mixtures is reviewed. Studies by various methods, including factor analysis of psychophysical data and analyses of the informational capacity of the olfactory channels, indicated that in humans probably not more than nine parameters of molecular species participate to provide the discriminating power of the olfactory sense. The merits and interpretative aspects of artificial sensors are also discussed. B.P.

N69-24026# Technische Univ., Berlin (West Germany).
BIOTECHNIQUE OF OSCILLATING PROPULSION SYSTEMS AND ITS INTEGRATION INTO THE BODY
Heinrich Hertel *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The optimum mutual harmony of shape, structure, and movement of creatures which swim or fly at high speeds is studied in relation to applications in engineering, as for example flight bodies. The adaptive aspect of living things has resulted in models for retractable power units, among others. Detailed research was conducted on the oscillatory propulsion afforded by the tailfin of fish. The new biomechanical knowledge resulted in a novel technical system of propulsion by oscillating fins; application of this drive system is shown for ships and centrifugal pumps. B.P.

N69-24027# Glasgow Univ. (Scotland).
METHOD FOR THE ANALYSIS OF THE NEURAL MECHANISMS FOR POSTURAL ADJUSTMENTS
T. D. M. Roberts and D. J. Murray-Smith *In* AGARD Bionics Symp. Sep. 1968 1 p refs (See N69-24005 12-04)
Avail: CFSTI

Research was carried out to determine how the nervous system uses the incoming sensory messages to construct its motor commands. The strategy adopted is one based on modeling. The case is considered where the sensory input to the labyrinthine reflexes produces its effects in the extensor muscles of the limbs by modifying the sensitivity of their stretch reflexes. The final output command, in the form of an impulse stream in the alpha motoneurons, reflected the interacting influences of signals in many pathways, including those that affect the servo loop through intrafusal control of the muscle spindles. Predictive relationships are found that will describe what changes are made in each of the relevant control signals when there is a change in the signal from the labyrinth. An adaptive model was constructed of the stretch reflex and the changes seen in this were correlated with the changing signal from a model representing the sensory apparatus of the labyrinth. Author

N69-24028# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
FUNCTIONS OF THE VESTIBULAR SYSTEM IN HUMAN GUIDANCE AND CONTROL
Laurence R. Young *In* AGARD Bionics Symp. Sep. 1968 2 p refs (See N69-24005 12-04)
Avail: CFSTI

Bionic models of the vestibular system were developed after a thorough investigation of the characteristics of the human system. Experimental stimuli familiar to control engineers for system identification were used, including rotation and linear acceleration impulses, steps, ramps, sinusoids, and random continuous signals. A physical analog model is also presented of the vestibular system. The model consisted of a three gimbal head containing three rate gyroscopes and six linear accelerometers, and a special purpose analog computer simulating the dynamics and nonlinearities of the nonauditory labyrinth. B.P.

N69-24029# Centre National de la Recherche Scientifique, Marseilles (France). Institut de Neurophysiologie et Psychophysiologie
BIONICS OF MUSCULAR STRETCH RECEPTORS
Jacques Paillard *In* AGARD Bionics Symp. Sep. 1968 3 p refs In FRENCH (See N69-24005 12-04)
Avail: CFSTI

The working mechanisms of muscular stretch receptors, their feedback controls, and motor stability are reviewed. The functional neurophysiological implications of their dynamic and static responses are assessed with a view towards developing biological models using the combined efforts of physiologist and engineer. Transl. by B.P.

N69-24030# Air Force Systems Command, Brooks AFB, Tex. Aerospace Medical Div.
BIOELECTRO ENERGETICS: FUEL CELL ASPECT
Hubertur Strughold *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

The study of the biological electric phenomena offers new horizons to bioscience and bioengineering when viewed in the perspective of the recently developed fuel cells used in spacecraft. There are some interesting similarities and differences between biological organic fuel cells and the inorganic chemical fuel cells concerning structure and chemistry. This fuel cell aspect of

bioelectricity might provide an inspiring stimulus for progress and knowledge of bioelectro-energetics on the one hand, and in the development of inorganic fuel cells on the other, particularly if the specific organs such as the bioelectric generators of the electric fish and electric eel and paleological evolution down to the Archeozoic Era are included. Author

N69-24031# Michigan Univ., Ann Arbor *Mental Health Inst.*
MECHANISMS OF BIOLOGICAL MEMORY
Rudolf J. von Baumgarten *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

Biological memory mechanisms are reviewed. It was shown that heterosynaptic facilitation has in the same cell unspecific components of sensitization, as well as specific components which could help to explain short term memory. Other experiments were conducted on the temporal conditioning of single neurons. Hypotheses are presented, based on the experimental evidences, for the information storage and retrieval functions of memory. B.P.

N69-24032# State Univ. of New York at Buffalo.
MODELING THE ASSOCIATIVE MEMORY FUNCTION
Vincent E. Giuliano *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24003 12-04)
Avail: CFSTI

Although improved understanding of the processes of mental association and recall of concepts has been an important objective of scholars and philosophers since the beginning of organized knowledge, the explanations that have emerged through the millenia have been largely theoretical and quite untestable. In the last fifteen years, a new class of models and explanations has been evolving mathematical and simulation models that are constructible and testable using electronic information processing technologies. Some classes of models amenable to digital computer simulation are surveyed, and a particular type is explored in some depth. This is a network model for representing relationships of contiguity, similarity, and synonymy among linguistic representations of concepts. Author

N69-24033# California Univ., Berkeley.
PRINCIPLES OF NATURAL AND ARTIFICIAL INTELLIGENCE
Hans Bremermann *In* AGARD Bionics Symp. Sep. 1968 2 p refs (See N69-24005 12-04)
Avail: CFSTI

Problem solving and pattern classification techniques of machine systems are reviewed, along with the progress realized in the optimization of artificial learning systems. The use of theoretical biology in solving the challenges which remain in this field is proposed and emphasized. B.P.

N69-24034# Wildfowl Trust, Slimbridge (England).
BIRD NAVIGATION
G. V. T. Matthews *In* AGARD Bionics Symp. Sep. 1968 1 p (See N69-24005 12-04)
Avail: CFSTI

Hypotheses are presented for the directional tendencies of birds. One suggests that comparisons are made between the highest point of the sun arc at release compared with the remembered values at home. The other current thought requires measurement of the instantaneous altitude and the rate of change of altitude of the sun. While it is not possible to decide between the two at present, the evidence that some form of sun navigation is involved continues to accumulate. B.P.

N69-24035# University Coll. of North Staffordshire, Keele (England).
DIGITS AND ANALOGUES
D. M. MacKay *In* AGARD Bionics Symp. Sep. 1968 1 p refs (See N69-24005 12-04)
Avail: CFSTI

The science of artificial intelligence currently runs into trouble from two opposite quarters. On the one hand are those who make claims for computing machines; on the other are critics who seek to show that important human capacities are beyond the scope of digital machinery. Some recent attacks of the latter sort are reviewed; the suggestion is reiterated that the best kind of mechanism to meet such criticisms would combine discrete and continuous computer processes, in a manner somewhat analogous to the relation between quantal transitions and probability amplitudes in wave mechanics. Organized in hierarchic fashion, such processes would seem to have rich possibilities of reproducing spontaneously and naturally the features of behavior that are normally considered to be characteristic of human mentality. Author

N69-24044# School of Aerospace Medicine, Brook AFB, Tex.
INTRAOCULAR DYNAMICS OF DOGS EXPOSED TO NEAR-VACUUM PRESSURES Technical Report, Jan.-Jun.1968
Stanley C. Knapp, John D. Albright, and Julian P. Cooke Sep. 1968 13 p refs
(AD-680402; SAM-TR-68-89) Avail: CFSTI CSCL 6/19

Four mongrel dogs were individually decompressed to 200 torr (200 mm. Hg, absolute) while breathing oxygen, and then rapidly decompressed to a near-vacuum pressure as represented by 2 torr for a 2-minute exposure. Observations of intraocular pressure and retinal appearance were made before exposure and after recompression to ground-level pressure. Increased intraocular pressure, engorgement of the central and peripheral veins, narrowing of the peripheral arterioles, paling of the disc and peripheral retina, and cupping of the disc were observed. Intravascular bubbles were not seen, but a small flame-type hemorrhage was seen in the eye of one animal. Retinal appearance tended to return to the pre-exposure state within about 45 minutes. The observed modifications appear to be of a temporary nature and probably do not account for the blindness or impaired vision that sometimes occurs in humans and lasts for several hours after accidental exposure to markedly reduced pressures. Author (TAB)

N69-24057# Library of Congress, Washington, D. C. Aerospace Technology Div.
BIOMEDICAL PROBLEMS AND TECHNOLOGY (BIOINSTRUMENTATION) SURVEYS OF FOREIGN SCIENTIFIC AND TECHNICAL LITERATURE
Bettye P. Flippo 30 Apr. 1969 225 p refs Prepared for Army, Med. Intelligence Office
(ATD-69-58) Avail: CFSTI

A commentary and 218 abstracts on biomedical technology are presented, based on Soviet and satellite open source literature covering the period July 1966 through December 1968. The subject matter pertains to cardiovascular and circulatory systems; nervous and sensory systems; respiratory system and anesthesia; surgery, transplantation, and body temperature regulation; laboratory equipment and techniques; electrical equipment and recording devices; limb and organ protheses; radiation and electromagnetic spectrum equipment; computers and computer technology; and ultrasonics. Author

N69-24098*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Project Engineering Div.
QUALITY ASSURANCE MONITORING OF THE MICROBIOLOGICAL ASPECTS OF THE STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY

T. R. Gavin, G. H. Redmann, and D. M. Taylor 1 May 1969 13 p refs
(Contract NAS7-100)
(NASA-CR-100760; JPL-TR-32-1398) Copyright. Avail: CFSTI CSCL 06M

The Jet Propulsion Laboratory SADL (Sterilization Assembly Development Laboratory) program was initiated to develop and optimize the techniques, facilities, and procedures necessary for the assembly, test, microbiological monitoring, and sterilization of a capsule system which would satisfy NASA quarantine constraints with minimum effect on capsule reliability. An important aspect of SADL was the development of the Quality Assurance (QA) functions and procedures associated with the activities required for the microbiological monitoring of the capsule system, including sterility verification of material, the assay technique, certification of the facility, and the monitoring of personnel activity in the facility. The SADL QA program demonstrated that QA personnel can plan an effective role in monitoring microbiological operations by applying the same QA rationale used in their classical role in a hardware program. In particular, the application of QA methods identified the need for improvement in assay methodology and techniques as evidenced by a 0 to 30% variation in contamination of sterile samples over 16 repetitive assemblies. Author

N69-24159# Israel Program for Scientific Translations, Ltd., Jerusalem.
NITROGEN-FIXING PROPERTY AND DISTRIBUTION OF OLIGONITROPHILOUS ACTINOMYCETES IN GORNO-ALTAI SOILS
I. L. Klevenskaya *In its* Genesis of the Soils of Western Siberia 1968 p 72–78 refs (See N69-24151 12-13)
Copyright. Avail: CFSTI

Actinomycete distribution, and species composition in soils at different elevations were studied, as well as the biological fixation of atmospheric nitrogen by these microorganisms. It was found that their absolute and relative numbers in different vertical zones of the region increased considerably with the transition from high mountain to low mountain soil. In the low mountain soil, a significant number was recorded even in the winter months; an exceedingly large population was found in fall. It was concluded that the soils of the Gorno-Altai are clearly distinguished by the species spectrum and a proportion of individual species of oligonitrophilous actinomycetes. Some of the species have nitrogen fixing properties, and it emphased that, together with other oligonitrophilous microorganisms, these bacteria are instrumental in the nitrogen enrichment of soil. A.C.R.

N69-24160# Israel Program for Scientific Translations, Ltd., Jerusalem.
INTENSITY OF AEROBIC DESTRUCTION OF CELLULOSE IN RELATION TO THE NITROGEN COMPOUNDS IN GORNO-ALTAI SOILS
N. N. Naplekova *In its* Genesis of the Soils of Western Siberia 1968 p 79–84 refs (See N69-24151 12-13)
Copyright. Avail: CFSTI

Aerobic cellulolytic microorganisms in leached chernozem and meadow chernozem soils for the area were examined in the laboratory, using a oil plating method, and in natural conditions by embedding cloth in the soil. It was found that the soils are characterized by high potential fertility, with considerable reserves of humus, phosphorus and nitrogen. An excellent granular structure was discovered, as well as a tendency toward a slightly acid reaction (a water ph in meadow chernozem soil of 6.2 and of 6.5 in leached chernozem). It was concluded that the type of soil and nature of nitrogen nutrition greatly influenced the intensity of cellulose destruction; and, further, that the shift of predominance in the soils of the cellulolytic species in certain months could result from the dynamics of soluble forms of nitrogen during the growing season. A.C.R.

N69-24161# Israel Program for Scientific Translations, Ltd., Jerusalem.
EXPERIMENT WITH MINERAL FERTILIZERS ON GRAY FOREST SOILS IN THE NOVOSIBIRSK REGION
V. P. Shapovalov et al *In Its* Genesis of the Soils of Western Siberia 1968 p 85–91 refs (See N69-24151 12-13)
Copyright. Avail: CFSTI

The general agrochemical properties of gray forest soils, the dynamics of nutrients in them, and the effectiveness of various combinations of mineral fertilizers added under wheat were investigated. These soils, which develop on sandy and loamy alluvial-deluvial deposits on upper river terraces in the region, are strongly pulverized, structureless and show low permeability to air and water. In addition, it was found that they are clearly poor in mobile forms of nitrogen and potassium, but rich in mobile phosphoric acid. Mineral fertilizer additions once a year cause a considerable increase in the yield of wheat, maize, and other crops. Nitrogen fertilizers, in particular, exert a strong effect; while a perceptible increase in yield is evidenced by adding microelements, especially together with mineral fertilizers. The qualitative composition of the crops, such as albumin content, is also improved by these additives, and the experimental methods appear to be commercially practical. A.C.R.

N69-24177# Oak Ridge National Lab., Tenn. Health Physics Div.
THE EFFECTS OF BIOTIC COMPLEXITY AND FAST NEUTRON RADIATION ON CESIUM 137 AND COBALT 60 KINETICS IN AQUATIC MICROCOSMS
H. L. Ragsdale (Ph.D. Thesis—Tenn. Univ., Oak Ridge), J. P. Witherspoon, and D. J. Nelson
(Contract W-7405-eng-26)
(ORNL-4318) Avail: CFSTI

Aquatic microcosms consisting of various combinations of physical components and biological components were used to determine the effect of increased biotic complexity on mineral cycling parameters. The stability of mineral cycling parameters was tested by stressing selected complexity levels with sublethal and lethal doses of fast neutron radiation. The value of microcosms as ecological research units is discussed. Author (NSA)

N69-24183# Atomic Energy Commission, Las Vegas, Nev. Operations Office.
RUSSIAN RADIOECOLOGY: A BIBLIOGRAPHY OF SOVIET PUBLICATIONS WITH CITATIONS OF ENGLISH TRANSLATIONS AND ABSTRACTS
Alfred W. Klement, Jr., Charles F. Lytle (Penn. State Univ., Univ. Park), and Vincent Shultz (Washington State Univ.) Oak Ridge, Tenn. Sep. 1968 131 p refs
Avail: CFSTI

References to 1340 works by Soviet scientists in the direct and indirect interest of radioecology are included. Most of the references are dated after 1955, but the total time period covered is 1916 to 1968. The titles are all translated, and where English translations of the articles are available, that fact is indicated. NSA

N69-24198# Israel Program for Scientific Translations, Ltd., Jerusalem.
BIOLOGICAL OBSERVATIONS
K. A. Brodskii et al *In Its* The Sixth Voyage of R/V "OB" 1968 p 177–199 (See N69-24191 12-13)
Avail: CFSTI

Plankton was sampled at a total of 75 oceanographic stations, using gauze net No. 38 with an entrance aperture of 60 cm, and an Okean winch with a 5.1 mm cable. Due to the limited time spent at oceanographic stations, only one complete vertical sampling

was performed, from the surface down to 200 m. Plankton forms according to the stations are listed. At Antarctic stations the development stages of the dominant Calanidae species are indicated in addition to specific composition. Quantitative assessments are based on a visual scale and give an idea of the quantitative ratios of the plankton sample components. It will be seen that Antarctic plankton species are relatively limited. The dominant Calanidae species are: Calanus acutus, Calanus propinquus, Metridia gerlachei, while the Rhincalanus gigas, Paraeuchaeta antarctica, and Drepanopsis frigidus species are less numerous. Euphausiacea were mainly represented by young stages (calyptopis and furcilla), while adults were less numerous. Author

N69-24243# Army Natick Labs., Mass. Pioneering Research Lab.

THE UTILIZATION OF MILITARY ANTHROPOMETRY FOR AIRCRAFT COCKPIT DESIGN

Robert M. White *In* AGARD Probl. of the Cockpit Environ. Nov. 1968 2 p refs (See N69-24230 12-02)

Avail: CFSTI

The utilization of military anthropometry is discussed in terms of the collection and analyses of the data and the application of these data in aircraft cockpit design. It is concluded that new techniques of measurement and new methods of presentation of the data are required. More emphasis needs to be placed on functional or dynamic measurements of the seated operator, in addition to the traditional static measurements of a rigidly posed subject. P.A.B.

N69-24245# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

PILOTS' ASSESSMENT OF THEIR COCKPIT ENVIRONMENT

J. F. Murrell *In* AGARD Probl. of the Cockpit Environ. Nov. 1968 2 p refs (See N69-24230 12-02)

Avail: CFSTI

Assessment by the user pilot is an important source of information as to the efficiency of aircraft display and control systems. Information of value to life scientists and engineers can be gained and reduced to quantitative form by use of open ended questions. A study is reported in which 229 civilian airline pilots responded to five open ended questions about design and layout of their cockpits. They most often criticized their radio and navigation aids. Application of these results is discussed. Author

N69-24276*# Techtran Corp., Glen Burnie, Md.

ANALOG COMPUTER INVESTIGATIONS WITH A MATHEMATICAL MODEL FOR THE REGULATION MECHANISM OF CALCIUM METABOLISM [ANALOGRECHNER-UNTERSUCHUNGEN AN EINEM MATHEMATISCHEN MODELL ZU DEM REGULATIONSMECHANISMUS DES KALZIUMSTOFFWECHSELS]

A. Habermehl et al Washington NASA Apr. 1969 9 p Transl. into ENGLISH from German Federal Min. for Sci. Res. Rept. W68-30 Presented at the 2d meeting on Extraterrest. Biophys., Biol. and Space Med., Marburg, West Ger., 9–10 Oct. 1967

(Contract NASw-1695)

(NASA-TT-F-12151) Avail: CFSTI CSCL 06P

Calcium losses observed in astronauts following their participation in space flights prompted this study. The model is a quantitative expression of the regulatory mechanism for keeping the serum calcium level constant. The mathematical interrelation of the functional structure of the calcium metabolism is outlined, and the corresponding differential equations are presented. Analog computer calculations were performed for a number of realistic abnormal situations in the calcium metabolism. Author

N69-24277*# Techtran Corp., Glen Burnie, Md.

INTER- AND INTRA-INDIVIDUAL DESYNCHRONIZATION WITHIN AN ISOLATED GROUP [INTER- UND INTRAINDIVIDUELLE DESYNCHRONISATION INNERHALB EINER ISOLIERTEN GRUPPE]

E. Poeppel Washington NASA Apr. 1969 6 p refs Transl. into ENGLISH from German Federal Min. for Sci. Res. Rept. W68-30 Presented at the 2d Meeting on Extraterrest. Biophys., Biol. and Space Med., Marburg, West Ger., 9–10 Oct. 1967

(Contract NASw-1695)

(NASA-TT-F-12152) Avail: CFSTI CSCL 06P

An experiment is described in which four male human subjects were isolated as a group for three weeks. Recorded were the periods of activity and rest, electrolyte concentration in urine, body temperature, and psychomotor tempo. Various socio-psychological tests and self-appraisals were also conducted. The spontaneous periodicity of the subjects was compared with the normal 24-hour-day rhythm, and the test data were evaluated for the ability of the individuals to live as a group. Author

N69-24278*# Techtran Corp., Glen Burnie, Md.

THE CONDITIONAL INDEPENDENCE FROM GRAVITY OF DEVELOPMENT OF THE POLAR DIFFERENTIATION EGG [UBER DIE BEDINGTE UNABHANGIGKEIT DER ENTWICKELUNG DES POLAR DIFFERENZIRTEN EIES VON DER SCHWERKRAFT]

L. Kathariner Washington NASA Apr. 1969 12 p refs Transl. into ENGLISH from Arch. Entwicklungsmech. Organ. (Berlin), v. 12, 1901 p 597–609

(Contract NASw-1695)

(NASA-TT-F-12149) Avail: CFSTI CSCL 06C

In an experiment in which frog eggs were allowed to develop in a rising current of air bubbles, in order to impart irregular motion and thus eliminate the force of gravity as a factor in their development, the eggs developed normally, but somewhat more slowly than eggs in stagnant water. The author attributed the slower development to lower water temperature resulting from increased evaporation. Author

N69-24315# Argonne National Lab., Ill. Health Div.

GAMMA-RAY SPECTROSCOPY GROUP Research Report, Jul 1965–Jun. 1968

Jul. 1968 102 p refs

(Contract W-31-109-eng-38)

(ANL-7461) Avail: CFSTI

The incidence of radium-induced malignant tumors and blood dyscrasias was related to current or preterminal radium burden measurements and to retrospective estimates of maximum radium burdens for a series of 293 persons, most of whom acquired radium burdens in the period 1918 to 1933. The 46 malignant diseases included 23 bone sarcomas, 16 neoplasms of the skull (principally mastoid and paranasal air cell carcinomas), and 7 leukemias and aplastic anemias. Retrospective estimates of maximum radium burdens were made by application of the appropriate power function for ingestion or for multiple injections. Based on the estimated maximum initial burden, the data imply at least a twelve-fold margin of safety in the maximum permissible level for internally deposited radium. Author (NSA)

N69-24326# Battelle Memorial Inst., Columbus, Ohio. Remote Area Conflict Information Center.

PHYSIOLOGICAL FACTORS RELATING TO TERRESTRIAL ALTITUDES: A BIBLIOGRAPHY

L. Yvonne Wulff, Irene A. Braden, F. H. Shillito, and J. F. Tomashefski 1968 746 p refs
(Contracts F33657-67-C-0810; ARPA SD-171)
(AD-680474) Avail: CFSTI CSCL 6/16

The bibliography contains 4,000 references relating to the environmental and biological factors pertaining to terrestrial altitudes between 5,000 and 27,000 feet. Each entry consists of complete bibliographic data. TAB

N69-24328 Defence Research Board, Ottawa (Ontario).
THE EFFECT OF BLOCKAGE OF ALL SIX SEMICIRCULAR CANAL DUCTS ON NYSTAGMUS PRODUCED BY DYNAMIC LINEAR ACCELERATION IN THE CAT
M. J. Correia and K. E. Money Dec. 1968 16 p refs
(DRET-728) Avail: Issuing Activity

Seven cats were given rotary tests about an earth-vertical axis and also about an earth-horizontal axis. They were tested with the sagittal head plane in the plane of rotation as well as with the horizontal head plane in the plane of rotation. Recordings of eye movements were made during the tests. Following surgical transection and blocking of all six semicircular canal ducts, the cats were tested again. It was found postoperatively that horizontal and vertical nystagmus in response to angular acceleration about an earth-vertical axis were abolished. Nystagmus during constant velocity rotation about an earth-horizontal axis remained, however, although the slow phase eye velocity and frequency of the nystagmus were reduced. It is suggested that, although continuity of the semicircular canal ducts is necessary for the nystagmus in response to angular accelerations about a vertical axis, it is only contributory (and not necessary) for the nystagmus during constant velocity rotation about an earth-horizontal axis. These findings and conclusions are discussed in the context of existing data and theory. Author

N69-24348# Philco-Ford Corp., Blue Bell, Pa. Communications and Electronics Div.
ADAPTIVE MODELLING OF LIKELIHOOD CLASSIFICATION, SUPPLEMENT Final Report
Kenneth Abend, Thomas J. Harley, Jr., and Laveen N. Kanel Griffiss AFB, N. Y. RADC Dec. 1968 16 p refs
(Contracts AF 30(602)-3623; F33615-67-C-1836)
(AD-680468; B008-11-Suppl-1; RADC-TR-68-118-Suppl-1) Avail: CFSTI CSCL 6/4

An attempt was made to place the relationship between recognition and classification on the one hand and between theory and application of statistical classification on the other hand, in proper perspective. Compound decision theory is the latest step in the evolution of the most general model in which to imbed statistical classification problems arising in recognition system design. For the nonformalizable aspects of design, interactive approaches, namely those in which the human is part of the loop in the design process, with different classification and heuristic algorithms at his call, seem to be most promising. Author (TAB)

N69-24349# Stanford Univ., Calif. Dept. of Computer Science.
ARTIFICIAL INTELLIGENCE: THEMES IN THE SECOND DECADE
Edward A. Feigenbaum Aug. 1968 43 p refs
(Contract ARPA SD-183; ARPA Order 457)
(AD-680487; AI-M-67) Avail: CFSTI CSCL 6/4

In this survey of artificial intelligence research, the substantive focus is heuristic programming, problem solving and closely associated learning models. The focus in time is the period 1963-1968. Brief tours are made over a variety of topics: generality, integrated robots, game playing, theorem proving, semantic information processing, etc. One program, which employs the heuristic search paradigm to generate explanatory hypotheses in the analysis of mass spectra of organic molecules, is described in some detail. The problem of representation for problem solving systems is discussed. Various centers of excellence in the artificial intelligence research area is mentioned. A bibliography of 76 references is given. Author (TAB)

N69-24359*# California Univ., Berkeley. Sea Water Conversion Lab.
STUDY OF PERMEABILITY CHARACTERISTICS OF MEMBRANES Quarterly Report, 9 Nov. 1968–9 Feb. 1969
K. S. Spiegler, J. C. T. Kwak, D. A. Zelman, and J. Leibovitz 9 Feb. 1969 13 p Prepared for JPL
(Contracts NAS7-100; JPL-952109)
(NASA-CR-100777; QR-5) Avail: CFSTI CSCL 06C

Improvements in the apparatus for the measurements of transport properties of permselective membranes are described. These improvements include increased stability of the concentration feedback mechanism and alterations in the experimental set up to decrease the volume losses in the cell. Measurements of thickness, wet weight, ion-exchange capacity, and water content of the membrane to be used for the transport experiments are reported. Author

N69-24386# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
SPHEROIDAL PARTICLE FLOW IN A CYLINDRICAL TUBE
Tio C. Chen and Richard Skalak Nov. 1968 104 p refs
(Contract N00014-67-A-0108)
(AD-680455; TR-2) Avail: CFSTI CSCL 20/4

Viscous flow in a circular cylindrical tube containing an infinite line of rigid spheroidal particles equally spaced along the axis of the tube is considered for (a) uniform axial translation of the spheroids (b) flow past a line of stationary spheroids and (c) flow of the suspending fluid and spheroids under an imposed pressure gradient. The fluid is assumed to be incompressible and Newtonian. The Reynolds number is assumed to be small and the equations of creeping flow are used. Two types of solutions are developed for each case (i) an exact solution in the form of infinite series which is valid for ratios of the spheroid diameter to the tube diameter up to 0.80. (ii) an approximate solution using lubrication theory which is valid for spheroids which nearly fill the tube. The drag on each spheroid and the pressure drop are computed for all cases. Both prolate and oblate spheroids are considered. The results show that the drag and pressure drop depend on the spheroidal diameter perpendicular to the axis of tube primarily and the effects of the spheroidal thickness and spacing are secondary. The results are of interest in connection with mechanics of capillary blood flow, sedimentation, fluidized beds, and fluid-solid transport. Author (TAB)

N69-24397*# National Aeronautics and Space Administration, Washington, D. C.
CHANGES IN CORTICOSTEROID AND CATECHOLAMINE METABOLISM AFTER SHARP LIMITATION OF MOTOR ACTIVITY [IZMENIYA KORTIKOSTEROIDNOGO I KATEKHOLAMINOVOGO OBMENA PRI REZKOM ORGANIZMA GRANICHENII DVIGATEL'NOY AKTIVNOSTI ORGANIZMA]
V. V. Parin et al Apr. 1969 3 p refs Transl. into ENGLISH from Dokl–Akad. Nauk SSSR (Moscow), v. 184, no. 1, 1969 p 250–251
(NASA-TT-F-12211) Avail: CFSTI CSCL 06P

Hypokinesia was induced in sixteen experimental male rabbits and sixteen controls, weighing three to four kg each, by keeping them in cages especially designed to reduce motor activity to a

minimum. As the animals lost weight during the experiment, the sides of the cages were drawn together to force the animals to remain immobile. The rabbits were sacrificed 11 to 12 and 30 days after the start of the experiment. The contents of oxycorticosteroids in blood plasma and of norepinephrine and epinephrine in the adrenals, myocardium, and hypothalamus were determined fluorometrically. Experimental results showed that the sharp limitation of motor activity severely impaired the animals' corticosteroid and catecholamine metabolism. P.A.B.

N69-24430# Army Natick Labs., Mass. Food Lab.
GROWTH OF PLANT CELL CULTURES. 2: NUTRIENT REQUIREMENTS AND THEIR ROLE IN THE GROWTH OF SUSPENSION CULTURES
Mary Mandels, Judith Jeffers, and Hamed M. El-Bisi Oct. 1968 80 p refs
(AD-680230; FL-83; TR-69-36-FL) Avail: CFSTI CSCL 6/13

A detailed study has been made of some nutrient requirements of several plant cell suspension cultures. These cultures require the usual inorganic salts including inorganic nitrate nitrogen. Hydrolyzed protein or amino acids will serve as the sole source of nitrogen for growth, but organic nitrogen is not required. Urea or ammonia nitrogen in the absence of nitrate will not support growth. Sucrose is an excellent carbon source. Glucose and starch will also support growth of some cultures. Sucrose sterilized by gamma irradiation supports normal growth of these cultures. Growth is retarded on glucose sterilized by gamma irradiation at ambient temperature, but growth is normal on glucose irradiated at -80C. A few growth factors at low concentration are also required. An auxin (2,4 dichlorphenoxyacetic acid or naphthaleneacetic acid) and thiamine are required by all cultures. Kinetin (6 furfurylaminopurine) is also required by some cultures. Maximum productivity on this simple medium is about 1.5 grams dry weight per liter of culture per day, equal to, but not significantly greater than productivities obtained on much more complex media. Author (TAB)

N69-24431# TRW Systems, Redondo Beach, Calif.
BIOMECHANICS STUDIES ON DYNAMIC SHAPE RECOGNITION Final Technical Report
Gabriel E. Lowitz Nov. 1968 38 p refs
(Contract DAHC04-68-C-0016)
(AD-680237; TRW-10493-6001-R0-00; AROD-7820-1-RT) Avail: CFSTI CSCL 6/4

This report documents the experimental reduction to practice of the concept of dynamic shape recognition, an optical processing scheme applicable to the recognition of geometrical objects in photographic imagery. The concept involves the use of the motion of the sensor as a prime means of recognition. The appendix to this report contains additional theoretical studies useful for the implementation of the concept covering the noise analysis of the stochastic process involved. Author (TAB)

N69-24450# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
PROBLEMS OF DISTRIBUTION AND EXPERIMENTAL EVALUATION OF PERMISSIBLE LEVELS OF 137CS, 90SR, AND 106RU
L. A. Buldakov and Yu I. Moskalev 1968 51 p Transl. into ENGLISH from the Russian
(Contract AT(29-2)-1013
(AEC-TR-6972) Avail: CFSTI

Distribution patterns of radioisotopes in mice, rats, guinea pigs, and farm animals were analyzed. The kinetics of ^{137}Cs and ^{90}Sr metabolism in man were also investigated. Secretion of radioisotopes in milk and transmission to progeny were studied. Data were analyzed for the purpose of determining permissible levels of radioisotopes in air, water, and food. Tables are presented to show distribution of ^{106}Ru in various organs of mice and rats and maximum permissible levels of ^{106}Ru in air, water, and food. NSA

N69-24463# American Inst. for Research, Pittsburgh, Pa.
INSTRUCTIONAL METHODOLOGY AND EXPERIMENTAL DESIGN FOR EVALUATING AUDIO/VIDEO SUPPORT TO UNDERGRADUATE PILOT TRAINING Technical Report, 15 Sep. 1967–1 Aug. 1968
George R. Purifoy, Jr. Oct. 1968 92 p ref
(Contract F33615-68-C-1048)
(AD-680408; AIR-728-9/68-TR; AFHRL-TR-68-5) Avail: CFSTI CSCL 5/9

This report presents a detailed description of the methods by which airborne video recording will be utilized in the training of Air Force pilots, and presents plans for an assessment of its effectiveness. Audio/video equipment configurations and limitations are discussed as they apply to training operations in the T-37 and T-38 aircraft, and training methodology is described which has been formulated to permit the integration of video recording and teaching techniques into the Air Force undergraduate pilot training program. Plans for an eight-month experimental evaluation of the effects of these techniques are detailed, including schedules, operating practices, student selection procedures, instructor training plans, data gathering processes and materials, and analysis guidelines. Author (TAB)

N69-24476# Technische Hochschule Munchen (West Germany).
THE INFLUENCE OF PALMITYL CARNITINE ON THE BIOLOGICAL TERMINAL OXIDATION [DER EINFLUSS VON PALMITYLCARNITIN AUF DIE BIOLOGISCHE ENDOXYDATION]
Rudolf Ludwig Portenhauser (Ph.D. Thesis) 1968 23 p refs In GERMAN
Avail: CFSTI

The changes in rat liver mitochondries by fatty acids and acylcarnitine concentrations are studied and the effects of palmitylcarnitine on the terminal biological oxydation are outlined. Experiments show that small concentrations of palmitycarnitine stimulate succinate ventilation in intact rat liver mitochondries whereas large palmitylcarnitine doses inhibit ventilation. Pathologica organisms, especially diabetics, exhibit increased concentrations of acyl carnitite chains in their metabolic systems. Transl. by G.G.

N69-24480# Technische Hochschule Munchen (West Germany).
DETERMINATION OF TRITIUM ISOTOPE EFFECTS IN DEHYDROGENASE REACTIONS OF THE CARBOHYDRATE METABOLISM AND THEIR MECHANISTIC INTERPRETATION [BESTIMMUNG VON TRITIUM-ISOTOPENEFFEKTEN BEI DEHYDROGENASEREAKTIONEN DES KOHLENHYDRATSTOFFWECHSELS UND IHRE MECHANISTISCHE DEUTUNG]
Walter Rambeck (Ph.D. Thesis) 16 Dec. 121 p refs In GERMAN
Avail: CFSTI

Determined were tritium isotope effects on some dehydrogenase reactions in glucose metabolism and their reaction kinetics in similar enzyme reactions. Isotopic measurements on nicotineamide-adenine-dinucleotide(-phosphate) related dehydrogenases in vitro showed that catalytic reactions took place in unordered substrate bonds of the enzymes and that hydride transfer determined the reaction velocity. This effect was valid for the whole temperature range of possible enzyme reactions. Transl. by G.G.

N69-24491# Joint Publications Research Service, Washington, D. C.
SOVIET MEDICAL RESEARCH IN ANTARCTICA
7 Apr. 1969 26 p refs Transl. into ENGLISH from the Book "Trudy Sovetskoy Antarkticheskoy Ekspeditsii, vol. 48" Leningrad, Hydrometeorological Publishing House, 1967 p 329–346 (JPRS-47795) Avail: CFSTI

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1. PECULIARITIES OF THE COURSE OF REPARATIVE PROCESSES IN ANTARCTICA (EXPERIMENTAL INVESTIGATIONS) G. A. Barashkov p 1–14 refs (See N69-24492 12-04)

2. CHANGES IN THE CARDIOVASCULAR SYSTEM IN PERSONNEL OF HIGH-ALTITUDE STATIONS AND PARTICIPANTS IN SLED-TRACTOR EXPEDITIONS I. V. Shastin p 15–18 (See N69-24493 12-04)

3. EXPERIENCE OF MEDICAL SERVICES AT THE TRANSCONTINENTAL STATION OF VOSTOK IN THE PERIOD OF THE 1960 ANTARCTIC EXPEDITION N. V. Bystrov p 19–24 (See N69-24494 12-04)

N69-24492# Joint Publications Research Service, Washington, D. C.
PECULIARITIES OF THE COURSE OF REPARATIVE PROCESSES IN ANTARCTICA (EXPERIMENTAL INVESTIGATIONS)
G. A. Barashkov *In its* Soviet Med. Res. in Antarctica 7 Apr. 1969 p 1–14 refs (See N69-24491 12-04)
Avail: CFSTI

The vital activities of the organism and the condition of its reactive and defense forces depend on a whole series of interrelations of the organism with the external world, reflecting the unity of the organism with the surrounding environment. This interdependence is manifested with particular clarity when people from the middle latitudes of the Northern Hemisphere migrate to Antarctica. Under the influence of factors indigenous to the South Polar climate, the rhythm of the physiological reactions of the organism is disturbed and meteoneuroses of nonadaptation develop. The organism possesses large adaption possibilities; nevertheless, the prolonged residence of man in these new and extremely severe conditions produces a stress situation affecting all of the adaption mechanisms. This stress condition of the adaption mechanisms induces in the reactive mechanism changes that are undoubtedly reflected in the course of pathological processes, including circulation and the healing of wounds. Author

N69-24493# Joint Publications Research Service, Washington, D. C.
CHANGES IN THE CARDIOVASCULAR SYSTEM IN PERSONNEL OF HIGH-ALTITUDE STATIONS AND PARTICIPANTS IN SLED-TRACTOR EXPEDITIONS
I. V. Shastin *In its* Soviet Med. Res. in Antarctica 7 Apr. 1969 p 15–18 (See N69-24491 12-04)
Avail: CFSTI

Medical observations are presented on personnel of the Vostok Station prior to their flight from Mirnyy, and at the termination of winter year, after their return to the observatory. The personnel of the sled-tractor caravan were under observation on the route from Mirnyy to Komosomol'skaya Station. The first complaints of slight headaches, pains in the cardiac region, dyspnea caused by rapid walking, and loss of appetite appeared a month after the beginning of the expedition, at an altitude of only 3,000 meters above sea level. A rise in arterial pressure was observed in three of the people at this time. A week later, at the beginning of 1960, the condition of the personnel began to improve. Only K, an engineer 43 years of age, in whom a bundle-branch block was cardiographically diagnosed, continued to complain of pains in the cardiac region, while in I, a glacialist, the headaches became severe against a background of further elevation of arterial pressure. Author

N69-24494# Joint Publications Research Service, Washington, D. C.
EXPERIENCE OF MEDICAL SERVICES AT THE TRANSCONTINENTAL STATION OF VOSTOK IN THE PERIOD OF THE 1960 ANTARCTIC EXPEDITION
N. V. Bystrov *In its* Soviet Med. Res. in Antarctica 7 Apr. 1969 p 19–24 (See N69-24491 12-04)
Avail: CFSTI

The physical factors of Antarctica to a certain degree have a negative effect on the human organism, inducing specific physiological reorganizations. To these must be added the morale-mental factor evoked by prolonged separation of the small collective from the civilized world, relatives, and close friends. The collective group of the station arrived at Vostok by plane at the beginning of January 1960. From conditions of normal atmospheric pressure, plus temperatures, and normal air content of oxygen, the human organism, in a short period of time—5–6 hours, was thrust into conditions of low atmospheric pressure, reduced air humidity, and air temperature of minus 40 degrees. Changes took place in cardiovascular and respiratory systems. Author

N69-24498# Brookhaven National Lab., Upton, N. Y.
THE ROLE OF HUMAN GUIDANCE IN A FAST MEASUREMENT SYSTEM
P. L. Connolly, W. C. Delaney, P. V. C. Hough, J. M. Howie, R. R. Kinsey et al 25 Oct. 1968 9 p Presented at the Intern. Conf. on Advan. Data Processing for Bubble and Spark Chambers, Argonne, Ill., 28–30 Oct. 1968 Sponsored by AEC
(BNL-13060; Conf-681025-10) Avail: CFSTI

The design of advanced computer based film analysis systems for bubble chambers and its relation to the role of human guidance in film scanning are discussed. NSA

N69-24583# Army Nuclear Defense Lab., Edgewood Arsenal, Md.
NEUTRON SENSITIVITIES OF VARIOUS GAMMA DOSIMETERS
Max Stuetzer and Nancy N. Gibson Dec. 1968 25 p refs
(AD-682721; NDL-TM-52) Avail: CFSTI CSCL 6/18

The neutron sensitivities of silver-activated metaphosphate glass, manganese-activated calcium fluoride thermoluminescent dosimeters, and lithium fluoride thermoluminescent dosimeters have been measured for six neutron energies ranging from 1 to 14.6 MeV. Preliminary data from these experiments have been presented. Errors were introduced by the low intensities of the experimental neutron fluences and by gamma contributions to dosimeter responses. A first-order approximation of the gamma contributions was made and used to correct experimental data. The neutron sensitivities reported have been successfully applied to correct gamma-exposure data from three recent wagon effects experiments. Author (TAB)

N69-24591# Southwest Research Inst., San Antonio, Tex.
A LOW FIELD ELECTRON SPIN RESONANCE STUDY OF THE EFFECT OF RADIATION IN LIVING ANIMALS Final Report
Frank C. Whitmore and Charles E. Bryson Sep. 1968 79 p refs
(Contract DA-49-146-XZ-560)
(AD-680624; DASA-2153) Avail: CFSTI CSCL 6/18

It has been demonstrated that free radicals are formed in living systems as a consequence of exposure of these systems to various kinds of ionizing radiation. In addition, it has been shown that it is possible to obtain the environmental conditions necessary

to produce ESR while simultaneously maintaining those necessary for the survival of a living test specimen. It has been also demonstrated that a conveniently used, highly reproducible electronic system can be developed for the operation and control of an L-band spectrometer. Author (TAB)

N69-24593# Johns Hopkins Univ., Baltimore, Md. Dept. of Psychology.

THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE

Albert William Bevin, Jr. et al Dec. 1968 42 p refs

(Contract N00014-67-A-0163-0001; Grant NSF GB-5287)

(AD-680462; TR-57; TR-58; TR-59; TR-60) Avail: CFSTI CSCL 5/10

Contents: Does context influence the shape of a perceptual scale; The role of the thematic relationship between focal and contextual stimuli in recall; Structure in the classification of stimuli differing on several continuous attributes; and Incentive motivation and choice reaction time performance. TAB

N69-24615# Department of National Health and Welfare, Ottawa (Ontario). Radiation Protection Div.

DATA FROM RADIATION PROTECTION PROGRAMS, VOLUME 6, NUMBER 7

Jul. 1968 21 p refs

(NP-17691) Avail: AEC Depository Libraries

The report from the fallout monitoring program in Canada during June 1968 includes data on the total β activity in air filter samples and the content of ^{137}Cs and ^{90}Sr in samples of milk collected at selected locations. The results of analyses for radioactivity carried out on samples of surface water and biological materials collected in the vicinity of Canadian reactors are included. NSA

N69-24632# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.

PERSONNEL DOSE ASSESSEMENTS FOLLOWING ACCIDENTAL NON-UNIFORM IRRADIATION OF THE BODY

W. A. Langmead, N. Adams, B. Holliday (UKAEA, Dounreay, Scotland), G. Tyler (UKAEA, Dounreay, Scotland), and James Brown (UKAEA, Dounreay, Scotland) Sep. 1968 49 p refs

(AHSB(RP)R-85) Avail: CFSTI; HMSO 7s

An incident which involved the accidental exposure to external radiation of two men on the floor of the experimental fast reactor at Dounreay was reconstructed. The reconstruction, carried out in order to determine the radiation doses received by the two men, necessitated the filming of stages in the incident using a dummy source, the measurement of the dose-rate distribution around an irradiated fuel element and its simulation using ^{137}Cs point sources, the measurement of the dose-rate distribution around a man-phantom containing $^{137}CsCl_2$ solution, and the measurement of depth doses in a water phantom irradiated by a fuel element. These experimental measurements enabled the determination of doses to the men's eyes, gonads, hands and skin, and also the distribution of dose with depth at the waist level of one of the men. By making use of the reciprocal dose theorem, the integral doses and average doses to the bodies of the men were also determined. A short discussion of the validity of the reconstruction and the accuracy attainable is presented. Author (NSA)

N69-24643# Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.

QUANTITATIVE POPULATION GENETICS OF MICE UNDER IRRADIATION, 1 JUNE 1965–31 MAY 1968

Earl L. Green, and Thomas H. Roderick 30 Jun. 1968 17 p refs

(Contract AT(30-1)-1979

(NYO-1979-26) Avail: CFSTI

Nonirradiated descendants of irradiated and nonirradiated randombred sublines of populations of mice were compared with respect to lifespan and body weight. Nonirradiated descendants of irradiated and nonirradiated sublines of two populations of mice were compared with respect to lifetime reproductive performances, including percentages of fertile matings, mean numbers of litters, mean litter sizes, percentages of survival between birth and weaning, mean total numbers of progeny, and mean numbers of days of reproductive life. Other experiments were conducted to study recessive visibles, lethals, heritability, and inbreeding coefficients. Studies on genetic variants included determination of effects of deleterious recessives in heterozygotes of natural and radioinduced mutations and biochemical polymorphisms. NSA

N69-24666# Naval Ship Research and Development Center, Annapolis, Md.

AIR CAN BE CLEANED (FOR BREATHING)

W. R. Calvert Dec. 1968 24 p refs

(AD-680432; MATLAB-275) Avail: CFSTI CSCL 6/11

Life support, during ventures away from earths atmosphere, requires man-made system capability to provide clean air for breathing and to carry wastes (material and energy) to disposal. In this system, small fires and contaminant emitters must be controlled. Adsorption is essential to this systems process, which includes other phenomena for cleaning air. Author (TAB)

N69-24678# Federation of American Societies for Experimental Biology, Bethesda, Md.

PROMISING RESEARCH AREAS. 1: A STUDY OF THE BIOLOGICAL EFFECTS OF CHEMICAL SUBSTANCES EMPLOYING THE CONCEPTS AND TECHNIQUES OF PHYSICAL CHEMISTRY

J. F. A. Mc Manus Nov. 1968 67 p refs

(Contract DAHC19-68-C-0001)

(AD-680227) Avail: CFSTI CSCL 6/1

This report summarizes recent investigations that relate physical changes in macromolecular protein structures to biological functions. It is based on a review by scientists studying protein structure changes induced by van der Waals forces; model cell membrane systems that measure the functions of the enzyme permeases; the biological applications of nuclear magnetic resonance and electron spin resonance spectra and spin-labeling techniques; fluorescence spectra, polarization and decay times, and absorption spectroscopy as indicators of biological events; and the significance of molecular geometric changes in a series of biologically active compounds as related to their chemical structure. The topics include the nature of changes produced by chemicals at cell surfaces, enzyme-substrate interactions, novel concepts of charge transport through biological substrates, and their relationship to fine-structure changes in living systems. Author (TAB)

N69-24701# Hebrew Univ., Jerusalem (Israel). Dept. of Physical Chemistry.

INACTIVATION OF SOME ENZYMES IN AQUEOUS SOLUTION BY ATOMIC HYDROGEN

Gabriel Stein Apr. 1968 21 p refs Presented at Conf. on Energetics and Mech. in Radiation Biol., Port-Meirron, Wales, Apr. 1967 Submitted for publication

(Contract AT(30-1)-3242)

(NYO-3242-26; Conf-670422-1) Avail: CFSTI

Methods for quantitative study of the mechanisms and rate constants of the reactions of H atoms as the only reactive

species in aqueous solutions were developed. The results on solutions of enzymes such as cytochrome-c, chymotrypsin, trypsin, and ribonuclease are discussed. It is shown that in these complex molecules highly specific reactions occur, affecting the metal ion, when present, and aromatic as well as divalent-sulfur-containing amino acids. Author (NSA)

N69-24714# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.

RADIATION SHIELDING FOR SMALL POWER SOURCES OF Tm-170, Tm-171

S. Marshall Sanders, Jr., William J. Kerrigan, and Edward L. Albenesius Jan. 1969 18 p refs

(Contract AT(07-2)-1)

(DP-1158) Avail: CFSTI

Dose equivalent rates measured with a 6.8 W ^{107,171}Tm source shielded with tantalum agreed closely with rates calculated from the number and energy distribution of bremsstrahlung photons from the beta decay of ^{170}Tm. This excellent agreement validated the calculational method. Shielding requirements were estimated for a hypothetical 62 W power source of ^{171}Tm for the projected artificial heart application; the calculations suggest a required purity range of 10^{-4} to 10^{-5} Ci ^{170}Tm Ci ^{171}Tm for ^{171}Tm implanted in the human body. Author (NSA)

N69-24726# Deutsche Versuchsanstalt fuer Luft- Und Raumfahrt, Bad Godesberg (West Germany).

BONDINGS IN BIOLOGICAL IRON-PORPHYRIN CHELATES [BINDUNGEN IN BIOLOGISCHEN EISEN-POPPH YRIN-CHELATEN]

G. Schaefer Dec. 1968 95 p refs In GERMAN; ENGLISH summary

(DLR-FB-68-87) Avail: CFSTI

The biological synthesis of the prosthetic groups of hemoproteids show a high sensitivity to oxygen. The variety of reactions catalyzed by these proteids depends especially on the type of chemical bonding and therefore on the configuration of the 3d electrons of the iron ion in the center of the porphyrin ring. Although these 3d electrons have no primary part in the chelation, the function of the hexacoordinated heavy-metal complex is extensively modified by the participation of the d-electrons in π bondings of chelates. The primordial existence of the porphyrins seems to be strongly associated with the chemical origin of life, while the extremely high resonance stability of these compounds is in agreement with their spontaneous synthesis. The most important hemoproteids which have been differentiated by common genetic sources are discussed with respect to their type of bonding and their selective function. Author

N69-24729# National Academy of Sciences–National Research Council, Washington, D. C.

SUMMARY OF WORKING GROUP ACTIVITY FROM 1952 TO 1968 OF THE COMMITTEE ON HEARING, BIOACOUSTICS, AND BIOMECHANICS

Dec. 1968 50 p refs

(Contract Nonr-2300(03))

(AD-680454) Avail: CFSTI CSCL 6/16

Research in the fields of hearing, bioacoustics, and biomechanics over an extended period is reviewed. Topics include biological effects of noise, automatic audiometry, psychoacoustics, auditory perception, sonic boom effects, requirements for air and missile base noise surveys, bipacoustic aspects of rocket, missile, and space travel, community noise problems, sonar studies, and speech analysis. In most of the areas studied an attempt was made to establish standards and evaluation criteria for the various acoustic factors. A.C.R.

N69-24733# Texas Univ., Houston. Anderson (M.D.) Hospital and Tumor Inst.

RADIATION AND BIOPHYSICAL STUDIES ON VIRUSES AND CELLS Progress Report, 12 Oct. 1967–11 Oct. 1968

Robert J. Shalek 14 Oct. 1968 24 p refs

(Contract AT(40-1)-2832)

(ORO-2832-74) Avail: CFSTI

Following irradiation of chromosomes from cultured hamster cells, studies on their structure were conducted using electron microscopy. Techniques for high resolution stereo microscopy are described. Studies were conducted on ultracentrifugal characterization of double stranded DNA isolated from normal and x-irradiated metaphase chromosomes. Studies on the effects of low energy electron beams on mammalian cells indicated that the major radiosensitive structure was a thin peripheral shell close to the nuclear membrane in the interphase cells and a considerably thicker peripheral shell in metaphase cells. Similar studies on other types of cells showed that the major radiosensitive region was in the form of a thin shell located directly below the bacteriophage, spore and bacterial surfaces, or close to the nuclear surface of yeast cells. Studies were conducted on absorption of 20 eV to 50,000 eV electron beams in air and plastic and angular scattering of 0.5 to 80 keV electrons by collodion foils. NSA

IAA ENTRIES

A69-24263
OUTLINES OF SPACE RADIOBIOLOGY [OCHERKI KOSMICHESKOI RADIOBIOLOGII].
P. P. Saksonov, V. V. Antipov, and B. I. Davydov.
Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 9), 1968. 532 p. 109 refs. In Russian.

The combined biological effects of cosmic radiation and other space-flight factors on a variety of organisms are described in terms of results of laboratory experiments and actual space flights. Attention is given to both natural and artificial radiation sources in space. Early somatic effects are treated in terms of progressive changes in the organism, including reversible reactions and the effects of partial irradiation. The influence of several flight factors on the radiation-induced effects is described, together with the relative biological effectiveness of electromagnetic radiation, protons deuterons, alpha particles, neutrons, and heavy ions. The principles of safeguarding against radiation in orbital and interplanetary flights are examined, taking into account the possibility of using pharmacological means of increasing the resistance of the organism. T.M.

A69-24347 #
BIOTELEMETRIC EXAMINATIONS OF THE HEART AND CIRCULATORY SYSTEMS OF HELICOPTER PILOTS TO DETERMINE VARIOUS IN-FLIGHT STRESSES [BIOTELEMETRISCHE UNTERSUCHUNGEN DES HERZ-KREISLAUF-SYSTEMS BEI HUBSCHRAUBER-PILOTEN ZUR FESTSTELLUNG DER UNTERSCHIEDLICHEN FLIEGERISCHEN BELASTUNG].
H. Hoffmann (St.-Johannes-Hospital, Medizinische Klinik, Dortmund, West Germany), H. Strubel, H. Raabe, and M. Koch (Medizinische Universitätsklinik, Bonn; St.-Johannes-Hospital, Medizinische Klinik, Dortmund, West Germany).
Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin, vol. 15, Jan. 1969, p. 1-26. 34 refs.
In German.

Results of a study of a variety of psychic loads during flight carried out by in-flight tracking of EKG readings, respiratory rates, pulse rate, and oral reports during flight maneuvers or other flight incidents by the pilots themselves. The Hoffman (1967) method for recording these data by means of telemetric electrodes which transmit the data simultaneously to ground stations for later evaluation was used. The purpose of the study was to correlate the effects of psychic stress during critical flight situations to changes in the physiological parameters. The subjects were 61 pilots aged 23 to 45 years, with flight experience ranging from 100 to 500 hr. Readings were obtained for the following flight maneuvers: rectilinear flights, taxiing, vertical landings, vertical ascents, autorotation straight-in and autorotation at 180 and 360°, hovering, low-level flights, instrument landings at no visibility, recovery operations, rectilinear flights in formation, and rectilinear landings in formation. Analysis of the data shows that air catastrophes are related directly to takeoff and landing difficulties in the majority of cases. The role which human failure due to overloads of emotional stress plays in the causation of such accidents, apart from the technical conditions of the aircraft, is discussed at length, on the basis of the correlations observed in the tests. B.H.

A69-24488
HUMAN FACTORS EVALUATION OF AIRCRAFT ENGINE INSTRUMENT DISPLAYS.
Christopher L. Lair and Kenneth W. Bender (Cessna Aircraft Co., Wichita, Kan.).
Society of Automotive Engineers, National Business Aircraft Meeting, Wichita, Kan., Mar. 26-28, 1969, Paper 690328. 6 p.
Members, $1.00; nonmembers, $1.50.

The relative merits of three types of aircraft engine instruments were examined in respect to aircraft changing conditions. The experimental design considered interference, work load, age, and experience. Instruments were comparable so far as instrument size and characteristics would allow. Experimental results and comments indicated the experimental apparatus and failure parameters were comparable to actual aircraft situations. It was discovered that vertical-scale engine instruments required less recognition and scan time. Age and flight experience were not significant in this experimental design. (Author)

A69-24493
BIOENGINEERING OF IMPACT SURVIVAL IN BUSINESS AIRCRAFT.
Richard G. Snyder (Michigan, University, Ann Arbor, Mich.).
Society of Automotive Engineers, National Business Aircraft Meeting, Wichita, Kan., Mar. 26-28, 1969, Paper 690335. 32 p. 59 refs.
Members, $1.00; nonmembers, $1.50.

Aircraft used for business (executive corporate transportation or personal business) and utility purposes now represent about one-third of the total U.S. aircraft inventory, with the single-engine four- to six-place aircraft most numerous, followed by light twins. Data from accident investigation of business aircraft involved in survivable accidents indicate that serious injuries and fatality to the occupants occur most frequently as a result of the unprotected head and neck or chest flailing in contact with the aircraft controls, instrument panel, or structure. Improvement of current aircraft to provide increased occupant safety and survival during crash impacts is both necessary and feasible. Design considerations include folding seat back locks to prevent collapse, increased seat tie-down to structure, instrument panels and glare shields designed to absorb energy through structural design and padding, stronger seat structure, lateral protection, design and packaging of knobs and projections to minimize injury in contact, and installation of upper torso restraint. In the future passive restraint protection could be provided by current experimental systems such as the air bag and the use of side control-type devices to eliminate control wheel injuries. The single most important occupant protection advance would be through installation and use of upper torso restraint. (Author)

A69-24504
PRESSURIZED NAVAJO ENVIRONMENTAL SYSTEM.
Lewis E. Herr (Piper Aircraft Corp., Lock Haven, Pa.).
Society of Automotive Engineers, National Business Aircraft Meeting, Wichita, Kan., Mar. 26-28, 1969, Paper 690330. 12 p.
Members, $1.00; nonmembers, $1.50.

When the performance envelope for the pressurized Navajo aircraft was finalized, it was apparent that a sophisticated environmental system was needed to guarantee passenger comfort. The environmental studies centered around the ventilation, pressurization, heating, and air cooling systems. This work discusses parameters that governed the selection of each system design, and how they were integrated into a properly functioning overall system. The hardware that was needed and those factors that govern their selection are also discussed. Development of the various systems imposed many problems, and the solutions to these problems required many changes. Some of the more important of these are described in detail. (Author)

A69-24540 #
POSSIBILITY OF USING THE GRAPH METHOD IN ELECTROPHYSIOLOGY [O VOZMOZHNOSTI PRIMENENIIA METODA GRAFOV V ELEKTROFIZIOLOGII].
A. K. Popov and A. M. Volkov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem; Moskovskii Aviatsionnyi Institut, Moscow, USSR).
Akademiia Nauk SSSR, Doklady, vol. 184, Feb. 11, 1969, p. 1243-1246. In Russian.

Description of a technique for plotting the results of electrophysiological observations in the form of graphs and curves. The potentials of cortical reactions in various layers of the cortex, and the configurations of cortical responses to stimulation are given in graphic representation to demonstrate the application of the graph method to electrophysiology. Hodographs are assessed as effective aids in biopotential studies. V.Z.

A69-24737 *
RATE AND PREDICTABILITY IN RATE-TRACKING TASKS.
Don Trumbo, Frank Fowler, and Merrill Noble (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.).
Organizational Behavior and Human Performance, vol. 3, Nov. 1968, p. 366-377. 12 refs.
Grants No. AF AFOSR 526-64; No. NsG-606.

The constant rate of target displacement and the coherence of the track were varied in two factorial experiments. Both experiments involved pursuit tracking; the second also included compensatory tracking conditions. The results of both experiments showed significant increases in the criterion integrated absolute error scores with increases in rate and with decreases in coherence. The superiority of the pursuit mode increased with rate, but the mode-coherence interaction was not significant, indicating that both modes benefited about equally from input coherence. No significant losses in performance occurred after a one-month retention interval. Results are compared with prior data from step-function tracking. (Author)

A69-24795 *#
AUDITORY TEMPORAL MASKING AND THE PERCEPTION OF ORDER.
J. L. Homick (NASA, Manned Spacecraft Center, Houston, Tex.), L. F. Elfner, and G. G. Bothe (Florida State University, Tallahassee, Fla.).
Acoustical Society of America, Journal, vol. 45, Mar. 1969, p. 712-718. 7 refs.
NSF-supported research.

An investigation of the effects of frequency, intensity, and time on the perception of temporal order and the amount of temporal masking produced under conditions of a short burst (12 msec) of tone separated temporally from a narrow-band noise indicates a similarity of function underlying the two phenomena. Temporal masking is greater and the perception of temporal order is more difficult when the signal is centered in the band of noise. Temporal masking is greater and the perception of temporal order is more difficult for a weak signal than for a more intense signal. The observed temporal masking can be interpreted in terms of a cochlear model. The relationship between temporal masking and the perception of temporal order is discussed in terms of a hierarchy of level of perception brought about by temporal cues. (Author)

A69-24796 *#
JUDGED NOISINESS OF MODULATED AND MULTIPLE TONES IN BROAD-BAND NOISE.
Karl S. Pearsons, Dwight E. Bishop, and Richad D. Horonjeff (Bolt, Beranek and Newman, Inc., Los Angeles, Calif.).
Acoustical Society of America, Journal, vol. 45, Mar. 1969, p. 742-750. 12 refs.
NASA-supported research.

Paired-comparison judgment tests, undertaken to investigate the subjective noisiness of single, modulated, and multiple tones plus noise, clearly confirm the need for corrections in calculating perceived noise levels of spectra containing strong discrete frequency components. The tone-correction procedures of Little and Kryter-Pearsons both provided a considerable improvement in calculating perceived noise levels that agreed with judgments. The tests indicate that the tone corrections may continue to increase in magnitude as a function of tone-to-noise levels even for levels greater than 25 dB as measured in 1/3-octave bands. However, the rate of increase diminishes for higher tone-to-noise levels. Little difference was found in the judged noisiness of unmodulated and either frequency- or amplitude-modulated tones, except at rates of 5 Hz, where the modulated tones were found to be more annoying because of envelope irregularities. For multiple tones, little difference was noted in the judged noisiness of harmonic and nonharmonically related tone complexes. There was also found to be little consistent trend in the judged noisiness of two- or five-tone complexes of the same frequency range, except for the relatively narrow frequency range of 1/10-octave where the five-tone complexes were judged slightly noisier than the two-tone complexes. (Author)

A69-24797 #
NOISE, YOU CAN GET USED TO IT.
J. C. Webster (U.S. Naval Material Command, Naval Command and Control Communications Center, San Diego, Calif.) and M. Lepor (U.S. Naval Undersea Warfare Center, San Diego, Calif.).
Acoustical Society of America, Journal, vol. 45, Mar. 1969, p. 751-757. 8 refs.

On the basis of several Laboratory studies, a three-band preferred-frequency speech interference level (PSIL) of 64 dB (based on the octaves centered at 500, 1000, and 2000 Hz), or an A-weighted level (L_A) of 71 dB, were proposed as the criteria levels for acceptable voice communications. Two validation surveys were undertaken where ambient noise levels were measured, and subjective questionnaires were completed in various ship's spaces. When asked to rate a space along a five-point scale of noisiness (very quiet, quiet, moderately noisy, very noisy, and intolerably noisy), responses tended to center on moderately noisy regardless of objective noise level (PSIL, L_A, PNL, LL). When asked to give binary judgment on whether (1) normal speech was affected, (2) work was affected, (3) the space was acceptable, or (4) the environment was loud (and/or noisy, and/or annoying), or very loud (and/or very noisy, and/or very annoying), the following results were obtained: 80% thought that neither speech nor work was affected (and the space was acceptable) at PSIL of 67 dB (68 dB) or 73 dBA (74 dBA); 20% would accept higher noise levels, but 20% also said levels this high did affect speech and work and made the space "uncomfortable" and the noise "loud." (Author)

A69-24843
PROBABILITY ANALYSIS OF OCULAR DAMAGE DUE TO LASER RADIATION THROUGH THE ATMOSPHERE.
Paul H. Deitz.
Applied Optics, vol. 8, Feb. 1969, p. 371-375. 12 refs.

Description of a mathematical model which predicts the probability of ocular damage occurring to personnel illuminated by a pulsed laser beam as a function of the appropriate optical and atmospheric parameters. The evaluation includes terms for the laser output energy and divergence, and atmospheric parameters of attenuation and scintillation. Sample computations are shown, and a safety nomograph is developed to facilitate the eye hazard analysis. (Author)

A69-24844
CORNEAL DAMAGE THRESHOLDS FOR CO_2 LASER RADIATION.
N. A. Peppers, A. Vassiliadis, K. G. Dedrick, H. Chang, R. R. Peabody, H. Rose, and H. C. Zweng (Stanford Research Institute, Menlo Park, Calif.).
Applied Optics, vol. 8, Feb. 1969, p. 377-381. 14 refs.
USAF-supported research.

A Gaussian beam from a CO_2 laser emitting at 10.6 μ was used to measure damage thresholds on rabbit cornea at exposure times of 55, 10, and 3.5 msec. A theoretical model of the radiation-tissue interaction is presented and compared with experimental data. The comparison suggests that a critical temperature exists above which lesions are caused by protein denaturation. The model is useful for establishing safe exposure levels within a limited exposure range. (Author)

A69-24845
LASER RADAR EYE HAZARD CONSIDERATIONS.
P. W. Wyman (U.S. Navy, Naval Research Laboratory, Washington, D.C.).
Applied Optics, vol. 8, Feb. 1969, p. 383-392. 9 refs.

Analysis of the eye hazard posed by laser radars, and the methods for reducing this hazard. Order-of-magnitude calculations indicate that direct viewing of even a 1-mW gas laser at 6328 Å is extremely hazardous. The problem of eye hazard is examined from two slightly different points of view. The first examines the peak power received at an eye P_1 and at a laser-radar detector P_2 vs range R for an assumed transmitter intensity I_t of 10^{13} W/sr. The other point of view examines what happens when I_t is varied. The approach uses two inequalities - namely, the magnitude which I_t must not exceed in order to avoid the hazard of eye damage, and the magnitude which I_t must exceed in order to achieve successful detection. Curves are presented which show where the safe and hazardous radar regions occur. It is suggested that laser radars be operated at 10.6 μ, and at the minimum transmitter intensity that is consistent with system requirements, even for the case of a variable intensity transmitter. M.G.

A69-24865
CONSIDERATIONS RELATIVE TO THE CALCULATION OF RADIATION DOSES IN VIEW OF THE QUANTIFICATION OF BIOLOGICAL EFFECTS IN THE CASE OF SUPERSONIC TRANSPORT [CONSIDERATIONS RELATIVES AUX CALCULS DES DOSES DE RADIATIONS EN VUE DE LA QUANTIFICATION DES EFFETS BIOLOGIQUES DANS LE CAS DU TRANSPORT SUPERSONIQUE].
L. Miro, A. Pfister, G. Deltour, and R. Kaiser (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris; Centre de Recherches Nucléaires, DPC, Strasbourg; Compagnie Générale d'Electricité de Paris, Marcoussis, Essonne, France).
IN: CALCULATION OF RADIATION DOSES IN SPACE; CENTRE D'ETUDES ET DE RECHERCHES EN TECHNOLOGIE SPATIALE, EUROPEAN SYMPOSIUM, TOULOUSE, FRANCE, FEBRUARY 21-23, 1968, REPORTS [CALCUL DES DOSES DE RADIATIONS DANS L'ESPACE; CENTRE D'ETUDES ET DE RECHERCHES EN TECHNOLOGIE SPATIALE, JOURNEES EUROPEENNES, TOULOUSE, FRANCE, FEBRUARY 21-23, 1968, COMPTES RENDUS]. [A69-24854 11-29]
Symposium co-sponsored by the Centre National d'Etudes Spatiales. Edited by C. Elbaz, J.-F. Faugère, and A. Lebeau.
Toulouse, France, Centre d'Etudes et de Recherches en Technologie Spatiale, 1969, p. 187-194. 8 refs. In French.

General discussion of the problem of the biological effects of cosmic ionizing particles encountered by supersonic commercial aircraft at high-cruising altitudes. The characteristics, both physical and biological, of cosmic radiation at altitudes between 16 and 23 km, are discussed. The intensity of primary cosmic radiation is shown as a function of geomagnetic latitude. The spatial distributions of ionization for a heavy ion and an α particle are also shown. Results of some balloon experiments carried out with the aid of nuclear emulsions and biological preparations are discussed. M.G.

A69-24866
PROBLEMS OF ESTIMATING BIOLOGICAL RADIATION DOSES AND RADIATION PROTECTION IN SPACE.
W. Völker (Robert Bosch GmbH, Stuttgart, West Germany) and H. Bücker.
IN: CALCULATION OF RADIATION DOSES IN SPACE; CENTRE D'ETUDES ET DE RECHERCHES EN TECHNOLOGIE SPATIALE, EUROPEAN SYMPOSIUM, TOULOUSE, FRANCE, FEBRUARY 21-23, 1968, REPORTS [CALCUL DES DOSES DE RADIATIONS DANS L'ESPACE; CENTRE D'ETUDES ET DE RECHERCHES EN TECHNOLOGIE SPATIALE, JOURNEES EUROPEENNES, TOULOUSE, FRANCE, FEBRUARY 21-23, 1968, COMPTES RENDUS]. [A69-24854 11-29]
Symposium co-sponsored by the Centre National d'Etudes Spatiales. Edited by C. Elbaz, J.-F. Faugère, and A. Lebeau.
Toulouse, France, Centre d'Etudes et de Recherches en Technologie Spatiale, 1969, p. 195-206. 10 refs.

Discussion of the biological effects of galactic, solar-particle, and trapped radiation in space. It is pointed out that some radiations in space which might be biologically important are yet unknown in their physical parameters. In addition, the biological efficiency of other radiations, which are primarily investigated, is still unknown. Therefore, radiation dosimetry and radiation protection in space require exact analyses of the three components of radiation in space relative to their physical parameters and biological effects. The radiation dose in a spaceship and in the body of an astronaut mainly depends on secondary radiation and bremsstrahlung produced in the absorber. Because of most complex conditions, a calculation of the dose is not possible only from incident-beam data. M.M.

A69-24923 *
HEART RATE AND CHANGES IN BODY FLUIDS IN AESTIVATING TOADS FROM XERIC HABITATS.
Walter G. Whitford (New Mexico State University, Dept. of Biology, Las Cruces, N. Mex.).
IN: PHYSIOLOGICAL SYSTEMS IN SEMIARID ENVIRONMENTS; PROCEEDINGS OF THE SEMINAR, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, NEW MEXICO, NOVEMBER 9-11, 1967.
Seminar sponsored by the National Science Foundation, NSF Grant No. GZ-660.
Edited by C. C. Hoff and M. L. Riedesel.
Albuquerque, University of New Mexico Press, 1969, p. 125-133. 7 refs.
Grant No. NGR-32-003-27.

Study of three species of burrowed desert anurans (Scaphiopus hammondi, Bufo punctatus, and Bufo cognatus) to evaluate gross metabolic changes by monitoring heart rate and to observe changes in body fluids during aestivation. The animals were maintained at room temperature in terraria half filled with desert soil. Electrocardiograms on normal (control, nonburrowed) and burrowed animals were obtained. Changes in serum chloride, urea, and hemoglobin in Scaphiopus hammondi were studied by removing groups of animals from the terraria 14 and 42 days after they had burrowed. Samples from toads were obtained after hydration for two days prior to measurements. A varying degree of bradycardia was observed in the three species. This bradycardia is undoubtedly a reflection of a reduction in metabolism associated with burrowing. The Scaphiopus hammondi lost approximatey 7.7% of their initial body weight after two weeks in aestivation, but no additional weight loss was noted during the remainder of the 42 days. F.R.L.

A69-24924
EFFECTS OF ALTITUDE CLIMATES ON HUMAN PERFORMANCE - A REVIEW.
Ulrich C. Luft (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.).
IN: PHYSIOLOGICAL SYSTEMS IN SEMIARID ENVIRONMENTS; PROCEEDINGS OF THE SEMINAR, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, NEW MEXICO, NOVEMBER 9-11, 1967.
Seminar sponsored by the National Science Foundation, NSF Grant No. GZ-660.
Edited by C. C. Hoff and M. L. Riedesel.
Albuquerque, University of New Mexico Press, 1969, p. 187-190. 17 refs.

Assessment of the biological impact of altitude climates on human performance, taking into consideration the effects of moderate altitudes on the life processes. A summary of studies of the extent to which physical performance is affected at altitude when the demand for oxygen is greatly increased in vigorous physical activity is shown. It is pointed out that several investigations which included measurements of blood lactate indicate that the capacity for anaerobic energy production and presumably the oxygen debt is not altered at altitudes up to 13,000 ft in newcomers. It was found that the decrement in performance after less than 1 hr in a low-pressure chamber at 455 mm Hg was not as great as during the first few days at the White Mountain Laboratory at the equivalent altitude. Apparently other factors secondary to hypoxia may affect work capacity on transition to altitude. M.M.

A69-25456 *

RECENT ADVANCES IN STUDIES OF EVOLUTIONARY RELATIONSHIPS BETWEEN PROTEINS AND NUCLEIC ACIDS.

Thomas H. Jukes (California, University, Space Sciences Laboratory, Berkeley, Calif.).

Space Life Sciences, vol. 1, Mar. 1969, p. 469-490. 38 refs.
Grant No. NsG-479.

Discussion of new approaches to the study of evolutionary relationships of living organisms which are based on differences in the sequence of the elementary building blocks of their proteins and nucleic acids. These sequences are specific for different types of organisms. The number of differences found in the building blocks of nucleic acids and proteins of similar function for two biological species can serve as a criterion for the evolutional relationship of these species. A comparison between the globins of a fish and a mammal is cited which shows that the β and γ chains separated from each other subsequently to the time when human beings and fishes had a common ancestor, but before the lines of descent separated that led to human beings and horses. G.R.

A69-25457 *

SURVIVAL OF MICRO-ORGANISMS IN SPACE.

Peter R. Lorenz (Union University, Dudley Observatory; New York State, Dept. of Health, Div. of Laboratories and Research, Albany, N.Y.), Gert B. Orlob (Toronto, University, Toronto, Canada), and Curtis L. Hemenway (Union University, Dudley Observatory; New York, State University, Albany, N.Y.).

Space Life Sciences, vol. 1, Mar. 1969, p. 491-500. 22 refs.
Grant No. NsG-155-61; Contract No. NAS 9-5637.

Survival of coliphage T_1, tobacco mosaic virus (TMV), and spores of Penicillium roqueforti Thom after direct exposure to space on board six balloons, six sounding rockets, and three satellites is related to the numbers of solar UV photons incident during exposure. The survival followed exponential curves leading to complete inactivation. Solar UV radiation of wavelengths from 2000 to 3000 Å appears to be the main cause of inactivation of broth suspended phage and, probably, TMV. T_1 phage and Penicillium spores prepared in saline were also affected by radiation shorter than 2000 Å, while TMV seems to be resistant to radiation at these wavelengths The biological effectiveness of the solar spectrum in the area between 3000 to 50,000 Å was not significant. Sterilization of interplanetary spacecraft appears necessary since microorganisms can easily be shielded against lethal radiation. (Author)

A69-25458 *

HEMATOLOGICAL FINDINGS ASSOCIATED WITH CHRONIC ACCELERATION.

R. R. Burton and A. H. Smith (California, University, Dept. of Animal Physiology, Davis, Calif.).

Space Life Sciences, vol. 1, Mar. 1969, p. 501-513. 44 refs.
Grant No. NGR-05-004-008.

The effect of chronic acceleration on hematology was determined in chickens adapted to various field intensities. The erythrocyte number, plasma volume, and plasma proteins (globulin fractions) were increased in chickens after several months in a chronic acceleration environment (1.5 to 3 g). Erythrocyte size (mean corpuscular volume) and plasma A/G ratio were reduced by chronic acceleration. Where comparable data are available, the changes encountered may be equated to results from simulated weightlessness studies with humans. (Author)

A69-25459 *

BIOLOGICAL LOSSES AND THE QUARANTINE POLICY FOR MARS.

S. Eric Steg and Richard G. Cornell (Florida State University, Tallahassee, Fla.).

Space Life Sciences, vol. 1, Mar. 1969, p. 514-519.
Grant No. NGR-10-004-029.

An international committee known as COSPAR has agreed that the probability of a single viable organism aboard any unmanned spacecraft intended for planetary landing should be kept less than 10^{-3}, in agreement with work by Sagan and Coleman (1966). At present, the U.S. is committed to remain consistent with this standard. Using a model which includes both expected losses from failures to collect data and from contamination to analyze the quarantine problem, evidence is given which suggests that the current quarantine requirements may be too strict if their implementation forces a program delay. U.S. policy should be reexamined, keeping more fully in mind both the types and the relative sizes of the losses which might be encountered. (Author)

A69-25460 *

POTENTIAL EFFECTS OF RECENT FINDINGS ON SPACECRAFT STERILIZATION REQUIREMENTS.

S. Schalkowsky, R. C. Kline (Exotech, Inc., Washington, D.C.), and L. B. Hall (NASA, Washington, D.C.).

Space Life Sciences, vol. 1, Mar. 1969, p. 520-530. 6 refs.
Contracts No. NASw-1558; No. NASw-1666.

Discussion of an extended analytical model (accommodating information which has been developed in the past year or which is currently being evolved) for an assessment of spacecraft sterilization requirements. The probability of a release of viable organisms from the spacecraft is evaluated as a function of: (1) impact velocity magnitudes and the probability of their occurrence; (2) the degree of equipment fracturing at impact velocities; and (3) the number of viable organisms in spacecraft materials. It is concluded that the results of work now in progress on spacecraft material fracturing, on the estimation of buried contamination loads, and on microbial resistance on mated surfaces, may lead to less severe dry-heat sterilization of planetary spacecraft than had been considered necessary in the past. G.R.

A69-25461

RELEASE OF MICROBIAL CONTAMINATION FROM FRACTURED SOLIDS.

N. J. Petersen (U.S. Public Health Service, National Communicable Disease Center, Phoenix, Ariz.), R. G. Cornell (Florida State University, Dept. of Statistics, Tallahassee, Fla.), and J. R. Puleo (U.S. Public Health Service, National Communicable Disease Center, Spacecraft Bioassay Laboratory, Cape Kennedy, Fla.).

Space Life Sciences, vol. 1, Mar. 1969, p. 531-537.

Investigation of the probability of release of microbial contamination from the interior of solids upon fracture due to impact as an essential factor for the formulation of planetary quarantine and spacecraft sterilization requirements. A model system was designed in which known concentrations of bacterial spores were incorporated in methyl methacrylate plastic. Pieces of plastic were fractured in a uniform manner exposing interior surface areas of consistent and measurable size. Known surface areas were incubated in sets of 20 culture tubes containing a liquid growth medium. The subsequent occurrence of visible growth expressed as percent of tubes positive was interpreted as an estimate of the probability of release of at least one viable microorganism. G.R.

A69-25462
PREBIOLOGICAL MEMBRANES - SYNTHESIS AND PROPERTIES.
C. E. Folsome (Hawaii, University, Honolulu, Hawaii) and H. J. Morowitz (Yale University, New Haven, Conn.).
Space Life Sciences, vol. 1, Mar. 1969, p. 538-544. 21 refs.
Research supported by the University of Hawaii; NSF Grant No. GB-4108.

Demonstration that complex membrane-like structures can easily be synthesized by ultraviolet radiation of alkanes on aqueous solutions of phosphate and magnesium. Because biological phase separation is accomplished by membranes both within and around the cell, it is suggested that primitive collections of organic molecules could obtain boundaries, and thus phase separation, by primitive membranes. F. R. L.

A69-25463 *
COSMIC-RAY INDUCED RADIOACTIVITY IN ASTRONAUTS AS A MEASURE OF RADIATION DOSE.
R. L. Brodzinski, N. A. Wogman, and R. W. Perkins (Battelle Memorial Institute, Pacific Northwest Laboratory, Richland, Wash.).
Space Life Sciences, vol. 1, Mar. 1969, p. 545-553. 12 refs.
NASA-supported research; AEC Contract No. AT (45-1)-1830.

The activity-dose-energy relationships for ^{7}Be, ^{13}N, ^{22}Na, and ^{24}Na activities induced in muscle tissue by proton bombardment have been measured through the energy range up to 580 MeV. The relationship between radiation dose and induced activity for any given proton bombarding energy is defined. The determination of the radiation dose received by an astronaut from cosmic radiation of unknown energy by measuring the concentrations of the radioactive isotopes induced in his body is discussed. (Author)

A69-25464 *
BEHAVIORAL RESPONSES TO SHORT PERIODS OF LOWERED GRAVITATIONAL FORCE IN BLIND GOLDFISH.
R. J. Von Baumgarten, J. Atema, T. Hukuhara, and M. Rocker (Michigan, University, Mental Health Research Institute, Ann Arbor, Mich.).
Space Life Sciences, vol. 1, Mar. 1969, p. 554-564. 18 refs.
Grant No. NGR-23-005-201.

Study of the movements of blind goldfish flown in an aircraft through vertical flight patterns. A consistent correlation with the varying g loads as recorded by a g meter was found. Decreasing the g load caused the fish to dive downwards rapidly. The opposite reaction, a tilt and movement upwards, was observed in transitions from a lower to a higher g load, although the latter reaction was not as pronounced. Because any potential influence of visual cues, swimming bladder reflexes, and changing barometric pressure was excluded by experimental precautions, it was concluded that the response of the fish to varying g loads were vestibular reflexes, probably resulting from displacements of the otoliths during vertical accelerations. F. R. L.

A69-25642 *
SINGLE-CHANNEL PRESSURE TELEMETRY UNIT.
Harold Sandler, Thomas B. Fryer (NASA, Ames Research Center, Moffett Field, Calif.), and Boris Datnow (Mayo Clinic, Dept. of Pathology, Rochester, Minn.).
Journal of Applied Physiology, vol. 26, Feb. 1969, p. 235-238. 8 refs.

Description of a single-channel pressure telemetry unit which is capable of chronic implantation. Reliable function of these units has been obtained up to 6 months. Recent units have been modified to include a magnetic latching or radio frequency switch. Small size and low power consumption have been achieved without sacrificing accuracy and reliability. This approach is advocated for experimental situations requiring pressure measurements in free-ranging animals or in experimental animals in hostile environments. (Author)

A69-25643 *
ESTIMATING THE SIZE AND CONCENTRATION OF UNICELLULAR MICROORGANISMS BY LIGHT SCATTERING.
Edward L. Merek (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Applied Microbiology, vol. 17, Feb. 1969, p. 219-221. 6 refs.

The optical density of suspensions of microorganisms was measured at two different positions in a spectrophotometer cuvette compartment. From these two measurements, the particle size and the particle concentration could be estimated. Estimates of particle numbers were not significantly different from those obtained by direct microscopic counting. (Author)

A69-25656
MAN-MACHINE INTEGRATION - A LONG TERM LOOK.
G. Melvill Jones (Defence Research Board, Aviation Medical Research Unit, Ottawa; McGill University, Dept. of Physiology, Montreal, Canada).
Aeronautical Journal, vol. 72, Oct. 1968, p. 831-846. 55 refs.

Consideration of the broad areas for future endeavor in the field of man-machine integration as seen from the perspective of a biologically oriented observer. The essential prerequisites for man to be in control of machines are that he be assured of adequate data acquisition, for which all information must be channeled ultimately through the several sensory systems. The entire information outflow must be channeled through peripheral neuromuscular pathways. The sensory input systems and the motor (or output) systems are examined in detail. Attention is then given to the whole human organism as a component in the man-machine ensemble or control loop. Speculation is made on the impact of the man-machine hybrid upon the social structure. F. R. L.

A69-25764 *
SELF-ASSEMBLY OF THE PROTOCELL FROM A SELF-ORDERED POLYMER.
Sidney W. Fox (Miami, University, Institute of Molecular Evolution, Coral Gables, Fla.).
(International Convention of Biochemists, Bangalore, India, Sept. 7, 1967.)
Journal of Scientific and Industrial Research, vol. 27, July 1968, p. 267-274. 59 refs.
Grants No. NsG-689; No. NGR-10-007-008.

Discussion of the origin of life in terms of simple syntheses of polymers similar to those constituting contemporary cells under thermodynamically feasible and geologically plausible conditions. Polyamino acids prepared by thermal condensation contain some proportion of each of the proteinogenous amino acids, the polymers have molecular weights of many thousands, and they possess other properties of protein. They are found to be limited in heterogeneity; the accumulated evidence suggests that internal forces impose much ordering of amino acid residues. Simple treatment of thermal polyamino acids with water yields cell-like structures with many of the properties of contemporary living units. These properties include the ability to accept stains, ultrastructure having a bileaflet boundary, protoenzymic activities, fissionability, selective retention of macromolecules, growth by accretion with participation in the reproduction of their own likeness, and a kind of motility. P. v. T.

A69-25773 *#
ENZYME HISTOCHEMISTRY OF THE CEREBRAL CORTEX OF SQUIRREL MONKEY AND RAT.
T. R. Shantha, S. L. Manocha, and G. H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.).
Acta Histochemica, vol. 30, 1968, p. 218-233. 65 refs.
NIH Grant No. FR-00165; Grant No. NGR-11-001-016.

Macroscopic and microscopic study of the distribution of various oxidative and dephosphorylating enzymes and esterases in the cerebral cortex of the rat and squirrel monkey. Moderately strong to strong activity is shown in the neurins, particularly the pyramidal cells, for SDH, CYO, DPN-D, ATPase, AMPase, and acid phosphatase.

AChE and BChE show a mild reaction, the former on the surface of the cells, and the latter on the walls of the blood vessels. AK activity was observed in the nucleoli of the neurons of the blood vessels. The neuropil, with its dendrite and axonal branches and synaptic terminals, shows a strong reaction to oxidative enzymes. Cholinergic and adrenergic nerve endings were recognized on the basis of their reaction to MAO and AChE. Various amounts of TPPase positive Golgi material were observed in the form of networks, with the amounts depending on the size of the cells. B.H.

A69-25774 *#
HISTOCHEMICAL STUDIES ON THE NUCLEUS BASALIS OF MEYNERT OF THE SQUIRREL MONKEY (SAIMIRI SCIUREUS).
T. R. Shantha, G. H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.), and K. Iijima.
Acta Histochemica, vol. 30, 1968, p. 96-108. 48 refs.
NIH Grant No. FR-00165; Grant No. NGR-11-001-016.

Detailed systematic study of the distribution of enzymes in the nucleus basalis of Meynert (BM) in adult male and female squirrel monkeys. The histochemical tests and the most important findings are tabulated. It is concluded that the globus pallidus and BM differ in their enzyme equipment, indicating that the BM may subserve different functions. B.H.

A69-25775 *
PENILE ERECTION EVOKED FROM FOREBRAIN STRUCTURES IN MACACA MULATTA.
Bryan W. Robinson (Emory University, Yerkes Primate Center, Atlanta, Ga.) and Mortimer Mishkin (National Institutes of Health, National Institute of Mental Health, Bethesda, Md.).
Archives of Neurology, vol. 19, Aug. 1968, p. 184-198. 20 refs.
NIH Grant No. FR-00165; Grant No. NGR-11-001-012.

Description of the results of a systematic investigation of electrically evoked penile erection in Macaca mulatta. Quantitative measures of the density and distribution of points eliciting response from the forebrain of this species are presented. An attempt was made to relate penile erection to other effects evoked from the same points, including autonomic changes and behaviors indicative of the reinforcement value of the stimulation. M.M.

A69-25776 *
SPONTANEOUS GENERATION, THE ORIGIN OF LIFE, AND SELF ASSEMBLY.
Sidney W. Fox (Miami, University, Institute of Molecular Evolution and Dept. of Biochemistry, Coral Gables, Fla.).
(Canadian Institute of Chemists, Symposium on Evolution of Proteins, Vancouver, Canada, June 3, 1968.)
Currents in Modern Biology, vol. 2, 1968, p. 235-237, 239, 240. 38 refs.
Grants No. NsG-689; No. NGR-10-007-008.

Discussion dealing with the history of the concept of self-assembly in its relation to the origin of life. Self-assembly not only embraces the nineteenth century concept of "spontaneous generation," but applies conceptually to the origins of precellular polymers and systems as well as to contemporary biopolymers and cellular structures. (Author)

A69-25777 *
ENZYME-HISTOCHEMICAL STUDIES ON THE MUSCLE SPINDLE.
T. R. Shantha and G. H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.).
Histochemie, vol. 16, 1968, p. 1-8. 30 refs.
Grant No. NGR-11-001-016.

Detailed studies of the distribution of several enzymes in the muscle spindles of the hand and foot interosseous muscles and M. longissimus dorsi of the rhesus monkey as well as in those of the hand interosseous muscles of the squirrel monkey. The intrafusal muscle fibers (IMF) of the rhesus monkey can be classified into two types by the reaction intensity at the polar regions for adenosine triphosphatases and by the enzymes concerning the carbohydrate metabolism, except glucose-6-phosphate dehydrogenase, while the extrafusal muscle fibers (EMF) show three types of reactions for the enzymes of the Embden-Meyerhof pathway and the tricarboxylic acid (TCA) cycle. The IMF and EMF of the squirrel monkey are more variable than those of the rhesus monkey for the glycogen breakdown enzyme. It is possible that the small IMF are more capable of energy production through the TCA cycle than the large IMF and the EMF in both species. The positive cholinesterase reactions are found around the polar regions of the IMF, while only the rim of the equator of the IMF shows monoamine oxidase activity. The pericapsular epithelial cells of the muscle spindle seem to be metabolically similar to the perineural epithelial cells. M.M.

A69-25778 *
HISTOCHEMICAL MAPPING OF LACTATE DEHYDROGENASE AND MONOAMINE OXIDASE IN THE MEDULLA OBLONGATA AND CEREBELLUM OF SQUIRREL MONKEY (SAIMIRI SCIUREUS).
Sohan L. Manocha and Geoffrey H. Bourne (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.).
Journal of Neurochemistry, vol. 15, no. 9, 1968, p. 1033-1040. 20 refs.
Research supported by the National Foundation for Neuro-muscular Diseases; NIH Grant No. FR-00165; Grant No. NGR-11-001-016.

Study of the gross distribution of lactate dehydrogenase (LDH) and monoamine oxidase (MAO) in a caudocranial series of 50-μ-thick sections through the medulla oblongata and cerebellum. In general, LDH exhibited a stronger reaction in the neuropil and in the perikarya, whereas MAO showed moderate activity in the neurons and mild-to-moderate activity in the neuropil. M.M.

A69-25781 *
SELF-ORDERED POLYMERS AND PROPAGATIVE CELL-LIKE SYSTEMS.
Sidney W. Fox (Miami, University, Institute of Molecular Evolution and Dept. of Biochemistry, Coral Gables, Fla.).
Naturwissenschaften, vol. 56, no. 1, 1969, p. 1-9. 72 refs.
Grants No. NsG-689; No. NGR-10-007-008.

Discussion of recent data (accumulated since 1965) concerning the origin of life which emphasize that primordial protein would automatically be limited in heterogeneity. The thermally derived proteins would intrinsically possess, according to findings in a number of laboratories, a number of "protoenzymic" activities. The subjects discussed include earlier proteinoids, internal ordering phenomena, rate enhancement by proteinoids, hormonal stimulation, the proteinoid microspheres, photosensitized reactions, the budding of microspheres, prebiological geochemistry, the beginning of a coding mechanism, and the way to cellular evolution. G.R.

A69-25837
MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS.
Edited by W. J. Reals (St. Joseph Hospital and Rehabilitation Center, Laboratories, Wichita, Kan.).
Chicago, College of American Pathologists, 1968. 158 p.
$7.50.

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FOREWORD AND ACKNOWLEDGMENT. W. J. Reals (St. Joseph Hospital and Rehabilitation Center, Wichita, Kan.). 2 p.

INTRODUCTION. F. M. Townsend (Texas State Tuberculosis Hospital, San Antonio, Tex.). 2 p.

THE PROBLEM AND THE SOLUTION. W. J. Reals (St. Joseph Hospital and Rehabilitation Center, Wichita, Kan.), p. 1-6.

THE ROLE OF THE PATHOLOGIST IN AVIATION ACCIDENT INVESTIGATION. J. M. Blumberg (U.S. Army, Medical Research and Development Command, Washington, D.C.), p. 7-16. [See A69-25838 12-05]

A69-25838

THE ROLE OF THE PATHOLOGIST IN AVIATION ACCIDENT INVESTIGATION.

Joe M. Blumberg (U.S. Army, Medical Research and Development Command, Washington, D.C.).

IN: MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS. [A69-25837 12-05]
Edited by W. J. Reals.
Chicago, College of American Pathologists, 1968, p. 7-16.

Investigation of the causes of aircraft accidents from the standpoint of the pathologist, based on a close study of a number of fatalities. As far as the pathologist is concerned, the factors that lead to fatalities in accidents are environmental factors, traumatic factors, or preexisting disease. Coronary disease is not infrequent as a cause of accidents. For this reason it is recommended that everyone in the cockpit be able to fly a plane and to take over in case the pilot becomes incapacitated. P.v.T.

A69-25839

IDENTIFICATION OF BODIES IN ACCIDENTS INVOLVING EXTREME DISINTEGRATION.

Russell S. Fisher (Maryland, University, Medical School; Johns Hopkins University, Medical School and School of Hygiene, Baltimore, Md.).

IN: MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS. [A69-25837 12-05]
Edited by W. J. Reals.
Chicago, College of American Pathologists, 1968, p. 17-37.

Discussion of means of identifying human bodies torn apart or crushed in aircraft accidents. As an illustration, the record of a B-707, which crashed in a Maryland cornfield in late 1963 with 73 passengers and eight crew members on board is examined. For instance, a severed hand with a flexion deformity of the left little finger served as an important key to an identification, since this particular flexion deformity was present in only one of the 81 persons on the aircraft. Rings are extremely important, as they can be easily traced to the jeweler who sold them. Hair often gives a clue for identification. The same holds true of inner organs, from which the age of the deceased person and operations performed can be learned. Teeth are important for identification, especially dental work done. Fingerprints taken from severed hands are often helpful in identifying a person. Tissue and blood types are often used for clues. For proper identification, it is important, when a crash has occurred, to maintain the integrity of the scene, and to have a sufficient staff of pathologists available to make it possible to go through the material piece by piece and bit by bit. P.v.T.

A69-25840

AEROMEDICAL INVESTIGATIONS OF CIVIL AIRCRAFT ACCIDENTS

Bernard C. Doyle (U.S. Department of Transportation, National Transportation Safety Board, Bureau of Aviation Safety, Washington, D.C.).

IN: MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS. [A69-25837 12-05]
Edited by W. J. Reals.
Chicago, College of American Pathologists, 1968, p. 38-58.

Explanation of the role of the National Transportation Safety Board (NTSB) in the investigation of civil aircraft accidents. The NTSB is a relatively new agency under the Department of Transportation with broad authority to investigate accidents, to conduct special studies pertaining to transportation safety, and to make recommendations which will tend to prevent accidents and increase the safety of transportation. The legal aspects of post-mortem examinations of aircraft accident victims are outlined. The need for human factors investigation is explained by means of case histories. It is recommended that the assistance of pathologists throughout the country be sought in aeromedical investigations. P.v.T.

A69-25841

AVIATION PATHOLOGY IN AIRCRAFT ACCIDENT INVESTIGATION.

Stanley R. Mohler (Federal Aviation Administration, Office of Aviation Medicine, Aeromedical Applications Div., Washington, D.C.).

IN: MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS. [A69-25837 12-05]
Edited by W. J. Reals.
Chicago, College of American Pathologists, 1968, p. 59-70.

Discussion of aircraft accident survivability features and accident precipitation and contributing factors as the two areas wherein the pathologist provides contributions. The drawing of a lethal cockpit indicates how various structures in the cockpit area can have "high injury potential" in accidents. In comparison, a cleaned-up, properly designed cockpit is portrayed, which takes into account the tolerances of the human head. This delethalized cockpit is a composite of key features now found individually in various general-aviation aircraft. For further safety, the installation of properly designed, lightweight shoulder harnesses, of single- or double-strap type is recommended in connection with the seat belts. A special smoke protection hood, possibly to be contained in the back of each passenger seat, is being tested at the Civil Aeromedical Institute. Safety problems that could arise in future "jumbo jets" are discussed with illustrations. The evolution of supersonic transports will call for the guidance of human-factors and safety specialists in assuring optimum survival features. P.v.T.

A69-25842

AIRCRAFT ACCIDENT TOXICOLOGY.

Clayton A. Ainsworth, III (USAF, Hospital, Andrews AFB, Md.).

IN: MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS. [A69-25837 12-05]
Edited by W. J. Reals.
Chicago, College of American Pathologists, 1968, p. 81-85.

Guidelines for the collection, preservation, and shipment of aircraft accident specimens, as well as for the analysis of specimens and for the interpretation of test results. It is essential that fresh tissue be protected against chemical or mechanical change. Therefore, collection of specimens must be made as soon as possible after the accident. Since chemical preservatives invalidate results of toxicological analysis, no fixing fluid (Formalin) should ever be used. Thorough toxicological examination requires approximately 150 to 250 g each of brain, liver, kidney, and lung, 20 ml of blood, and all urine and stomach contents available. Refrigeration (dry ice) is the prescribed method of preservation, and rapid transportation is of the utmost importance. Various methods for the analysis of specimens are outlined (use of carbon monoxide, ethanol, lactic acid, drugs, etc.). The interpretation of the test results is explained. P.v.T.

A69-25843
THE INVESTIGATION.
William J. Reals (St. Joseph Hospital and Rehabilitation Center, Laboratories, Wichita, Kan.).
IN: MEDICAL INVESTIGATION OF AVIATION ACCIDENTS; COLLEGE OF AMERICAN PATHOLOGISTS, ANNUAL MEETING, WASHINGTON, D.C., SEPTEMBER 17-23, 1966, PROCEEDINGS. [A69-25837 12-05]
Edited by W. J. Reals.
Chicago, College of American Pathologists, 1968, p. 91-109.

Discussion of the nationwide plan of aircraft accident investigation developed by the FAA as a human factors investigation problem This plan involves the recruitment and master listing of physicians who are designated Aviation Medical Examiners - i.e., physicians who issue medical certificates to airmen. When news of a fatal accident is received, the FAA Regional Flight Surgeon is notified; in turn, he telephones to request that a nearby aviation medical examiner go to the site to assist in the investigation. These examiners have been instructed by the FAA to ask for autopsies and to secure the assistance of a pathologist to conduct the post-mortem examination. Prior to post-mortem examination, however, site organization is required. The site organization and investigation, the autopsy, the reporting of pathological findings, and the final report are discussed. The equipment for the pathologist "on call" for aircraft accident investigation is listed, as instant readiness is a requirement. The legal aspects are examined, and Public Law 87-810 of Oct. 15, 1962, is quoted. P.v.T.

A69-25929 *
THE HUMAN AS AN OPTIMAL CONTROLLER AND INFORMATION PROCESSOR.
Sheldon Baron and David L. Kleinman (Bolt, Beranek and Newman, Inc., Cambridge, Mass.).
IEEE Transactions on Man-Machine Systems, vol. MMS-10, Mar. 1969, p. 9-17. 10 refs.
Contract No. NAS 12-104.

Development of a mathematical model of the instrument-monitoring behavior of the human operator. The model is based on the assumption that the operator behaves as an optimal controller and information processor, subject to his inherent physical limitations. The resulting model depends explicitly on the control task and the control actions. Provision is made for the ability to obtain information from the peripheral visual field. There are no restrictions on signal coupling. The specific characteristics of the operator's visual sampling behavior are predicted by solving a nonlinear, deterministic optimization problem. A two-axis compensatory tracking example is investigated, and the results exhibit the general characteristics expected of a human operator performing a similar task. (Author)

A69-25930 *
A METHOD FOR THE DIRECT MEASUREMENT OF CROSSOVER MODEL PARAMETERS.
Glenn A. Jackson (Oakland University, School of Engineering, Rochester, Mich.).
IEEE Transactions on Man-Machine Systems, vol. MMS-10, Mar. 1969, p. 27-33. 11 refs.
Contract No. NASr-54(06).

Discussion of a parameter tracking system that directly measures the gain and time-delay parameters of the crossover model of a compensatory control system. The parameters of the crossover model, as determined by the tracking system, are shown to vary between subjects, with input bandwidth, and with subject practice. The accuracy of the parameter tracking system is substantiated by cross-checking experimental data by spectral analysis. (Author)

A69-25931
THE POLARITY COINCIDENCE CORRELATION TECHNIQUE - A USEFUL TOOL IN THE ANALYSIS OF HUMAN-OPERATOR DYNAMICS.
H. G. Stassen (Delft, Technische Hogeschool, Delft, Netherlands).
IEEE Transactions on Man-Machine Systems, vol. MMS-10, Mar. 1969, p. 34-39. 19 refs.

Description of a special correlation technique, called the "polarity coincidence correlation method." It is shown that a two-state characterization of a random process leads to this simple correlation procedure. The utility of the method in dynamics studies of man-machine systems, its limitations, its assumptions, and, finally, the accuracy due to a finite time of observation are discussed. (Author)

A69-25989 #
DYNAMIC AND STATIC PROBLEMS IN THE THEORY OF DEFORMABLE MEMBRANES OF THE CARDIOVASCULAR SYSTEM [DINAMICHESKIE I STATICHESKIE ZADACHI TEORII DEFORMIRUEMYKH OBOLOCHEK KROVENOSNOI SISTEMY].
A. S. Vol'mir and M. S. Gershtein (Voenno-Vozdushnaia Inzhenernaia Akademiia, Moscow, USSR).
(Vsesoiuznyi S'ezd po Teoreticheskoi i Prikladnoi Mekhanike, 3rd, Moscow, USSR, Jan. 27-Feb. 1, 1968.)
Prikladnaia Mekhanika, vol. 5, Jan. 1969, p. 3-10. 13 refs.
In Russian.

Discussion of some aspects of the biophysics of the cardiovascular system, on the basis of a blood vessel model in the form of a circular cylindrical shell containing a liquid. The Korotkov tones, audible in blood pressure measurements by the sound method, are treated as oscillations of a shell after stability loss under the action of external pressure. Some mechanical properties of the vessel walls are identified, and the propagation of a pulse wave in an artery is described. Certain unsteady hemodynamic phenomena, associated with the acceleration problem in space physiology are examined. The peculiar shape of erythrocytes is studied from the standpoint of elastic shell theory. V.P.

A69-26130
IRREVERSIBLE BLUNTED RESPIRATORY SENSITIVITY TO HYPOXIA IN HIGH ALTITUDE NATIVES.
S. Lahiri, F. F. Kao, T. Velásquez, C. Martinez, and W. Pezzia (New York, State University, Downstate Medical Center, Dept. of Physiology, Brooklyn, N.Y.; San Marcos University, Andean Institute of Biology, Lima, Peru).
Respiration Physiology, vol. 6, Apr. 1969, p. 360-374. 29 refs.

Exploration of the blunted hypoxic drive to ventilation seen in high-altitude natives by investigation at 4540-m altitude of the steady-state ventilatory response to inhaled CO_2 of six high-altitude natives, eight lowlander residents, and three lowlander visitors. Investigation at sea level was carried out on three highlander residents and two sea-level natives. No difference in CO_2 sensitivity between the groups at altitude and at sea level was apparent, although the sea-level values were lower, as expected. Both the interactive and additive effects of hypoxic and hypercapnic stimuli on ventilation were less in the highlanders, and this blunted response was not reversed by ten months residence at sea level. F.R.L.

A69-26131
PERIPHERAL CHEMOREFLEXES IN THE REGULATION OF BREATHING OF HIGH ALTITUDE NATIVES.
S. Lahiri and N. H. Edelman (Michael Reese Hospital and Medical Center, Cardiovascular Institute, Chicago, Ill.).
Respiration Physiology, vol. 6, Apr. 1969, p. 375-385. 24 refs.
Research sponsored by the State University of New York; PHS Grants No. HE-06375; No. HTS-5252.

Transient ventilatory response to three and five breaths of N_2 at rest and during exercise at sea level was determined in three high altitude natives acclimatized for 10 months and in three sea level natives. In the highlanders ventilation increased only when PA_{O_2}

fell to 50 to 60 mm Hg, whereas in the lowlanders any decrease in PA_{O_2} from the resting value augmented ventilation, and the increase in ventilation with PA_{O_2} reduction was much less in the highlanders. The relative increase in ventilation during exercise from euoxic to hypoxic levels was also less in the highlanders than in the lowlander Transient relief of hypoxia at 4540 m by two breaths of O_2 during rest decreased ventilation by 10% in the highlander and by 37% in the lowlander. Thus ventilatory drive to transient O_2 stimulus in the highlander is low, and it remains low even after prolonged stay at sea level, suggesting irreversible insensitivity of the peripheral arterial chemoreflex mechanism to hypoxia. (Author)

A69-26235 *

AN ANALYTIC ELASTIC-VISCOELASTIC MODEL FOR THE SHAPE AND THE FORCES IN THE LEFT VENTRICLE.

Dhanjoo N. Ghista and Harold Sandler (NASA, Ames Research Center, Moffett Field, Calif.).

Journal of Biomechanics, vol. 2, Mar. 1969, p. 35-47. 7 refs.

An analytic model of the human left ventricle is presented, which incorporates the three-dimensional shape of the left ventricle and the effects of ventricular wall thickness. The model resembles a thick-walled ellipsoid of revolution, a shape chosen because its volume most closely approximates the volume of postmortem left ventricular chambers when compared with volumes estimated by other regular three-dimensional figures of equivalent dimensions. The shape and size parameters of the model are determined from ventricular dimensions obtained from single plane cineangiocardiography. The model is equilibrated by a uniform internal normal stress, corresponding to the measured pressure in the ventricle cavity, and zero stress on the outer surface. Elastic and quasi-static viscoelastic solutions (for stresses and strains) that provide for shear in the ventricular wall are obtained for uniform isotropic wall material. (Author)

A69-26300

GENESIS AND EVOLUTIONARY DEVELOPMENT OF LIFE.

A. I. Oparin.

(Translation of Vozniknovenie i Nachal'noe Razvitie Zhizni, Moscow, Izdatel'stvo Meditsina, 1966.)
New York and London, Academic Press, 1968. 210 p. 404 refs. $9.50.

The origin and evolution of living matter are considered in the light of the most recent findings and theoretical developments. A historical and philosophical background is established in a short history of attempts to solve the problem of the origin of life. The initial stages in the evolution of carbon compounds are dealt with, and the formation of the "primitive soup" is discussed. The origins of prebiological systems are examined, and the evolution of "protobionts" is discussed in relation to the origin of primitive organisms. The further evolution of the first organisms is examined, and it is shown that the application of evolutionary biochemical investigations of present living organisms can be used to a certain degree to formulate principles of organization of the first living beings. An effort is made to create an objective chronology as a historical background to the theoretical considerations of the origins of life. B.H.

A69-26346 #

CHARACTERISTIC OF THE BLOOD OXYGEN PARAMETERS IN DOGS UNDER CONDITIONS OF A DECREASE IN THE OXYGEN PARTIAL PRESSURE IN THE INHALED AIR [KHARAKTERISTIKA KISNEVIKH PARAMETRIV KROVI U SOBAK V UMOVAKH ZNIZHENNIA PARTSIAL'NOGO TISKU KISNIU U VDIKHUVANOMU POVITRI].

M. M. Seredenko (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Viddil Vikovoi Fiziologii, Kiev, Ukrainian SSR).

Fiziologichnii Zhurnal, vol. 15, Jan.-Feb. 1969, p. 19-28. 29 refs. In Ukrainian.

Study of the changes in the oxygen metabolism of a group of 17 dogs kept for one hour under chloralose anesthesia in an atmosphere containing 14.5, 10.9, or 7.8% oxygen. The oxygen content in the arterial and venous blood and the minute volume of blood circulation of the dogs were found to decrease with decreasing oxygen contents in the air. V.Z.

A69-26347 #

MORPHOLOGICAL CHANGES IN THE GANGLIA OF THE SOLAR PLEXUS UNDER THE ACTION OF TOTAL X-IRRADIATION [MORFOLOGICHNI ZMINI V GANGLIIAKH SONIACHNOGO SPLETENNIA PRI ZASTOSUVANNI ZAGAL'NOGO RENTGENIVS'KOGO OPROMINENNIA].

N. E. Dumbrova (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Laboratoriia Patomorfologii Nervovoi Sistemy, Kiev, Ukrainian SSR).

Fiziologichnii Zhurnal, vol. 15, Jan.-Feb. 1969, p. 76-83. 32 refs. In Ukrainian.

Study of the micro- and submicrochanges in the ganglia of the solar plexus of white rats after a single total X-irradiation with 100, 300, and 800 r. Complex nonuniform changes, depending on the dose and duration of exposures, are established in the mitochondria, nuclear membranes, nucleoplasms and other fine elements of solar plexus ganglia of these rats after X-irradiation. V.Z.

A69-26348 #

EFFECT OF ACUTE HYPOXIA ON BLOOD COAGULATION IN VARIOUS ANIMALS [VPLIV GOSTROI GIPOKSII NA ZSIDANNIA KROVI U TVARIN RIZNIKH VIDIV].

V. V. Bakans'ka (Grodnens'kii Medichnii Institut, Kafedra Patologichnoi Fiziologii, Grodno, Belorussian SSR).

Fiziologichnii Zhurnal, vol. 15, Jan.-Feb. 1969, p. 104-107. 16 refs. In Ukrainian.

Investigation of the effect of 3-hr exposures to a pressure corresponding to an altitude of 5000 m on blood coagulation in white rats, rabbits, and dogs. Statistical analysis of the results indicates increased blood coagulation rates in all experimental animals. The effects of hypoxia on other characteristics of blood morphology in these animals are also noted. V.Z.

A69-26372 *

DISTANCE DISCRIMINATION IN A SIMULATED SPACE ENVIRONMENT.

Robert J. Vincent, Bill R. Brown, Robert P. Markley, and Malcolm D. Arnoult (Texas Christian University, Fort Worth, Tex.).

Perception and Psychophysics, vol. 5, no. 4, 1969, p. 235-238. 8 refs.
Contract No. NAS 2-1481; Grant No. NGR-44-009-018.

The just noticeable difference for distance was investigated by a paired-comparisons method using successive comparisons. The research utilized an optically simulated large target located in a textureless environment at distances along the saggital plane out to 12,800 ft. The value of $\Delta D/D$ varied from less than 3% at 200 ft to about 7% at 12,800 ft. The results confirmed a power function relationship between distance threshold and observation distance. (Author)

A69-26490 #

MODERN PROBLEMS OF AERONAUTICAL HEALTH SERVICES [PROBLEMI MODERNI DEL SERVIZIO SANITARIO AERONAUTICO].

Alessandro Polizzi di Sorrentino (Corpo Sanitario Aeronautico).

Rivista di Medicina Aeronautica e Spaziale, vol. 31, Apr.-June 1968, p. 180-202. In Italian.

Discussion of problems encountered by modern aeronautical health services. Some of the numerous current problems regarding the efficiency of the personnel of military air forces and civil aviations of all countries are examined, including problems which must be solved in the very immediate future. M.M.

A69-26491 #

TELECOMMUNICATION OF PHYSIOLOGICAL DATA IN AEROSPACE FLIGHT - PRINCIPLES, TECHNIQUES, AND RESULTS [LA TELETRASMISSIONE DEI DATI FISIOLOGICI NEL VOLO AEROSPAZIALE - PRINCIPI - TECNICHE - RISULTATI].

A. Judica-Cordiglia.

Rivista di Medicina Aeronautica e Spaziale, vol. 31, Apr.-June 1968, p. 203-240. 123 refs. In Italian.

Discussion of the possibility of telemetering physiological processes taking place in individuals in space. Such telemetry ensures continuous physiopsychological control of the subject both during launching and reentry, and in the orbital phases. It makes possible immediate intervention, manual or automatic, in the case

of personal emergency due to various causes, whether ascribed to the individual or to rapid environmental changes caused by vehicle failures. New research techniques and applications can be carried out. The units of a biotelemetering system are described. Some experiments carried out in aircraft are reported. The biotelemetering instrumentation used in the Mercury and Gemini projects, which monitored respiratory and heart rates, provided EKG and phonocardiograms, and measured body temperature are briefly discussed. Some typical telemetered data are presented in a table. F. R. L.

A69-26492 #
THE CHOICE OF MILITARY PILOTING AS A NEUROTIC COMPENSATORY MOTIVATIONAL FACTOR [LA SCELTA DEL PILOTAGGIO AEREO MILITARE QUALE FATTORE MOTIVAZIONALE A CARATTERE NEVROTICO-COMPENSATORIO].
L. Longo.
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Apr.-June 1968, p. 241-255. 8 refs. In Italian.

Consideration of the social aspects of neuroses and their sociogenic etiopathogenesis, followed by an outline of the factors which may affect the choice of a military flying career as a means of compensating for a poor personality (not sure of oneself, with conflicts, or definitely neurotic). Seven cases are discussed which express some considerations on the concept of "compensation" and its relation to the choice of military flying. It is concluded that it is important to determine, during the selection process, the most significant aspects of the personality of the subject, the most suitable method for this being a personal interview. F. R. L.

A69-26493 #
THERMOREGULATION PROBLEMS OF SPACE MISSIONS [PROBLEMI DI TERMOREGOLAZIONE NELLE MISSIONI SPAZIALI].
P. Rota (Corpo Sanitario Aeronautico).
(Convegno Internazionale Tecnico-Scientifico sullo Spazio, 8th, Rome, Italy, Apr. 1968.)
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Apr.-June 1968, p. 256-290. 61 refs. In Italian.

Survey of the principal medical heat problems arising during space missions now in progress or soon to be undertaken. The thermal characteristics of space missions are discussed, as well as heat control and methods of studying environmental heat conditions. The problems of conditioning and of heat protection for the space vehicle and the astronaut are analyzed. Studies carried out on resistance to heat and adaptation to high temperatures are reviewed. Attention is given to aeromedical techniques used to study thermal effects. F. R. L.

A69-26494 #
PRELIMINARY RESULTS OF SPACE BIOLOGICAL EXPERIMENTS [PRIMI RISULTATI DEGLI ESPERIMENTI BIOLOGICI SPAZIALI].
A. Scano (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
(Convegno Internazionale Tecnico-Scientifico sullo Spazio, 8th, Rome, Italy, Apr. 1968.)
Rivista di Medicina Aeronautica e Spaziale, vol. 31, Apr.-June 1968, p. 291-309. 49 refs. In Italian.

Discussion of biological tests performed on lower animals and vegetables in order to seek answers to questions posed by the behavior and phenomena observed in higher organisms, particularly from the standpoint of future prolonged manned space flights. Experiments in the field of biological satellites conducted by NASA are briefly reviewed. M. M.

A69-26547 *
STRUCTURAL ELEMENTS IN THE CONCEPT OF MOTION SICKNESS.
Ashton Graybiel (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 351-367. 50 refs. NASA-sponsored research.

Study of motion sickness by using a slow rotation room in a laboratory environment with control of not only the stressful Coriolis accelerations but also of other important procedural and environmental variables. It is shown that manifestations of disturbances in the vestibular system fall into two distinct categories. In the first category are reflex phenomena evoked by Coriolis accelerations when the head is rotated out of the plane of the room's rotation, and revealed through systems which, under natural stimulus conditions, have functional articulations with vestibular receiving areas. These phenomena include the Coriolis oculogyral illusion, nystagmus, dizziness, and neuromuscular incoordination. The symptomatology in the second category comprises an epiphenomenon superimposed on any manifestation of the first category. It is shown that the experimenter, by manipulating mainly vestibular homeostatic mechanisms, can prevent the appearance of manifestations in the second category, control their severity when evoked, and lose control only when these symptoms are relatively severe. P. v. T.

A69-26548
COMPARISON OF SPEECH MATERIALS RECORDED IN ROOM AIR AT GROUND LEVEL AND IN A HELIUM-OXYGEN MIXTURE AT A SIMULATED ALTITUDE OF 18,000 FEET.
S. Joseph Barry and James E. Endicott (USAF, Systems Command, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 368-371. 7 refs.

Articulation functions associated with two 50-item lists of phonetically balanced speech materials of demonstrated equivalence were compared for a single male talker under two different atmospheric conditions. One set of materials was recorded in an atmosphere of ordinary room-air composition at ground level, and the other in a helium-rich atmosphere maintained at a simulated altitude of 18,000 ft. The articulation functions associated with both sets of materials resembled each other closely in slope and configuration; however, the helium speech function was somewhat displaced along the abscissa, representing an increase in sensation level. This finding indicated that in order to achieve intelligibility equal to that for room-air speech at presentation levels below those productive of near-maximum intelligibility, the helium speech materials required about a 6 dB increase in intensity. (Author)

A69-26549
EXPERIMENTAL STUDY OF A PASSIVE THERMAL CONTROL SYSTEM FOR SPACE SUITS.
Ferdinand Votta, Jr. (Rhode Island, University, Kingston, R.I.) and Leo A. Spano (U.S. Army, Material Command, Natick Laboratories, Natick, Mass.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 372-378.

A passive thermal control system for spacesuit use in an extravehicular environment has been tested experimentally. The controlled vaporization of water from a wet wick provided the cooling. The wick was separated from a simulated skin temperature by a narrow air gap and an impermeable membrane. Cooling rates as high as 182 Btu/(hr x ft^2) were obtained with a simulated skin temperature of 91°F without depending on the sweating mechanism. Excellent control of the simulated skin temperature at widely varying heat flow rates was possible. Temperature control was obtained by controlling the wick vaporization pressure. (Author)

A69-26550 #
PHYSIOLOGIC EVALUATION OF SEA SURVIVAL EQUIPMENT.
J. C. Pittman, W. C. Kaufman, and C. E. Harris (USAF, Systems Command, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 4, Apr. 1969, p. 378-381. 6 refs.

Comparison of a developmental insulated one-man life raft to a standard life raft to determine whether the former provides increased thermal protection in Arctic and subarctic conditions. Four healthy men, with body build varying from tall-thin to short-heavy served as test subjects. They were wetted with sea water and then entered both rafts which floated on 4°C sea water in a test chamber. Different air environments and temperatures were provided. Average endurance times in the new raft were from 26 to 79% longer than exposures in the old raft. The rate of rectal temperature decrease was in every case more rapid in thin subjects. For short-heavy individuals, the new raft made little difference, for tall-thin subjects, however, it could prove to be life saving. P. v. T.

A69-26551
EFFECT OF GRAVITY ON VESTIBULAR NYSTAGMUS.
W. J. Oosterveld and W. D. van der Laarse (Amsterdam, University, Amsterdam, Netherlands).
Aerospace Medicine, vol. 4, Apr. 1969, p. 382-385. 11 refs.

The effect of weightlessness as well as of higher g values on caloric and rotational nystagmus were investigated. Weightlessness suppressed the caloric nystagmus completely, but no effect was seen on the rotational nystagmus. Higher g values were able to arouse the caloric nystagmus in a period of 16 to 20 min following the start of the calorization. Higher g values diminished the rotational nystagmus for a period of 12 sec. (Author)

A69-26552 #
ANTICIPATORY STRESS AND FLIGHT STRESS IN F-102 PILOTS.
George T. Demos, Henry B. Hale, and Edgar W. Williams (USAF, 57th Dispensary, Paine Field, Wash.; USAF, Systems Command, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 385-388. 12 refs.

Pilots of F-102 aircraft were studied during a period of preparation for an unaccustomed flying mission as well as during the actual mission, using a battery of urinary determinations (norepinephrine, epinephrine, 17-hydroxycorticosteroids, urea, phosphorus, magnesium, potassium, sodium, and creatinine). There were four different test circumstances: (1) pretraining briefings dealing with overwater flying and in-flight refueling, (2) the first refueling training flight, (3) the first leg of the actual mission (California to Hawaii), and (4) the second leg of the mission (Hawaii to Guam). In each circumstance there was evidence of endocrine-metabolic hyperactivity, which suggests nonspecific stress, but only during the training flight was there an increase in 17-OHCS excretion and hypophosphaturia (the latter condition suggesting hyperventilation, a known specific response to flight). Flight effects during the second leg of the transoceanic flight were less numerous than during the first leg, which suggests that a adaptive change occurred. (Author)

A69-26553 *
EEG SENSING AND TRANSMITTING SYSTEM CONTAINED IN A FLIGHT HELMET.
Richard M. Westbrook and Joseph J. Zuccaro (NASA, Ames Research Center, Moffett Field, Calif.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 392-396.

Taking EEG data from human subjects participating in aircraft or flight simulator programs is often impractical because the technique of applying the electrodes in slow and tedious and often abrasive to the subject's scalp. An EEG monitor helmet has been developed in which the electrodes can be applied quickly and easily because they require no special preparation of the subject's scalp. A pilot's flight helmet is used to hold the prepositioned electrodes. Electrical contact is made between scalp and electrodes by means of a paste electrolyte. All of the electronics, including the rf transmitter, are an integral part of the helmet's shell. This system has been tested in the laboratory and in flight. It provides excellent EEG data. (Author)

A69-26555
INFORMATION LOAD AND THREE-MAN FLIGHT CREWS - AN EXAMINATION OF THE TRADITIONAL ORGANIZATION IN RELATION TO CURRENT AND DEVELOPING AIRLINERS.
Gerald D. Scucchi (Texas Christian University, Institute of Behavorial Research, Fort Worth, Tex.; American Airlines, Inc., New York, N.Y.) and S. B. Sells (Texas Christian University, Institute of Behavorial Research, Fort Worth, Tex.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 402-406. 7 refs.

The traditional division of work among the airline pilot, the first officer, and the flight engineer originated in the piston engine era. It is still in use today, an anachronism in today's vastly different flight systems, and a growing threat to safety. Its rigid structure imposes duties and schedules which no longer fit the timing or the events of a modern flight operation. Consequently, technical advances which could decrease crew work load actually increase it. Today, a flight system with intrinsically less demands than formerly is caused to place requirements on the flight crew which exceed their capacity to respond appropriately - and to do so routinely. Evidence is cited which indicates the duty "tradition" of the flight crew as a cause of pilot error. It is a coupling between men and machines which becomes less appropriate as more technical progress is made. In this analysis, the need for updating the structure and duties of the flight crew becomes clear and urgent. Beyond this point, it is equally clear that the flight crew, and what they do, must be subordinate to the total flight system, altered as needed, to remain compatible. (Author)

A69-26556
PERCEPTUAL STYLE DIFFERENCES BETWEEN AIRLINE PILOTS AND ENGINEERS.
John F. Cullen, C. R. Harper (United Air Lines, Inc., Denver, Colo.), and G. J. Kidera (United Air Lines, Inc., Chicago, Ill.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 407, 408. 6 refs.

Results of a test of 149 pilots with the Witkin Rod and Frame Test (RFT) for their ability to position a rod in a vertical position when it is surrounded by conflicting cues in the visual field. Success on the RFT requires the ability to separate or disembed the primary stimulus (rod) from the visual field (frame), and the manner in which this task is approached has been referred to as perceptual style. It has been demonstrated that perceptual style is correlated with cognitive style as well as with certain personality characteristics. It was found that the pilots possessed a great deal of skill in disregarding the visual field. The mean error score of the pilots on three series of the RFT was significantly smaller than the mean error score of a group of aerospace engineers. Possible reasons for the extreme field independence of the pilots are discussed. It was concluded that, since the personality correlates of extreme field independence are not consistent with the current conception of the ideal flight instructor, good instructor pilots would be found to be less field independent than the typical pilot. This hypothesis is now being tested. In the future, the RFT may prove useful in identifying instructor pilots with the best personal characteristics for the job. (Author)

A69-26557 *
RAT BODY COMPOSITION - SENSOR IMPLANTATION AND LIGHTING EFFECTS.
Grover C. Pitts, T. Robert Bullard, John W. Tremor, Paul D. Sebesta, Franz Halberg, and Walter Nelson (Virginia, University, School of Medicine, Charlottesville, Va.; NASA, Ames Research Center, Moffett Field, Calif.; Minnesota, University, Medical School, Minneapolis, Minn.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 417-420. 14 refs.
Contracts No. NAS 2-1554; No. NAS 2-2738.

The effects of transensor-implantation, sham-implantation, or no implantation and three lighting regimens (continuous light, or darkness, or 12 hr of each per day) on body composition of 54 adult female Sprague-Dawley rats were evaluated by analysis of variance with a factorial design. Body composition involved chemical fractionation into lipid, water, protein-nitrogen, and ash of eviscerated carcass and viscera treated separately. Statistically significant results included: (1) percent fat in eviscerated carcass reduced in presence of transensor, (2) percent fat in viscera reduced after sham operation, (3) percent water in fat-free viscera increased in presence of the transensor (probably edema evoked by transensor as an irritant), and (4) percent fat in eviscerated carcass increased with daily dark-fraction, probably reflecting effect of lighting regimen on feeding activity. (Author)

A69-26558 *
POWER SPECTRUM OF THE IMPEDANCE PNEUMOGRAPH - A DATA REDUCTION SYSTEM PRODUCING AN ANALYTICAL PARAMETER OF POTENTIAL CLINICAL USEFULNESS.
C. C. Lushbaugh, E. L. Frome, D. S. Bibler (Oak Ridge Associated Universities, Inc., Oak Ridge, Tenn.), and H. T. Davis (Oak Ridge Associated Universities, Inc., Oak Ridge, Tenn.; Johns Hopkins University, Dept. of Statistics, Baltimore, Md.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 425-429. 11 refs.
AEC-NASA-sponsored research.

As yet no data-reduction system is available to facilitate medical interpretation of changes in the pulmonary impedance pneumograph as used clinically in remote monitoring. A preliminary study has been made of the feasibility of using power spectral analysis for this purpose. It shows that changes in the pulmonary impedance pneumograph that occur in man during exercise, pain, and gastrointestinal distress can be summarized statistically by this method and depicted graphically. Alterations in the pulmonary-impedance power spectra seem to reflect changes in respiratory frequency and its variance.

Further clinical physiologic observations are being made to search for any additional medical information that can be derived from this system. (Author)

A69-26559
UNCOMMON CAUSE FOR GROUNDING A PILOT.
P. B. Gaskill and G. J. Kidera (United Air Lines, Inc., Medical Dept., Chicago, Ill.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 429.

Discussion of a case of a pilot who eventually developed a renal infarction and was subsequently taken off flight status. It is believed that, in the preventive medicine practiced in handling airline pilots, significance must be put on all manifestations of disease that could lead to sudden incapacitation in flight, in order to avoid a high percentage of accidents attributable to disabilities and deaths from natural causes. P. v. T.

A69-26560
URINARY 17-KETOSTEROIDS AND 17-HYDROXYCORTICOSTEROIDS FOR CIVILIAN AIRCREWS IN A TROPICAL COUNTRY.
J. L. Watrin (Société Anonyme Belge d'Exploitation de la Navigation Aérienne, Kinshasa, Democratic Republic of Congo).
Aerospace Medicine, vol. 4, Apr. 1969, p. 430-432. 25 refs.

European men who were accustomed to the climate of equatorial Africa (Congo) and who had flying as their occupation were studied during regular flying missions in either DC-4 or DC-6 aircraft. Mission times approximated 33 hr, and flight times in the different aircraft averaged, respectively, 7 hr, 20 min and 9 hr, 40 min. The flying periods represented times of escape from the hot-humid climate. Adrenocortical appraisal was made by means of urinary 17-ketosteroid and 17-hydroxycorticosteroid determinations. The depressed 17-ketosteroid and 17-hydroxycorticosteroid excretion that is characteristic of chronically heat-exposed persons was not evident. Heat effects either are readily reversible or flight-induced changes tend to obscure heat effects on these urinary steroids. (Author)

A69-26561
BETHANECHOL CHLORIDE IN THE TREATMENT OF MOTION SICKNESS - NEGATIVE RESULTS.
Asa L. Godbey, Jr. (Florida Teaching Hospital, University, Dept. of Psychiatry, Gainesville, Fla.).
Aerospace Medicine, vol. 4, Apr. 1969, p. 432, 433.

Review of Stebbins' (1966) experience in the treatment of motion sickness with bethanechol chloride and evaluation of the preparation under more controlled circumstances. Twelve selected airsick student naval aviators were treated in a double-blind fashion with bethanechol chloride after a routine interview. The results of this experience failed to substantiate Stebbins' findings. What was previously felt to be successful treatment of fear-induced intestinal hypomotility with bethanechol chloride may have been the result of successful supportive psychotherapy. (Author)

A69-26562 #
PARTICIPATION OF THE VENTRAL POSTEROLATERAL THALAMUS NUCLEUS OF CATS IN THE TRANSMISSION OF AFFERENT VISCERAL SIGNALS [UCHASTIE VENTRAL'NOGO ZADNE-LATERAL'NOGO IADRA TALAMUSA KOSHKI V PEREDACHE AFFERENTNYKH VISTSERAL'NYKH SIGNALOV].
V. N. Chernigovskii and S. S. Musiashchikova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR).
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Jan.-Feb. 1969, p. 5-19. 54 refs. In Russian.

Study of initiated VPL potentials in cats anesthetized with chloralose and immobilized with flaxedile in response to electric stimulation of mesenteric nerves and the mechanoreceptors of the stomach and the large intestine. With respect to shape, time parameters, and rhythmic stimulus and localization within the thalamus nucleus relay, the initiated potentials appear as primary responses. Simultaneous recording of responses to the stimulation of mesenteric nerves in the somatosensory brain cortex and in VPL shows the synchronism and monotypicity of primary responses. The difference in the latency of responses originating in the foci of maximum activity within the thalamus and brain cortex amounted to 1 msec. P. v. T.

A69-26563 #
CHANGES IN THE INDICES OF EXTERNAL RESPIRATION, GAS EXCHANGE, AND ENERGY EXPENDITURE IN HUMANS UNDER CONDITIONS OF WEIGHTLESSNESS [IZMENENIIA POKAZATELEI VNESHNEGO DYKHANIIA, GAZOOBMENA I ENERGOTRAT CHELOVEKA V USLOVIIAKH NEVESOMOSTI].
I. I. Kas'ian, G. F. Makarov, I. P. Neumyvakin, R. I. Utiamyshev, and B. V. Blinov.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Jan.-Feb. 1969, p. 20-30. 22 refs. In Russian.

Studies of gas exchange in the human body under conditions of temporary weightlessness in aircraft, during the space flight of Voskhod 2, and under conditions of relative hypodynamia, when the tested subjects experienced a dosed physical stress and in cases when no stress was exerted. Indices of external respiration were investigated with the aid of a gas counter and small spiral anemometers; the gas analysis was made with the Haldane apparatus. These studies show that the intensity of gas exchange and the level of gas expenditure under conditions of temporary weightlessness greatly exceed the indices obtained during horizontal flight. Under conditions of hypodynamia, the tested subjects displayed a reduced level of metabolic processes amounting to 30 to 40%, whereas performance under a dosed physical stress showed a reduction of only 5 to 10%. The performance of different work tasks in unsupported space seems to require a much greater energy expenditure than on earth. P. v. T.

A69-26564 #
VESTIBULAR REACTIONS DURING ROTATION OF HUMANS IN DIFFERENT PLANES [VESTIBULIARNYE REAKTSII PRI VRASHCHENII CHELOVEKA V RAZLICHNYKH PLOSKOSTIAKH].
S. S. Markarian.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Jan.-Feb. 1969, p. 31-38. 6 refs. In Russian.

Examination of human subjects rotating at rates ranging from 0.25 to 2 rotations per second in different positions and inclinations toward the axis of rotation. The angular acceleration amounted to 60° per sec^2. A total of 32 subjects were examined, four of which were lacking the vestibular analysor function. The data obtained revealed that the increase in the timing effect of angular acceleration resulted in an increase in the duration of the counterrotation illusion and of the nystagmic reaction. These features had a negative effect on the rapidity and accuracy of reading indices revealed by instruments and symbols depicted by Kholina's table. Similar disorders were not observed in subjects lacking the vestibular analysor function. With a gradual increase in the angle of inclination of the subject's body from the axis of rotation, provided that the affecting parameters remained unchanged, the nystagmic reaction revealed a decrease in its intensity. P. v. T.

A69-26565 #
STUDY OF THE CORIOLIS COUPLE IN THE HORIZONTAL SEMICIRCULAR CANALS DURING ROTATION OF HUMANS WITH SIMULTANEOUS ROTATORY MOTION OF THE HEAD [O PARAKH SIL KORIOLISA V GORIZONTAL'NYKH POLUKRUZHNYKH KANALAKH PRI VRASHCHENII CHELOVEKA S ODNOVREMENNYM VRASHCHATEL'NYM DVIZHENIEM GOLOVY].
F. A. Solodovnik and L. M. Vorob'ev.
Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia, Jan.-Feb. 1969, p. 39-49. 10 refs. In Russian.

Investigation of variations in the direction of the nystagmic reaction during rotation of a human subject with simultaneous rotatory motion of the subject's head in the sagittal plane. The subject examined straightened his head (which was inclined) in a forward direction, until it reached 90°. This continued up to a point where the head was thrust back by 60° and ceased to move at a position where the head's inclination in a forward direction amounted to 30°. Three series of experimental studies were carried out. The tested subject varied his head movements in relation to the positioning of the rotation axis. It was established that the subject's rotation involved, together with simultaneous rotation of his head in the sagittal plane, a change in the direction of the endolymph movement in the horizontal semicircular canals and, hence, the direction of the nystagmic reaction develops after the plane of the semicircular canals positions itself perpendicularly to the rotation axis. P. v. T.

A69-26973 #
CHANGES IN THE CORTICOSTEROID AND CATECHOLAMINE METABOLISM DURING A SHARP LIMITATION OF THE MOTOR ACTIVITY OF THE ORGANISM [IZMENENIIA KORTIKOSTEROIDNOGO I KATEKHOLAMINOVOGO OBMENA PRI REZKOM OGRANICHENII DVIGATEL'NOI AKTIVNOSTI ORGANIZMA].
V. V. Parin, B. M. Fedorov, and V. S. Nevstrueva (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR).
Akademiia Nauk SSSR, Doklady, vol. 184, Jan. 1, 1969, p. 250, 251. 6 refs. In Russian.

Study of the corticosteroid and catecholamine metabolism in a group of 16 male rabbits kept for 12 or 30 days in special cages strongly restraining motor activity. Marked disorders of these metabolisms are established in the rabbits. V. Z.

A69-27074
LIFE-SUPPORT SYSTEMS FOR HIGH-ALTITUDE AND SPACE FLIGHTS [SISTEMY ZHIZNEOBESPECHENIIA CHELOVEKA PRI VYSOTNYKH I KOSMICHESKIKH POLETAKH].
D. I. Ivanov and A. I. Khromushkin.
Moscow, Izdatel'stvo Mashinostroenie, 1968. 252 p. 56 refs. In Russian.

The influence of the physical characteristics of the earth's atmosphere and outer space on human physiology is discussed, with particular reference to such factors as the gas composition, barometric pressure, high and low temperatures, humidity excess, the cosmic radiation level, and weightlessness. Methods of establishing hygienic and physiological standards for space cabins and spacesuits are proposed, and modern oxygen supply systems for emergency bailout systems and spacesuits are described. The principal spacesuit designs, including lunar landing models, are discussed and illustrated. The life-support systems designed in the USSR and the U.S. for use in various space missions, including future orbital stations, are described. The problem of recovering aircraft and space crews in emergency situations at various altitudes is examined, together with some technological solutions to this problem. The book should be of interest to specialists and students concerned with the design of life-support systems. The text is clarified and supplemented by 40 tables and 113 photographs and sketches. V. P.

A69-27079
THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS].
Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969. 487 p. In French and English.
$19.20.

CONTENTS:

A69-27081
STUDY OF THE HUMAN OPERATOR AS AN ELEMENT OF A SERVO SYSTEM [ETUDE DE L'OPERATEUR HUMAIN EN TANT QU'ELEMENT D'UN SYSTEME ASSERVI].
J. C. Raoult (Compagnie des Compteurs, S.A., Montrouge, Ville-de-Paris, France).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, *PROCEEDINGS* [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05]
Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 347-361; Discussion, Naslin (Ecole Nationale Supérieure de l'Armement, Arcueil, Val-de-Marne, France), W. G. Matheney (Life Sciences, Inc., Fort Worth, Tex.), Jamati (Institut Blaise Pascal, Paris, France), and J. A. Michon (Institute for Perception RVO-TNO, Soesterberg, Netherlands), p. 373-375. In French, with discussion in English and French.

Classification of human operator models into two groups: those which result from syntheses made starting on the cellular scale, and those which are obtained by considering the man as composed of a certain number of subassemblies assimilable into given material systems. The research is slanted toward models of the second group, of which two examples are presented: study of the human operator in a tracking task, and study of the operator in an equilibrium task. The initial hypotheses of the studies (review of the cybernetic chains concerned, nature of the information from the detectors, etc.) are presented, together with the first results concerning the behavior in an open loop. Special attention is given to conclusions reached from a brief analysis of electromyograms. F. R. L.

A69-27082
A MODEL FOR PREDICTING MAN'S CONTROL BEHAVIOR IN A MAN-MACHINE SYSTEM.
W. G. Matheny (Life Sciences, Inc., Fort Worth, Tex.).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05]
Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 363-372; Discussion, Naslin (Ecole Nationale Supérieure de l'Armement, Arcueil, Val-de-Marne, France), J. C. Raoult (Compagnie des Compteurs, S.A., Montrouge, Ville-de-Paris, France), Jamati (Institut Blaise Pascal, Paris, France), and J. A. Michon (Institute for Perception RVO-TNO, Soesterberg, Netherlands), p. 373-375. Discussion in English and French.

Description of a man-machine model developed to respond to the requirements of quantitative definitions of the system parameters. An analysis of helicopter pilot tasks was made as a basis for making recommendations concerning ground-based training simulators. The model was generated on the basis of this analysis, published data from laboratory tracking experiments, handling-qualities data from both fixed and rotary wing aircraft, and judgments by experienced helicopter pilots of the relative difficulty of the several dimensions of helicopter control. The model addresses itself to that aspect of the man/machine control task in which the operator is engaged in closed-loop tracking. It is concerned with compensatory closed-loop tracking since this is a primary aspect of control in many man/machine systems. The importance of the operator's perceptual threshold as a parameter in the model is emphasized. F. R. L.

A69-27083
NECESSITY FOR AN EXHAUSTIVE CRITERIOLOGY IN THE SIMULATION OF COMPLEX PILOTING [NECESSITE D'UNE CRITERIOLOGIE EXHAUSTIVE DANS LA SIMULATION DES PILOTAGES COMPLEXES].
E. J. Caille, G. Bock, A. Bernardini, A. Titli, and A. Bertails (Centre d'Etudes et de Recherches de Psychologie Appliquée, Toulon, Var, France).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05] Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 377-386; Discussion, A. I. Siegel (Applied Psychological Services, Wayne, Pa.), J. A. Michon (Institute for Perception RVO-TNO, Soesterberg, Netherlands), James Jenkins (U.S. Navy, Ship Systems Command, Washington, D.C.), and Robert Glaser (Pittsburgh, University, Pittsburgh, Pa.), p. 399-401. 6 refs. In French, with discussion in English and French.

Study of the optimization of the man/machine synergy emphasizing the importance of a precise definition of the transfer chracteristics of the human operator. Only a realistic simulation bearing on models of variable complexity (using higher-order derivatives) makes it possible to separate the optimal parameters, which add to the flexibility and adaptability of the man, the precision, and the speed of computers. These models are tested from the point of view of their operational effectiveness and the fatigue developed in the pilot. The study uses appropriate visual data to facilitate learning and to limit the fatigue of the operator. F.R.L.

A69-27084
A MODEL OF SOME TEMPORAL RELATIONS IN HUMAN BEHAVIOR.
John A. Michon (Institute for Perception RVO-TNO, Soesterberg, Netherlands).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05] Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 387-397; Discussion, A. I. Siegel (Applied Psychological Services, Wayne, Pa.), E. J. Caille (Centre d'Etudes et de Recherches de Psychologie Appliquée, Toulon, Var, France), James Jenkins (U.S. Navy, Ships Systems Command, Washington, D.C.), and Robert Glaser (Pittsburgh, University, Pittsburgh, Pa.), p. 399-401. 7 refs. Discussion in English and French.

Description of a model for the temporal structure of human behavior which was obtained by analysis of the treatment of temporal information in a task which can be considered as an example of subjective synchronization. A motor task (tapping a key) was synchronized with hearing a sequence of sounds separated by unequal intervals. The subject's task consisted of extrapolating the sequence as well as possible in order to minimize his synchronization error or gap between the sound and the motor response. The internal representation tends to deteriorate - i.e., the inexactness bearing on the correct interval increases with the duration of the experiment. The synchronization error is not immediately compensated; under certain circumstances the subjects integrate only with the most recent interval when the intervals vary greatly. A weighted synchronization error form is retained in order to avoid the endless addition of errors and the "explosion" of the system. On the basis of several experiments, it may be considered that the parameters of the temporal system are not affected by external information, with the exception of momentary response fluctuations. F.R.L.

A69-27085
MATHEMATICAL MODELS OF HUMAN PERFORMANCE IN MAN-MACHINE SYSTEMS.
Donald A. Topmiller (USAF, Aerospace Medical Research Laboratories, Behavioral Sciences Laboratory, Human Engineering Div., Wright-Patterson AFB, Ohio).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05] Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 403-417; Discussion, p. 429-433. 5 refs. Discussion in English and French.

Description of three research programs which are somewhat similar in ultimate purpose, but different in conceptual approach to the problem of representing factors parameters in overall systems performance assessment. The first approach attempts to examine the degree to which human performance parameters have been incorporated into operations research (OR) system analyses so that better estimates of total systems performance can be made, and also to identify the problem of mathematically representing human factors parameters in these OR analyses. The second approach attempts to relate man's contribution to one of the subordinate measures of systems effectiveness - i.e., maintainability. The third approach attempts to use real-time computer simulation to assess the relative contribution of manual vs computer-processed probabilistic information to the overall quality of decisions in command and control type systems. F.R.L.

A69-27086 #
SIMULATION OF CORRECTIVE MAINTENANCE BEHAVIOR.
J. W. Rigney (Southern California, University, Electronics Personnel Research Group, Los Angeles, Calif.).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05] Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 419-428; Discussion, p. 429-433. Discussion in English and French.
Contract No. Nonr-228(22).

Description of simulation studies which develop and confirm some models of cognitive behavior and psychomotor behavior required for maintenance tasks. In the first study, the model described is based on the concepts of information theory and produces optimal detection sequences of malfunctions, commencing with sampled information and assuming a matrix of "symptons-malfunction" relationships upon which to work. In a second study, a method of evaluating costs during psychomotor performances of tasks in series is developed, using the time measure as the basis of a computer program called ARMAN (Artificial Methods Analyst). F.R.L.

A69-27087
PREDICTION OF INDIVIDUAL AND CREW PERFORMANCE BY COMPUTER SIMULATION.
Arthur I. Siegel (Applied Psychological Services, Wayne, Pa.).
IN: THE SIMULATION OF HUMAN BEHAVIOR; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS [LA SIMULATION DU COMPORTEMENT HUMAIN; NATO, SYMPOSIUM, PARIS, FRANCE, JULY 17-21, 1967, PROCEEDINGS]. [A69-27079 12-05] Paris, Dunod Editeur (Sciences du Comportement. Volume 7), 1969, p. 435-443; Discussion, D. A. Topmiller (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), R. J. Beishon (Bristol, University, Bristol, England), and James Jenkins (U.S. Navy, Ship Systems Command, Washington, D.C.), p. 445, 446.

Description of two computer simulation models which make possible the simulation of the man-machine environment before the system has been constructed and allow prediction of man-machine effectiveness in the simulated environment. The first model simulates systems comprising one or two operators, while the second simulates systems consisting of up to 999 operators divided into 99 separate stations. In the first case, the simulation makes possible the calculation and the recording of different items such as the response time of the operator, omissions, stress, and dead time for each subtask which the operator should accomplish. The simulation in the case of multiple operators considers (1) the calculation of time of execution, (2) the effectiveness of the group as a function of modalities of communications, (3) the competence according to specialty of members of the group, (4) the environment, (5) the psychosocial interaction, and (6) the adequacy of the determination of the simulated performance. F.R.L.

LC ENTRIES

A69-80952
SOME TEMPORAL AND GEOGRAPHIC RELATIONS OF SNAIL RESPONSE TO VERY WEAK GAMMA RADIATION.
Frank A. Brown, Jr. and H. M. Webb (Northwestern U., Evanston, Ill. and Goucher Coll., Towson, Md.).
Physiological Zoölogy, vol. 41, Oct. 1968, p. 385–400. 11 refs.
Contract ONR 1228-30, Grants NSF GB-469 and NIH GM-07405.

The turning tendency of mud snails, *Nassarius obsoletus*, in an unvarying symmetrical field of illumination and with initial path in each of the four geographic directions was assayed mornings and afternoons through the summers of 1963, 1964, and 1965. On each occasion and for each direction, the influence of a Cs^{137} γ source presented at right angles to right and to left of the initial snail path was determined. The strength of these horizontal γ fields at the site of the snails was six times the ambient background. The average turning tendency of the control snails for the four directions varied greatly and unpredictably from one day to the next and from morning to afternoon of the same day, but two independent population samples concurrently observed in different apparatus and laboratory sites were correlated, with high statistical significance. The turning tendency of the controls displayed a synodic monthly component, with the mean patterns for the combined morning and afternoon values for the four directions generally similar to one another but with a slight variation with geographic direction. However, the monthly pattern of turning for the combined four directions for mornings was the mirror image, to an important degree, of the comparable afternoon one. With the weak γ source, the snails tended to turn toward the source when they were north and west directed and away from it when south and east directed. The tendency to orient with respect to source direction possessed a monthly variation which altered in form with geographic orientation. The averaged monthly variation in γ directional response for north- and west-directed snails paralleled in a striking manner the comparable variation for south- and east-directed snails when the latter variation was displaced to a 90° earlier phase of moon. A comparable 90° shift of the averaged north and east monthly variation, relative to the south and west one, also yielded remarkably similar but now mirror-imaged patterns. Comparison of the morning and afternoon directional responses to the γ disclosed a highly significant negative correlation between the two. Fluctuations in responses of the snails to the experimental γ sources were correlated with the concurrent paths of the control snails. These correlations differed between morning and afternoon with high statistical significance, changing sign between these two times of day. Evidence suggested that not only do normally uncontrolled geophysical fluctuations influence the sign and strength of directional responses relative to the gamma sources, but also influence differentially the directional responses to oppositely oriented γ fields. The nature of the several relationships between turning of control snails and the concurrent γ responses suggested that the γ response involves the same integrative system normally concerned with a steadily continuing response of the snails to their fluctuating ambient geophysical environment. The results are discussed and interpreted as providing additional evidence for an intricate, geophysically dependent, time-space organization of these terrestrial organisms, or, in other words, an integrated biological clock and compass complex. Possible bases and significances of this organization are suggested.

A69-80953
ELECTROENCEPHALOGRAPHIC RECOVERY OF CEREBRUM AFTER HYPOXIA IN DEVELOPING CHICKS.
Joseph J. Peters, John J. McDonough, and Alphonse R. Vonderahe (Xavier U., Dept. of Biol., Cincinnati and Cincinnati, U., Coll. of Med., Dept. of Anat., Ohio).
Physiological Zoölogy, vol. 41, Oct. 1968, p. 481–490. 33 refs.
Grant NINDB B-201.

One hundred and twenty New Hampshire Red chicks 1 to 21 days old were used to investigate the assumption that the recovery of a progressively maturing organism from severe hypoxia would reveal a graded resistance of some physiological components in the cerebral lobes when examined with electroencephalographic (EEG) techniques. The data yielded two generalizations: (1) the younger chicks showed a greater resistance to hypoxia than older chicks; and (2) following the hypoxic reduction of the cerebral EEG to zero potential, the recovery of the apparently normal EEG patterns took place in a series of approximately six steps. Both newly hatched chicks and those that were 20 days old passed through the same series of EEG patterns during recovery, indicating that the neurological apparatus affected by hypoxia is similar in the two age groups. Chicks recovering from hypoxia seemed to manifest no behavioral defects in walking, balancing, eating, and even some instances learning during the two-wk. period following the experiments.

A69-80954
EFFECTS OF ENVIRONMENTAL TEMPERATURE–HUMIDITY AND CAGE DENSITY ON BODY WEIGHT AND BEHAVIOR IN MICE.
A. Anderson, J. Werboff, and E. P. Les (Maine, U., Dept. of Psychol., Portland; Conn., U., Health Center, Hartford; and Jackson Lab., Bar Harbor, Maine).
Experientia, vol. 24, Nov. 15, 1968, p. 1022–1023. 13 refs.
Grants PHS HD-01019, PHS CA-5013, and PHS FR-05545.

The effects of rearing mice under different conditions of environmental temperature–humidity and cage density on body weight and a test of swimming survival were investigated. Analysis of variance of the data showed a significant environmental temperature–humidity effect ($p<0.01$) and a significant environmental temperature–humidity x cage density interaction ($p<0.01$). Analysis of variance of swimming survival times showed a significant water temperature effect ($p<0.01$) and a significant environmental temperature–humidity x cage density interaction ($p<0.05$). It was evident that environmental temperature–humidity and cage density were important factors in the rearing experiences of the animals; however, their effects on a variety of biological and behavioral measures of adaptation are not simply cumulative but interact differentially as a function of the particular physiological and behavioral requirements of the task.

A69-80955
MEASUREMENT OF BLOOD FLOW BY HEATED THERMOCOUPLE WITH FEEDBACK CONTROLLED CURRENT.
K. Tsunekawa, K. Mohri, M. Ikeda, N. Ohgushi, T. Soma, and T. Sawai (Kyoto U., Dept. of Surg. and Dept. of Elec. Eng., Japan).
Experientia, vol. 24, Nov. 15, 1968, p. 1077–1078. 8 refs

The measurement of blood flow by heated thermocouple with feedback controlled current was described. The feedback control system is employed for automatic regulation of the temperature difference between the hot and cold junctions kept constant by adjusting the heating current depending on the change of flow rate. The structure of the electrode and a block diagram of the feedback control system were given. Equations were included which indicated the relationship between flow rate and the heating current.

A69-80956
CAUSES OF DERMATITIS AMONG THE AVIATION TECHNICIANS [PRZYCZYNY WARUNKUJACE POWSTAWANIE DERMATOZ ZAPALNYCH WSROD PERSONELU TECHNICZNEGO W LOTNICTWIE].
Antoni Zgrzybowski and Eliguisz Waś.
Lekarz Wojskowy, vol. 44, no. 6, 1968, p. 441–446. In Polish.

An investigation was carried out to determine the causes of different inflammatory dermatoses among the members of the aviation ground crews. The findings showed that they were mainly due to the combined action of aviation fuels, cold weather, insulation, injuries, and cleaning chemicals.

A69-80957
EFFECT OF Gz ACCELERATION ON THE RADIOGRAPHY OF THE THORACIC CAGE ORGANS [WPLYW PRZYSPIESZEN W OSI +Gz NA OBRAZ RADIOLOGICZNY NARZADOW KLATKI PIERSIOWEJ].
Bolesław Bembnowski.
Lekarz Wojskowy, vol. 44, no. 6, 1968, p. 447–454. In Polish.

The changes occurring in the thoracic cavity organs under the effect of positive acceleration of four and five g were studied radiographically in 50 healthy mean aged 20 to 35 yr. It was found that under the effect of the acceleration changes appeared in the shape and size of the thoracic organs. The vascular pattern in the lower zone of the lungs did not show marked differences when compared with the initial radiographic image and was sometimes slightly smaller. The degree of the changes observed was related to the acceleration rate and individual characteristics of the subject tested. Under the influence of five g acceleration the individual differences were less marked it was explained by a lower efficiency in the compensatory reactions. It was noted that in 30% of the subjects tested the highest depression of the average decrease of the pulmonary artery in the radiographic image of the lungs vascular pattern and the sharpness of the heart shadow were related with the decrease in tolerance to positive acceleration.

A69-80958
A MATHEMATICAL TREATMENT OF THE EVOKED POTENTIALS. 2. RELATIONSHIPS BETWEEN RETINAL POTENTIALS AND EVOKED VISUAL POTENTIALS [SUR UNE RELATION MATHEMATIQUE REGISSANT LA CHRONOLOGIE DES POTENTIELS EVOQUES. RELATIONS ENTRE LES POTENTIELS RETINIENS ET LES POTENTIELS EVOQUES VISUELS].
Pierre Dubouloz, Gérard Kaphan, Jacques Corriol and Dong Chau-Huu (Marseille, U., Fac. de Méd., Lab. of Physics and Lab. of Physiol., France).
Journal de Physiologie, vol. 60, May–Jun. 1968, p. 171–192. 27 refs. In French.

A logarithmic relationship previously proposed was applied to a study of the optic pathway. The coincidence of the light stimulus and the zero point in time was confirmed. When the stimulus intensity increased, the latency diminished according to the relationship established by Hartline. The times at which first the events occurred retained a constant relationship. A study of the different stages of the visual signal showed that the logarithmic relationship was continuous at the level of the retina, optic nerve, lateral geniculate body and cortex. It was concluded that the retinal rhythms occurred in the cortical evoked potentials brought about by summation. A hypothesis was proposed for the mechanism leading to this relationship, and an explanation of the logarithmic connection based on probability was presented.

A69-80959
ELECTRORETINOGRAM OF THE CAT DURING HYPOXIA [L'ELECTRORETINOGRAMME DU CHAT EN CAS D'HYPOXIE].
Gérard C. Van den Bos (Amsterdam, U., Lab. of Physiol., The Netherlands).
Journal de Physiologie, vol. 60, May–Jun. 1968, p. 199–216. 47 refs. In French.

The effect of oxygen lack on the electroretinogram (ERG) was studied in cats during spontaneous and artificial respiration. In the first part of the experiment the lowest level of oxygen (O_2) in the air inhaled was 6%; in the later part, the oxygen percentage was lower. The heart rate, blood pressure, and electrocardiogram (ECG) were recorded in order to follow the general circulatory condition. In moderate hypoxia there was a clear connection between the b wave and the oxygen percentage in the air inhaled. In this degree of hypoxia a supernormal b may appear temporarily. This was more apparent in spontaneous breathing. A close agreement was found between the behavior of the T wave in the ECG and the b wave in the ERG during hypoxia. The ECG was a simple measure of the hypoxia, more indicative than the ERG. At very low HbO_2 values the ERG was converted into a biphasic curve, probably formed by a, b- and c. Possible explanations of the results were discussed.

A69-80960
PERCEPTION OF THE APPARENT MOVEMENT IN DEPTH WITH PRESENTATION OF TWO ENTIRELY SUPERIMPOSED STIMULI [LA PERCEPTION DU MOUVEMENT APPARENT EN PROFOUNDEUR AVEC PRESENTATION DE STIMULI ENTIEREMENT SUPERPOSES].
G. C. Zapparoli and E. Funari.
Journal de Psychologie, no. 3, Jul.–Sep. 1968, p. 309–317. 8 refs In French.

An attempt was made to analyze the appearance of an apparent movement in depth with two superimposed stimuli. By varying gradually the length of the pause between two stimuli from 0 to 60 sigma, three types of movement were produced: gamma movement, flicker and apparent movement in depth. To elicit the latter with superimposed stimuli intervals of 40 to 60 sigma were used, being the same values that produced the appearance of beta movement with spatially separate stimuli. Also observed was the evident parallelism existing between the order of the phenomena obtained with superimposed stimuli (gamma movement, flicker, movement in depth) and the order of Wertheimer classical phenomena produced with spatially distinct stimuli (simultaneity, partial movements, beta movement). Conditions that would permit stimuli presented on a frontal plane to elicit a kinetic phenomenom in a tridimensional space would constitute a proper solution in solving the conflict between the spatial interval (non-existant in the present case) and the temporal interval (optimal pause between two stimuli for the appearance of the beta movement).

A69-80961
CORRELATION OF BRAIN LEVELS OF DRUGS WITH BEHAVIORAL EFFECTS.
R. P. Maickel, R. H. Cox, Jr., F. P. Miller, D. S. Segal, and R. W. Russell (Ind. U., Depts. of Pharmacol. and Psychol., Lab. of Psychopharmacol., Bloomington).
Journal of Pharmacology and Experimental Therapeutics, vol. 165, Feb. 1969, p. 216–224. 15 refs.
Grants PHS MH-06997 and PHS MH-14658.

Physiologic disposition studies of H^3-d-amphetamine in rats indicate high degrees of localization in all tissues except fat, with tissue/plasma levels >1 maintained for >8 hr. Similar studies of pentobarbital-2-C^{14} show moderate localization in fat, kidney and liver, also maintained for >8 hr. The effects of d-amphetamine on a variety of behavioral tasks indicate a differential sensitivity to the drug; minimal effective brain levels range from 0.40 μg/g for continuous avoidance to 5.0 μg/g in a straightaway escape response. In contrast, pentobarbital has a relatively uniform sensitivity; minimal effective brain levels are in the range 1.0 to 1.2 μg/g for all behavioral tests.

A69-80962
THE EFFECTS OF SELECTED CHOLINERGIC DRUGS AND STRYCHNINE ON COCHLEAR RESPONSES AND OLIVO-COCHLEAR INHIBITION.
R. D. Brown, E. A. Daigneault, and J. R. Pruett (La. State U., Med. Center, Dept. of Pharmacol., New Orleans).
Journal of Pharmacology and Experimental Therapeutics, vol. 165, Feb. 1969, p. 300–309. 26 refs.
Grants PHS 5-51-GM-30, 708-03 and PHS 1 R01 NB06261-02 CMS.

The pharmacology of olivo-cochlear (o-c) inhibition was investigated in cats. Intravenous strychnine blocked the N_1 depression produced by i.a. acetylcholine as well as the effects produced by o-c bundle stimulation. Intraarterial hemicholinium (Schueler's HC-3) produced a partial block of o-c bundle stimulation effects. Intraarterial choline produced N_1 depression in control animals and animals which had received HC-3 and a complete block of o-c bundle stimulation effects in the HC-3 animals. Thus, the cochlear action of HC-3 appeared to be similar to its action at the neuromuscular junction. Intraarterial physostigmine, atropine, gallamine and mecamylamine produced no significant changes in either control N_1 and microphonics or in the o-c bundle stimulation effects. It is concluded that a definitive evaluation of pharmacology of olivo-cochlear inhibition cannot be made at this time.

A69-80963
BIOCHEMICAL MECHANISMS UNDERLYING THE METABOLIC OSCILLATIONS IN YEAST.
E. Kendall Pye (Pa., U., Johnson Res. Found. and Dept. of Biochem., Philadelphia).
Canadian Journal of Botany, vol. 47, Feb. 1969, p. 271–285. 40 refs. *Can. Soc. of Plant Physiol., 9th Ann. Meeting, Ontario, Jun. 1968.*
Grants PHS GM 12202 and PM. FR 5415-06.

Metabolic oscillations associated with the glycolytic pathway in intact cells and cell-free extracts of yeasts probably represent the first observation of prolonged self-sustained biochemical oscillations *in vivo* and *in vitro*. These oscillations have many characteristics similar to those of endogenous biorhythms which, others have postulated, might be driven by oscillations at the biochemical level. Among these characteristics are a stable frequency, a self-sustained nature, a susceptibility to phase shifting, fadeout, and reinitiation. The frequency is, however, temperature sensitive and high (approximately 1.8 $min.^{-1}$ *in vivo* and 0.17 $min.^{-1}$ *in vitro*). The metabolic oscillations, which represent a pulsing of the glycolytic flux, appear to arise by a mechanism involving an initial step of constant and specific velocity together with an activation of the enzyme phosphofructokinase by its product adenosine diphosphate. Other coupled reactions are also involved which may explain the appearance of beats and pulse-type oscillations, as well as the normal sinusoidal type of waveform. These oscillations are an interesting metabolic control phenomenon and allow the demonstration of apparent metabolic coupling between individual cells. They may also be useful as a model for a driving oscillation for endogenous biorhythms.

A69-80964
TRANSDUCING MECHANISMS BETWEEN CIRCADIAN CLOCK AND OVERT RHYTHMS IN GONYAULAX.
Beatrice M. Sweeney (Calif., U., Dept. of Biol. Sci., Santa Barbara).
Canadian Journal of Botany, vol. 47, Feb. 1969, p. 299–308. 23 refs.
Can. Soc. of Plant Physiol., 9th Ann. Meeting, Ontario, Jun. 1968.
NSF supported research.

In *Gonyaulax polyedra* it is possible to measure overt rhythms in luminescence, photosynthesis, and cell division. A common endogenous oscillator appears to control all three processes. The question of concern here is the manner in which the information regarding period and phase is transduced from oscillator to overt rhythm. In the rhythm of photosynthetic capacity, the path of electron flow through systems I and II appears not to be the site of transduction, since there is no rhythm in cells flashing light, in the Hill reaction, or in sensitivity to such specific inhibitors as dichlorophenyl dimethyl urea (DCMU), and carbonyl cyanide m-chlorophenylhydrazone (CCmP). The probable site of control is in the Calvin cycle, since the activity of the first enzyme in this cycle, ribulose diphosphate dicarboxylase, varies with the phase of the cells from which the enzyme is derived. The low activity of this enzyme in crude extracts from cells in the night phase in continuous light can be overcome by increasing the concentration of bicarbonate in the reaction mixture. *In vivo* also, increasing the concentration of bicarbonate decreases the amplitude of the rhythm markedly. The activity of mixtures of extracts prepared during the day and the night phase is intermediate between that of either enzyme preparation alone, suggesting that the differences in activity are not caused by the presence of activators or inhibitors. The activity of ribulose diphosphate carboxylase is reduced by high temperature and by the presence of parachloromercuribenzonate (pCMB) and both adenosine triphosphate (ATP) andadenosine diphosphate (ADP), but differences in sensitivity to inhibitors between "day" and "night" enzyme preparations are not observed. The concentration of ATP extractable from cells does not vary with the phase of the rhythm. Transduction in the luminescent rhythm appears to be via changes in the mechanism by which luminescence is stimulated *in vivo*, since it is possible to obtain large and almost equal amounts of light from cells throughout the rhythmic cycle by the additon of acid. Eliciting luminescence in this way appears to bypass the normal mechanism of stimulation. This conclusion is strengthened by the observation that the inhibitory effect of light on cell luminescence is also eliminated when acid is used.

A69-80965
MEASUREMENT OF MEMORY BY PROMPTED RECALL.
Harry P. Bahrick (Ohio Wesleyan U., Delaware).
Journal of Experimental Psychology, vol. 79, Feb. 1969, p. 213–219. 18 refs.
Grant PHS HD00926-07.

A69-80966

An analytic method of measuring memory by prompted recall is described. The results are related to a two-factor theory in which storage and retrieval processes of retention show losses at different rates and for different reasons. In this method, when the subject fails to give a response in a paired-associate (PA) free recall test, he is given a prompting word to aid recall. The prompter, which has a predetermined probability of evoking the correct response if no prior training is given, evokes the response with a higher probability for subjects who have been previously trained on the PA list. These incremental probabilities are a function of the time interval following training and the effectiveness of the prompter used.

A69-80966
GENERALIZATION GRADIENTS IN RECOGNITION MEMORY OF VISUAL FORM: THE ROLE OF STIMULUS MEANING.
Robert L. Feuge and Henry C. Ellis (N. Mex., U., Albuquerque).
Journal of Experimental Psychology, vol. 79, Feb. 1969, p. 288–294. 17 refs.
Grant NSF GB-3432.

Two experiments tested the hypothesis that gradients of generalization in recognition memory are steeper for more meaningful stimuli. The subjects were given various kind of paired-associate (PA) practice in labeling random shapes, or in observing them, and then were given a 30-item recognition test consisting of both the shapes in the PA list and systematic distortions of these shapes along a dimension of similarity. Experiment I revealed that gradients of generalization were steeper for the more meaningful stimuli, where meaningfulness was defined in terms of association value (AV) of the shapes. In contrast, Exp. II revealed an opposite effect when stimulus meaning was defined as associative frequency (AF); high-AF stimuli yielded flatter and broader gradients of generalization. An encoding-variability interpretation was proposed to account for differences in slopes of the gradients. It was suggested that the percentage of subjects having an association to a stimulus (AV) and the number of associations a stimulus elicits (AF), although commonly regarded as reflecting correlated events, be viewed as contributing to the storage and/or retrieval of visual information in quite different ways.

A69-80967
TRANSFER MECHANISMS IN VERBAL DISCRIMINATION.
N. Jack Kanak and M. Faith Dean (St. Louis U., Mo.).
Journal of Experimental Psychology, vol. 79, Feb. 1969, p. 300–307. 14 refs.
NASA and NSF supported research.

Mechanisms for verbal discrimination (VD) learning were investigated under various transfer conditions. Experiment I tested extensions of Osgood-type empirical laws to VD transfer, and Exp. II tested mechanisms in corresponding vs. noncorresponding (or re-paired) paradigms. Both experiments demonstrated significant but decreasing positive transfer relative to the nonspecific control under corresponding conditions of right (R) item identity as wrong (W) items varied from identity through associative relatedness to neutrality. Re-pairing with W-item identity or relatedness produced further decrements in the degree of positive transfer over that observed in corresponding counterparts. With W-item identity, resultant positive transfer in corresponding paradigms decreased as R items varied from identity to relatedness and became negative with R-item neutrality. A weaker degree of negative transfer was observed under re-pairing with R-item relatedness. The transfer results gave support to the view that VD transfer is a resultant of frequency cues and interacting associative mechanisms.

A69-80968
FUNCTIONAL IDENTIFICATION OF PERCEPTUAL AND RESPONSE BIASES IN CHOICE REACTION TIME.
David Laberge, Ross Legrand, and Russel K. Hobbie (Minn., U., Minneapolis).
Journal of Experimental Psychology, vol. 79, Feb. 1969, p. 295–299. 7 refs.
NASA Grant NGR-24-005-063 and Grant NSF GS-541.

A two-choice speeded identification task involved two stimuli associated with one response, and a third stimulus associated with the other response. In the first experiment, the relative frequency of one of the pair of stimuli associated with one response was increased progressively. In a second experiment, this stimulus was given additional emphasis by presenting a mild noise burst following fast correct responses. Comparisons of response latencies to the three stimuli indicated that both perceptual and response biases operate in this situation.

A69-80969
STIMULUS STRUCTURE, COGNITIVE STRUCTURE, AND THE PERCEPTION OF LETTER ARRAYS.
Maurice Hershenson (Wis., U., Madison).
Journal of Experimental Psychology, vol. 79, Feb. 1969, p. 327–335. 22 refs.
U.S. Office of Educ. Cooperative Res. supported research.

Experiments within the microgenetic paradigm provide an assessment of the role of stimulus structure and, inferentially, cognitive structure in perception. Seven-letter arrays differing in percentage of redundancy were repeatedly exposed for brief durations. The arrays were unfamiliar to subjects in Exp. I, whereas subjects had to memorize the list of stimuli in Exp. II. All subjects were instructed to report what they saw. Perceptual reports were obtained in Exp. II only. Letter position was the overriding determiner of perceptibility, yielding an inverted U-shape function about the fixation point. The increase in perceptibility as a function of stimulus structure was significant but small, while information transmitted decreased markedly. The results are interpreted in relation to two models of information flow for the recognition and microgenesis tasks.

A69-80970
INFORMATION THEORY AND STIMULUS ENCODING IN PAIRED-ASSOCIATE ACQUISITION: ORDINAL POSITION OF FORMAL SIMILARITY.
Douglas L. Nelson and Frank A. Rowe (South Fla., U., Tampa).
Journal of Experimental Psychology, vol. 79, Feb. 1969, p. 342–346. 13 refs.

Statistical analyses of English words show that beginning and end letters carry more information than middle letters and that beginning letters carry more than end letters. Two experiments were performed in which the ordinal position of identical letters within the three-letter word stimuli of paired-associate lists was varied. Each subject acquired a single list in which there were identical letters in only the first, middle, or last, or first-and-middle, first-and-last, and middle-and-last letter positions. A zero-identity condition and a condition with identity in first-middle-and-last letter positions were also constructed. Consistent with predictions derived from the informational analyses, difficulty of acquisition varied with the location of information which could be used to discriminate

between stimuli and the degree to which the location of this information was incompatible with encoding habits.

A69-80971
HUMAN ADAPTATION TO HIGH ALTITUDE.
Paul T. Baker (Pa. State U., University Park).
Science, vol. 163, Mar. 14, 1969, p. 1149–1156. 23 refs.
Contracts DA-49-193-MD-2260 and DA-49-193-MD-2709; Grants PHS GM-07325-03 and PHS IROI HD-01756-01; Pa. State U. and Inst. de Biol. Andina supported research.

In order to learn more about the adaptations which enable the native to survive at high altitudes, an intensive study of a native population is being carried out in the district of Nuñoa in the Puruvian Altiplano. In this area hypoxia and cold appeared to be the most unusual environmental stresses. Results to date show a high birth rate and a high death rate, the death rate for females, both postnatal and prenatal (as inferred from the sex ratio at birth), being unusually high. Birth weights are low, while placenta weights are high. Postnatal growth is quite slow relative to the rate for other populations throughout the world, and the adolescent growth spurt is less than that for other groups. The maximum oxygen consumption (and thus the capacity for sustained work) of adult males is high despite the reduced atmospheric pressure at high altitude. All lowland groups brought to this altitude showed significant reductions in maximum oxygen consumption. The Nuñoa native's responses to cold exposure also differ from those of the lowlander, apparently because blood flow to his extremities is high during exposure to cold. The disease patterns are not well known; respiratory diseases appear common, whereas there seems to be almost no cardiovascular disease among adults. Systemic blood pressures are very low, particularly those of individuals living in traditional native fashion. Nutrition appears to be good, but analysis of the nutrition studies is continuing. The results of these studies are interpreted as showing that some aspects of the native's adaptation to high altitudes require lifelong exposure to the environmental conditions and may be based on a genetic structure different from that of lowlanders.

A69-80972
BACTERIAL SPORES: CHEMICAL SENSITIZATION HEAT.
Gordon Alderton and Neva Snell (U.S. Dept. of Agr., Agr. Res. Serv., Western Reg. Res. Lab., Albany, Calif.).
Science, vol. 163, Mar. 14, 1969, p. 1212–1213.

Spore heat resistance is largely an inducible property, chemically reversible between a sensitive and resistant state. Therefore, the constitutive assumption and common practices based on it, such as direct testing of spores for heat resistance without prior treatment and the assumption of logarithmic death for spores in general, are no longer appropriate. A new approach is reported to the reduction of heating severity for a given survivor reduction of bacterial spores suspended in complex biological mixtures at their ordinary pH. Heating time advantages amount to severalfold and do not involve antimicrobial additives.

A69-80973
LASER IRRADIATION OF THE ANTERIOR SEGMENT OF THE EYE. 2. MONKEY EYES.
Vivienne L. Hallman, E. S. Perkins, G. K. Watts, and C. B. Wheeler (London, U., Inst. of Ophthalmol., Great Britain).
Experimental Eye Research, vol. 8, Jan. 1969, p. 1–4.
Min. of Aviation and Min. of Defence supported research.

The lesions produced in the iris of cynomolgus monkeys by a pulsed ruby laser are described and compared with those produced in pigmented rabbits. Differences in the reaction of the iris tissue in the two species can be explained by differences in anatomical structure. Pigment liberated from the iris could be seen to leave the anterior chamber by infiltration between the muscle layers of the ciliary body.

A69-80974
EFFECT OF COLD ON MUSCLE POTENTIALS AND ELECTROLYTES.
R. Klein, J. E. Haddow, C. Kind, and F. Cockburn (Boston U., School of Med., Dept. of Pediat. and Boston City Hosp., Pediat. Clin. Center, Mass.).
Metabolism, vol. 17, Dec. 1968, p. 1094–1103. 12 refs.
Grant NIH FR-00103 and John A. Hartford Found. supported research.

External cooling *in vivo* produces multiple changes in human and rat muscle membrane potentials and electrolytes. The first change noted is the appearance of increasing numbers of spontaneous potentials and repetitive action potentials after a single stimulus as the rat muscle is cooled 32°C. or less. Extracellular action potentials in humans and both intracellular and extracellular action potentials in rats become progressively more prolonged as the muscle cools below 26°C. In the animals this is accompanied by an increase in muscle Na (and Cl) and decrease in muscle K. Further cooling to below 23°C. produces a drop in resting membrane potential as well as progressive increase in duration of the action potential. The previous increase in muscle Na is unaffected but muscle K decreases progressively and muscle water increases without change in muscle inulin space. Muscle Mg and Ca were not significantly different from control values. As cooling progresses in both rats and humans there is at first a slight increase in amplitude of the action potential and then a marked and significant diminution in amplitude. Cooling increases the threshold for stimulation and the delay between stimulus and onset of action potential. At temperatures below 8°C. no visible contraction could be seen and the membrane became unresponsive to stimuli of greater than 100 v. The repetitive action potentials noted with minimal cooling diminished rapidly in amplitude. Repetitive action potentials became undemonstrable before the single stimulated action potential did. The possible interrelation of electrolyte changes, muscle membrane potentials and muscle contraction is considered.

A69-80975
HIGH FREQUENCY BLOOD GLUCOSE OSCILLATIONS IN MAN.
A. Iberall, M. Ehrenberg, S. Cardon, and M. Simenhoff (Gen. Tech. Serv., Inc., Biophysics Lab., Upper Darby, Pa. and Jefferson Med. and Med. Center, Clin. Res. Center, Philadelphia, Pa.).
Metabolism, vol. 17, Dec. 1968, p. 1119–1121. 7 refs.
NASA Contract NASW-1066 and Grant NIH FR-72.

High frequency oscillations in blood glucose levels have been demonstrated in man by careful autoanalysis, agreeing with results by conventional bench methods. These oscillations are another example of dynamic regulation in biological systems, previously denoted homeokinesis.

A69-80976
IN VIVO MEASUREMENT OF BONE MASS IN THE RADIUS.
C. Conrad Johnston, Jr., David M. Smith, Pao-Lo Yu, and W. P. Deiss, Jr. (Ind. U., School of Med., Dept. of Med., Indianapolis).
Metabolism, vol. 17, Dec. 1968, p. 1140–1153. 22 refs.
Grants PHS AM07126, PHS FR00057, PHS FR000162, and PHS AM07162; Eli Lilly and Co. supported research.

A sensitive method for measuring bone mass in the radius is described. It employs a monochromatic gamma source (^{125}I) to scan the bone. The method is quite reproducible with a coefficient of variation of approximately 2.5%. An estimate of reliability indicates that most of the variation in a population survey is due to difference in the individuals rather than instrumentation error. Females have lower bone mass than males and Caucasians lower than Negroes. There is a marked decrease in the bone mass of women after age 50 and a more gradual loss in men after age 60. Scans at three cm. from the distal end of the radius measure primarily cancellous bone. Patients with vertebral collapse have significantly less mass at this site than those without collapse. Scans at eight cm. measure primarily compact bone. The total mass measurement is useful for following individuals over extended periods. This figure may be divided by the scan width and, at the eight cm. level, this provides a better figure to differentiate the abnormal individual from the population. This ia a rapid, accurate method of determining bone mass which can easily produce comparable results in different laboratories.

A69-80977
EFFECTS OF RAISING RATS ON A LIQUID OR SOLID DIET ON RESPONSE CHOICE MADE WITH HUNGER AND THIRST SIMULTANEOUSLY OPERATIVE.
Robert J. Thompson, Jr. and Thomas B. Leonard, III (N. Dak., U., Grand Forks).
Psychonomic Science, vol. 14, Jan. 10, 1969, p. 9–10. 7 refs.

One group of rats was raised normally on a diet of dry pellets, another group was raised almost completely on a liquid diet of Metrecal, in order to control the amounts of reinforced time spent eating and drinking in each group, hence producing different incentive values for eating and drinking. Both groups were then trained to turn left in a T-maze for dry food and right for water. After 60 hr. of simultaneous hunger and thirst deprivation, free choice test trials were given. Normally raised rats always turned toward food, but rats raised on Metrecal turned toward food and water about equally often. The results are explained by the different incentive values for eating and drinking produced by the different diets.

A69-80978
INFLUENCE OF HEAD POSITION ON THE HABITUATION OF VERTICAL VESTIBULAR NYSTAGMUS IN THE CAT.
William E. Collins (FAA, Office of Aviation Med., Civil Aeromed. Inst., Oklahoma City, Okla.).
Journal of Comparative and Physiological Psychology, vol. 67, Feb. 1969, p. 156–159. 21 refs.

Habituation of vertical ocular nystagmus by means of repeated angular acceleration was accomplished with a group of eight cats. For all habituation trials, the sagittal plane of the head and body of each animal was in the plane of rotation. By changing the position of the animals 180° after the habituation trials, the same set of semicircular canals was simulated, but the orientation of the otoliths was changed. Habituation was specific to the practiced direction of nystagmus and to the practiced position of specific and nonspecific gravireceptors.

A69-80979
THE EFFECTS OF DEPRIVATION AND POST-DEPRIVATION ON THE HEART RATE OF RATS.
Sachio Ashida (Mich., U., Ann Arbor).
Psychonomic Science, vol. 14, Feb. 10, 1969, p. 123–124. 7 refs.

The heart rate (HR) of male hooded rats was recorded in their individual home cages for three wk. Then they were deprived of water (Group 1, N≐6) or food (Group 2, N=10) up to 96 hr. Immediately after the deprivation period water (for Group 1) and food (for Group 2) were placed in their home cages. Under these conditions, HR was recorded. During the deprivation period, the HR of group 1 increased linearly with the duration of deprivation, and that of Group 2 showed an inverse U-shaped function. During the postdeprivation period, the HR of both groups sharply increased about 10 min. after food or water was placed in their cages. These findings suggest that HR is clearly influenced both by deprivation and by consummatory activities.

A69-80980
POSITION, PERSONALITY, AND LEADERSHIP.
Mark Abrahamson (Syracuse U., Dept. of Sociol., N.Y.).
Psychological Record, vol. 19, Jan. 1969, p. 113–122. 12 refs.

This paper examines the methodological consequences of communication network studies, pointing out that the use of partitions removes the possibility of either personality differences or deviance from effecting leadership. In a face to face network, high centrality incumbents are found to emerge as leaders immediately only when no personality liability is present. In groups of all types, however, the impact of centrality upon leadership—defined as influence and control—is found to diminish as problem solving proceeds. The conclusion is that the previously observed relationship between leadership and spatial position is due, in large part, to the physical enclosure of participants.

A69-80981
ACOUSTIC VERSUS ASSOCIATIVE MODELS OF SHORT-TERM MEMORY CODING.
John F. Marshall, Richard O. Rouse, Jr., and Roger M. Tarpy (Williams Coll., Williamstown, Mass.).
Psychonomic Science, vol. 14, Jan. 25, 1969, p. 54–55. 11 refs.

A 230-item word list was used to study methods of coding. The list consisted of 35 pivot words, one each of their high associates (HA), medium associates (MA), synonyms (S), rhymes (R), plus 20 buffer words. The data indicated that short-term memory coding complied to an associative rather than an acoustical model. The study offers a possible explanation of why different experiments have found acoustical coding predominant in short-term memory.

A69-80982
THE EFFECT OF REPETITION UPON THE SERIAL LEARNING OF FAMILIAR ITEMS.
John F. Catalano (N.Y., State U., Cortland).
Psychonomic Science, vol. 14, Jan. 25, 1969, p. 65–66.

Two experiments were conducted in which serial learning of familiar names with standard repetition was compared to learning under a modified procedure where repetition was eliminated. In the first experiment, the modification involved removal of incorrectly anticipated items and the substitution of new items. In the second experiment the positions of incorrect items were interchanged. In both experiments learning with repetition was significantly faster.

A69-80983
REPETITION EFFECTS AND THE ORDERED RECALL OF CATEGORIZED SERIAL LISTS.
James R. Craig and Wayne H. Bartz (Iowa State U., Ames).
Psychonomic Science, vol. 14, Jan. 25, 1969, p. 67–68. 7 refs.
Grant PHS MH 13192.

Two-store memory theories predict no repetition effects for last-presented items in serial lists. Thirty lists of 10 numbers were categorized by recording half the list in a male voice and the other in a female voice. The order of the number was repeated every third list in one of the categories. Four groups of subjects (N = 10) recalled the categories in serial or reverse order. The results indicated that repetition effects were isolated principally to the first-presented category.

A69-80984

THE EFFECT OF HEAD POSITION ON SIZE DISCRIMINATION.

Peter W. Zinkus and Paul T. Mountjoy (Western Mich. U., Kalamazoo).

Psychonomic Science, vol. 14, Jan. 25, 1969, p. 80.

Twenty subjects were required to match the size and distance of equal-size disks in different planes of space. Head position was shown to be significantly related to the subjects' inability to make these discriminations. Evidence was also given to support the hypothesis of a vestibular contribution to space perception.

A69-80985

THE DISTURBANCE EFFECT OF WHITE NOISE ON HUMAN SHORT-TERM MEMORY DURING LEARNING.

Walter Sloboda (St. Elizabeths Hosp., Behavioral and Clin. Studies Res. Center, Washington, D.C.).

Psychonomic Science, vol. 14, Jan. 25, 1969, p. 82–83.

Subjects had to learn a seven-digit number presented either with or without a five-sec., 72-db. burst of white noise. No significant difference was found in recall between white-noise and no-white-noise conditions with either a 2- or 12-sec. retention interval (RI). Galanic skin response measures did not differentiate the white-noise and no-white-noise conditions, nor were differences found in recall performance between trials with large drops in resistance and those showing minimal changes. A rho of −.86 was found for the 12-sec. RI between background skin resistance (BSR) and performance, with those subjects having low BSR performing more poorly than those subjects having higher BSR. No comparable correlation was found for the two-sec. RI.

A69-80986

OXIDATIVE PHOSPHORYLATION IN THE BRAIN AND LIVER OF WARM BLOODED ANIMALS DURING HYPOTHERMIA AND THE INITIAL PERIOD OF SELF-WARMING [OKISLITEL'NOE FOSFORILIROVANIE V MOZGU I PECHENI TEPLOKROVNYKH ZHIVOTNYKH PRI GIPOTERMII I V NACHAL'NYI PERIOD SAMOSOGREVANIIA].

N. A. Shvets and E. M. Khvatova (S. M. Korov Gor'kii Med. Inst., Central Sci.-Res. Lab., USSR).

Voprosy Meditsinskoi Khimii, vol. 14, Nov.–Dec. 1968, p. 593–598. 40 refs. In Russian.

Experiments were conducted on male chinchilla rabbits to study the oxidative phosphorylation in the brain and liver during hypothermia and the initial period of self-warming. It was found that during deep hypothermia with the disappearance of thermoregulation an increase occurred in the brain and liver mitochondria oxidative phosphorylation processes. The initial phase of body temperature restoration was characterized by a reduction of respiration and phosphorylation coupling and an activation of free oxidation in the brain and the liver. The energy changes during the hypothermia and the self-warming period were more marked in the brain mitochondria than in the liver.

A69-80987

WHIP-LASH INJURY OR INDIRECT TRAUMATISMS OF THE CERVICAL VERTEBRAE OR POST-TRAUMATIC CERVICAL SYNDROME [WHIP-LASH INJURY OU TRAUMATISMES INDIRECTS DU RACHIS CERVICAL (COUP DE FOUET, COUP DU LAPIN, CISAILLEMENT) OU SYNDROME CERVICAL POST-TRAUMATIQUE].

A. Wakenheim.

Bulletin de la Société des Sciences Médicales du Grand-Duché de Luxembourg, vol. 105, No. 1968, p. 93–114. In French.

Presented was a discussion on whip-lash injuries, with emphasis on radiographical symptomatology. The different cervical vertebrae lesions that could be caused by whip-lash such as fractures and luxations, various radiculomedullary paralyses were reviewed, as well as some less apparent consequences encountered very frequently in patients suffering from functional disturbances. Detection of whip-lash injury depended on precise analysis of cervical statics and dynamics with the help of radiography, and all the symptoms indicated the necessity to make a vertebral angiogram.

A69-80988

EFFECT OF ULTRAVIOLET RADIATION EMITTED BY GERMICIDAL LAMPS ON THE HUMAN VISUAL ANALYZER [VLIV UV-ZARENI GERMICIDNI VYBOJKY NA ZRAKOVY ANALYZATOR CLOVEKA].

S. Bafík and A. Milová.

Ceskoslovenská Hygiena, vol. 13, Dec. 1968, p. 584–590. 10 refs. In Czech.

The adaptation curve of five different age groups of women (20 to 24, 25 to 29, 30 to 39, 40 to 44 and over 45 yr.) was studied by means of optotypes reading on the Zeiss's nyctometer, before and after exposure to irradiation from a germicidal gas discharge tube, of 30 W. situated at two m. distance. Two min. irradiation decreased the latency and the total dark adaptation period was shortened. This decrease was most marked in women at the age of 30 to 39 yr.

A69-80989

CHANGES OF HEMODYNAMIC INDICES IN HEALTHY PERSONS DURING AND AFTER MODERATE PHYSICAL EXERTION [IZMENENIIA POKAZATELEI GEMODINAMIKI U ZDOROVYKH LIUDEI VO VREMIA I POSLE VYPOLNENIIA FIZICHESKOI RABOTY SREDNEI TIAZHESTI].

V. S. Georgievskii and L. I. Fat'ianova (USSR, Min. of Health, Inst. of Med.–Biol. Problems, Moscow).

Kardiologiia, vol. 8, Nov. 1968, p. 134–137. 6 refs. In Russian.

On the basis of a complex study of different hemodynamic indices as a functional test of the state of circulation physical loads with an intensity of 100 wt. for seven min. were recommended. During and after this test there occurred an increase of the frequency and strength of cardiac contractions and a moderate rise of the tone of major vessels; there were no signs of overexertion of the circulatory system. The recorded changes of the mean values of hemodynamic indices may be used as a standard characterizing the reaction of the circulatory system of a healthy man to moderate physical loads.

A69-80990
ESTIMATION OF THE LOWER BOUNDARY AND THICKNESS OF VENUS CLOUD LAYER [OTSENKI NIZHNEI GRANITSY I TOLSHCHINY OBLACHNOGO SLOIA NA VENERE].
A. M. Obukhov and G. S. Golitsyn.
Kosmicheskie Issledovaniia, vol. 6, Sep.–Oct. 1968, p. 759–764. 6 refs. In Russian.

The lower boundary and thickness of the cloud layer in the Venus atmosphere were determined. Two extreme values of the partial water vapor pressure to the absolute atmospheric pressure ratio (smaller than 0.1 and greater than 0.7%) were determined on the basis of the data, on the chemical composition of the Venus atmosphere and the temperature and pressure profiles obtained by the Venera 4 space probe. It was estimated that the clouds lower boundary was situated at an altitude of 35 km. above the planet surface. Its water content was calculated, and accordingly the temperature of Venus stratosphere was established in the neighborhood of 200K°. The upper boundary of the clouds layer was found to be near the tropopause level (42 to 43 km.); the thickness of the clouds layer would then be in the range of five to ten km. Basically the clouds layer consisted of ice crystals but its lower zone could be made up of supercooled water.

A69-80991
DRUG THERAPY AND FLIGHT SAFETY. [LEKARSTVENNAIA TERAPIIA I BEZOPASNOST' POLETOV].
I. S. Gurin, B. I. Davydov, IA. N. Divin, E. M. Panova, P. P. Saksonov, and V. G. Terent'ev.
Kosmicheskie Issledovaniia, vol. 6, Sep.–Oct. 1968, p. 782–787. 30 refs. In Russian.

A review was presented of the drugs used in aerospace medicine. The undesirable side effects and their importance in the physical fitness of pilots and astronauts for flight duty were discussed. A choice was given of drugs to be included in the medicine kit onboard aircraft and spacecraft.

A69-80992
GROWTH STIMULATION IN SOME BIOLOGIC OBJECTS DUE TO THE EFFECT OF VERTICAL VIBRATIONS [STIMULIATSIIA ROSTA U NEKOTORYKH BIOLOGICHESKIKH OB''EKTOV POD VOZDEISTVIEM VERTIKAL'NOI VIBRATSII].
N. L. Delone, V. V. Antipov, E. M. Morozova, P. P. Saksonov, and A. S. Trusova.
Kosmicheskie Issledovaniia, vol. 6, Sep.–Oct. 1968, p. 788–792. 11 refs. In Russian.

Experiments were carried out to study the effect of vibration on the growth of *Allium cepa* bulb sprouts and on the body weight in mice. The findings showed a stimulation in the growth of *Allium cepa* bulbs subjected to vibration of 70 hz. for ten hr. The body weight gain of mice exposed to vibration of 70 and 1500 hz. for one hr. was markedly increased.

A69-80993
ANTIEMETIC ACTION OF TRIMETHOXAN [PROTIVORVOTNOE DEISTVIE TRIMETOKSANA].
IU. L. Varshamov and N. M. Stetiukha (S. M. Kirov Mil.–Med. Acad., Leningrad, USSR).
Farmakologiia i Toksikologiia, vol. 31, Sep.–Oct. 1968, p. 537. In Russian.

Experiments conducted on dogs demonstrated that trimethobenzamide (TIGAN) exercises a marked antiemetic action in checking vomiting of the central type, irrespective of the routes of its introduction. In the vomiting of the reflex-type the effect is achieved by using dosages exerting sedative action.

A69-80994
THE EFFECT OF CENTRAL NEUROTROPIC SUBSTANCES ON THE HYPOPHYSIS-ADRENAL CORTEX SYSTEM IN IMMOBILIZED ANIMALS [VLIIANIE TSENTRAL'NYKH NEIROTROPNYKH VESHCHESTV NA SISTEMU GIPOFIZ-KORA NADPOCHECHNIKOV PRI IMMOBILIZATSII ZHIVOTNYKH].
V. E. Ryzhenkov (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Dept. of Pharmacol., Leningrad).
Farmakologiia i Toksikologiia, vol. 31, Sep.–Oct. 1968, p. 545–548. 19 refs. In Russian.

Experiments conducted on guinea pigs demonstrated that immobilization of the animals for 5, 12, 24 and 48 hr. resulted in a persistent rise of the blood plasma 17-oxycorticosteriods concentration. Repeated administration of phenobarbital (50 mg./kg.), of gamma-oxybutyric acid sodium salt (500 mg./kg.), as well as a combined administration of central M- and H-cholinolytics and small doses of phenobarbital, tended to inhibit the activation of the adrenal cortex in guinea pigs immobilized for 48 hr.

A69-80995
CONTRIBUTION TO THE ANALYSIS OF HYPOTHERMIC ACTION OF SOME PHARMACOLOGICAL AGENTS [O GIPOTERMICHESKOM DEISTVII NEKOTORYKH FARMAKOLOGICHESKIKH SREDSTV].
O. Iu. Uriupov (S. M. Kirov Mil.–Med. Acad., Dept. of Pharmacol., Leningrad, USSR).
Farmakologiia i Toksikologiia, vol. 31, Sep.–Oct. 1968, p. 568–571. In Russian.

Experiments were conducted on mice to investigate the relationship between varying body temperature in the animals under the effect of tranquilizers, hypnotics, muscle relaxants, sympatholytics and other compounds, on the one hand, and environmental temperature, on the other. In conformity with the results of the research the substances cited above were classified into three groups: agents producing controlled, partially controlled and uncontrolled hypothermia. The development of controlled hypothermia was due either to the inhibition of tissue oxidation, or altered physical thermoregulation; that of partially controlled hypothermia was first and foremost bound with the suppression of voluntary muscular activity and chills, while uncontrolled hypothermia was caused by the suppression of the afferent portion of central mechanisms of thermoregulation.

A69-80996
RELATIONSHIP BETWEEN THE PERIPHERAL VASCULAR RESISTANCE AND RENAL EXCRETION OF SODIUM AND WATER FOLLOWING EPHEDRINE ADMINISTRATION [ZAVISIMOST' MEZHDU PERIFERICHESKIM SOPROTIVLENIEM SOSUDOV I POCHECHNOI EKSKRETSIEI NATRIIA I VODY PRI VVEDENII EFEDRINA].
L. L. Branchevskii.
Farmakologiia i Toksikologiia, vol. 31, Sep.–Oct. 1968, p. 593–596. 14 refs. In Russian.

Acute tests were carried out on dogs to study the action of different doses of ephedrine and epinephrine on the excretory renal function, on the background of hemodynamic changes. Given in doses of 1 to 1.5 mg./kg. ephedrine was found to increase the excretion of the electrolytes and water, and in a dose of 4 mg./kg. to decrease it. A correlation between the changes in the total peripheral resistance of vessels and the renal excretion of sodium and water was established.

A69-80997

CHARACTERIZATION OF THE PHARMACOLOGICAL ACTION EXERCISED BY P-BROMO-METHYLAMPHETAMINE [K KHARAKTERISTIKE FARMAKOLOGICHESKOGO DEISTVIIA P-BROMMETILAMFETAMINA].

G. I. Mil'shtein and N. V. Savateev (S. M. Kirov Mil.–Med. Acad., Leningrad, USSR).

Farmakologiia i Toksikologiia, vol. 31, Sep.–Oct. 1968, p. 607–609. 8 refs. In Russian.

The effect of p-bromo-methylamphetamine on conditioned behavior in rats and dogs, as well as on the spontaneous bioelectrical activity of certain subcortical structures and the brain cortex of cats was investigated. The behavior of rats linked with the thirst motivation was found to be upset following intraperitoneal introduction of the drug in doses of 20 mg./kg. In dogs, taught to follow a behavioral motor pattern elaborated on the grounds of food motivation, the intramuscular injection of the agent in doses of three mg./kg. was in 50% of the cases followed by drastic disorders of the higher nervous activity. With the dosage of the drug raised up to five mg./kg. the behavioral habit was inhibited in 90% of the tests. When given intramuscularly in doses of five mg./kg. slow high-voltage activity became apparent on the electroencephalogram of cats.

A69-80998

LIPID-FREE LOTION, SKIN CLEANSING AND TRANSIENT BACTERIAL FLORA.

Robert E. Lyons (Southwestern Med. School, Dallas, Tex.) and Richard J. O'Brien (Tex. Pharmacal Co., San Antonio).

Cutis, vol. 5, Jan. 1969, p. 70–72. 12 refs.

Twelve female volunteers were used to determine if Cetaphil Lotion, a lipid-free lotion, used as a cleanser would materially reduce microorganisms on the skin surface. The findings indicated that Cetaphil Lotion cleansing reduced the recoverable bacteria more than 45%. Because of its low irritation potential and its pH within the neutral or slightly acid range, it appears that the lotion would be of value not only in atopic dermatitis, but also in other skin conditions liable to damage by soaping.

A69-80999

THE MINIMUM DOSE OF X-RAYS ABLE TO ALTER IN VIVO INTENSTINAL ABSORPTION OF GLUCOSE

M. Lluch and F. Ponz (U. of Navarra, Fac. of Sci., Dept. of Physiol. and Biochem. (C.S.I.C.), Pamplona, Spain).

Revista Española de Fisiologia, vol. 24, no. 3, p. 117–119. 10 refs.

Contract IAEA 263/RB and Min. de Educ. y Cienc. supported research.

The minimum dose of X-rays necessary to alter the intestinal absorption of glucose within 96 hr. after irradiation is between 50 and 100 r. With 100 r absorption increases 45% at 96 hr., while with 600 r at 96 hr. there is a decrease of the same magnitude. Cysteamine is seen to be an effective radioprotector, eliminating the aforementioned increase in glucose absorption.

A69-81000

RADIOPROTECTIVE ACTION OF CYSTEAMINE WITH RESPECT TO RADIATION PRODUCED ALTERATIONS IN THE INTESTINAL ABSORPTION OF GLUCOSE.

M. Lluch and F. Ponz (U. of Navarra, Fac. of Sci., Dept. of Physiol. and Biochem. (C.S.I.C.), Pamplona, Spain).

Revista Española de Fisiologia, vol. 24, no. 3, 1968, p. 147–148.

Contract IAEA 263/RB and Min. de Educ. y Cienc. support research.

The radioprotective action of cysteamine with respect to radiation produced alterations in the intestinal absorption of glucose in rats was investigated. A simple injection of cysteamine did not affect the active transport of glucose. Irradiation inhibited almost 45% of the active transport. Cysteamine given at 10 and 5 mg./100 g. of body weight completely protected from the inhibition of absorption. The radioprotective action was lacking with doses of 1 and 2.5 mg./100 g.

A69-81001

SYSTEMIC AND PULMONARY CHANGES WITH INHALED HUMID ATMOSPHERES.

Thomas D. Graff and Donald W. Benson (Johns Hopkins Hosp. and U., Div. of Anesthesiol., Baltimore, Md.).

Anesthesiology, vol. 30, Feb. 1969, p. 199–207. 35 refs.

The systemic and pulmonary changes associated with inhaled humid atmospheres were reviewed. Two systemic problems in the use of high-density water aerosols were: (1) excessive absorption of water, leading to water and electrolyte imbalance; and (2) interference with mechanisms of heat loss from the respiratory tract that normally helps to regulate body temperature. Pulmonary changes included those associated with the hazards of bacterial contamination and infection, pathologic changes, and changes in surface activity. Three reasonable uses of humidity or mist in clinical medicine were given. They are: (1) to humidify inspired air or therapeutic gases that bypass the normal humidifying mechanisms of the nose and throat; (2) to deposit liquid water in the airways and thereby end in mobilization and evacuation of retained secretions; and (3) to provide greater patient comfort by the prevention of muscosal drying of inflamed or congested proximal airways.

A69-81002

SENSORIMOTOR ADAPTATION TO DISPLACED VISUAL FEEDBACK FROM OWN BODILY MOVEMENT [VISUMOTORISCHE ADAPTATION BEI GESTORTER VISUELLER RUCKKOPPLUNG EIGENER KORPERBEWEGUNGEN].

Christian Becker-Carus (Hamburg, U., Psychol. Inst., West Germany).

Psychologische Forschung, vol. 32, Nov. 27, 1968, p. 219–243. 26 refs. In German.

The predescribed rearrangement experiments were done to analyze the mechanism underlying sensorimotor coordination in man. Different possible feedback loops were experimentally strengthened or excluded by means of a mirror-apparatus including a device for a tracking task. The experiments showed that passive movement, in the absence of the opportunity for recognition of error does suffice to produce adaptation if the subject is ordered to pay attention to the felt position of the moving hand (strengthening

of the proprioceptive feedback loop). The shift is as large as with active arm movement. An additionally presented visual stimulus of comparison during the adaptation period is able to enlarge the shifts in reaching for the visible target. In the tracking condition a clear cut difference was to be found between the adaptation scores in terms of aftereffect and the adaptation scores measured directly. The course of adaptation under different conditions is measured from two to four to eight min. at the first and at the second day of adaptation. The experiments showed that adaptation of eight min. training could still be proved after an interval of about 24 hr. These results were discussed by means of a proposed model for the "Wirkungsgefüge". It is concluded that: (1) the reafferent feedback could be substituted by a proprioceptive feedback to gain the same extent of unconscious positive adaptation; (2) the amplification of the adaptation effect by means of the additional stimulus as well as the possibility to call on unconsciously the trained shift after a 24 hr. interval is seen to be an approval of the expectations deriving from the model; and (3) the progress of the directly measured adaptation in terms of the model is interpreted to be the result of two different effects. It is demonstrated, at last that the apparently contradictional results of some other authors can be derived from the model without difficulty.

A69-81003
QUALITY AND INTENSITY IN OLFACTORY PERCEPTION [INTENSITAT UND QUALITAT IN DER GERUCHSWAHRNEHMUNG].
Ingeborg Wender (Saarlandes, U., Psychol. Inst., West Germany).
Psychologische Forschung, vol. 32, Nov. 27, 1968, p. 244–276. 62 refs. In German.

In an experiment on olfaction 23 subjects judged 16 odors (four chemicals each in four concentrations) with respect to intensity and with respect to similarity for each pair of stimuli. Systematic interindividual variation can be found neither in the intensity nor in the similarity data. Multidimensional scaling according to Kruskal's procedure reveals a configuration in five dimensions, the exponent of the optimal Minkowski-metric (out of 25 alternative solutions) is $r=2.5$. This scaling is based on the medians of similarity judgments. One of the dimensions corresponds to a subjective scale of intensity, with a zero-point lying outside of the configuration. The quality of the stimuli depends on their concentrations. The perceived quality-changes differ in amount and directions for each of the chemicals.

A69-81004
STUDIES ON RADIATION-SENSITIVE MUTANTS OF E. COLI. 3. PARTICIPATION OF THE REC SYSTEM IN INDUCTION OF MUTATION BY ULTRAVIOLET IRRADIATION.
Akiko Miura and Jun-ichi Tomizawa (Japan, Natl. Inst. of Health, Dept. of Chem., Shinagawaku, Tokyo).
Molecular and General Genetics, vol. 103, Nov. 27, 1968, p. 1–10. 26 refs.
Grant PHS GM 08384.

Participation of the Rec system in the induction of mutation by ultraviolet (UV) irradiation was investigated using radiation-sensitive mutants of *Escherichia coli*. The bacterial recA gene participated in the induction by UV irradiation of the clear mutation of phase λ and the Lac^- mutation of bacteria. The necessary function was induced by irradiation of Rec^+ bacteria and acted upon DNA irradiated with UV light.

A69-81005
THE EFFECT OF CODABILITY OF THE STIMULUS ON RECOGNITION REACTION TIMES.
Gillian Cohen (Oxford, U., Inst. of Exptl. Psychol., Great Britain).
British Journal of Psychology, vol. 60, Feb. 1969, p. 25–29. 8 refs.

Recognition reaction times for four different kinds of stimuli are compared. The stimuli are simple lines, unpronounceable trigrams, three-letter words and nonsense syllables. The results can be explained in terms of the codability of the stimulus array. The effects of acoustic and visual confusability, and of the position of the different signs within an array, are also examined. The results confirm that the ease and economy with which a stimulus array can be labelled affects speed of recognition, and it follows that acoustic matching takes place when the stimuli are highly codable.

A69-81006
RESPONSE LATENCIES IN JUDGMENTS OF SPATIAL LOCATION.
Philip H. K. Seymour (Dundee, U., Dept. of Psychol., Great Britian).
British Journal of Psychology, vol. 60, Feb. 1969, p. 31–39. 19 refs.

Subjects were presented with the printed word *above* or *below* and a configuration consisting of a reference shape (a square) and a smaller shape of variable location (a blacked-in circle) which might appear above or below the square. The instruction was to report yes if the word and the location of the circle relative to the square were congruent, and no if they were not. The latency of this judgment was measured from the simultaneous onset of the displays to the initiation of the verbal response. The pair *above*/ABOVE was classified as congruent significantly more rapidly than the pair *below*/BELOW or either of the mismatched pairs. The order in which word and configuration were fixated was a significant factor, response times being faster where the word was fixated first.

A69-81007
THE CONTINUOUS MEASUREMENT OF ARTERIAL OXYGEN TENSION IN HUMANS [DIE FORTLAUFENDE MESSUNG DES ARTERIELLEN SAUERSTOFFDRUCKES BEIM MENSCHEN].
Helmut Fabel (Med. Hochschule, Med. Klin., Hannover, West Germany).
Archiv für Kreislaufforschung, vol. 57, Dec. 1968, p. 145–189. 90 refs. In German.

A new method to measure changes as small as 0.25 to 0.5 Torr pO_2 and down to two to three sec. duration is described. A platinum electrode is posed at the end of a double-barrelled intraarterial canula, in which coagulation of blood is inhibited by heparin. As blood flow through the capillary-electrode is very low (0.5 to 2.0 ml./min.) blood need not be reinfused. Results in healthy adults: (1) Mean arterial pO_2 during continuous recording in the absolutely quiet breathing man is about four Torr less ($pO_2=83.4$ Torr) than the pO_2 value obtained by the usual method with single samples ($pO_2=87.5$ Torr). (2) In 20 healthy adults (mean age 38 yr.) mean variations of pO_2 ranged between 77.3 and 91.5 Torr. In some people pO_2 fell below 70 Torr for short durations. For these reasons blood sampling in the usual technique may give incorrect results. (3) Periodical fluctuations of arterial pO_2 having the same period as ventilation were not observed in man during quiet breathing. (4) Beside the fluctuations of arterial pO_2

due to changes in alveolar pO_2 the largest fluctuations were recorded due to changes of functional venous admixture. (5) The continuous recording of arterial pO_2 combined with recording of pulmonary gas-mixing following the change of air breathing to oxygen breathing allows the determination of uneven ventilation-perfusion ratio (method described). (6) Oxygen breathing alters the ventilation-perfusion ratio in healthy adults enhancing perfusion of poor ventilated alveoli. (7) In extreme obesity functional venous admixture is very high due to the elevated diaphragm. This feature disappears in deep inspiration. If obesity is associated with bronchospasm, venous admixture is reduced. Results in obstructive emphysema: (1) In contrast to healthy adults arterial pO_2 during long lasting continuous measurement is not less than that sampled by arterial puncture in the usual way. (2) Individual fluctuations of arterial pO_2 are significantly less than in healthy adults. (3) Functional pulmonary right to left shunt is low in contrast to healthy adults. (4) Extreme emphysema is characterized by a lack of pO_2-increase, even following hyperventilation. (5) In emphysema the time of increase of arterial pO_2 following oxygen breathing usually exceeds the delayed rise of alveolar pO_2 indicating a relative overperfusion of "slow space". In opposition to this, "slow space" of some extreme emphysema (with bullae) is very poorly ventilated but better ventilated than perfused. (6) The course of continuously recorded arterial pO_2 during rest, work, and recovery differs characteristically from that of healthy adults. This fact depends on the severity of obstruction.

A69-81008
IMPROVED CAPACITY OF CONTRACTION RATE AND STROKE VOLUME THROUGH INOTROPIC MECHANISMS IN THE INTACT HEART IN SITU [STEIGERUNGSFAHIGKEIT VON KONTRAKTIONSGESHWINDIGKEIT UND SCHLAGVOLUMEN DURCH INOTROPE MECHANISMEN BEIM INTAKTEN HERZEN IN SITU]

R. Jacob, G. Kissling, and J. Segarra-Domenech (Würzburg, U., Physiol. Inst., West Germany).

Archiv für Kreislaufforschung, vol. 57, Dec. 1968, p. 291–323. 89 refs. In German.

Deut. Forschungsgemeinschaft supported research.

The effects of an exclusive improvement of the myocardial contractility (without any adaption on exercise of the total circulation) on the velocity of ventricular contraction and the stroke volume of the intact heart *in situ* were studied in lightly anesthetized dogs in supine position. As a model of an inotropic intervention sustained paired stimulation of the heart was considered. Right ventricular stimulation with single impulses was based as state of control. In closed chest dogs the average increase of stroke volume in steady state of improved contractility was only 7.6% in spite of considerable increase of the velocity of contraction (mean heart rate 96/min.). It is demonstrated by correlation and by compilation of simplified pressure volume diagrams that even in the fully intact heart postextrasystolic potentiation causes a considerable steepening of the end systolic pressure volume relation (maximum curves of afterloaded contractions). Comparative measurements of pressure in thoracotomized dogs under isovolumetric conditions proved a considerable increase of the isovolumetric peak pressure even if the contractility was primarily not or little impaired. The increase of the developed force results exclusively by a stronger systolic contraction, not by an increase of the diastolic distensibility of the completely relaxed ventricle. For constant conditions concerning distolic volume and systolic afterload the increase of stroke volume of the intact dog's heart by sustained paired stimulation is estimated at 18 to 25% on presented results grounds, while in the failing heart greater increases are possible. The following are regarded as the causes of the small or lack of increase in stroke volume of the intact heart which appears in the steady state in spite of a considerable increase of contractility: (1) a decrease of duration of the systole (prevailing of the velocity parameters); (2) a lack of proportionality between the possible increase of the isometric peak pressure on the one hand of the stroke volume and on the other hand (related to identical diastolic volumes and constant afterload), if the end diastolic pressure–volume relationship is steep under conditions of control; and (3) a decrease of the end diastolic volume of the ventricle as a consequence of a primary decrease of the end systolic volume with consecutive limitation of the stroke volume. The results might also contribute to the understanding of the effects of the heart glycosides in the non-failing heart. They refer to the importance of peripheric mechanisms for the regulation of the stroke volume and of the cardiac output under exercise.

A69-81009
THE OVERALL EFFECTS OF NOISE [DIE ALLGEMEINWIRKUNGEN DES LARMS].

W. Lorenz (Martin-Luther U. Halle-Wittenberg, Klin. für Hals-Nasen-Ohren-Krankh., Halle (Saale), East Germany).

Das Deutsche Gesundheitswesen, vol. 23, Dec. 12, 1968, p. 2379–2383. 38 refs. In German.

Noise effects manifest their traces by pathological changes of the inner ear, but also numerous other organs which are affected by excessive exposure to sound. Thus, numerous noise-exposed workers complain about nervous irritability, headache and sleeping disturbances. Vegetative reactions may be manifested by nausea, vomiting and certain disturbances of equilibrium which cannot be defined precisely. Moreover, much is known about the occurrence of chronic gastritides and gastroduodenitides in noise-exposed workers. As has been proved, excessive noise also exerts a negative effect on the circulatory system as well as on rhythm and depth of respiration. Finally, noise may also lead to humoral and hormonal changes. In some single cases, even a fatal effect has been ascribed to highly intensive jet-plane noise.

A69-81010
AUDIOLOGICAL DESCRIPTION AND HISTOLOGICAL BASIS OF NOISE INDUCED INNER EAR DAMAGE [DAS AUDIOLOGISCHE BILD UND HISTOLOGISCHE SUBSTRAT DES LARMBEDINGTEN INNENOHRSCHADENS].

W. Lorenz (Martin-Luther U. Halle-Wittenberg, Klin. und Poliklin. für Hals-Nasen-Ohren-Krankh., Halle (Saale), East Germany).

Das Deutsche Gesundheitswesen, vol. 23, Dec. 19, 1968, p. 2423–2426. 34 refs. In German.

Audiologically, four stages can be differed in the course of noise-induced hardness of hearing: the phase of adaptation, the phase of best compensation, the phase of breakdown and the phase of saturation. Mostly, a noise-induced chronic injury begins with a diminution of sound perception within a range of about 4,000 hz. A detectable correlation between the energy maximum of the detrimental noise and the frequency extent of the auditory threshold depression appears questionable. The anatomic substrate of chronic noise-induced injury consists of alterations of the hair cells of Corti's organ. At first, these alterations are initiated by a deformation and swelling of the outer hair cells. Later on, both the outer and the inner hair cells, as well as the marrowless nervous fibers are disintegrated. The above mentioned alterations appear to be due to metabolic disturbances caused by an insufficient blood circulation in the region of the stria vascularis which, in turn, results in a reduction of oxygen supply to the endolymph.

A69-81011
RESPONSES OF PRIMARY AND SECONDARY MUSCLE SPINDLE AFFERENTS TO SINUSOIDAL MECHANICAL STIMULATION. 2. VARIATION OF THE STATIC COMPONENT OF THE STIMULUS [REAKTIONEN PRIMARER UND SEKUNDARER MUSKELSPINDELAFFERENZEN AUF SINUSFORMIGE MECHANISCHE REIZUNG. 2. ANDERUNG DER STATISCHEN VORDEHNUNG].

H. Dabbert and O.-J. Grüsser (Free U., Physiol. Inst., Berlin, East Germany).

Pflügers Archiv European Journal of Physiology, vol. 304, Nov. 18, 1968, p. 258–270. 14 refs.
Deut. Forschungsgemeinschaft supported research.

The action potentials of primary and secondary muscle spindle afferents from the gastrocnemius muscle of the cat were recorded from small dorsal root filaments. The length of the gastrocnemius muscle was sinusoidally varied (1, 2.5 and 10 c.p.s.). The dependence of the response on the static component of the stimulus (D_o) above the threshold (D_s) on which the sinusoidal stimulus was superimposed was determined. The average impulse frequency (R) is dependent on the muscle length: $R=k\ D_o+c$ [Impulses $sec.^{-1}$]. With additional sinusoidal stimulation the equation $R=k^*\ D_o+c+c_d$ [Impulses x $sec.^{-1}$] was valid. Not only the additive constant c_d but also the multiplicate constant k^* depended on the frequency of the sinusoidal stimuli and on the degree of modulation. This is believed to be a further indication of non-linear properties of the investigated system.

A69-81012
THE DEPENDENCE OF SURFACE FORCES OF ISOLATED RAT LUNGS ON VENTILATION, TEMPERATURE AND METABOLISM [DIE ABHANGIGKEIT DER OBERFLACHENKRAFTE ISOLIERTER RATTENLUNGEN VON ATMUNG, TEMPERATUR UND STOFFWECHSEL].

E. Lingelbach, R. Rüfer, and Chr. Stolz (Max-Planck-Inst. für exptl. Med., Abt. Physiol., Göttingen, West Germany).

Pflügers Archiv European Journal of Physiology, vol. 304, Nov. 23, 1968, p. 315–321. 8 refs. In German.
Bergbau-Berufsgenossenschaft Bochum supported research.

The effect of ventilation on the lung alveolar lining layer was demonstrated by analysis of pressure–volume diagrams. Ventilation of isolated rat lungs at intrapulmonary pressures of 0 to 25 cm. H_2O caused an increase of surface forces in the lungs. After ventilation was stopped the lungs were kept inflated at intrapulmonary pressures of 25 cm. H_2O up to 60 min. Subsequent analysis of the pressure–volume diagrams indicated a decrease of surface forces at 37°C. while at 20 to 24°C. only little recovery occurred. The influence of ventilation with N_2 or poisoning with KCN on aerobic cell metabolism was investigated. The increase of surface forces was only slightly more pronounced by anoxia during lung-ventilation than in the above experiments. Aerobic cell metabolism, therefore, did not play an important role in the experiments. It is very likely that the decrease of surface activity following ventilation was caused by mechanical changes of the alveolar surfactant was inactivated. Recovery can be explained by new spreading of inactivated materials or by passage of lung alveolar surfactant from the alveolar cells to the alveolar surface.

A69-81013
MODIFICATION OF VESTIBULAR NYSTAGMUS AND "VERTIGO" BY MEANS OF VISUAL STIMULATION.

William E. Collins (FAA, Civil Aeromed. Inst., Psychol. Lab., Oklahoma City, Okla.).

Transactions American Academy of Ophthalmology and Otolaryngology, vol. 72, Nov.–Dec. 1968, p. 962–979. 17 refs.
Am. Acad. of Ophthalmol. and Otolaryngol., 72nd Ann. Session, Chicago, Oct. 29–Nov. 3, 1967.

Visual information in conflict with vestibular signals was presented to groups of subjects by illuminating the test room for brief periods during angular deceleration, or immediately after termination of deceleration. Trials were otherwise in total darkness. Both primary nystagmus and primary subjective reactions were markedly shortened during the periods of darkness subsequent to the intervals of light. In addition, strong secondary reactions (nystagmic and subjective) frequently followed the vision-attenuated primary responses.

A69-81014
NASA AND FLIGHT SAFETY RESEARCH.

Charles W. Harper (NASA, Office of Advan. Res. and Technol., Washington, D.C.).

Air Line Pilot, vol. 38, Feb. 1969, p. 10–11.
ALPA, 15th Ann. Air Safety Forum, Seattle, Jul. 9, 1968.

The problems encountered in flight safety research and some solutions undertaken by the National Aeronautics and Space Administration were discussed. It was concluded that safety will be realized by having a built-in and predetermined response to all failure modes of every aircraft.

A69-81015
PATIENT SURVEILLANCE BY COMPUTER.

Howard M. Hochberg, James W. McAllister, Juan Calatayud, Cesar A. Caceres (HEW, Dept., PHS, Washington, D.C.), and Patricia Russell (George Washington U., Hosp., Washington, D.C.).

AORN Journal, vol. 9, Jan. 1969, p. 42–47.

The usefulness of automated monitoring systems for use in patient surveillance was discussed. A description of the system already available for coronary care units and operating rooms was presented. Use of such patient monitoring systems and analysis systems will relieve the doctor and nurse of some aspects of patient surveillance.

A69-81016
LEUKEMIA IN A RHESUS MONKEY (*MACACA MULATTA*) FOLLOWING EXPOSURE TO WHOLE-BODY PROTON IRRADIATION.

Alan M. Siegal, Harold W. Casey, Robert W. Bowman, and Joseph E. Traynor (USAF School of Aerospace Med., Aerospace Med. Div., Radiobiol. and Biosci. Div., Brooks AFB, Tex.).

Blood, vol. 32, Dec. 1968, p. 989–996. 10 refs.
NASA supported research.

A rhesus monkey (*Macaca mulatta*) developed acute granulocytic leukemia two and one-half yr. after whole-body irradiation with protons. This was the third reported case of primate leukemia following irradiation.

A69-81017
BURN INJURY AFTER CARBON DIOXIDE LASER IRRADIATION.

Martin S. Litwin (Tulane U., Med. School, New Orleans, La.), Samuel Fine (Northeastern U., Boston), Edmund Klein (Roswell Park Mem. Inst., Buffalo, N.Y.), and Ben S. Fine (George Washington U., Med. School, Washington, D.C.).
Archives of Surgery, vol. 98, Feb. 1969, p. 219–222. 10 refs.
Contracts DA-49-193-MD-2436, DA-49-193-MD-2437, DA-49-193-MD-2680, and DADA17-67-C-7049; Grants PHS RH 00361-01-RAH, PHS R01-CA-08901-01, and PHS 1-K3-HE-38, 604-01.

Experiments were conducted in animals to show the biologic effects of exposure to continuous wave CO_2 laser radiation. Effects noted were those of localized heat injury. Severity was directly related to exposure time, power output, and power density. A 1,000-w. CO_2 laser beam at a tissue penetration rate of 0.001 cm./sec./w./sq. cm. can be expected to produce a localized soft-tissue burn one cm. deep over an area of one sq. cm. within one sec. Concussion injury, elastic propagation of shock waves and over-pressures in closed cavities have not been problems with the CO_2 laser.

A69-81018
A MODEL OF THYROXINE METABOLISM BASED ON THE EFFECTS OF ENVIRONMENTAL TEMPERATURE.
W. A. Harland and J. S. Orr (Glasgow, U., Western Infirmary, Pathol. Dept. and Western Reg. Hosp. Board, Reg. Physics Dept., Glasgow, Great Britain).
Journal of Physiology, vol. 200, Feb. 1969, p. 297–310. 17 refs.

Evidence is presented that, in rats, the whole body and plasma half-lives of [^{131}I] thyroxine are different. It is shown that the whole body half-life can be influenced by environmental temperature: plasma half-life is influenced to a much lesser extent. It is demonstrated that, in the rabbit, free labelled thyroxine and plasma bound labelled thyroxine leave the plasma at different rates when administered by intravenous injection. It is deduced from the above and other evidence that the currently accepted view of thyroxine distribution and metabolism is invalid and a model compatible with the evidence is presented and discussed. The essential feature of the model is that protein binding in plasma or in various tissues, once it has occurred, may be regarded as being irreversible and that no significant interchange takes place. Indices of thyroxine metabolism are derived. These enable thyroxine content and turnover of the whole body or of individual organs to be measured.

A69-81019
BLOOD VOLUME CHANGES IN OUT DOOR EXERCISE OF 8–10 HOUR DURATION.
L. G. C. E. Pugh (Natl. Inst. for Med. Res., Lab. for Field Physiol., London, Great Britain).
Journal of Physiology, vol. 200, Feb. 1969, p. 345–351. 14 refs.

Blood volume was measured with carbon monoxide on six hill-walkers before and immediately after a 28-mile walk on two occasions. The subjects had free access to food and fluid. Blood volume increased and hematocrit fell significantly on both occasions compared with the control observations. The mean increase of blood volume was 204 ml. or 3.9% ($P<0.01$) and the mean reduction of hematocrit was 2.1% ($P<0.02$). Plasma volume calculated from these results increased by 233 ml. or 7.3%. There was no significant change in red cell volume or plasma protein concentration. These changes are the opposite of those taking place in short-term exercise and suggest that in the absence of dehydration a compensatory adjustment of blood volume takes place during exercise of many hours duration.

A69-81020
THE DYNAMICS OF SMALL SACCADIC EYE MOVEMENTS.
J. G. Thomas (U. Coll., Eng. Dept., Cardiff, Great Britain).
Journal of Physiology, vol. 200, Jan. 1969, p. 109–127. 24 refs.

The mechanical characteristics of the system comprising the eyeball and its attachments were determined, by applying rotational forces to the eyeball, and using an accelerometer on a contact lens to measure the resulting movement. The angular acceleration-versus-time curves of small saccades were recorded. Some of these saccades are made while the eye is being vibrated by external forces. A mechanical model of the orbital system was formulated. This is considered to bear a relationship to the structures in the orbit. The model was used to deduce the force pattern of the active component in the extraocular muscles during the execution of a saccade. It is concluded that a saccade is initiated by a rapid rise of tension. After a short time, the tension falls to a lower level, which is the new steady-state level. The present findings are therefore basically different from those of previous workers, in that a change is deduced in the force pattern during the course of the movement.

A69-81021
FLASH BLEACHING OF RHODOPSIN IN THE HUMAN RETINA.
H. Ripps and R. A. Weale (N.Y., U., Med. Center, Dept. of Ophthalmol., New York).
Journal of Physiology, vol. 200, Jan. 1969, p. 151–159. 26 refs.
Grants PHS NB-05487 and PHS K3-NB-18,766.

Measurements were made of the photo-sensitivity of rhodopsin in the living human retina following bleaching with (a) a flash less than one msec. in duration, and (b) a continuous exposure lasting 30 sec. The apparatus consisted of a fundus reflectometer coupled to a computer for on-line processing. Three subjects were studied. The relations between the quantity of pigment bleached and the incident energy are so similar for the flash and continuous exposure tests that the occurrence of photo-reversal (such as has been reported in similar circumstances for visual pigment in solution) seems to be ruled out. Nonetheless, the two experimental conditions lead qualitatively to two different photo-chemical states in as much as the density difference spectrum for the flash exposure is displaced toward longer wave-lengths in comparison with the data obtained with the continuous exposure. The results are discussed with reference to the sequence of events following the bleaching of visual pigment solutions as reported by other workers.

A69-81022
APPARENT SIZE AS A DETERMINER OF FIGURAL AFTER-EFFECTS. 1.
Kyösti Kolehmainen (Turku, U., Inst. of Psychol., Finland).
Scandinavian Journal of Psychology, vol. 9, no. 4, 1968, p. 230–236. 17 refs.

Apparent size as a determiner of figural after-effects (FAE) was studied by presenting the inspection figures in drawings which appeared three-dimensional because of gradient-effects. Significant FAEs were found. It is argued that apparent size does not determine FAE directly but an apparent decrement in the size of the test figure is connected to an after-effect in third-dimension.

A69-81023
APPARENT SIZE AS A DETERMINER OF FIGURAL AFTER-EFFECTS. 2.
Kyösti Kolehmainen (Turku, U., Inst. of Psychol., Finland).
Scandinavian Journal of Psychology, vol. 9, no. 4, 1968, p. 237–240. 8 refs.

A brightly illuminated circle (TF) was flashed at distance d. The subject projected the after-image of TF on a screen placed at distance d/2, and fixated the after-image, which appeared to be half the size of the stimulus figure. Then TF and a comparison circle (CF) of equal size were shown, faintly illuminated, at distance d. A clear-cut figural after-effect occurred: TF was perceived to be larger. It is suggested that TF appeared dimmer after the fixation and was perceived to be farther away than CF. As a consequence of this TF looked larger.

A69-81024
ROD VISION AS CHROMATIC VISION.
Bjørn Stabell (Oslo, U., Inst. of Psychol., Norway).
Scandinavian Journal of Psychology, vol. 9, no. 4, 1968, p. 282–288. 15 refs.
Norweg. Res. Council for Sci. and Humanities supported research.

Evidence was presented in an attempt to support the assumption that the color-related response, triggered by the test stimulation, is generated centrally to the photochemical system of the rods. It was found that: (1) the smallest quantity of light pre-stimulation which produces color upon test-stimulation, stands in unique relation to the intensity of the specific threshold; and (2) that the size of the pre- and test-stimulation fields may affect the duration of the after-image. The results are judged to indicate that pre-stimulation of cones creates the disposition for the color-related response, and that the color-related response is generated centrally to the photochemical systems of the receptors.

A69-81025
THE ROLE OF THE CEREBRAL CORTEX AND THE MEDIAL GENICULATE BODIES IN THE ANALYSIS OF INDIVIDUAL PARAMETERS OF ACOUSTIC CONDITIONED STIMULI OF DIFFERENT DURATION [ZNACHENIE KORY BOL'SHIKH POLUSHARII I VNUTRENNIKH KOLENCHATYKH TEL V FUNKTSII ANALIZA OTDEL'NYKH PARAMETROV ZVUKOVYKH USLOVNYKH RAZDRAZHITELEI RAZNOI DLITEL'NOSTI].
M. M. Khananashvili (USSR, Acad. of Med. Sci., I. P. Pavlov Inst. of Exptl. Med., Leningrad).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 18, Sep.–Oct. 1968, p. 755–764. 31 refs. In Russian.

The structural organization of the function of analysis of acoustic stimuli parameters (intensity, frequency, time increase, localization) and the significance of signal duration for this function were studied on dogs by means of the motor food conditioned reflexes. The following operations were performed: switching off the neocortex by sectioning all its projection connections, removal of the temporal area or of its separate gyri and destruction of the medial geniculate bodies. It has been shown that the analysis of spatial and temporal characteristics of acoustic signals is to a considerable extent determined by cortical mechanisms, while analysis of signals' intensity and frequency occurs at the subcortical level. The subcortical structures, however, perform this function only when the signal lasts a certain time: discrimination of short duration signals (less than 100 msec.) takes place in normal animals with the participation of the cerebral cortex. The data obtained testify that, first, the cerebral cortex plays a major role in retaining excitation traces when the signal lasts a short time, and thus provides for their analysis, and, secondly, it exerts a stabilizing and toning effect on the subcortical analyzing mechanisms.

A69-81026
PARTICIPATION OF THE VISUAL CORTICAL UNITS IN THE CONDITIONED REFLEX TO TIME IN RABBITS [UCHASTIE NEIRONOV ZRITEL'NOI KORY KROLIKA V USLOVNOM REFLEKSE NA VREMIA].
A. Bagdonas, V. B. Polianskii, and E. N. Sokolov (M. V. Lomonosov Moscow State U., Dept. of Physiol. of Higher Nervous Activity, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 18, Sep.–Oct. 1968, p. 791–798. 7 refs. In Russian.

Forty-seven units in the visual cortex of non-anesthetized rabbits were studied by means of chronically implanted extracellular micro-electrodes. Three of them exhibited signs of the conditioned reflex to time in the form of spike appearance, preceding the actual stimulation, and of the appearance of a discharge pattern typical of the action of a flash. In addition to the conditioned reflex to time, repetition of flashes led to the intensification and stabilization of the spike discharge. The achieved stabilization of the response is desynchronized and disturbed when the stereotype of stimuli presentation was changed. The observed changes in the spike discharge in response to signals given with regular intervals were due to the following interactions: (a) extinction of the orienting response; (b) enhanced excitability of the networks of visual analyzer; (c) involvement of the neuronal mechanisms of time count, connected with the effect of extrapolation and reproduction of the specific discharge pattern when the signal was omitted.

A69-81027
INFLUENCE OF PIRIDROL ON CONDITIONED REFLEXES AND THE BEHAVIOR OF DOGS IN EXPERIMENTAL DEFENSIVE SURROUNDINGS [VLIIANIE PIRIDROLA NA USLOVNYE REFLEKSY I POVEDENIE SOBAK V EKSPERIMENTAL'NOI OBORONITEL'NOI OBSTANOVKE].
A. IA. Mekhedova (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 18, Sep.–Oct. 1968, p. 807–812. 26 refs. In Russian.

Motor defensive reflexes were elaborated in three dogs under ordinary experimental conditions and during a chronic administration of piridol (meratran). The effects of the drug on stable reflexes were studied in experiments with single and chronic administrations. The rate of appearance and stabilization of the defensive conditioned reactions proved to be equal in both cases. However, the behavior of the animals under experimental defensive surroundings, both with chronic and single drug administration, was calmer than under the usual experimental conditions. The latter fact suggested that piridrol diminished the emotional stress (fear) owing to the shifts in the sympatho-parasympathetic balance.

A69-81028
DYNAMICS OF HUMAN CORTICAL ELECTRICAL RESPONSES TO PHOTIC STIMULATION UNDER THE INFLUENCE OF INTENSE NOISE [O DINAMIKE KORTIKAL'NYKH ELEKTRICHESKIKH OTVETOV CHELOVEKA NA SVETOVUIU STIMULIATSIIU PRI DEISTVII INTENSIVNOGO SHUMA].
A. B. Strakhov (Gorki Med. Inst., Dept. of Normal Physiol., USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 18, Sep.–Oct. 1968, p. 873–879. 16 refs. In Russian.

The effect of high-frequency noise of 95 to 100 db on man is attended with a generalized alpha-rhythm depression developing over a period exceeding ten min. Photic stimulation, applied at the beginning of the noise, leads to the emergence of

alpha-rhythm bursts which weaken and completely disappear as the noise action continues. Discontinuation of the noise first brings about new bursts of alpha-rhythm in response to photic stimulation, and subsequently complete restoration. The use of M-cholinolytics (scopolamine, vasano) delays the development of these changes. The data obtained are regarded as a result of the development of an inhibitory state in the cerebral cortex due to the activation by noise of the reticular structures of the inferior parts of the brain-stem and the release of inhibitory mechanisms of the non-specific thalamus.

A69-81029

MANIFESTATION OF THE EXCITABILITY OF THE VISUAL CENTERS IN THE SPONTANEOUS EEG IN MAN [OTRAZHENIE VOZBUDIMOSTI ZRITEL'NYKH TSENTROV NA SPONTANNOI ELEKTROENTSEFALOGRAMME CHELOVEKA].

V. I. Shostak (S. M. Kirov Mil.–Med. Acad., Dept. of Normal Physiol., Leningrad, USSR).

Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 18, Sep.–Oct. 1968, p. 880–885. 7 refs. In Russian.

Fully dark adapted subjects were presented with short intense light flashes, and then the electrical sensitivity of the eye, and the critical frequency of phosphene disappearance were measured and a record was made of the spontaneous bioelectrical activity in the occipital cortical region. A close linear correlation was found between the total electroencephalogram (EEG) energy and the alpha-rhythm energy on the one hand, and electrical excitability and critical frequency, on the other. The data obtained led to the conclusion that spontaneous EEG might be used for studying the excitability of visual centers.

A69-81030

CHANGES IN THE SUMMATION OF THE ELECTRICAL ACTIVITY AT SOME LEVELS OF THE VISUAL ANALYZER INDUCED BY CALORIC STIMULATION OF THE VESTIBULAR SYSTEM IN RABBITS [IZMENENIE SUMMARNOI ELEKTRICHESKOI AKTIVNOSTI NEKOTORYKH UROVNEI ZRITEL'NOGO ANALIZATORA POD VLIIANIEM KALORICHESKOGO RAZDRAZHENIIA VESTIBULIARNOI SISTEMY KROLIKA].

V. M. Kamenkovich (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).

Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 18, Sep.–Oct. 1968, p. 912–914. 7 refs. In Russian.

Experiments were carried out on unrestrained rabbits with permanently implanted microelectrodes in the cortex, to study the effect of vestibular stimulation on the electrical activity of the visual cortex. The frequency of the light stimulus used was eight c.p.s. with an intensity that would elicit an assimilated rhythm amplitude that would not exceed the background potentials by more than two to three times. Dry heat was used for the vestibular stimulation. Electroencephalograms and nystagmograms were recorded. It was found that caloric stimulation of the vestibular apparatus elicited a depression of the middle frequency amplitudes of the summation of electrical activity of the visual cortex, the lateral geniculate body and the mesencephalon reticular formation. This response was not similar in all the rabbits. The amplitude of the assimilated rhythms increased in some experiments and decreased in others in the same animal. It was inferred that when two different stimuli (light, vestibular) were applied, different reception of the stimulation by the vestibular system produced different results, and therefore the findings could not be utilized for the analysis of adequate vestibular stimulation effects.

A69-81031

COMPLEX VIGILANCE: RELEVANT AND IRRELEVANT SIGNALS.

Irwin L. Goldstein (Md., U., College Park), William A. Johnston, and William C. Howell (Ohio State U., Columbus).

Journal of Applied Psychology, vol. 53, Feb. 1969, p. 45–48. 7 refs.

Contract AF 30(602)-3622.

Human monitors were required to detect additions and deletions of experimentally defined relevant signals which were presented via a computer on an 8×8 matrix display. The ratio of relevant to irrelevant stimuli on the display (20:10, 15:15, 10:20) and ratio of relevant to irrelevant signals or changes (40:20, 20:40 per 100-min. period) were investigated. Vigilance decrements were found in the detection of omit signals with the greatest decrements occurring in the experimental condition where the proportion of relevant to irrelevant signal changes was smallest.

A69-81032

ALTERATIONS OF PINEAL GLAND BIORHYTHMS BY N-METHYL-3-PIPERIDYL BENZILATE (JB336).

James H. Merritt and Thomas S. Sulkowski (USAF School of Aerospace Med., Biosci. Div., Pharmacol.–Biochem. Branch, Brooks AFB, Tex.).

Journal of Pharmacology and Experimental Therapeutics, vol. 166, Mar. 1969, p. 119–124. 22 refs.

N-methyl-3-piperidyl benzilate (JB336), an anticholinergic psychotogenic agent, disrupts the circadian rhythm of serotonin in the rat pineal gland when the drug is administered at 0800 hr. The dose used, one mg./kg., has no effect on the whole rat brain serotonin. JB336 alters hydroxyindole-O-methyltransferase activity at various times of the 24-hr. day. Protein and total ribonucleic acid content of the rat pineal gland are found to have circadian rhythms. These rhythms are also disrupted by a single injection of one mg. of JB336 per kg. administered at 0800 hr.

A69-81033

STUDIES ON THE ALIMENTARY FLORA OF PIG. 3. INFLUENCE OF FERMENTED-CHLORELLA DIET ON THE FECAL FLORA.

Manabu Ogata, Yoshiyuki Morishita, Yutaka Tanaka, Toshiharu Shinjo (Tokyo, U., Fac. of Agr., Dept. of Vet. Microbiol., Japan), and Kazuo Uchida (Nippon Vet. and Zootech. Coll., Dept. of Vet. Hyg., Musashi Sakai, Tokyo, Japan).

Japanese Journal of Veterinary Science, vol. 30, Oct. 1968, p. 287.

Viable counts were made of the fecal flora of four pigs fed a fermented-*Chlorella* diet in exchange for a commercial diet. Streptococci, veillonellae, coliforms, and staphylococci were reduced after the exchange of diet and particularly showed a great decrease in count in and after the second week. Accordingly, it is clear that these four groups of bacteria were suppressed by the fermented-*Chlorella* diet. Yeasts began to show a considerable increase in the third week after the exchange of diet. Pedicocci were frequently found in considerable numbers in the feces in the fourth week and the last week after the exchange of diet. This may indicate that some changes have occurred in the contents of the digestive tract to such an extent as to allow these bacteria and yeasts to survive or multiply. The administration of the fermented-*Chlorella* diet had no significant influence on the quantities of lactobacilli, bacteroides, and bifidobacteria. Anaerobic streptococci (principally *Peptostreptococcus elsdenii*) were frequently found in considerable numbers during the experimental period.

A69-81034
STUDIES OF THE GROWTH IN CULTURE OF EXCISED WHEAT ROOTS. 6. INFLUENCE OF CARBON DIOXIDE ON GROWTH AND BRANCHING
Beryl Talbot and H. E. Street.
Physiologia Plantarum, vol. 21, no. 4, 1968, p. 800–805. 14 refs.

Aeration of root culture medium with air containing 5% or 10% CO_2 enhances growth, particularly lateral initiation and growth, compared with aeration with air or CO_2-free air. This beneficial effect of enhanced CO_2 pressure on the growth of cultured roots of Atson Elite 56 wheat can also be demonstrated in presence of a high (40%) and inhibiting level of oxygen. Carbon-14 labelling from a carbonate-bicarbonate solution of pH 7.0 by cultured wheat roots is enhanced by light and this labelling is not inhibited by the presence of 1% ethyl urethane.

A69-81035
ON THE DELIMITATION OF CHLOROPHYLL FORMATION AFTER AN IRRADIATION WITH A SHARPLY DEFINED LIGHT AREA.
Hemming I. Virgin and Lars G. Arvidsson (Göteborg, U., Dept. of Plant Physiol., Sweden).
Physiologia Plantarum, vol. 21, no. 6, 1968, p. 1177–1184. 25 refs.

Leaves of dark grown wheat seedlings have been irradiated for a few minutes with a strictly defined beam of red light. After a stay in darkness for six hr. the whole leaves were irradiated for three hr. The pre-irradiated spot will then stand out greener than the rest of the leaf, due to accelerated formation of photochlorophyll, and will consequently show a higher concentration of chlorophyll *a*. By scanning the leaf with a microphotometer it was shown that no spread whatsoever of the effect of the light impulse takes place, i.e. the phytochrome, which is one of the light absorbing systems, exerts its effect strictly locally. This is in contrast to many other red light effects on photomorphogenetic phenomena characterized by a rapid spread of the stimulus. The two kinds of phytochrome actions are discussed.

A69-81036
VENTROMEDIAL HYPOTHALAMIC LESIONS AND CHANGES IN BODY WEIGHT AND FOOD CONSUMPTION IN MALE AND FEMALE RATS.
Verne C. Cox, Jan W. Kakolewski, and Elliot S. Valenstein (Fels Res. Inst., Yellow Springs, Ohio).
Journal of Comparative and Physiological Psychology, vol. 67, Mar. 1969, p. 320–326. 22 refs.
NASA Grant NSG-437, Grants PHS M-4529 and PHS MH-4947.

Ventromedial hypthalamic (VMH) lesions had differential effects in male and female rats. When males and females were matched for either age or weight, lesioned females displayed greater hyperphagia and weight gain than did males. Extensive bilateral VMH damage resulted in diminished rate of weight gain in males, in spite of increased food intake.

A69-81037
ALCOHOLIC CARDIOMYOPATHY.
G. E. Burch and N. P. DePasquale.
Cardiologia, vol. 52, no. 1–2, 1968, p. 48–56. 26 refs.

Excessive alcoholic intake may result in heart muscle disease (cardiomyopathy) as a result of a direct toxic effect of alcohol on the myocardium, from nutritional deficiency and from a relative deficiency of thiamine. Thiamine deficiency is a rare cause of heart muscle disease in the United States. On the other hand, myocardial degeneration secondary to the toxic effects of alcohol, perhaps conditioned by malnutrition, infection, and physical stress, is relatively common. Indeed, in adult patients alcoholic cardiomyopathy probably occurs more frequently than congenital heart disease or thyrotoxic heart disease. The common form of alcoholic cardiomyopathy observed in the United States is clinically distinct from alcoholic beriberi heart disease. Whereas right heart failure, a rapid circulation and marked clinical improvement following thiamine deficiency characterize beriberi heart disease, in the more common type of alcoholic cardiomyopathy, signs of both left and right heart failure are common and thiamine deficiency is therapeutically ineffective.

A69-81038
AN IMPROVED BIOASSAY FOR CALCITONIN.
W. C. Sturtridge and M. A. Kumar (Toronto, U., Dept. of Pharmacol., Canada).
Journal of Endocrinology, vol. 42, Dec. 1968, p. 501–503. 7 refs.
Natl. Res. Council, Med. Res. Council, and J. P. Bickell Found. supported research.

A sensitive method for the assay of calcitonin is described with a much lower detection limit than that reported hitherto. Calcitonin was injected intravenously into fasting Wistar rats and aortic blood was collected 30 min. later under anesthesia. Equivalent hypocalcemia was produced in 3-wk.-old rats by doses less than a third of those required in 5-wk.-old ones. Less than 0.1 m-u. calcitonin/3-wk.-old rat could be measured with an index of precision of about 0.2.

A69-81039
COMPARATIVE CHARACTERISTIC OF THE GROWTH AND DIRECTION OF THE BIOSYNTHETIC PATHWAYS OF CHLORELLA STRAINS UNDER CONDITIONS OF NITROGEN DEFICIENCY. 1. GROWTH AND PRODUCTIVITY [SRAVNITEL'NAIA KHARAKTERISTIKA ROSTA I NAPRAVLENNOSTI BIOSINTEZA RAZLICHNYKH SHTAMMOV KHLORELLY V USLOVIIAKH AZOTNOGO GOLODANIIA. 1. IZUCHENIE ROSTA I PRODUKTIVNOSTI]
M. G. Vladimirova, G. L. Kliachko-Gurvich, T. A. Kurnosova, and T. S. Zhukova (USSR, Acad. of Sci., K. A. Timiriazev Inst. of Plant Physiol., Moscow).
Fiziologiia Rastenii, vol. 15, Nov.–Dec. 1968, p. 993–1001. 28 refs. In Russian.

The physiological and morphological response of 13 *Chlorella* strains to the exclusion of nitrogen from the nutrient medium was studied. The response of the strains to nitrogen deficiency differed in productivity, multiplication rate, growth and morphology of the cells. The variations could not be correlated to either the taxonomic characteristics of the plants or the cultures productivity under normal conditions. However, a correlation between the growth reaction (change of weight) and variation of the size and structural organization of the cell was found. The first response of some varieties to nitrogen deficiency was a slowing down or cessation of division, increase of weight and size of the cells and appearance of strong granulation of the cellular contents. In other varieties division was accelerated and the cells formed were smaller and lighter than those in the control plants. Inclusions possessing the shape of globules were formed in such cells. Some strains occupied an intermediate position.

A69-81040
EFFECT OF SIMAZIN ON THE PHOTOSYNTHETIC PIGMENTS OF GREEN ALGAE [VLIIANIE SIMAZINA NA FOTOSINTETICHESKIE PIGMENTY ZELENYKH VODOROSLEI].
L. N. Paromenskaia and G. N. Lialin (A. A. Zhdanov Leningrad State U., All-Union Sci. Res. Inst. of Agr. Microbiol., USSR).
Fiziologiia Rastenii, vol. 15, Nov.–Dec. 1968, p. 1002–1007. 17 refs. In Russian.

The amount of chlorophylls *a* and *b*, carotene, lutein and violaxanthin and the chlorophyll fluorescence spectra are determined after 2, 7 and 17 days of incubation of three species of green algae in a medium containing or not containing simazin. The pigment content and particularly that of lutein, carotine and chlorophyll *a* dropped in cells of the herbicide-sensitive species (*Chlorella vulgaris* and *Ankistrodesmus brauni*). A study of the chlorophyll luminescence spectra indicates that the decrease of the chlorophyll content is due to a direct interaction between the pigment and simazin. In the species which is resistant to the herbicide (*Chlorosarcina* sp.) such an interaction occurs after only two days which probably explains, at least partly, the disintoxication of simazin observed in the cells of the algae.

A69-81041
ILLUSIONS IN CONCRETE SITUATIONS. 1. INTRODUCTION AND DEMONSTRATIONS.
G. H. Fisher and Ann Lucas (Newcastle upon Tyne, U., Dept. of Psychol., Great Britain).
Ergonomics, vol. 12, Jan. 1969, p. 11–24. 34 refs.
Contract MD 70/GEN/9617.

Attention is drawn to the antipathy of a number of authorities towards experimental study of illusions. Much of this is based upon the view that illusory spatial distortions fail to become evident in two-dimensional projections of real-life scenes and solid objects. This implies that the appearances assumed by illusory patterns are irrelevant for understanding the broader issues of visual perception. Sets of line-drawings, photographs and projections of features of well-known and widely-used information-display equipment are described and illustrated. The appearances assumed by these suggest that many examples of illusory distortion become clearly apparent in situations closely resembling those of real life. The conclusion drawn is that the arguments which claim that illusions have no relevance to space and shape perception are unfounded and that these arguments have been instrumental in delaying understanding of the functional repertoire of the visual projection system.

A69-81042
PHYSICAL FITNESS AND BODY BUILD OF YOUNG MEN AND WOMEN.
A. W. Sloan (Cape Town, U., Dept. of Physiol. and Med. Biochem., South Africa).
Ergonomics, vol. 12, Jan. 1969, p. 25–32. 35 refs.
Va., Med. Coll., Cape Town, U., and South African Council for Sci. and Ind. Res. supported research.

The fitness index (FI), assessed by the Harvard Step Test, and height, weight and body fat (expressed as a percentage of body weight), were determined on young men and women in Cape Town, South Africa and in Richmond, Virginia. There was no significant difference in height surface area, reciprocal ponderal index (RPI) or body fat between the two groups of men or the two groups of women, but the American men were heavier than the South Africans and both American groups had lower mean FIs than the corresponding South African groups. Only in American men were the heavier subjects less fit and the more linear (high RPI) more fit. In both groups of men, but not in women, there was highly significant negative correlation between FI and body fat. In terms of relative ectomorphy, mesomorphy and endomorphy, male, but not female, endomorphs were significantly less fit. In men who performed work on a bicycle ergometer the more obese subjects showed no impairment of work capacity with a standard work-load, but had lower FIs when the work-load was proportional to the body weight.

A69-81043
THE EFFECT OF KNEE-JOINT ANGLE ON HARVARD STEP-TEST PERFORMANCE.
G. Ariel (Mass., U., Boyden Gymnasium, Amherst).
Ergonomics, vol. 12, Jan. 1969, p. 33–37. 9 refs.

The purpose of this study was to determine whether the angle of the knee joint has an effect on the Fitness Index Scores of the Harvard Step-Test (HST). Thirty-three young Caucasoid male subjects were used in this study. The HST was administered in four different knee-joint angles. A repeated measures one-way classification analysis of variance, a one-way classification analysis of variance and an analysis of covariance were used to analyze the data obtained during nine wk. All tests yielded significant F ratios at the 0.01 level of confidence. Based on these findings, persons who perform the HST in different knee-joint angles have indices which are not measuring cardiopulmonary stress on the same scale. The HST based on standardization of the knee-joint angle promises to increase the evaluating or discriminating power of the test.

A69-81044
ENERGY LEVELS OF HUMAN BODY SEGMENTS DURING LEVEL WALKING.
H. J. Ralston and L. Lukin (Calif., U., Med. Center, Biomech. Lab., San Francisco).
Ergonomics, vol. 12, Jan. 1969, p. 39–46. 14 refs.
NASA and NIH supported research.

A method is described for measuring the mechanical energy levels of the principal body segments during walking at moderate speeds on the treadmill. Together with metabolic measurements, the method provides a powerful means of analyzing human locomotion. It is shown that the energy level of the HAT (head+arms+trunk) tends to remain constant—except for a period during transition from stance to swing—and therefore acts as a semi-conservative system. The main input of muscular work occurs during the period shortly preceding and following heel contact, agreeing with electromyographic studies of muscle activity during walking. The push-pull character of walking is evident from the mechanical energy curves. The metabolic and mechanical effects of load are described, particularly as related to gravitational and inertial effects. The gross efficiency of the external work performed during walking is shown to be about 23%, agreeing with figures in the literature for human muscle work.

A69-81045
AN INVESTIGATION INTO THE EFFECT OF EXERCISING PARTICULAR LIMB-SEGMENTS UPON PERFORMANCE IN A TRACKING TASK.

M. Hammerton and A. H. Tickner (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 12, Jan. 1969, p. 47–49.

An account is presented of an investigation into the effect upon skill in an acquisition tracking task of exercising particular limb-segments. To carry out the task the operator used his thumb to operate a small joystick. Two sorts of exercise were employed: one used the muscles of the whole hand, the other principally those of the thumb. It was found that the latter produced a marked, though transient, decrement in performance, whereas the former did not. It appears that, for tasks of this type and order of difficulty, serious decrement in performance is only to be expected when highly specific muscle groups are exercised. Normal work-loads and activities should not, therefore, constitute a hazard.

A69-81046
THE EFFECT OF SIGNAL CHARACTERISTICS ON REACTION TIME USING BISENSORY STIMULATION.
A. D. Perriment (Monash U., Clayton, Victoria, Australia).
Ergonomics, vol. 12, Jan. 1969, p. 71–78. 5 refs.

Sixty-four subjects were tested to examine the effect upon reaction time of the composition of bisensory signals simultaneously presented in two sensory modes. The stimulus display consisted of a flash of light from one of two lamps and a 1,000 c.p.s. tone presented at one or other earphone of a binaurally balanced headset. Subjects responded by depressing push buttons. The three response code variables examined were the code carried by each of the operating limbs; the code carried by the operating digits of each hand; and the degree of separation between the button pairs. Signals were classified as either unilateral, both components of the audio–visual signal originating on the same side of the body mid-line, or bilateral, the separate components originating contralaterally. Clear and consistent differences in the reaction times given to unilateral and bilateral signals were found. An explanatory attempt in terms of differential cortical stimulation is considered, and rejected. An alternative explanation involving "spatial expectancy" is offered, and found to have limitations.

A69-81047
APPLICATION OF A DAMPED SPRING-MASS HUMAN VIBRATION SIMULATOR IN VIBRATION TESTING OF VEHICLE SEATS.
C. W. Suggs, C. F. Abrams, and L. F. Stikeleather (N.C. State U., Dept. of Biol. and Agr. Eng., Raleigh).
Ergonomics, vol. 12, Jan. 1969, p. 79–90. 8 refs.
Grant PHS R01-U161.

There is a need for standardized methods for testing vehicle seats. Such methods would allow for the direct comparison of the merits of seats of diverse types and designs. At the present time standardized testing procedures are not possible because the dynamic characteristics of the human subjects occupying the seat during testing vary widely from man to man and affect the seat response. Testing with dead weight loading does not accurately portray the dynamic characteristics of the seat. A damped spring-mass system closely approximating to the dynamic characteristics of a seated man to vertical modes of vibration has been developed as the basis on which a standardized vehicle seat testing procedure can be built. Analysis of the problem by means of mechanical impedance techniques indicated that a two-degree-of-freedom system was sufficient to simulate the major dynamic characteristics of man in the frequencies below 10 hz. where seat vibration is most severe. Test procedures have been developed which utilize the man-simulator as the seat load. Results of these tests will be useful because they do not contain the subject variable and therefore can be compared directly with results obtained in other laboratories using the same methods.

A69-81048
BRIGHTNESS MATCHING UNDER INTERMITTENT STIMULATION.
Jonathan D. Kazsuk and S. Howard Bartley (Mich. State U., Dept. of Psychol., East Lansing).
Journal of Psychology, vol. 71, Mar. 1969, p. 281–289. 19 refs.
Grants PHS 5 F1 MH-34,407 and PHS NB 05260.

The present study was made to deal with certain confusions regarding brightness obtained with low rates of intermittent photic stimulation. In so doing, it was shown that, as rates become low, a point is reached at which the intermittent target is no longer seen as one having a steady brightness component to match with the steady standard target. It becomes a field of definitely fluctuating brightness. The observer's problem then becomes very different from that occurring before. He now is faced with choosing whether to try to make a mean or average reading of the fluctuation or to deal with the low brightness phases or the high brightness phases of the fluctuation. In any case, he is no longer doing what he was able to do up to this point. The present findings pertain to what happens under the three possible sets of instructions—high brightness ("on"), low brightness ("off"), or an attempted mean set of readings. The data show that under some conditions, mean readings are impossible (at low rates), and also that off readings are impossible (at high rates). The results replicate, in principle, a variety of findings in the literature and at the same time show how these were misinterpreted. The data that were added, further the demonstration that findings from all conditions (rates, etc.) cannot be compared as if they pertained to a single set of sensory phenomena.

A69-81049
RATE OF REMOVAL OF COLLAGEN AND MINERAL FROM BONE AND CARTILAGE.
H. E. Firschein and Nancy W. Alcock (New York Hosp.–Cornell U., Med. Coll., Hosp. for Spec. Surg. and Sloan-Kettering Inst. for Cancer Res., New York, N.Y.).
Metabolism, vol. 18, Feb. 1969, p. 115–119. 7 refs.
Grants PHS AM08978, PHS AM09982, PHS K3AM21720, PHS CA08748, PHS FR5495, and NF 365.

The quantitative relationship between collagen and mineral dynamics in bone and costal cartilage was studied. Young rats were injected simultaneously with both ^{14}C-proline and ^{85}Sr. The animals were sacrificed at intervals ranging from one to 20 days after injection. The femurs, proximal 20% of the tibias, and the enter costal cartilage were removed for analyses. Hydroxyproline was isolated from the tissues, and the specific activity of both the ^{14}C-hydroxyproline and the ^{85}Sr-mineral were determined. The results show that in both the proximal end of the tibia and the femur, the rates of removal of the collagen and mineral phases are identical. However, in the costal cartilage the rate of removal of collagen was markedly less than that in bone, while the rate of removal of the mineral was similar to that found in bone. In costal cartilage, therefore, the rates of removal of the collagen and minerals were not identical.

A69-81050
THE EFFECT OF FEEDING FREQUENCY ON DIURNAL PLASMA FREE FATTY ACIDS AND GLUCOSE LEVELS.
Walter M. Bortz, Paula Howat, and William L. Holmes (Lankenau Hosp., Div. of Res., Philadelphia, Pa.).
Metabolism, vol. 18, Feb. 1969, p. 120–123. 11 refs.
Grant NIH AM-08887.

The effect of variation in feeding frequency was noted on the diurnal plasma free fatty acids (FFA) and glucose levels in five lean males. It was shown that the single meal pattern resulted in higher mean FFA and glucose levels. The significance of these observations to the relationships between meal pattern and serum lipids and glucose tolerance is discussed.

A69-81051
VISUAL EVOKED RESPONSE OF SINGLE CELLS AND OF THE EEG IN PRIMARY VISUAL AREA OF THE CAT.
O. Creutzfeldt, A. Rosina, M. Ito, and W. Probst (Max-Planck-Inst. of Psychiat., Dept. of Neurophysiol., Munich, West Germany).
Journal of Neurophysiology, vol. 32, Mar. 1969, p. 127–139. 25 refs.
Grant DF Cr 30.

The visual evoked potential (VEP) was recorded with epicortical electrodes in cats from area 17, and was related to the unit activity of afferent fibers and cortical cells as well as to the intracellularly recorded slow potential changes (PSPs). Some of the cellular records were of the "quasi-intracellular" type. The VEP was elicited by stroboscopic flashes. The interindividual variability of the relative amplitudes of the different components of the VEP is large, but basically all components seen in the mean VEP are also recognized in the individual VEPs. Six components were discriminated: (1) small surface positivity; (2) small surface negativity; (3) large surface positivity; (4) large surface negativity super-imposed on the upward slope of the surface positivity; (5) slow surface positivity (continuation of 3); and (6) late, inconsistent negativity. The relation between surface VEP and intracellular activity is such that the polarization (inhibition) of cortical cells coincides with the surface positivity. Only the first part of the surface positivity coincides with the excitation of geniculocortical afferents and the excitation of a fraction of cortical cells. The findings are discussed with respect to the electrogenesis of epicortically recorded potentials and the synaptic organization of the visual cortex.

A69-81052
OBSERVATIONS ON TYPES OF RESPONSE TO COMBINATIONS OF NECK, VESTIBULAR, AND MUSCLE STRETCH SIGNALS.
Jeh Hyub Kim and Lloyd D. Partridge (Chon-Nam U., Med. School, Dept. of Physiol., Korea and Tenn., U., Med. Units, Dept. of Physiol. and Biophysics, Memphis).
Journal of Neurophysiology, vol. 32, Mar. 1969, p. 239–250. 31 refs.
Grant ESRF N-657.

Decerebrate cats were prepared for electrical stimulation of individual branches of the vestibular nerve, mechanical stretch of the triceps surae muscle and rotation of the head with respect to the body. During ramp stretches the total muscle tension was measured. Stimuli were used in various combinations. Utricular nerve stimulus generally increased tension but in a few cats reduced tension. Individual canal nerve stimulus on either side gave effects which were qualitatively independent of the particular branch stimulated and were similarly indistinguishable from effects of utricular branch stimulus. Neck rotation was found to attenuate the action of utricular nerve stimulus on reflex tension, whatever the nature of the utricular nerve action. Two significantly different types of nerve signal combinations were demonstrated, multiplicative and additive. It is proposed that these should regularly be differentiated in all experiments involving combination of input signals in reflexes. A possible functional use of a multiplicative combination of vestibular signals with muscle stretch signals is proposed. This type of signal interaction could produce an effective postural adjustment during movement without the necessity of complex modification to correct for different joint positions.

A69-81053
RESPONSIVENESS OF THALAMIC AND CORTICAL MOTOR RELAYS DURING AROUSAL AND VARIOUS STAGES OF SLEEP.
M. Steriade, G. Iosif, and V. Apostol (RSR Acad., Inst. of Neurol., Bucharest, Rumania).
Journal of Neurophysiology, vol. 32, Mar. 1969, p. 251–265. 48 refs.

The responsiveness of the motor cortex and thalamic ventrolateral nucleus (VL) was investigated during protracted or short conditioning high-frequency stimulation of the mesencephalic reticular formation in acute preparations at different levels of wakefulness and sleep (with bulbospinal, midpontine pretrigeminal, and rostropontine transections) and during sleep-wakefulness cycle in chronically implanted cats. During RF-induced arousal reaction in encéphale isolé cats (or increased wakefulness in midpontine pretrigeminal preparations) and on natural arousal from slow-wave sleep in behaving animals, VL responses were enhanced and polysynaptic responses relayed in the motor cortex were depressed, as indicated by the analysis of different components recorded in the pyramidal tract. The dissociation between responsiveness of the VL nucleus and motor cortex during wakefulness and various stages of sleep is discussed.

A69-81054
EFFECT OF PHENFORMIN ON THE ELEVATED BLOOD LACTIC ACID PRODUCED BY HYPOXIA IN NORMAL AND DIABETIC RATS.
Thomas N. Ruggles, Marc H. Lavietes, Max Miller, Hiram Woodward, Jr., and Michael Treister (Western Reserve U., School of Med., Dept. of Med. and U. Hosp., Cleveland, Ohio).
Annals of the New York Academy of Sciences, vol. 148, Mar. 26, 1968, p. 662–670. 20 refs.
Grant PHS AM05422-05 and Western Reserve U. supported research.

Albino rats of the Wistar strain were used, with each rat serving as its own control. Diabetes was produced by the i.v. administration of alloxan in a dosage of 50 mg./kg. After being anesthetized with halothane, the rats were subjected to sequential lowering of the oxygen tension at five-min. intervals, starting from 20% oxygen and progressing to 16, 12, 8, and 6% oxygen. At the end of each five-min. interval, blood samples were drawn and analyzed for a lactate by the Barker and Summerson technique. The identical procedure was repeated using the same rat 2-1/2 hr. after the intraperitoneal administration of 75 mg./kg. of phenformin. The results showed that lowering the oxygen tension in the inspired air caused a proportional elevation in blood lactate ($P<.005$). Phenformin had an effect in addition to the rise caused by hypoxia with a $P<.005$ in the nondiabetic rats and a $P<.01$

in the diabetic rats. This elevation of blood lactate with phenformin was nearly constant over the range of oxygen tensions used, varying from 8 to 14 mg./100 ml. at each oxygen concentration. The changes in lactate concentration with phenformin and hypoxia in the diabetic rats were similar to those in the normal rats. The data show clearly that phenformin does not produce any synergistic effect on the increase in blood lactate produced by hypoxia. Since the few cases of lactic acidosis reported in patients treated with phenformin have usually been associated with hypoxic states, it is doubtful that the drug, *per se*, played any deleterious role clinically.

A69-81055
DYNAMIC RADIOGRAPHY OF THE CERVICAL SPINE OF THE MILITARY FLYING PERSONNEL: IN PARTICULAR THE CASE OF JET PILOTS [LA RADIOLOGIE DYNAMIQUE DU RACHIS CERVICAL DU PERSONNEL NAVIGANT MILITAIRE; CAS PARTICULIER DES PILOTES D'AVIONS A REACTION].
R.-P. Delahaye and G. Gueffier.
Revue des Corps de Santé des Armées terre mer Air, vol. 9, Oct. 1968, p. 593–614. 36 refs. In French.

The preliminary results of a study in progress on the utilization of dynamic radiology in the detection of cervical spine injuries among military jet pilots and flying personnel in general were presented. The most current causes of cervical spine injuries were reviewed briefly. The different techniques of dynamic radiology used were described. The findings of a statistical study using this radiological technique and based on 377 cases of military flying personnel, including 103 pilots 40 of them flying jets, showed a high frequency of alterations of the spinal curve, numerous vertebral displacements and a high incidence of arthrosis mainly localized in the upper cervical vertebrae.

A69-81056
EXAMINATION OF THE CENTRAL VISUAL FUNCTION AMONG THE FLYING PERSONNEL OVER FIFTY YEARS OLD [EXAMEN DE LA FONCTION VISUELLE CENTRALE CHEZ LE NAVIGANT APRES 50 ANS].
A. Mercier, G. Perdriel, and J. Chevaleraud.
Revue des Corps de Santé des Armées terre mer Air, vol. 9, Oct. 1968, p. 615–622. In French.

Presented was a study of the changes occurring in the central visual function among the flying personnel over 50 yr. of age. It was observed that the visual acuity decreased parallel to age and in the same determined amount as for a non-flying population. The color vision studied with the Fansworth test (100-hue series) complied with the average increase of the score index. The study of central sensitivity to light showed a decrease in 50% of the cases, however no significant changes were noted in the recovery time after dazzling. Also examined were the different modifications due to the aging of the eyes, and the possible existing correlations between the visual function and aging were investigated.

A69-81057
CONTRIBUTION TO THE STUDY ON THE PERFORMANCE FITNESS OF AIRBORNE UNITS DURING LOW ALTITUDE TACTICAL MISSIONS [CONTRIBUTION A L'ETUDE DE LA CAPACITE OPERATIONNELLE D'UNITES AEROTRANSPORTEES, LORS DE MISSIONS TACTIQUES A BASSE ALTITUDE].
Pierre Galban, Maurice Gouars, Marc Guillermin, and Jacques Ilias.
Revue des Corps de Santé des Armées terre mer Air, vol. 9, Oct. 1968, p. 623–638. In French.

To study the physical fitness of airborne units for duty, four flying missions were carried out in C 160 Transall aircraft flying at 300 ft. altitudes for approximately two hr. and transporting 80 parachutists. The results showed a high incidence of motion sickness, only 32% of the group did not present signs of motion sickness. The fitness for duty assessed by obstacle course tests and target shooting decreased by 20% after the flying.

A69-81058
PSYCHOLOGY AND AVIATION ACCIDENTS [PSYCHOLOGIE ET ACCIDENTS AERIENS].
M. Mathieu.
Revue des Corps de Santé des Armées terre mer Air, vol. 9, Oct. 1968, p. 639–643. In French.

The lack of improvement in the rate of aviation accidents due to the human factor established the need for a study of the psychological understanding of the problem. An approach to this problem was outlined. The methodological difficulties related to the definition and seriation of the causes should be overcome first. Two classical hypotheses placing the problem at the selection stage, lack of flying aptitudes and accident proneness, should be discussed next. Finally, an in depth approach to psychodynamics should be considered, namely the place occupied by the plane in the pilot's unconscious. The aviation accidents were closely related to a movement of self-destruction fantasies and seemed to be part of an inadaptation to flying. However, the transition from inadaptation to accident still remained unclear.

A69-81059
PURIFICATION OF CARBON MONOXIDE BY HOPCALITE IN SEALED SPACES [EPURATION DE L'OXYDE DE CARBONE PAR L'HOPCALITE DANS UNE ENCEINTE CLOSE].
H. Ducros.
Revue des Corps de Santé des Armées terre mer Air, vol. 9, Oct. 1968, p. 645–664. 14 refs. In French.

The purification of air of a sealed cabin contaminated with carbon monoxide (CO) were studied. Different CO purification systems, in particular the method using molecular sieves 5A, were ineffective to remove the CO from an atmosphere polluted by this gas. It was therefore necessary to provide for an additional CO purification device. Hopcalites seemed to answer the basic requirements for CO removal. Experiments were conducted to study the effect of different physical factors on hopcalite catalytic oxidation activity. The results showed that the catalytic properties of hopcalites were not affected by either CO content or the presence of carbon dioxide (CO_2); however variation of the flow rate of the gas used and the presence of water vapors decreased the rate of CO oxidation to CO_2 reaction. Tests to remove CO from the air of a sealed cabin were carried out by adding a container of hopcalite to the air regeneration system. The results were satisfactory, and under the effect of hopcalite the initial CO content decreased gradually in the sealed cabin.

A69-81060
FUNGAL FLORA OF THE NORMAL HUMAN SMALL AND LARGE INTESTINE.

R. Cohen, F. J. Roth, E. Delgado, D. G. Ahearn, and M. H. Kalser (Miami, U., School of Med., Depts. of Med. and Microbiol., Div. of Gastroenterol., Coral Gables, Fla.).
New England Journal of Medicine, vol. 280, Mar. 20, 1969, p. 638–641. 34 refs.
Contract DA 19-193 MD-2254, Grants PHS NIH TIAM 5247, PHS 1 M01 FR00261 and PHS AI 01546.

Cultures of 86 specimens (including 23 oropharyngeal, 26 jejunal, 20 ileal and 17 fecal samples in 27 normal adults showed *Candida albicans* to be the most frequent fungus in high concentrations in all areas sampled. Both the frequency and concentration of *C. albicans* increased progressively from the oropharynx to the colon: 30% in the oropharynx, 54% in the jejunum, 55% in the ileum and 65% in the fecal specimens. *C. albicans* in concentrations of 10^2 colonies per mm. or greater, were encountered in 27% of oropharyngeal, 43% of jejunal, 50% of ileal and 59% of colonic specimens. The stability of the mycofloral pattern of the small intestine was demonstrated in five subjects who were resampled five to nine mo. after the initial studies; the fungal pattern was qualitatively and quantitatively unchanged.

A69-81061
CARBONO-MONOXIDE ENCEPHALOPATHY IN A CASE PRESENTING DIAGNOSTIC DIFFICULTIES [ENCEFALOPATIA TLENKOWEGLOWA W PRZYPADKU NASTRECZAJACYM KLINICZNE TRUDNOSCI DIAGNOSTYCZNE].
Danuta Markiewicz, Bozena Oleszczuk, and Andrzej Blaszke.
Neuropatologia Polska, vol. 6, Oct.–Dec. 1968, p. 403–410. 17 refs. In Polish.

The case of a 59 yr. old woman was discussed in which an unusual clinical syndrome developed in several wk. The case history did not afford clinical explanation of the etiology. It was only possible after morphological investigations and after obtaining additional data about the possibility of exposure to the injurious effects of carbon monoxide to define a typical CO encephalopathy.

A69-81062
EFFECTS OF NUCLEOTIDES ON THE HILL REACTION IN AGED CHLOROPLASTS.
Tatsuo Oku and Giiti Tomita (Kyushu U., Fac. of Agr., Inst. of Biophysics, Fukuoka, Japan).
Journal of the Faculty of Agriculture, Kyushu University, vol. 14, Nov. 30, 1968, p. 473–482. 27 refs.

The interference between the effects of various nucleotides and lipids on the Hill reaction of chloroplasts was studied at the various stages of aging. The presence of nucleotides such as ATP, ADP and AMP inhibits not only Hill activity of freshly prepared chloropasts without phosphorylating reactions but that of chloroplasts aged at low temperature. However, the nucleotides act as a stimulator for chloroplasts aged for the long period over about 75 hr. Hill activity is lowered by the presence of the lipids extracted from the aged chloroplast suspension, but when the nucleotides are added, recovered to a large extent. The lowering of Hill activity due to the aging can be understood by the absorption effect of free lipids (containing free fatty acids) released from chloroplasts on the lamellae membrane. For this reason, in the case of chloroplasts freshly prepared or aged for the short period, nucleotides may directly attack the membrane structure of lamellae, leading to the inhibition of Hill activity. In the case of chloroplasts aged for the long period, the free lipids may form the adsorption layer on the lamellae membrane enough to cause the inhibition of Hill activity. Such an adsorption layer may be removed to some extent by the addition of nucleotides, and the lamellae membrane may come back to more active state. The controlling of the adsorption of the lipids is understood to be derived from the direct interaction of nucleotide with fatty acid. This explains the observed inhibition and stimulation effects of nucleotides, depending on the aging period, on the Hill reaction of aged chloroplasts.

A69-81063
PERFORMING A VISUAL TASK IN THE VICINITY OF REPRODUCED SONIC BOOMS.
Muriel M. Woodhead (MRC, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Journal of Sound and Vibration, vol. 9, Jan. 1969, p. 121–125. 8 refs.

Recorded sonic booms accompanied a fast visual task performed by subjects working indoors. The sound pressure levels of the booms corresponded to the indoor stimulation experienced for outdoor sonic booms of 0.80 lb./ft.^{2} to 2.53 lb./ft.^{2}. Performance on the visual task was temporarily impaired when the sonic booms were at the highest level. This was above the level of loudness set as an upper limit around airports for existing aircraft. The main finding of the study was that work on a rapid visual task can be temporarily impaired by sonic booms of outdoor peak pressure on the ears of 2.53 lb./ft.^{2}.

A69-81064
EFFECT OF STIMULATION OF THE BRAIN-STEM RETICULAR FORMATION ON CEREBRAL BLOOD FLOW AND OXYGEN CONSUMPTION.
John S. Meyer, F. Nomura, K. Sakamoto, and A. Kondo (Wayne State U., School of Med., Dept. of Neurol.; Harper Hosp., Wayne Center for Cerebrovascular Res.; and Detroit Gen. Hosp., Detroit, Mich.).
Electroencephalography and Clinical Neurophysiology, vol. 26, Feb. 1969, p. 125–132. 36 refs.
PHS and Detroit Gen. Hosp. Res. Corp. supported research.

The brain-stem reticular formation in the pons was stimulated in 12 monkeys (*Macacus rhesus*) while recording cerebral blood flow and oxygen consumption by the use of the electromagnetic flowmeters and cerebral arterio-venous oxygen differences. During stimulation, cerebral blood flow and oxygen consumption usually increased if the electroencephalograph (EEG) showed desynchronization. The EEG desynchronization was associated with a mean increase in cerebral oxygen consumption of 7.7% and an increase in cerebral blood flow of 9.7%. After discontinuing the stimulation, cerebral oxygen consumption returned to the steady state within three min. while the EEG reverted to the resting pattern immediately after the stimulus was discontinued. Less well defined EEG changes were induced by stimulation of the femoral nerve, weak stimulation of the reticular formation or after transection of the cerebral spinal cord. Such poorly defined EEG changes were associated with little or no increase in cerebral blood flow and oxygen consumption. The increase of cerebral blood flow appeared to be caused by increase cerebral metabolism associated with EEG desynchronization.

A69-81065
LAMBDA RESPONSES IN RELATION TO VISUAL EVOKED RESPONSES IN MAN.

John S. Barlow and Leodegar Cigánek (Mass. Gen. Hosp. and Harvard Med. School, Dept. of Neurol., Boston and Mass. Inst. of Technol., Dept. of Elec. Eng., Cambridge).

Electroencephalography and Clinical Neurophysiology, vol. 26, Feb. 1969, p. 183–192. 50 refs.
Grants PHS 5K3-NB-9201 and PHS NB-03752.

In five normal subjects, midline parietoociptal averaged electroencephalographic (EEG) responses to shifts of the image of a spot of light from an oscilloscope screen on the retina were examined. The shifts of the position of the image on the retina were accomplished in two different ways: (a) by alternation of the direction of visual gaze, the position of the spot of the oscilloscope screen remaining unchanged (lambda responses); and (b) by alternation of the position of the spot on the oscilloscope screen, the direction of gaze remaining fixed (ordinary visual evoked responses). In order to insure comparability of the time course of retinal stimulation, the motion of the spot on the oscilloscope screen was controlled by a previously recorded electro-oculogram from the same subject. Additional recordings under several different experimental conditions were also included, for fuller definition of the phenomena under study. In no case were the EEG responses for the two conditions identical, although for some subjects there was a marked similarity for responses resulting from a shift of the image of the spot from the periphery onto the fovea of the retina; for the reverse, wave forms and similarities were much less well defined. In all instances of voluntary eye movements (i.e., alternation of gaze between bright and dim, or between dim and dim spots, in total darkness, or when the spot on the oscilloscope screen moved congruently with the eyes so that its image remained constantly on the fovea), an EEG potential change was evident, the onset of which preceded the initiation of eye movements by 150 to 200 msec.; this anticipatory potential change was absent for the involuntary or compensatory eye movements occurring upon passive turning of the head. These findings are discussed in relation to the phenomena of expectancy waves, decreases in the amplitude of evoked responses and the increases in visual threshold associated with eye movements, and in relation to mechanisms of supposed perceptual blanking associated with eye movements.

A69-81066
INCREASES IN CNS EXCITABILITY DURING NEGATIVE CORTICAL SLOW POTENTIALS IN MAN.

Dale W. McAdam (Iowa, U., Dept. of Psychiat., Iowa City).

Electroencephalography and Clinical Neurophysiology, vol. 26, Feb. 1969, p. 216–219. 12 refs.

The latencies of components in the somato-sensory evoked potential occurring between 200 and 400 msec. are shorter when the somato-sensory stimulus is applied during the slow potential change known as the "contingent negative variation", than when the stimulus is applied during a baseline state. This is interpreted as giving qualified support to the hypothesis that the contingent negative variation is accompanied by an increase in central nervous system excitability.

A69-81067
EFFECT OF MICROWAVES ON THE EYE.

Leo Birenbaum, Saul W. Rosenthal (Polytech. Inst. of Brooklyn, Dept. of Electrophysics, Long Island Graduate Center, Farmingdale, N.Y.), Gerard M. Grosof, and Milton M. Zaret (Zaret Found., Scarsdale, N.Y.).

IEEE Transactions on Bio-medical Engineering, vol. BME-16, Jan. 1969, p. 7–14. 22 refs.
Intern. Conf. on Med. and Biol. Eng., Stockholm, 1967.
Grant DADA-17-68-G-9249.

The utilization of microwave energy to produce an acute effect on the eyes of rabbits was experimentally investigated using both CW and pulsed power at 5.5 GHz. When present, lens opacities were developed within four days after exposure of sufficient intensity and duration; three min. at the one w. level were found to exceed cataractogenic threshold while at the 1/2 w. level no acute effect was observed following a two-hr. exposure. The method consisted of placing the anesthetized animals so that the exposed eye served as the termination of a length of waveguide, permitting conventional microwave instrumentation to be used for measurement of power entering the eye. The development of a device to channel the microwave power from the relatively large waveguide cross section through a small aperture for delivery into the eye of the animal was necessary preliminary to the carrying out of this work. Threshold curves were determined for both CW and pulsed (0.001 duty cycle) power and no substantial difference was found to exist. Thus, the average power level rather than the peak power was the determinant of injury. As a by-product of the work, the exposure technique may serve as a useful tool for inducing cataracts. This may be of value in ophthalmic research, since other current methods for producing cataracts involve use of toxic agents.

A69-81068
EEG ELECTRODE SENSITIVITY: AN APPLICATION OF RECIPROCITY.

Stanley Rush and Daniel A. Driscoll (Vt., U., Dept. of Elec. Eng., Burlington).

IEEE Transactions on Bio-medical Engineering, vol. BME-16, Jan. 1969, p. 15–22. 13 refs.
NASA supported research.

In this paper, the reciprocity theorem is used to determine the sensitivity of electroencephalographic leads to the location and orientation of sources in the brain. Quantitative information used in determining the sensitivity is derived from constant potential plots of a three-concentric-sphere mathematical model of the head with current applied through surface leads (the reciprocal problem), and from an electrolytic tank employing a human skull. Advantages of the reciprocal or lead field approach are outlined and the following conclusions are drawn: (1) leads placed at the end of a diameter through the center of the brain have a range of sensitivity due to source location of only three to one; (2) for the same electrode placement, sensitivity is maximum to sources oriented parallel to the line of the electrodes regardless of source location; and (3) electrodes spaced five cm. apart are about 10 times more sensitive to proximal cortical sources (by virtue of position) than to sources near the center of the brain. In the Appendices, the solution is derived for the potential and current density in three concentric conducting spheres energized by arbitrarily placed point electrodes on the surface, and the reciprocity theorem is extended to inhomogeneous anisotropic media.

A69-81069
THE PROBLEMS OF AGING AT ALTITUDE.

Ross A. McFarland (Harvard School of Public Health, Boston, Mass.).

Yale Scientific Magazine, vol. 43, Jan. 1969, p. 20–28. 40 refs.

Many observations on both normal and diseased subjects have indicated that there is a decrease in cerebral metabolic rates or oxygen consumption with age. In some instances, there is evidence of loss of cerebral tissue. Reduction in the total number of cells, for any reason, is therefore another cause for decreased oxygen uptake. However, in some diseased conditions hypoxia precedes the cell destruction. While one would not wish to imply that oxygen is the sole factor in aging, as is the case in responding to high altitude, this variable is one of the most closely related and basic single factors. Multiple casuality is undoubtedly involved in such a complex process as aging. Several lines of evidence have been summarized which suggest a basic similarity between the kinds of behavior, both physiological and psychological, encountered in oxygen want at high altitude and in aging. In fact, some of the evidence indicates a cause and effect relationship, with hypoxia implicated as an etiological agent in senesence. A precautionary note should be added, however, that living in an enriched oxygen atmosphere would not necessarily prevent aging or prolong life. It can also be concluded, in regard to the problems which have been reviewed here concerning acclimatization to high altitude that: (1) this field of study offers a very basic approach to many aspects of the physiological mechanisms of the body; (2) a better understanding of cerebral functions can be obtained in analyzing the effects of hypoxia in both acclimatization to high altitude and in aging; and (3) many new approaches can be worked out to the more traditional areas in the fields of mental and emotional illness, growth and development in the earlier stages of life, and certain cardiovascular diseases.

A69-81070
THE EFFECT OF AGE AND COLD ACCLIMATION ON THE METABOLISM OF BROWN ADIPOSE TISSUE IN COLD-EXPOSED RATS.

Jean Himms-Hagen (Ottawa, U., Dept. of Biochem., Ontario, Canada).

Canadian Journal of Biochemistry, vol. 47, Mar. 1969, p. 251–256. 9 refs.
Med. Res. Council supported research.

The effect of exposure to cold (4°C.) on the incorporation of glucose carbon into total lipids of interscapula brown adipose tissue was studied in warm-acclimated and cold-acclimated rats of different ages. Exposure to cold had little effect on the very low incorporation in warm-acclimated rats regardless of their ages. Incorporation was always greater in cold-acclimated rats in the cold than in warm-acclimated rats in the cold, but the increase due to cold exposure was smaller in young cold-acclimated rats than in older cold-acclimated rats. The concentration of glucose in the blood was highest in the youngest rats and was increased further after exposure to cold; older rats did not become hyperglycemic in the cold. The relation between brown adipose tissue metabolism and nonshivering thermogenesis is discussed.

A69-81071
SUDDEN FAILURE OF SWIMMING IN COLD WATER.

W. R. Keatinge, C. Prys-Roberts, K. E. Cooper, A. J. Honour, and J. Haight (Radcliffe Infirmary, Oxford, Great Britain).

British Medical Journal, no. 5642, Feb. 22, 1969, p. 480–483. 12 refs.

To investigate the effect of cold water on swimming four men who declared themselves good swimmers were immersed fully clothed on separate days in water at 23.7° and 4.7°C. The time that they were able to swim in the cold water was much shorter than in the warm. The two shortest swims ended after 1.5 and 7.6 min., before rectal temperature fell, when the men suddenly floundered after developing respiratory distress with breathing rates of 56 to 60/min. The other cold swims, by the two fattest men, ended less abruptly with signs of general and peripheral hypothermia. It is concluded that swimming in cold water was stopped partly by respiratory reflexes in the thin men and hypothermia in the fat, and partly by the cold water's high viscosity. The longer swimming times of the fat men are attributed largely to their greater buoyancy enabling them to keep their heads above water during the early hyperventilation. The findings explain some reports of sudden death in cold water. It is clearly highly dangerous to attempt to swim short distances to shore without a life-jacket in water near 0°C.

A69-81072
REFLEX REGULATION OF ARTERIAL PRESSURE DURING SLEEP IN MAN.

Harley S. Smyth, Peter Sleight, and George W. Pickering (Radcliffe Infirmary, Dept. of the Regius Professor of Med. and Cardiac Dept., Oxford, Great Britain).

Circulation Research, vol. 24, Jan. 1969, p. 109–121. 35 refs.
Med. Res. Council and Rhodes Trust supported research.

The control of arterial pressure during sleep was studied in 13 untreated, unsedated subjects aged 20 to 46, including seven with hypertension. Arterial pressure was measured directly. A transient rise of arterial pressure up to 30 mm. Hg was produced by the sudden intravenous injection of 0.25 to 2 μg. of angiotensin. Linear plots were obtained in 10 of 13 subjects when the systolic pressures of successive pulses during the pressure rise were plotted against the pulse intervals which began the next beat. The relationship was disturbed by movement or arousal, and was better when pulse intervals falling in inspiration were discarded. The slope of the line (msec. of cardiac slowing per mm. rise in systolic pressure) in the awake subject ranged from 2 to 15.5 msec./mm. Hg. and from 4.5 to 28.9 during sleep. Reflex sensitivity was highest in dreaming sleep. In seven of 10 subjects, baroreflex sensitivity increased significantly during sleep; in six, the prevailing arterial pressure was inversely correlated with the baroreflex sensitivity. The pressure appeared to be the dependent variable. It is concluded that the baroreceptor reflex arc can be rapidly reset, particularly during sleep. The lower arterial pressures during sleep may be actively maintained in some subjects by increased baroreflex sensitivity.

A69-81073
EVIDENCE FOR THYROCALCITONIN BINDING TO PROTEIN IN PLASMA.

J. Leggate, A. D. Care, and S. C. Frazer (Aberdeen, U., Dept. of Chem. Pathol. and Rowett Res. Inst., Great Britain).

Journal of Endocrinology, vol. 43, Jan. 1969, p. 73–81. 15 refs.
Med. Res. Council supported research.

A simple method is described for concentrating thyrocalcitonin from plasma by adsorption onto finely divided silica gel. An approximately 20-fold increase in biological activity with respect to protein content has been obtained with recoveries of added material of about 80%, allowing subsequent fractionation and bioassay of the fractions. Porcine thyrocalcitonin was added to either porcine or human plasma to given concentrations within the range observed in porcine thyroid venous plasma. Concentration on silica gel followed by gel filtration on Sephadex G 50 resulted in separation of the biological activity into two fractions, one of which was

associated with the plasma proteins. A similar result was obtained with porcine thyroid venous plasma containing endogenous thyrocalcitonin. Preparative ultracentrifugation of plasma rich in thyrocalcitonin also provided evidence suggestive of some protein binding of the hormone. It is concluded that thyrocalcitonin is carried in plasma partly free and partly bound to plasma protein.

A69-81074
INFLUENCE OF DIETARY CALCIUM INTAKE ON CA 47 ABSORPTION IN MAN.

Herta Spencer, Isaac Lewin, Josephine Fowler, and Joseph Samachson (Veterans Admin. Hosp., Metab. Res. Unit, Hines, Ill.).
American Journal of Medicine, vol. 46, Feb. 1969, p. 197–205. 29 refs.
Grant PHS A-5572 and Natl. Dairy Council supported research.

The absorption of calcium, using Ca^{47} as the tracer, was determined in 21 patients under controlled dietary conditions during both low and high calcium intake; each patient served as his own control. The absorption of Ca^{47}, determined from the fecal Ca^{47} excretion and as judged by the Ca^{47} plasma levels, varied greatly in different persons on the same constant low calcium intake and also during a period of constant high calcium intake. The Ca^{47} absorption differed significantly during low and high calcium intake in the same patients. The average per cent absorption of Ca^{47} in the 21 patients was 63.6% during low calcium intake and 30.5% during high calcium intake. The Ca^{47} plasma curves were similar during low and high calcium intake, the highest level being attained at four hr. after the ingestion of the dose under these study conditions. The Ca^{47} plasma level in all patients was significantly lower during high than during low calcium intake, the lower Ca^{47} plasma levels corresponding to the higher fecal Ca^{47} excretion in the high calcium study. The studies emphasize three observations: (1) the importance of calcium intake in estimating calcium absorption from radiocalcium data in man; (2) the great variability in calcium absorption of persons on the same calcium intake (low or high); and (3) the need for stool collections over a period sufficiently long to permit estimations of radiocalcium absorption from fecal radiocalcium excretion.

A69-81075
EXPECTANCY AND FEEDBACK AS INDEPENDENT FACTORS IN TASK PERFORMANCE.

Robert B. Zajonc and Philip Brickman (Mich., U., Ann Arbor).
Journal of Personality and Social Psychology, vol. 11, Feb. 1969, p. 148–156. 28 refs.

The analysis of the reciprocal effects of expectancy and performance requires that task feedback be made independent of both initial expectancies and actual performance, a condition not met in level-of aspiration studies. The analysis also requires that some meaningful measure of actual performance be retained, a condition not met in the arbitrary tasks employed in dissonance studies. The present study realized such requirements by using a reaction-time task to explore the independent effects of performance expectancy, feedback, and expectancy changes on performance. After 30 trials of base-line performance subjects (120 males) either stated performance expectancies (being classified into high-expectancy and low-expectancy groups) or did not give expectancies. Following additional trials without feedback, subjects in each expectancy condition either continued without feedback or received success or failure feedback. Major conclusions were that stating expectancies is a sufficient condition for performance enhancement in the absence of feedback; higher expectancies resulted in greater improvement than lower expectancies. Subjects who resisted lowering their expectancies after failure showed more subsequent improvement than those who lowered their expectancies sharply. Stating expectancies moderated differential reactions to success versus failure, but the crucial dissonance theory prediction, that low expenctancy subjects would show a performance decrement under success, was not supported for the reaction-time task.

A69-81076
VESTIBULAR-EVOKED POSTSYNAPTIC POTENTIALS IN DEITERS NEURONES.

M. Ito, T. Hongo, and Y. Okada (Tokyo, U., Fac. of Med., Dept. of Physiol., Bunkyo-ku, Japan).
Experimental Brain Research, vol. 7, Feb. 6, 1969, p. 214–230. 33 refs.
Min. of Educ. supported research.

Stimulation of the vestibular nerve induced excitatory postsynaptic potentials (EPSPs) monosynaptically in 29% of the cat's Dieters neurons sampled on the ipsilateral side. The EPSPs started with latencies of 0.6 to 1.0 msec., rose sharply with a summit time of 0.5 msec. and decayed exponentially with a time constant of 0.9 to 1.7 msec. Their amplitudes were graded finely according to the intensity of the vestibular nerve stimulation, the maximal size being 5 to 10 mV. The unitary EPSPs, evoked by vestibular nerve stimulation at juxta-threshold intensity or appearing spontaneously, were as small as 0.2 to 0.3 mV. in amplitude. Those neurons monosynaptically activated by vestibular nerve volleys were located in the ventral portion of the nucleus of Deiters, in agreement with histological data. The vestibular nerve impulses also produced delayed EPSPs with latencies of 1.0 to 1.8 msec., presumably disynaptically. They occurred in many Deiters neurons located not only ventrally but also dorsally. Even later EPSPs often were superposed on the monosynaptic EPSPs with latencies of 1.9 to 2.2 msec. There is evidence that they were caused by repetitive discharges in the vestibular nerve fibers which occur in response to single shock stimulation of the vestibular nerve. Inhibitory postsynaptic potentials were produced only polysynaptically in some Deiters neurons in association with the monosynaptic EPSPs.

A69-81077
POST-PRIMARY FLASH-EVOKED RESPONSES IN UNANESTHETIZED NIGHT- AND DAY-ACTIVE MONKEYS.

D. A. Ionescu (Max-Planck-Inst. für Hirnforschung, Neuro-Anat. Abt., Frankfurt am Main, West Germany).
Experimental Brain Research, vol. 7, Feb. 6, 1969, p. 275–298. 45 refs.

In the night-active *Galago crassicaudatus* the extent of cortical areas striata (17) and prestriata (18), and the sterotaxic coordinates of the optic tract, lateral geniculate body and pulvinar were anatomically determined. Electric shocks applied to the lateral geniculate elicit area prestriata response patterns which differ from and are longer in latency than area striata responses. In the dark-adapted *Galago*, light-flashes of progressive intensity or duration evoke in visual cortex a primary *a* wave, with 16 to 22 msec. latency, and a subsequent post-primary *b* complex consisting of one or two positive waves within the latency range of 30 to 70 msec. In the day-active *Saimiri sciureus*, a different response is elicited, composed of 6 to 9 early low-voltage oscillations followed by late, higher voltage waves exceeding 70 msec. in

latency. Simultaneously applied steady light produces in *Galago* an elective post-primary *b* complex potentiation, which contrasts with the reduction of the oscillations recorded from the optic tract and lateral geniculate body, and the reduction of the cortical primary *a* wave; in *Saimiri,* it induces only a slight potentiation of cortical oscillations in the latency range of 45 to 60 msec., and, as in *Galago,* a reduction of lateral geniculate oscillations. In both species the steady light effects of cortical potentiation are elicited also by applying steady light to the retina opposite to that stimulated by the testing flash, thus suggesting a central origin of these effects and a binocular cortical convergence. In both species, flash-evoked responses in area striata (17) and area prestriata (18) undergo the same alterations during steady light. Flash-evoked responses were recorded from the intergeniculate (inferior) nucleus of the pulvinar; during steady light they were depressed in *Galago* and totally suppressed in *Saimiri.* Within the limits of the investigation modalities used, the present results on *Galago* did only slightly differ from previous ones on cat, but those in *Saimiri* proved to differ from both.

A69-81078
VESTIBULAR CONTROL OF LARYNGEAL AND PHRENIC MOTONEURONS OF CAT.

D. Megirian (Tasmania, U., Fac. of Med., Dept. of Physiol., Hobart, Australia).

Archives Italiennes de Biologie, vol. 106, Dec. 1968, p. 333–342. 11 refs.
Grant PHS NB-07195.

Effects of evoked afferent volleys in vestibular, as well as trigeminal and superior laryngeal, nerve branches on laryngeal and phrenic motoneurons were examined in chloralose anesthetized cats. Weak vestibular nerve stimulation evoked overt discharges in recurrent laryngeal and phrenic nerves after a latency of 20 to 25 msec. during expiration and briefly attenuated on-going activity in the phrenic nerve during inspiration. Both types of responses were abolished by decerbration. The delayed, not the early, trigeminorecurrent laryngeal and the trigemino-phrenic nerve responses observed during expiration were also abolished by decerebration. Whereas superior laryngeal nerve stimulation elicited both excitatory and inhibitory changes in laryngeal montoneurons during expiration and inspiration, respectively, it caused only inhibitory action in phrenic motoneutrons during inspiration. It is concluded that the previously reported delayed vestibulo-vagal response reflects evoked impulses in recurrent laryngeal nerve fibers, a response dependent upon intact cortico-diencephalic structures for its genesis.

A69-81079
CHANGES IN THE THRESHOLD OF THE RECRUITING RESPONSES DURING SLEEP AND WAKEFULNESS: A QUANTITATIVE STUDY.

S. Giaquinto (Calif. Inst. of Technol., Div. of Biol., Pasadena).

Archives Italiennes de Biologie, vol. 106, Dec. 1968, p. 364–378. 54 refs.
Grant NIH MH-03372.

Ten cats carrying chronic implanted electrodes in thalamic nuclei were used for testing the threshold of recruiting responses in the sleep-wakefulness cycle. During light sleep and paradoxical sleep stimulations were self-triggered by high voltage slow activity and by eye movements, respectively. Eight/sec., 0.5 msec. pulse duration trains were used. The mean values of the thresholds during the different stages are: 332 ± 73 μA (strong arousal), 260 ± 66 μA (relaxed wakefulness), 218 ± 56 μA (light sleep) and 269 ± 73 μA (paradoxical sleep). The differences among the four mean thresholds are significant at the .001 level by the F test. The amplitude of the recruiting responses is further decreased during the rapid eye movements (REM) in paradoxical sleep. The difference from the responses evoked during non-REM spells is significant at .05 level by the t test. No statistical difference exists between the mean values obtained during relaxed wakefulness and paradoxical sleep. The results are referred mainly to variations of the functional activity of the synchronizing systems occurring during the sleep-wakefulness cycle.

A69-81080
SYMPATHETIC ACTIVITY DURING NATURAL SLEEP AND AROUSAL.

W. Baust, H. Weidinger, and F. Kirchner (U. Heidelberg, Physiol. Inst., West Germany).

Archives Italiennes de Biologie, vol. 106, Dec. 1968, p. 379–390. 25 refs.
Deut. Forschungsgemeinschaft supported research.

In unrestrained cats the activity of a postganglionic sympathetic nerve was recorded by means of chronically implanted electrodes. Simultaneously the cortical electroencephalograph (EEG) the electromyograph of the cervical muscles, and ocular movements were recorded. The sympathetic tone is defined precisely as the tonic discharge of pre- or postganglionic sympathetic neurons. The spontaneous sympathetic outflow may show respiratory oscillations or be completely irregular. The type of pattern does not depend on the state of sleep or wakefulness. During synchronized and desynchronized sleep phasic changes in the sympathetic tone were observed without any behavioral or EEG changes. Any arousal, either spontaneous or produced by natural arousal stimuli, is accompanied by an increase in the sympathetic discharge which outlasts the EEG arousal. In cases of spontaneous arousal the increase of the sympathetic output occurs one to two sec. before the EEG desynchronization. A marked decrease in the sympathetic tone takes place during desynchronized sleep. An episode of desynchronized sleep is herald by a phasic increase in the sympathetic tone. The findings reported in this study show that indirect measurements of the level of the sympathetic tone do not necessarily allow exact conclusions.

A69-81081
RAPID PHOTORESPONSES IN THE RETINA AND THEIR RELEVANCE TO VISION RESEARCH.

William L. Pak (Purdue U., Dept. of Biol. Sci., Lafayette, Ind.).

Photochemistry and Photobiology, vol. 8, Nov. 1968, p. 495–503. 29 refs.
Second Intern. Conf. on Photosensitization in Solids, Tucson, Jan. 29–31, 1968.
Grant NSF GB-4312 and PHS supported research.

An intense short flash stimulus gives rise to transient electrical responses of about a millisecond duration from vertebrate and some invertebrate retinas. Some aspects of these rapid retinal responses are reviewed. It is concluded that they probably represent electrical expressions of photochemical events or events closely associated with photochemistry of visual pigment, that they do not represent the excitation of the photoreceptors per se, and that still unidentified, silent processes intervene between them and the excitation of the photoreceptor. The fact that photochemical events produce movements of charges, which result in these responses, is of interest in itself. Moreover, these responses present us with

a relatively simple and effective technique for probing the role of visual pigment in visual excitation in the intact retina.

A69-81082
DIRECT MEASURES OF SHORT-TERM VISUAL STORAGE.

Ralph Norman Haber and L. G. Standing (Rochester, U., Dept. of Psychol., N.Y.).

Quarterly Journal of Experimental Psychology, vol. 21, Feb. 1969, p. 43–54. 21 refs.
Grants PHS MH 10753 and NSF GB 5910.

Two experiments, involving seven conditions, explored the use of direct measures of visual persistence. In each, the subject was asked to judge if an intermittent stimulus appeared perceptually continuous, or whether it completely faded before the next presentation occurred. The first experiment showed that visual persistence was set at approximately 250 msec. for a recycling presentation of a circle in a tachistoscope; in another task employing a moving opaque slit passing back and forth over a circle, persistence times averaged 50 msec. longer. Reducing luminance by 2 log units increased persistence only slightly, though removing the adapting field increased it by over 100 msec. The second experiment, using the repeating circle, varied the duration of the stimulus, and compared monoptic with dichoptic presentations. Visual persistence was found to be independent of stimulus duration over a range of 4 to 200 msec., where all durations were above recognition threshold for the stimulus. Persistence was unaffected whether the stimulus was repeatedly presented in the same eye or alternated between eyes, strongly suggesting that the storage is central. Finally, a re-analysis of Dodwell and Engel's paper on stereopsis suggests that their effects can be adequately explained by visual persistence of the asynchronous stereo pairs, rather than a more complex fusion model. All of these results strongly support the use of visual persistence as a direct measure of short-term visual storage.

A69-81083
THE DEMONSTRATION OF DICHOPTIC FLICKER EFFECTS BY USE OF POLAROID.

M. Kinsbourne and P. J. Coughlin (Oxford, U., Inst. of Exptl. Psychol., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 21, Feb. 1969, p. 67–68. 8 refs.

A simple way of setting up dichoptic flicker with variable phase relationship is described. Sine wave flashes result, and for these, as for square waves, Sherrington's hypothesis of independent testing for intermittence of inputs to each eye is approximately borne out. Observations of the attributes of these two modes of stimulation at sub-fusion frequencies suggest that no such independence holds for computation of luminous flux over time.

A69-81084
EFFECT OF HYPEROXIA ON THE ERYTHROPOIETIC RESPONSE TO SODIUM-L-TRIIODOTHYRONINE.

Neil I. Gallagher and George H. Ford (St. Louis U., School of Med., Dept. of Internal Med. and Veterans Admin. Hosp., Hematol. Res. Lab., St. Louis, Mo.).

Proceedings of the Society for Experimental Biology and Medicine, vol. 130, Feb. 1969, p. 672–674. 11 refs.

The effects of hyperoxia on the erythropoietic response to 1-triiodothyroine was tested in rats at doses of 1, 2.5 or 10 μg. given each day for 14 days. The animals were in a 50% oxygen atmosphere an increase in body weight, hematocrit and basal metabolic rate was noted. Red cell production increases were thought to be related to increased thyroid activity.

A69-81085
DISTURBANCES OF NYCHTHEMERAL RHYTHM DUE TO AIR TRAVEL.

J. M. Adam

Journal of the Royal Army Medical Corps., vol. 115, no. 1, 1969, p. 14–18. 9 refs.

A report is given of the effects of air travel on the nychthemeral rhythm changes in metabolic parameters in personnel flown over various areas of the world. The physiological results of such flights are discussed. The preparation of troops for long flights to maintain their efficiency is considered of prime importance. A list of recommendations for alleviating fatigue is given.

A69-81086
THE CAPACITY FOR PHYSICAL WORK OF WHITE MINERS IN SOUTH AFRICA. 3. THE MAXIMUM OXYGEN INTAKES OF NORMAL MINERS AND MINERS WITH CARDIORESPIRATORY DISEASES.

C. H. Wyndham and G. K. Sluis-Cremer (CSIR, Miners' Med. Bur. and Pneumoconiosis Res. Unit, Johannesburg, South Africa).

South African Medical Journal, vol. 43, Jan. 4, 1969, p. 3–7.

Men generally gain weight with increasing age, and the maximum oxygen intake decreases; no figures are, however, available on the changes in maximum oxygen intake with increase in age. Measurements of maximum oxygen intake were made by an indirect method on 815 miners between the ages of 20 and 70 yr., who were considered clinically to be either normal or suffering from cardiorespiratory diseases. Heart rates and oxygen consumptions were measured on each of the subjects at three rates of work. Maximum oxygen intakes were determined by plotting the heart rates against the oxygen consumptions at the three rates of work for each individual, and extrapolating the line to a heart rate of 180 beats/min. The maximum oxygen intake of the 60 to 69 yr. age-group was significantly different (5% level) from the means for the age-groups 30 to 39 yr. and 40 to 49 yr., but not for the 50 to 59 yr. age-group. Among the bronchitics none of the differences between the means was significant at the 5% level. When expressed as maximum oxygen intake per kilogram of body-weight, there was a decided increase in the percentages of the samples with advancing age in the lower class intervals of maximum oxygen intake. This was not so in the case of the miners with mild chronic bronchitis.

A69-81087
ELECTROENCEPHALOGRAPHIC STUDY OF SLEEP DEPRIVATION IN FLYING PERSONNEL.

Donald R. Bennett, Fred A. Ziter (Utah, U., Coll. of Med., Dept. of Neurol., Salt Lake City), and Edward A. Liske (N. Mex., U., Coll. of Med., Div. of Neurol., Albuquerque).

Neurology, vol. 19, Apr. 1969, p. 375–377. 9 refs.

One hundred and twenty-five healthy aviators were studied electroencephalographically before and after 24 to 36 hr. of sleep deprivation. Ten percent of the initial records were abnormal. Sleep deprivation produced a nonspecific accentuation of the control abnormality in five of nine subjects. However, only two previously undetected proxysmal discharges were elicited; the six-per-sec. spike-and-wave patterns which are electroencephalographic complexes of questionable clinical significance.

A69-81088
THE INFLUENCE OF GREEN LIGHT ON GEOTROPISM OF AVENA COLEOPTILES.
J. Lion (Botan. Lab., Utrecht, The Netherlands).
Acta Botanica Neerlandica, vol. 17, Dec. 1968, p. 437–440. 11 refs.
Netherlands Organ. for the Advan. of Pure Res. (Z.W.O.) supported research.

Monochromatic green light (563 nm.) of very low intensity (2.10^{-5} W.m.$^{-2}$) given to isolated *Avena* coleoptiles shortly before the beginning of geotropic stimulation ehances the insuing curvature.

A69-81089
THE EFFECT OF SEVERE EXERCISE ON SERUM FREE FATTY ACIDS IN RATS FED WITH DIETS OF DIFFERENT PROTEIN VALUES [WPLYW DLUGOTRWALEGO WYSILKU FIZYCZNEGO NA STEZENIE WOLNYCH KWASOW TLUSZCZOWYCH SUROWICY KRWI PRZY STOSOWANIU DIET O ROZNEJ WARTOSCI BIOLOGICZNEJ BIALKA].
Zenon Jendykiewicz, Lech Hryniewiecki, Ryszard Bernat, Krystyna Makowska, and Teresa Grala.
Acta Physiologica Polonica, vol. 19, Nov.–Dec. 1968, p. 865–874. 35 refs. In Polish.

The experiments were done on 72 adult male rats, divided into two equal groups which had been previously kept in a state of decreased mobility and fed for 48 days with isocaloric diets: diet of high protein value (NDp Cal. % 9.3) and protein free diet (NDp Cal. % 0.0). All the animals except control subgroups were exercised for an hr. on the treadmill rotating with a speed of 15 r.p.m. thus covering a distance of 1825 m. It was found that severe exercise brought about some changes in the blood serum free fatty acids (FFA). The general trend of these alterations was closely dependent upon the protein value of the applied dietary regimen. Serum FFA increased one hr. after the run on the treadmill in rats fed with a diet of NDp Cal. % 9.3. This increment was still maintained after 24 hr. In animals fed with protein free diet the rise of the serum FFA was observed after 24 hr. A very significant correlation was found between the serum FFA increase and the serum glucose decrement in the group kept on a high protein diet. It was inferred that the increase of serum FFA after exercise was a response of the body fuel reserves to postexercise hypoglycemia mediated by various humoral factors. The efficiency of these control systems depended on the amount of protein being supplied in the food.

A69-81090
THE EFFECT OF SEVERE EXERCISE ON FREE AND TOTAL INSULIN-LIKE ACTIVITY (ILA) OF THE BLOOD SERUM IN RATS FED WITH DIETS OF DIFFERENT PROTEIN VALUES [WPLYW DLUGOTRWALEGO WYSILKU FIZYCZNEGO NA ZMIANY AKTYWNOSCI INSULINY WOLNEJ I CALKOWITEJ SUROWICY KRWI PRZY STOSOWANIU DIET O ROZNEJ WARTOSCI BIOLOGICZNEJ BIALKA].
Lech Hryniewiecki, Ryszard Bernat, and Zenon Jendykiewicz.
Acta Physiologica Polonica, vol. 19, Nov.–Dec. 1968, p. 875–888. 34 refs. In Polish.

The experiments were done on 60 adult male rats, divided into two equal groups which had been previously kept in a state of decreased mobility and fed for 48 days with isocaloric diets: diet of high protein value (NDpCal.% 9.3) and protein free diet (NDpCal.% 0.0). All the animals except the control subgroups were run for an hour on the treadmill rotating with a speed of 15 r.p.m., thus covering distance of 1825 m. It was found that severe exercise brought about some changes of the insulin-like activity (ILA) in the serum. The intensity of these changes was dependent upon the protein value of the diets. The serum free ILA increased one hr. after the run on the treadmill. This increment showed a negative correlation with the simultaneous decrease of serum glucose and amino nitrogen content. The serum free ILA rise was greater and lasted for 24 hr. after exercise in animals having been kept on high protein diet but fell in protein deficient rats. However, 24 hr. after run the increase of the total ILA was observed in both groups of animals. It was suggested that insulin played the role of a regulatory humoral factor which might take part in shifting nitrogen and carbohydrate metabolism of the liver and skeletal muscle after severe exercise, towards anabolism.

A69-81091
THE INFLUENCE OF SHORT-TERM PHYSICAL WORK ON BLOOD CLOTTING [WPLYW KROTKOTRWALEJ PRACY FIZYCZNEJ NA KRZEPNIECIE KRWI].
Janusz Bielski and Zygmunt Zyskowski.
Acta Physiologica Polonica, vol. 19, Nov.–Dec. 1968, p. 889–896. 22 refs. In Polish.

The influence of short-term physical work on blood clotting was studied in 30 healthy men, physical workers, aged 17 to 19 yr. Thromboelastograms of whole blood were performed, clotting and bleeding times, plasma fibrinogen levels, rate of fibrinolysis of euglobulins were determined, and platelet counts were made. Physical work was measured by means of a bicycle ergometer at 100 to 150 watts for 5 to 10 min., corresponding to 3000 to 9000 kgm. Clotting was studied before the experiments, immediately after work, and after 30 min. It was concluded that short-term physical work of the magnitude 3000 to 9000 kgm. performed in the course of 5 to 10 min. did not produce any distinct disorders in blood clotting or fibrinolysis in workers.

A69-81092
AN ATTEMPT OF ASSESSING THE FUNCTIONAL STATE OF THE CEREBRAL SYNAPSES IN RABBITS EXPOSED CHRONICALLY TO THE ACTION OF MICROWAVES [PROBA OCENY STANU CZYNNOSCIOWEGO SYNAPS MOZGOWYCH KROLIKOW PODDANYCH PRZEWLEKLEMU DZIALANIU MIKROFAL].
Zbigniew Edelwejn.
Acta Physiologica Polonica, vol. 19, Nov.–Dec. 1968, p. 897–906. 19 refs. In Polish.

Using electroencephalography and pharmacologic agents, an attempt was made to determine the true point of central action in rabbits exposed to chronic irradiation with microwaves.

A69-81093
THE INFLUENCE OF VIBRATION ON ADRENOCORTICAL FUNCTION [WPLYW WIBRACJI NA STAN CZYNNOSCIOWY KORY NADNERCZA].
Krzysztof Kwarecki.
Acta Physiologica Polonica, vol. 19, Nov.–Dec. 1968, p. 907–917. 22 refs. In Polish.

The influence of vibration on adrenocortical function was studied in sexually mature male guinea pigs. Vibration stimuli with

the following parameters were used: frequency 50 c.p.s., amplitude one mm., time of exposure three hr. daily. The animals were subjected to vibration for 3, 6 and 12 days. The adrenocortical function was assessed on the basis of morphometric, morphologic, histochemical and histoenzymatic studies. Two stages in the reaction of adrenal cortex to the vibration stimuli were distinguished. In the first stage, between the first and sixth day of vibration, signs of stimulation of the gland were observed. In the second stage, after six days' vibration, gradual adaptation or secretory exhaustion were noted.

A69-81094
CHANGES IN THE ACETYLCHOLINE CONCENTRATION IN THE CEREBRAL TISSUE IN RATS REPEATEDLY EXPOSED TO THE ACTION OF MECHANICAL VIBRATION [ZMIANY STEZENIA ACETYLOCHOLINY W TKANCE MOZGOWEJ SZCZUROW POD WPLYWEM WIELOKROTNEJ EKSPOZYCJI NA DZIALANIE DRGAN MECHANICZNYCH].
Zofia Brzezińska.
Acta Physiologica Polonica, vol. 19, Nov.–Dec. 1968, p. 919–926. 7 refs. In Polish.

Rats were exposed to the action of mechanical vibration together with noise, or only noise, two hr. daily for 3, 6, 9, 12 and 15 days. Concentrations of acetylcholine, acetylcholine esterase activity and synthesis of acetylcholine were studied in fresh tissue of the cerebral hemispheres. After a single two-hr. exposure, the concentrations of acetylcholine increased in the cerebral tissue of the rats, then gradually decreased and returned to normal values as in the control group after 15 exposures. Acetylcholine esterase activity and ability of cerebral tissue to synthesize acetylcholine gradually increased.

A69-81095
MEMORY RETRIEVAL AND CENTRAL COMPARISON TIMES IN INFORMATION PROCESSING.
George E. Briggs and John Blaha (Ohio State U., Columbus).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 395–402. 13 refs.
Grant NSF GN 534.1.

Memory load and display load were varied orthogonally in a simple information-reduction task which required the subject to respond either yes or no that a visual display does or does not contain an item previously memorized. Twelve subjects were given extended (12 days) practice. Reaction time was a linear function of memory load, and the slope constants of that relationship were a linear function of display load for positive responses and a power function of display load for negative responses. The fitted equations provided indexes of memory retrieval time and central comparison time separately. These times decreased systematically with practice. It was concluded that throughout the subject performed an exhaustive serial comparison process with display rechecking prior to a negative response.

A69-81096
CHOICE AMONG EQUAL EXPECTED VALUE ALTERNATIVES: SEQUENTIAL EFFECTS OF WINNING PROBABILITY LEVEL ON RISK PREFERENCES.
Louis Miller, David Edward Meyer (Mich., U., Ann Arbor), and John T. Lanzetta (Dartmouth Coll., Hanover, N.H.).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 419–423. 10 refs.

On each of 100 trials, 75 subjects chose and played one of five alternative gambles having positive equal expected values. Depending on the experimental condition, the winning probability level of each alternative was either .2, .5, or .8. Results showed that when the winning probability level of each alternative was increased from .2 to .8, subjects preferred relatively more risky alternatives as measured by the relative variance of chosen alternatives. These differences occurred although subjects averaged the same net profit across trials. Whereas the effect was not apparent on the first block of 10 trials, it became increasingly marked in succeeding blocks, being strongest for P (win) = .8. The effect was attributed to the relative and absolute frequency of winning.

A69-81097
INTERACTION OF FACTORS AFFECTING SPACE LOCALIZATION.
Paul Meisel and Seymour Wapner (Clark U., Worcester, Mass.).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 430–437. 7 refs.
Grant PHS MH 00348.

The problem of interaction of sensory and muscular factors in space perception is studied through an empirical test of a summative hypothesis derived from sensory-tonic field theory. A number of criteria for adequate test of the hypothesis are described and used in evaluating the findings of an experiment testing interaction by assessing the effect on perceived position of the median plane (straight ahead) of variation of asymmetry of extent of a stimulus figure and asymmetry of ocular convergence. While the results indicate that for interaction of these two factors certain criteria for summation are met, the stringent criterion, relating to identity between predictor and observed values, is not satisfied. The findings suggest directions for possible theoretical reformulation of the summative hypothesis, including consideration of (a) individual differences and (b) limitation to the responsiveness of the organism.

A69-81098
RESPONSE TIMES WITH NONAGING FOREPERIODS.
Raymond S. Nickerson (Bolt Beranek and Newman Inc., Cambridge, Mass.) and David W. Burnham (USAF, Electron. Systems Div., Bedford, Mass.).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 452–457. 13 refs.
NASA supported research.

Foreperiods (FP) were generated in such a way that the probability of the immediate termination of an FP was independent of its age. Under these conditions mean response time (RT) increased linearly with mean, or expected, FP when the latter was varied from 250 msec. to 32 sec.

A69-81099
EFFECT OF THREAT AND UNCERTAINTY ON MASTERY OF STRESS.
Walter D. Fenz, Brian L. Kluck, and C. Peter Bankart (Waterloo, U., Ontario, Canada).

Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 473–479. 14 refs.
Grant MRC MA 2330.

Parallel forms of a word association test containing words scaled along a dimension of increasing relevance to parachuting were administered to 20 experienced parachutists at 2-wk. intervals. Ten subjects were given the second test under experimental conditions of threat and uncertainty. It was found that during regular testing conditions subjects produced inverted V-shaped gradients, i.e., stronger galvanic skin response (GSR) and longer reaction times (RT) to low intensity cues than to high-intensity cues. This replicated earlier findings with experienced parachutists. When tested under conditions of threat and uncertainty, subjects showed a reversal in their response patterns, i.e., monotonic gradients of GSR and RT to the same stimulus dimension. Monotonic gradients are consistently found for novice jumpers. It was concluded that the processes responsible for the backward shift as a function of experience are reversible.

A69-81100
PSYCHOPHYSICS OF ACTIVE KINESTHESIS.
Heather Wood (Calgary, U., Alberta, Canada).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 480–485. 20 refs.

Active kinesthesis was scaled using five psychophysical methods, and found to be a prothetic continuum as described by Stevens and predicted from the operating characteristics of the sense receptors involved. The results support Stevens' theory of two sensory continua. Exponents for the power functions obtained are reported.

A69-81101
MULTIPLE-COMPONENT HEART RATE RESPONSES CONDITIONED UNDER PACED RESPIRATION.
Mary W. Headrick (Vanderbilt U., Nashville, Tenn.) and Frances K. Graham (Wis., U., Madison).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 486–494. 19 refs.
Grants PHS MH02011, PHS HD01490, PHS K3-MH-21762, PHS FR00249, and PHS 5T01 MH08107.

Three groups of human subjects were given differential conditioning trials with respiration uncontrolled, controlled at normal rates, or controlled at rapid rates. Significant differential heart rate responding occurred in all groups and, except in the rapid breathing group, improved across trials. Respiration did not affect the form of the conditioned response. There were three significant components: deceleration immediately following conditioning stimulus onset, subsequent brief acceleration, and marked deceleration just prior to unconditioning stimulus onset. Analysis indicated that the triphasic response was neither a homeostatic adjustment nor an unconditioned orienting response. Discrepant findings in earlier studies may be largely explained by experimental conditions that differentially affect the three components.

A69-81102
MOTION PARALLAX AND PROJECTIVE SIMILARITY AS FACTORS IN SLANT PERCEPTION.
Richmond Willey and John W. Gyr (Mich., U., Ann Arbor).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 525–532. 16 refs.
Grant NIH HD 01368.

The subjects matched the slant of a rectangle by adjusting an identical rectangle under conditions precluding simultaneous objective and projective matching. In Exp. I, a stationary reduction aperture produced a tendency toward projective matching, which was reduced when the aperture was in motion. In Exp. II, the addition of a textured background made no difference. In Exp. III, a difference found between two stationary and moving aperture positions was comparable to that between the stationary and moving aperture in Exp. I. In Exp. IV, there was no difference between binocular viewing and monocular viewing without an aperture. A mean underestimation, found in the other experiments, was absent but there was still a projective matching tendency. Implications for current theories of slant perception were discussed.

A69-81103
RESEARCH METHODOLOGY IN TEMPORAL PERCEPTION.
Alan D. Hornstein (Long Island U., N.Y.) and George S. Rotter (Montclair State Coll., Upper Montclair, N.J.).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 561–564. 7 refs.

Using 18 male and 18 female subjects, three methods for investigating temporal perception were compared: MVE (method of verbal estimation), MP (method of production), and MR (method of reproduction). Stimuli were 10 experimental time intervals ranging from 2 to 29 sec. in steps of 3 sec. For all intervals MVE was overestimated while MP and MR were estimated. The strong effects for MP and MVE, however, came primarily from the female subjects. There appeared an inverse relationship between degree of inaccuracy and interval size.

A69-81104
AMOUNT OF POSITION RESPONDING IN DISCRIMINATION REVERSAL AND SPEED OF REVERSAL.
Sally E. Sperling (Calif., U., Riverside) and Stephen G. Yoder (Calif., U., Santa Cruz).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 573–574.
Grant NSF GB-4072.

After training to criterion on a visual discrimination with simultaneous stimulus presentation, rats were given reversal training with stimulus positions either determined by the same semirandom schedule that had been used in acquisition or by a response-contingent procedure that has been shown to reduce position responding if used during acquisition. Reduced position responding was also observed in reversal with this procedure, and the group that did less position responding during reversal reversed faster. These results were compared to data showing that overtraining on an initial problem also reduces the amount of position responding during reversal but does not result consistently in faster reversal. A possible necessary condition for the observation of faster reversal with less position responding was discussed.

A69-81105
USE OF SECOND-ORDER DEPENDENCIES IN TWO-CHOICE LEARNING.
James R. Erickson and Joann Cuchural (Ohio State U., Columbus).
Journal of Experimental Psychology, vol. 79, Mar. 1969, p. 575–577.
Contract AF 33(615)-2248.

Forty college student subjects were run in a two-choice probability-learning task in which marginal and first-order conditional event probabilities were set at p = .50. Event schedules were drawn up so that the four second-order conditional event probabilities were all equal to p = .72 or p = .92. The subjects were assigned randomly to the resulting two groups. When second-order event probabilities were high, all four asymptotic second-order response probabilities were high, p = .97 on the average; and there were no marginal or first-order response biases. When event probabilities were low, there were large differences among the four second-order responses probabilities and a strong first-order repetition bias. Run structure analyses showed that unless the event pattern was very strong, it was much easier for subjects to predict the continuation of a run than its termination.

A69-81106
PERCEPTUAL MASKING IN MULTIPLE SOUND BACKGROUNDS.

Raymond Carhart, Tom W. Tillman, and Elizabeth S. Greetis (Northwestern U., Auditory Res. Lab., Evanston, Ill.).

Journal of the Acoustical Society of America, vol. 45, Mar. 1969, p. 694–703. 19 refs.

Natl. Inst. of Neurol. Diseases and Blindness supported research.

Shifts in marked spondee thresholds during several conditions of listening (monaural, homophasic, antiphasic, and with interaural time disparity) in the presence of one to four competing maskers were measured. The maskers used were white noise, white noise modulated four times per second by 10 db. with a 50% duty cycle, the same noise with 75% duty cycle, connected speech by one male talker, and connected speech by a second male talker. Results from three experiments that employed various permutations of the aforementioned conditions are reported. The findings, after equating conditions to equivalent masker levels, were four. First, the modulated noise with 50% duty cycle produced about 3.5 db. less masking than that produced by unmodulated white noise. Second, the modulated noise with 75% duty cycle allowed only about 1 db. less shift than did the unmodulated noise. Third, mixing one speech train with noise (either modulated or unmodulated) induced about 3.2 db. excess masking. This excess is here termed perceptual masking. Fourth, perceptual masking rose to 6.6 db. when two speech trains were included in the masker complex, irrespective of whether or not noise was also part of the complex. The findings support the hypothesis that successive stages of perceptual masking arise as the task of signal sorting becomes more exacting for the listener. Related studies are discussed in this connection.

A69-81107
AUDITORY TEMPORAL MASKING AND THE PERCEPTION OF ORDER.

J. L. Homick (NASA Manned Spacecraft Center, Houston, Tex.), L. F. Elfner, and G. G. Bothe (Fla. State U., Tallahassee).

Journal of the Acoustical Society of America, vol. 45, Mar. 1969, p. 712–718. 7 refs.

NSF supported research.

An investigation of the effects of frequency, intensity, and time on the perception of temporal masking produced under conditions of a short burst (12 msec.) of tone separated temporally from a narrow-band noise indicates a similarity of function underlying the two phenomena. Temporal masking is greater and the perception of temporal order is more difficult when the signal is centered in the band of noise. Temporal masking is greater and the perception of temporal order is more difficult for a weak signal than for a more intense signal. The observed temporal masking can be interpreted in terms of a cochlear model. The relationship between temporal masking and the perception of temporal order is discussed in terms of a hierachy of level of perception brought about by temporal cues.

A69-81108
JUDGED NOISINESS OF MODULATED AND MULTIPLE TONES IN BROAD-BAND NOISE.

Karl S. Pearsons, Dwight E. Bishop, and Richard D. Horonjeff (Bolt Beranek and Newman Inc., Los Angeles, Calif.).

Journal of the Acoustical Society of America, vol. 45, Mar. 1969, p. 742–750. 13 refs.

NASA supported research.

Paired-comparison judgment tests, undertaken to investigate the subjective noisiness of single, modulated, and multiple tones plus noise, clearly confirm the need for corrections in calculating perceived noise levels of spectra containing strong discrete frequency components. The tone-correction procedures of Little and Kryter–Pearsons both provided a considerable improvement in calculating perceived noise levels that agreed with judgments. The tests indicate that the tone corrections may continue to increase in magnitude as a function of tone-to-noise levels even for levels greater than 25 db. as measured in 1/3-oct bands. However, the rate of increase diminishes for higher tone-to-noise levels. Little difference was found in the judged noisiness of unmodulated and either frequency- or amplitude-modulated tones, except at rates of 5 Hz., where the modulated tones were found to be more annoying because of envelope irregularities. For multiple tones, little difference was noted in the judged noisiness of harmonic and nonharmonically related tone complexes. There was also found to be little consistent trend in the judged noisiness of two- or five-tone complexes of the same frequency range, except for the relatively narrow frequency range of 1/10 oct where the five-tone complexes were judged slightly noisier than the two-tone complexes.

A69-81109
NOISE, YOU CAN GET USED TO IT.

J. C. Webster (Naval Electron. Lab. Center, San Diego, Calif.) and M. Lepor (Naval Undersea Warfare Center, San Diego, Calif.).

Journal of the Acoustical Society of America, vol. 45, Mar. 1969, p. 751–757. 8 refs.

On the basis of several laboratory studies, a three-band preferred-frequency speech interference level (PSIL) of 64 db. (based on the octaves centered at 500, 1000, and 2000 Hz.), or an A-weighted level (L_A) of 71 db., were proposed as the criteria levels for acceptable voice communications. Two validation surveys were undertaken where ambient noise levels were measured and subjective questionnaires were completed in various ship's spaces. When asked to rate a space along a five-point scale of noisiness (very quiet, quiet, moderately noisy, very noisy, and intolerably noisy), responses tended to center on moderately noisy regardless of objective noise level (PSIL, L_A, PNL, LL), confirming the remark, "You get used to it." When asked to give binary judgment on whether (1) normal speech was affected, (2) work was affected, (3) the space was acceptable, or (4) the environment was loud (and/or noisy, and/or annoying), voice very loud (and/or very noisy, and/or very annoying), the following results were obtained: 80% thought that neither speech nor work was affected (and the space was acceptable) at PSIL of 67 db (68 db.) or 73 dbA (74 dbA); 20% would accept higher noise levels, but 20% also said levels this high

did affect speech and work and made the space "uncomfortable" and the noise "loud."

A69-81110
COMPUTER DETERMINATION OF SPORE SURVIVAL DISTRIBUTIONS IN THERMALLY-PROCESSED CONDUCTION-HEATED FOODS.

Arthur A. Teixeira, John R. Dixon, John W. Zahradnik, and Goerge E. Zinsmeister (Mass., U., Depts. of Agr. Eng. and Mech. and Aerospace Eng., Amherst).

Food Technology, vol. 23, Mar. 1969, p. 78–80.

In this paper, computer distributions of survivors and spore concentrations in cylindrical containers of conduction heated food are presented for various can sizes, lethal rate data and processing conditions. The results for a No. 10 can indicate that the location in the food container where the number of bacteria surviving a given thermal process would be greatest is on the midplane at a distance approximately one-fourth the radius from the center line. This agrees with the prediction made by Stumbo. This location was found to vary, depending on container geometry and processing conditions. Spore concentration, however, was found to be greatest near the center for all can sizes studied. An interpretation of the relationship between spore concentration and number of survivors is given.

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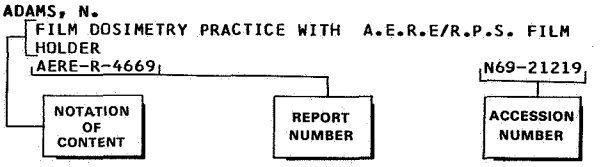

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