AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

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NASA SP-7011 (48)

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 February, 1968.

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. MARCH 1968

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In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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c. LC entries identified by a number in the A68-80000 series.

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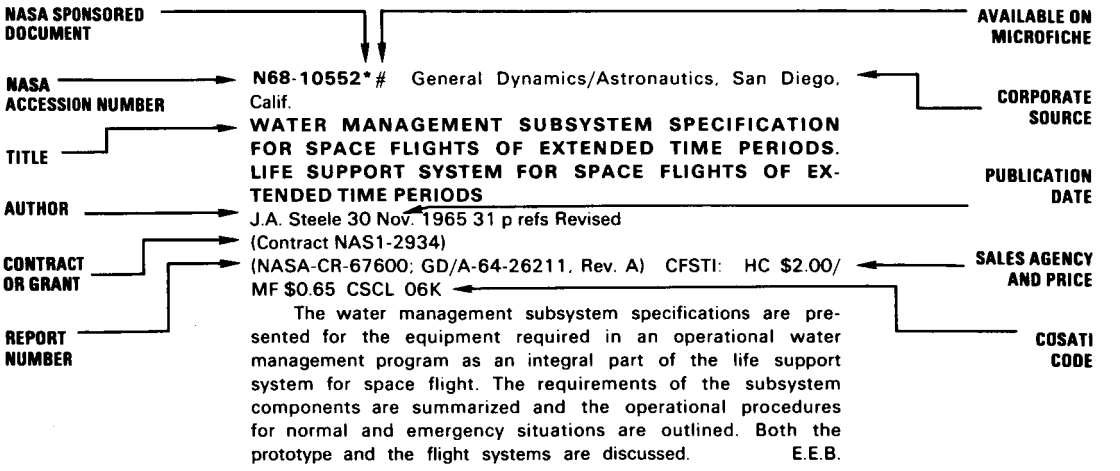
TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography MARCH 1968

STAR ENTRIES

N68-11942# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
IMMEDIATE BEHAVIORAL DETECTION OF X-RAYS BY THE RHESUS MONKEY Final Report, Period Ending Jul. 1967
Henry L. Taylor, James C. Smith, and C. Ann Hatfield Oct. 1967 19 p refs Prepared jointly with Fla. State Univ., Tallahassee
(Contracts F29600-67-C-0012; AT(40-1)-2903; AT(40-1)-2690)
(ARL-TR-67-20; AD-660580)

Immediate detection of X-rays (.63r/sec.) in four rhesus monkeys was demonstrated through the use of the conditioned suppression technique. Detection was evident in three monkeys after 20 trials in which X-rays and unavoidable shock were paired, and after 5 trials of pairing X-rays and shock for one monkey. Dose rate was decreased to .03r/sec. and all subjects showed a high level of response suppression in the presence of X-rays, but no suppression of response was evident during control trials. Author (TAB)

N68-11948*# Raff Analytic Study Associates, Inc., Silver Spring, Md.
EXPERIMENTAL RESEARCH STUDIES ON TOOLS FOR EXTRAVEHICULAR MAINTENANCE IN SPACE, PHASE 2 Final Report
Lawrence B. Johnson and Paul W. Havener 31 Aug. 1967 71 p refs
(Contract NASw-15900)
(NASA-CR-91052; Rept.-67-9) CFSTI: $3.00 CSCL 05E

Breadboard models of two conceptual space tool designs developed in an earlier phase of this effort are evaluated. The basic concept was to develop a multipurpose power tool that would offer suit and glove protection to the space maintenance worker, a unique storage arrangement for tool attachments, and would be compatible with currently envisioned space maintenance tasks. Tool modifications and accessory development continued throughout the research program based on human, mechanical, and electrical engineering requirements, and five behavioral experiments were conducted to evaluate human performance while performing simulated maintenance tasks. Author

N68-11968*# Dudley Observatory, Albany, N. Y.
THE MICROBIOLOGICAL FLORA OF THE GEMINI 9 SPACECRAFT BEFORE AND AFTER FLIGHT
John Hotchin (N. Y. State Dept. of Health), Peter Lorenz, Aletha Markusen (N. Y. State Univ., Albany), and Scott Covert (Albany Med. Coll., N. Y.) Washington NASA Dec. 1967 16 p refs
(Grant NsG-155)
(NASA-CR-972) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Three sites within the Gemini IX space capsule were investigated for microbiological contamination by swabbing before and after the flight. Bacterial or mold growth was observed in three sets of swabs taken before the flight and one set of swabs taken after the flight, and most of the swabs were then found heavily covered with dust. The results were obtained by the completely independent study of the eluted suspensions of the swabs by three research groups and, despite the considerable variation of the detailed results, they show that the inside of the Gemini IX space capsule was contaminated with microbiological materials both before and after the flight. Author

N68-12075# School of Aerospace Medicine, Brooks AFB, Tex.
HEARING OF FLYING PERSONNEL: 1962 TO 1965
Harrell C. Sutherland, Jr., James E. Endicott, and Frederick G. Collins Jun. 1967 22 p refs
(SAM-TR-67-56; AD-660558)

A survey was made of pure-tone threshold audiograms of 2,246 flyers (pilots, navigators, and others) who were tested at the School of Aerospace Medicine during the years 1962 to 1965. Hearing levels were tabulated by percentiles for each age range, at eight audiometric frequencies and for right and left ear separately. These hearing levels were compared to those of another group composed of Air Force pilots only (tested during the years 1955 to 1962) and to hearing levels of the adult, male population of the United States as reported by the National Center for Health Statistics. The results indicate that hearing acuity decreases with age and increased pure-tone frequency (except at 8000 Hz), and that flyers have better hearing than does the general population but tend to lose hearing more rapidly at 6000 Hz. Author (TAB)

N68-12084*# California Univ., Berkeley. Space Sciences Lab.
MOLECULAR BIOLOGY AND GENETICS
T. H. Jukes *In its* Ann. Conf. of Episcopal Cathedral Deans Apr. 1967 p 25-39 (See N68-12081 03-34)

Research landmarks on deoxyribonucleic acid (DNA) are reviewed, along with various genetic concepts. The structure of part of a DNA molecule is depicted to illustrate the phenomenon of hydrogen bonding, and to show how one molecule could carry all the information for all forms of life from generation to generation starting with the vary origin of life itself. It is also shown how one DNA molecule can produce two, each of which is identical with the parent. The three main types of ribonucleic acid (RNA) and their three separate functions are discussed, and the 20 amino acids concerned in the synthesis of proteins are listed. Attention is also centered on the genetic code, or the translation procedure by which

the four-letter language of DNA is translated into the 20-letter language of the proteins. The impact of such findings on the concept of evolution is discussed, and several examples of mutations that take place in DNA molecules are given. M.G.J.

N68-12097# Wisconsin Alumni Research Foundation, Madison.
DEVELOPMENT AND EVALUATION OF A PELLETED AND TABLETED DIET FOR CHIMPANZEES Final Report, Apr. 1966–Feb. 1967
E. S. Robaidek, Philip H. Derse, Leonard Regel, and Paul O. Nees Holloman AFB, N. Mex. Aeromed. Res. Lab. Oct. 1967 82 p refs
(Contract AF 29(600)-5181)
(ARL-TR-67-21; AD-660862)

Eleven modifications of the Wisconsin Alumni Research Foundation (WARF) chimpanzee diet were evaluated for nutritional adequacy during a 9 month feeding period. Six 18-36 months old chimpanzees of both sexes were used. Daily food intake and bi-weekly body weights were obtained. Hematological studies, and biochemical determinations of serum, urinary and fecal constituents were made at regular intervals during the course of the study. Fecal bacteria measurements at selected intervals were also made. Feed palatability and fecal consistency were evaluated. All modifications of the diet were found to be adequate in providing the basic nutritional requirements of the animals, with the exception of vitamin C, which was partially lost in pelleting of the diets. A formulation was made which could be satisfactorily tableted for use in dispensing machines. The same formulation was the most palatable and produced a very satisfactory fecal consistency. Suggestions for improving vitamin C stability in the pelleted diets were made. Author (TAB)

N68-12151 India. Dept. of Atomic Energy, Bombay.
BIOCHEMICAL EFFECTS OF IONISING RADIATIONS
A. Sreenivasan 1967 29 p
(BARC-287) CFSTI: $3.00

Radiobiological damage effects to various organisms at molecular or chemical levels are reviewed. Radiation effects on cells are investigated. Data tables summarizing these effects include: development of radiation injury, half-inactivation dose for various microorganisms, dosage for 50 percent deaths in 30 days (X-rays), survival of mice after 1025 r of X-rays, radiation damage to DNA in aqueous environment, possible post-irradiation DNA repair mechanisms, effect of homologous and heterologous native DNA preparations on the survival of lethally irradiated rats, effects of administered DNA on ability of bone marrow cells to synthesize DNA, urinary taurine after whole body X-irradiation of rats, X-irradiation and *in vivo* administration of ascorbic acid on CF synthesized by rat bone morrow, X-irradiation on rat tissue folates, radiation effect on survival of *s. cerevesiae* and catalase induction, induced catalase synthesis and dose modifying effect of prior aeration, and irradiated sucrose solution effect on oxidative metabolism in rat liver mitochondria. E.C.

N68-12158# Honeywell, Inc., St. Paul, Minn.
LASER RADIATION EFFECTS ON THE MORPHOLOGY AND FUNCTION OF OCULAR TISSUE Annual Report
Arthur E. Jones and David D. Fairchild Aug. 1967 52 p refs
(Contract DADA-17-67-C-0019)
(Doc.-12047-TDRI; AR-1; AD-661094)

A study was made of the effects of laser radiation on the structure and function of the primate retina. The program encompasses the ocular effects of pulsed and CW laser radiation through: (1) Anatomical studies of laser-exposed and non-exposed tissue at the resolution of both light and electron optics. These are directed toward studies of the chemical morphology of retinal structures through enzyme and other staining techniques. (2) Analysis of bioelectric potentials in the visual system. The electroretinogram recorded from the intact eye is used to follow long-term effects of laser radiation. The LERG (localized electroretinogram) will be used to study localized effects of laser radiation. Single unit recording from the fourth-order neurons (LGN) of the visual system will be used to study photochemical effects of laser radiation. (3) Laser-induced changes in retinal metabolism are being investigated through autoradiographic studies of C14 labeled vitamin A. (4) Laser exposures of the macula of rhesus and mangabey monkeys are made in conjunction with ERG studies. These animals are trained to perform in testing apparatus and are tested for visual defects. Author (TAB)

N68-12194# Joint Publications Research Service, Washington, D. C.
FEEDING OF ASTRONAUTS
A. Ushakov 11 Dec. 1967 6 p Transl. into ENGLISH from Med. Gazeta (Moscow), 3 Oct. 1967 p 4
(JPRS-43664) CFSTI: HC $3.00/MF $0.65

A journalistic account is given of the areas of investigations for food supply. Dehydrated foods are indicated for short space flights. For prolonged flights, food production onboard the spacecraft is discussed. The use of algae and bacteria are mentioned. Higher plants considered the most promising for a spacecraft greenhouse are potatoes, sweet potatoes, tomatoes, carrots, cabbage, and lettuce. Problems likely to be encountered with raising chickens, ducks, and rabbits are outlined. N.E.N.

N68-12218* LTV Aerospace Corp., Dallas, Tex. Astronautics Div.
THERMAL PERFORMANCE TESTS OF THE A-2H APOLLO EXTRAVEHICULAR MOBILITY UNIT, VOLUME 2
F. H. Goodnight, R. O. Pearson, and R. J. Copeland 15 Mar. 1965 836 p
(Contract NAS9-3414)
(NASA-CR-65856; Rept.-00.638, V. 2) CFSTI: $3.00 CSCL 06K

Plots are presented of Apollo space suit temperature data measured during a test series in a space environment simulator. Conducted to experimentally evaluate the thermal performance and design adequacy of the suit for extravehicular operations in space and on the lunar surface, the tests consisted of a simulated deep space extravehicular operation, lunar simulation with no tears in the suit, and lunar simulation with a vertical tear in the right leg and a v-shaped tear in the left leg. Summaries of the test conditions and thermocouple channel identifications are included. M.G.J.

N68-12219# Pittsburgh Univ., Pa.
EFFECTS OF CERTAIN COMPOUNDS ON ANIMALS SUBJECTED TO SIMULATED HIGH ALTITUDE Annual Progress Report, Feb. 1–Oct. 1, 1967
Joseph P. Buckley Oct. 1967 8 p
(Contract DADA-17-67-C-7089)
(APR-1; AD-661059)

The studies were mainly concerned with the possible mechanisms of action of the compound in protecting the animals from the lethal effects of severe hypoxia and the design and manufacture of a decompression chamber which would permit utilization of four Skinner boxes to determine the effects of phenformin HCl on performance and learning at simulated high altitude. Author (TAB)

N68-12300# Joint Publications Research Service, Washington, D. C.
PHYSIOLOGICAL STUDIES IN EMOTIONAL AND MENTAL STRESS

A. I. Kikolov 13 Dec. 1967 119 p refs Transl. from the book "Umstvenno-emotsional'noye Napryazheniye za Pul'tom Upravleniya" Moscow, Meditsina p 7–25, 42–162, 171–175
(JPRS-43700) CFSTI: HC$3.00/MF$0.65

A literature survey was conducted on the physiological and emotional effects of work assignments involving the use of automatic equipment containing control boards. Emphasis is placed on determining optimum work and rest cycles. Functional states of various organs and systems in humans engaged in mental work are reviewed. A lengthy study is described based on the working conditions of the following control board operators: television studio personnel, testers in the aviation industry, and monitors and dispatchers in air, rail, and subway systems. A second study further examines the work processes of television studio and rail transport personnel. E.C.

N68-12310*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ENVIRONMENTAL REQUIREMENTS
In its Space Programs Sum. No. 37-47, Vol. 3 31 Oct. 1967 p 31–35 refs (See N68-12306 03-30)

An investigation is made of the effects of microbial load distribution on the heat sterilization of spacecraft. A conceptual analytic model was constructed that consists of a cylinder 8 ft. in radius and 16 ft. high, of homogeneous material and insulated at the ends. This model was selected so that a thermal analysis could be easily performed, and it is assumed that the model could be divided into zones or shells of constant altitude. It is shown that the microbial distribution on the spacecraft may significantly affect the calculation of the required process parameters. It is also shown that the interrelationship between microbial distribution and thermal characteristics of the spacecraft may result in the use of a zone other than the most heat-resistant zone for establishment of process parameters. C.T.C.

N68-12322*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
BIOSCIENCE
In its Space Programs Sum. No. 37–47, Vol. 3 31 Oct. 1967 p 189–197 refs (See N68-12306 03-30)

Planetary research is reported in (1) metabolic activities of an osmophilic yeast relative to a study of limitations of water on growth and metabolism and (2) a pyrolysis–infrared analysis of selected soils and natural materials. In the first area determinations were made of the difficulties encountered in measuring the activities of *Saccharomyces mellis* whose metabolism is functional at low water activities such as is indicated on the surface of Mars. In the second area the pyrolysis-infrared method was applied to soils that differ in organic content and to artificial soils composed of mixtures of selected natural materials with ignited soils. Results suggest that soils can be distinguished from one another in this way and that some of the classes of organic compounds that make up a soil can be identified. C.T.C.

N68-12336# School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECTS OF MONOMETHYLHYDRAZINE ON THE COAGULATION MECHANISM
Jarrell D. Bairrington Jul. 1967 11 p refs
(SAM-TR-67-64; AD-660560)

The in vivo effects of a 0.6 LD50 dose of monomethylhydrazine (MMH) on the prothrombin-activating mechanism and the fibrinolytic mechanism were studied in rats anesthetized with ether. The studies were evaluated by means of the prothrombin time, partial thromboplastin time, thromboplastin generation test, and quantitative measurements of free and total profibrinolysin, and the euglobulin inhibitor. No significant changes were found in the prothrombin time or partial thromboplastin time, but the thromboplastin generation time was increased ($P < .001$) and total profibrinolysin was decreased significantly ($P < .05$). The relationship of these changes with the effects of hydrazine is discussed. Author (TAB)

N68-12342*# Northrop Space Labs., Hawthorne, Calif.
A PROTOTYPE SPACE FLIGHT EXPERIMENT PACKAGE TO STUDY CIRCADIAN PERIODICITY IN POCKET MICE
Final Report
Jun. 1966 58 p refs
(Contract NASw-1191)
(NASA-CR-91062; NSL-66-89) CFSTI: HC $3.00/MF $0.65
CSCL 06F

This report summarizes the development, testing and recommended modification of a Prototype Space Flight Experiment Package designed to conduct a study of the circadian periodicity of body temperature in the pocket mouse, *Perognathus longimembris*. The prototype has survived all environmental testing including vibration, acceleration, humidity, thermal and vacuum stresses. Experimental animals, with and without implanted telemeters, survived all parts of the environmental testing program pertinent to the experiment objectives. After thirty days of continuous operation in simulated space, there was no evidence of the package configuration affecting circadian periodicity in the mice. Author

N68-12369# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
BIONICS—BASE FOR INNOVATION. A MANAGEMENT OVERVIEW OF THE BIRTH AND DEVELOPMENT OF BIONICS AT WRIGHT FIELD
K. W. Zahrt Sep. 1967 33 p
(ASB-TM-67-1; AD-660614)

The report presents the story of a new technology which has produced a flight control system with a learning, or self-organizing, functional capability; a system which can adapt more quickly than even the most skillful pilot to the flight characteristics of an aircraft. It promises a radical step forward in Air Force operational capability by, in effect, invisibly adding a superman in the cockpit to share the flight control duties. The story is a retrospective analysis which traces the evolution of a major state-of-the-art advance from the serendipity of early Air Force research planners. It illustrates the fact that a well-chosen, carefully nurtured, and well-managed, research program without a specific initial military objective often can provide a series of startling breakthroughs in weapon system operational effectiveness. The background information which introduces the story provides a realistic picture of the time factor involved in bringing hitherto unrelated research ideas into a well-focused, applicationally-oriented reality. Woven into the story are recurring references to the evolution of long range planning concepts within the Air Force research and development community. Author (TAB)

N68-12376# School of Aerospace Medicine, Brooks AFB, Tex.
DIZZINESS AND VERTIGO IN AVIATORS
William L. Mitchell, Morgan E. Wing, and Frederick G. Collins Jul. 1967 18 p refs
(SAM-TR-67-60; AD-660559)

The medical records of 84 patients referred to the USAF School of Aerospace Medicine because of vertigo or diseases which are capable of producing vertigo are reviewed, and the findings and aeromedical disposition are analyzed. Approximately one-third of the patients evaluated in this series fell into the category of vestibular neuronitis. The remaining categories in order of decreasing frequency were Menieres disease, idiopathic paroxysmal vertigo, labyrinthine or central nervous system ischemia, trauma, barovertigo, and vertigo suspected to be due to neoplasm. Ten of the patients in this study were thought to have lightheadedness of nonvestibular origin. Author (TAB)

N68-12403# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
LEGIBILITY OF SEGMENTED VERSUS STANDARD NUMERALS: A REVIEW

Terrence K. Gibney Jun. 1967 12 p refs
(AMRL-TR-67-116; AD-661262)

The literature review compares the legibility of segmented numerals and standard Arabic numerals. Based on present literature, the following conclusions are drawn. When compared to standard Arabics, segmented numerals are usually found to be less legible. However, of all the nonstandard numeral designs, segmented numerals are consistently superior. As the complexity of the observers task increases, differences between the legibilities of segmented and standard numerals become insignificant. Therefore, no appreciable decrement in functional legibility is to be expected from segmented numerals in applied situations where tasks are typically complex. Practice effects, observers motivation and stress, interaction of design types, number of segments and intersegmental distance are important variables to be considered. At present, little is known about how these variables influence legibility. Future research on legibility should be conducted under conditions which most nearly simulate the situation for which the proposed design is intended. Author (TAB)

N68-12429# Florida State Univ., Tallahassee.
CRITICAL FUSION FREQUENCY IN RHESUS MONKEYS USING THE CONDITIONED SUPPRESSION TECHNIQUE Final Report for Aug. 1967
Stephen A. Shumake, James C. Smith, and Henry L. Taylor Holloman AFB, N. Mex. Aeromedical Res. Lab Oct. 1967 25 p refs Prepared jointly with Aeromedical Res. Lab.
(Contracts F29600-67-C-0012; AT (40-1)-2903)
(ARL-TR-67-22; AD-661298)

By using a modified conditioned suppression technique, critical fusion frequencies were determined across 8.0 log units of brightness for three rhesus monkeys. Threshold values ranged from 20 c.p.s. for -3.9 log ft. L. to 95 c.p.s. for 4.1 log ft. L. Although systematic individual differences were observed at each brightness value, the intrasubject variability did not exceed 5 c.p.s. upon replication. Author (TAB)

N68-12494*# General Technical Services, Inc., Upper Darby, Pa.
TRANSIENT BEHAVIOR OF ARTERIAL SYSTEMS IN RESPONSE TO FLOW PULSES
E. D. Young Washington NASA Dec. 1967 35 p refs
(Contract NASw-1066)
(NASA-CR-990) CFSTI: HC $3.00/MF $0.65 CSCL 06P

In this paper we hope to show the relation of transient analysis of fluid lines to harmonic analysis thereof, to indicate the practicality of formulating the transmission problem with respect to transients in the time domain and uniformly with respect to frequency or pulse width within the domain of linearity assumptions of Witzig, Iberall, Womersley, etc., to apply this transient analysis to a whole class of systems embracing in principle the normal range of mammalian arterial systems which should help to clarify the meaning of equivalence among various idealized models mentioned, to trace causual relations between familiar wave distortions seen in arterial trees and the basic geometry of the trees, or that of the equivalent system. Author

N68-12502*# Retec, Inc., Portland, Oreg.
DESIGN AND DEVELOPMENT OF A TWO-WAY BREATHING VALVE Final Report
Henry L. Burns Sep. 1966 11 p
(Contract NAS9-5598)
(NASA-CR-65730) CSCL 06B

In order to design a two-way breathing valve acceptable for space flight medical experiments, engineering activity was directed towards the improvement of available valves used with anesthesia equipment. The major area for improvement in these valves lies in the form and support of rubber flappers used as inhalation and exhalation check valves. Therefore, using only NASA-approved Apollo command module materials, an elastomer valve flapper with a heavy circular section circumferential rim was constructed. Enough hoop strength was provided with this design to eliminate the usual supporting spokes. The ability of the design to prevent flapper inversion without the aid of supporting spokes or webs was determined by an overpressurization test in which the results were plotted in terms of pressure drop in centimeters of water and back leak in liters per minute. Engineering drawings are given for the valve designed and its component parts. E.J.S.

N68-12568* West Virginia Univ., Morgantown.
THE EFFECT OF CHANGING GRAVITY AND WEIGHTLESSNESS ON VASOPRESSIN CONTROL SYSTEMS *Progress Report*, 15 Feb.–14 Aug. 1967
Walter H. Moran, Jr. 14 Aug. 1967 9 p refs
(Grant NGR-49-001-019)
(NASA-CR-90750) CFSTI: $3.00 CSCL 06S

Efforts this period were devoted to increasing the accuracy of the antidiuretic hormone (ADH) assay method, to studying the ADH secretory response to stress in infants, to assaying plasma samples from Navy pilots in Vietnam for ADH content, to developing LINC-8 computer programs for analyzing the urinary conductance and urinary flow parameters of the rat ADH bioassay and for automatically controlling intravenous hydration of the rat bioassay preparation, and to isolating CRF from rat plasma. A report on ADH blood levels in infants from birth to three months of age is appended. R.N.A.

N68-12569# Oak Ridge National Lab., Tenn.
EFFECTS OF IONIZING RADIATION ON INTERSPECIFIC COMPETITION
B. G. Blaylock [1967] 22 p refs Presented at 2d Natl. Symp. on Radioecol., Ann Arbor, Mich.
(Contract W-7405-ENG-26)
(ORNL-P-3063; CONF-670503-15)

The effect of acute and chronic radiation on competiton was studied in laboratory populations of the sibling species *Drosophila melanogaster* and *Drosophila simulans* that are similar both morphologically and genetically. *Drosophila simulans* was the superior species for thirty weeks in the control populations, but was eliminated by *D. melanogaster* when the populations were exposed to a chronic dose of 4.3 RADS/hr. After an acute dose of 2000 RADS, *D. melanogaster* was the superior species for approximately 12 weeks; however, the reverse was true when the populations were exposed to 10,000 RADS. *Drosophila melanogaster* was eliminated by *D. simulans* by the end of six weeks. The frequency of irradiated *D. melanogaster* or irradiated *D. simulans* (2000 RADS) decreased rapidly when placed in competition with non-irradiated flies of the opposite species. Under these conditions, irradiated *D. melanogaster* recovered after six weeks, but irradiated *D. simulans* never recovered and was eliminated in one population after 24 weeks. Population size was affected by the exposure to acute and chronic radiation, but most of the populations recovered after six weeks. The populations receiving 10,000 RADS were the exceptions; they required twelve weeks to recover. This was attributed to the effects of radiation on the reproductive capabilities of these species. After nine weeks of competition the populations having the largest average size were the ones that received an acute dose of 2000 RADS. Author (NSA)

N68-12573# Army Chemical Center, Edgewood, Md. Experimental Medicine Dept.
EFFECTS OF MAGNESIUM PEMOLINE UPON HUMAN LEARNING, MEMORY, AND PERFORMANCE TESTS, FEBRUARY–AUGUST 1966

Ronald G. Smith Oct. 1967 59 p refs
(EATR-4139; AD-661320)

The purpose of this report was to determine the effects of magnesium pemoline (a combination of 2-imino-5-phenyl-4-oxazolidinone and magnesium hydroxide) on a variety of human learning, memory, and performance tasks, magnesium pemoline (25 or 37.5 mg) or a placebo was administered orally on a double-blind basis to intelligence-matched groups of normal, adult males. These agents were administered 3 hr before the testing. Seven different tests were used in the experiment: verbal learning, motor learning, galvanic skin response, classical conditioning, visual short-term memory, auditory short-term memory, visual reaction time, and arm-hand steadiness, from the test results. It was concluded that magnesium pemoline, in the doses tested, does not facilitate learning, memory, or performance in normal, adult men. In fact, the only statistically significant effects indicate that the higher dose was deleterious for verbal and motor learning. Author (TAB)

N68-12649# Oak Ridge National Lab., Tenn.
ENVIRONMENTAL STUDIES: RADIOLOGICAL SIGNIFICANCE OF NUCLEAR ROCKET DEBRIS Progress Report, Jul. 1, 1965–Jun. 30, 1966
B. R. Fish, T. G. Clark, R. H. Boyett, W. H. Wilkie, Jr., and J. L. Thompson Dec. 1966 65 p refs
(Contract W-7405-ENG-26)
(ORNL-TM-1686) CFSTI: HC $3.00/MF $0.65

Radiological safety studies being conducted for the Space Nuclear Propulsion Office, Flight Safety Branch, are summarized for the period, July 1, 1965 to June 30, 1966. An assessment was made of the significance of radioactive debris that may enter the biosphere following accidental destruction of a nuclear propulsion system. The production and dosimetry of micron-size particles containing individual radionuclides or a spectrum of fission products were studied. Two dosimetric techniques were used to extrapolate to minute volumes of tissue the dose absorbed from small spheres of reactor fuel material. The first utilized an air ionization chamber. The second used a technique in which progressively smaller discs of an organic scintillator yield pulse height spectra. Spherical particles from 1 mm to 1 cm diameter were made in thermal gradient columns or in split molds of aluminum or teflon. Labeling of these sources was done by addition of radioisotopes to a uranium–carbon mix prior to insertion in the mold or by neutron irradiation following particle fabrication. Deposition and adhesion of radioactive debris on the skin were studied. The degree of initial retention on the arm of particles falling vertically in a uniform fallout was determined. Coated UC_2 fuel beads were used in tests to determine the initial deposition and retention time on the skin. A wide variation was noted between individuals in the average length of time these particles remained on the arm under identical environmental conditions. Skin decontamination experiments showed that simple sanitary habits suffice to remove particles ranging from 1 to 1000 microns in diameter. Preliminary determination of gastrointestinal tract transit time in man, using insoluble particles showed a significant fraction to be retained for periods longer than the 31-hour standard value. NSA

N68-12688# California Univ., Livermore. Lawrence Radiation Lab.
PERSONNEL MONITORING WITH FILM, GLASS, AND TLD
R. L. Kathren and R. E. Yoder 7 Oct. 1966 8 p Presented at Western Ind. Health Conf., Los Angeles, 7 Oct. 1966
(Contract W-7405-ENG-48)
(UCRL-70171; CONF-661027-1) CFSTI: HC $3.00/MF $0.65

Criteria for the ideal personnel dosimeter are presented. It is concluded that no dosimeter in present use fills all the requirements. The performance of photographic film dosimeters, radiophotoluminescent glass dosimeters, and thermoluminescent dosimeters is discussed. It is concluded that radiophotoluminescent glass and thermoluminescent dosimeters are both superior to photographic film dosimeters and that the ideal personnel dosimeter should include all three radiation detectors. NSA

N68-12748 Joint Publications Research Service, Washington, D. C.
PROTECTION OF RESPIRATORY ORGANS AGAINST RADIOACTIVE SUBSTANCES
S. M. Gorodinskiy, T. N. Skvortsova, and V. L. Shcherbakov 5 Dec. 1967 10 p refs Transl. into ENGLISH from Gigena Truda i Prof. Zabolevaniya (Moscow), no. 9, 1967 p 13–16
(JPRS-43578)

The value of individual respirators for protecting the respiratory organs against radioactive substances is considered in terms of Soviet developments since 1960. Characteristics of three brands of Lepestok-type respirators are compared, and recommendations are offered for their uses. Mention is made of pneumatic suits and hose-type protective suits that have been used in industrial situations. M.W.R.

N68-12755# Argonne National Lab., Ill. Industrial Hygiene and Safety Div.
RADIATION SAFETY TECHNICIAN TRAINING COURSE
H. J. Moe, S. R. Lasuk, and M. C. Schumacher Sep. 1966 359 p refs Supersedes ANL-6991
(Contract W-31-109-ENG-38)
(ANL-7291; ANL-6991) CFSTI: HC $3.00/MF $0.65

Lectures prepared for a training course for radiation safety technicians are presented. Topics discussed include basic information on radiation, natural radioactivity, properties of radiations, radiation units and dose determinations, shielding, biological effects of radiation, background radiation, radiation protection standards, internal dose calculations, radiation detection principles, operating characteristics of radiation detectors, radiation survey instruments, personnel monitoring devices, air sampling methods, and the design characteristics and radiation protection problems of reactors, hot cells, and particle accelerators. NSA

N68-12786# Staatliche Zentrale fuer Strahlenschutz, Berlin (East Germany).
ABNORMAL MOLECULES IN URINE AFTER IRRADIATION
Z. Dienstbier, M. Arient, and J. Shejbal Oct. 1966 29 p refs
(SZS-12(1966))

In a review of different catabolites, the excretion of which is quantitatively changed after irradiation, their importance for the diagnosis of postirradiation damage is discussed. Author (NSA)

N68-12789# Staatliche Zentrale fuer Strahlenschutz, Berlin (East Germany).
CHANGES IN THE BIOELECTRIC ACTIVITY OF THE BRAIN BY THE ACTION OF IONIZING RADIATION [VERAENDERUNGEN DER BIOELEKTRISCHEN AKTIVITAET DES GEHIRNS DURCH EINWIRKUNG IONISIERENDER STRAHLUNG]
J. Michel Sep. 1966 38 p refs In GERMAN; ENGLISH summary
(SZS-11(1966))

Experimental and clinical studies of radiation effects on brain electrical activity so far known in literature are surveyed and discussed with regard to evidence of radiosensibility of the brain and the usefulness of the surface EEG as a criterion for

radiation-induced functional changes or damages to the CNS. The results demonstrate that even smallest radiation doses may cause transitory functional changes in the brain and that various structures of the brain obviously have a high selective radiosensibility. The difficulties in interpreting the changes of brain electrical activity caused by small and medium radiation doses are pointed out, especially with regard to the question when these changes must be considered a damage. The question, whether the surface-EEG is useful as a criterion for changes or early damages of the function of the brain caused by small and medium radiation doses cannot be answered by investigations to date with mainly conventional, qualitative EEG-analysis and its final clearing is reserved for further studies with objective, quantitative (automatic) analysis.

Author (NSA)

N68-12798# Advisory Group for Aerospace Research and Development, Paris (France).

ASSESSMENT OF SKILL AND PERFORMANCE IN FLYING

Sep. 1966 134 p refs Presented at 23d Ann. Meeting of AGARD Aerospace Med. Panel, Toronto, 7 Sep. 1966

(AGARD-CP-14; AD-661165)

Contents: Human error research and analysis program; The analysis of human performance within the operational flight environment; Sustained pilot performance requires more than skill; Sleep rhythms in transatlantic civil flying; Navigation of helicopters in slow and very low flight: a comparison of solo and dual pilot performance; Development of the spatial orientation trainer; Measurement of performance in F-86K simulator; Measuring the pilots contribution in the aircraft control loop; Prior learning and age in relation to pilot performance; Plasma phospholipid composition as a biochemical index to stress; The electroencephalogram as a physiological criterion of performance; The use of psycho-physiological measures in the assessment of operator effort; Influence of mild hypoxia on visual perception during post-rotatory nystagmus. TAB

N68-12810# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

THE EFFECTS OF TASK-INDUCED STRESS ON SPEECH Final Report, Jul. 1, 1966–Jun. 30, 1967

Michael H. L. Hecker, Kenneth N. Stevens, Gottfried von Bismarck, and Carl E. Williams 25 Aug. 1967 81 p refs

(Contract AF 19(628)-6052)

(BBN-1542; AFCRL-67-0499; AD-660595)

In order to induce stress in an experimental subject, a task involving the addition of numbers under time pressure was developed. The subject was required to read six meters and to announce the sum of his readings, together with a test word. By controlling the duration of the meter display, the experimeter could vary the level of stress induced in the subject. For each of ten subjects, numerous verbal responses were obtained while the subject was under stress and while he was relaxed. Contrasting responses containing the same test word were assembled into paired-comparison listening tests. Listeners could identify the stressful responses of some subjects with better than 90 percent accuracy and of others only at chance level. The test words from contrasting responses were analyzed with respect to level and fundamental frequency, and spectrograms of these test words were examined. The results indicate that stress can produce a number of characteristic changes in the acoustic speech signal. Most of these changes are attributable to modifications in the amplitude, frequency, and detailed waveform of the glottal pulses. Other changes result from differences in articulation. Although the manifestations of stress varied considerably from subject to subject, the test words of most subjects exhibited some consistent effects. Author (TAB)

N68-12847*# IIT Research Inst., Chicago, Ill.

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, 1 Sep.–30 Nov. 1967

Charles A. Hagen 30 Nov. 1967 17 p refs

(Contract NASr-22)

(NASA-CR-91291; IITRI-L6032-11) CFSTI: HC $3.00/MF $0.65 CSCL 06F

B. cereus and *S. aureus* survived in various severe environments for at least 12 months with no appreciable decrease in the number of viable cells. Barometric pressure, carbon dioxide concentration, and length of daily freeze influenced the growth response of both organisms. The 100% carbon dioxide environment at 10 mb with a 20-hr daily freeze allowed survival with no appreciable die off of *B. cereus*. Growth of *S. aureus* occurred in the same environment, with final counts about 4-fold higher than initial counts. Barometric pressure and length of daily freeze affected the growth of *S. aureus* in environments with low water activities (a_w). The lowest a_w range thus far tested that permitted growth was 0.70 to 0.75. Preliminary data from soil ecology experiments indicated that the a_w of the environment is important to survival. As the a_w decreased, a greater number of cells was required for suvival. Author

N68-12873# International Atomic Energy Agency, Vienna (Austria).

BASIC SAFETY STANDARDS FOR RADIATION PROTECTION

1967 89 p *Its* Safety Ser. No. 9

Safety standards are presented to provide a regulatory basis for protecting the health and safety of employees and the public, without imposing undue burdens upon users of radioactive material. These standards apply to the production, processing, handling, use, storage, transport, and disposal of natural and artificially produced radioactive material, and to the use and operation of other radiation sources. The data presented pertain to limitation of doses for exposures from controllable sources, radiation doses and intakes of radioactive materials through external and internal exposure, and fundamental operational principles to ensure radiation protection. Tables list the maximum permissible annual intakes in air or water for single radionuclides applicable to workers engaged in radiation work, and the maximum permissible activity for exemption from notification, registration, or licensing. M.G.J.

N68-12925# School of Aerospace Medicine, Brooks AFB, Tex.

GROWTH OF THE YOUNG MALE RAT IN A HYPEROXIC ENVIRONMENT

Methodius J. Bartek, Murphy B. Daniels, and Frode Ulvedal Sep. 1967 27 p refs

(SAM-TR-67-82; AD-661978)

Young male rats were maintained continuously in a hyperoxic environment for periods up to 8 weeks. During this time, the animals were subjected to an oxygen partial pressure of 369 mm. Hg (97.1%) at a simulated altitude of 380 mm. Hg (18,000 ft). The parameters chosen to delineate growth and development in the rat were: total body weight gain; weight gain of the liver, kidney, testis, spleen, lung, adrenal, heart, and brain; deoxyribonucleic acid (DNA), ribonucleic acid (RNA), and protein content of these organs; incorporation of 14C-leucine into liver protein; and serum lactate dehydrogenase (LDH) isozymes. In spite of the changes reported in the text, the animals grew well in this atmosphere; however, it should be noted that several fundamental changes were observed in the growth and development on the cellular level. Author (TAB)

N68-12946*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

STERILIZATION: A SELECTED BIBLIOGRAPHY FROM THE LITERATURE RETRIEVAL SYSTEM, SPACE BIOLOGY BRANCH

Nov. 1967 40 p refs Revised
(NASA-TM-X-63054; X-624-67-564, Rev.; X-450-66-53) CFSTI: HC $3.00/MF $0.65 CSCL 06T

An annotated bibliography is presented with topical headings. These headings include: (1) clean rooms; (2) decontamination; (3) sterilization methods, i.e., air filtering, chemicals, radiation and heat; (4) methods and statistics for detection and monitoring of microorganisms; (5) spacecraft sterilization; and (6) survival viability of microorganisms. D.T.

N68-12952# North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.
ACCLIMATIZATION VERSUS TOLERANCE TO STRESS, VOLUME 1 An Annotated Bibliography, May 1964–Jul. 1965
J. T. Celentano, H. B. Kelly, Jr., and W. I. Lilley Brooks AFB Tex. School of Aerospace Med. Sep. 1967 561 p refs Submitted for publication
(Contract AF 41(609)-2335)
(SAM-TR-67-95, V. 1; AD-661571)

The bibliography was prepared from the literature surveyed as part of the study to determine the effect of altitude acclimatization on various selected stresses. This volume contains a compilation of titles and abstracts on altitude acclimatization and the exposure to chronic hypoxia. The bibliography is arranged alphabetically by last names of authors. Author (TAB)

N68-12953# McGill Univ., Montreal (Quebec).
STUDIES OF THE EFFECTS OF MANIPULATION OF BRAIN METABOLISM ON LEARNING. 1: VITAMIN B12. 2: MAGNESIUM PEMOLINE (CYLERT). 3: MALONONITRILE DIMER (U9189). 9: ANODAL POLARIZATION Final Report, 6 Jul. 1966–5 Jul. 1967
John A. Corson Holloman AFB, N. Mex. Aeromed. Res. Lab. Oct. 1967 58 p refs
(Contract AF 29(600)-5685)
(ARL-TR-67-18; AD-660565) CFSTI: HC $3.00/MF $0.65

Male rats were subjects in experiments on the effects of various chemical and electrical interventions on learning ability. The studies used a variety of behavioral testing situations ranging from simple escape to pattern discrimination. The following behavioral results were obtained: (1) vitamin B12 improved the learning of hooded rats in simple escape and pattern discrimination situations, (2) magnesium pemoline improved some types of performance, primarily those with speed components, and interfered with others, (3) malononitrile dimer had a generally detrimental effect on performance, the one exception being an improvement in one phase of spatial learning, and (4) in pilot experiments using small groups, anodal polarization of cortical tissue had no significant effect. The following chemical results were obtained: (1) vitamin B12 increased the concentration of RNA in the nucleoli of neurons in the cerebellum and spinal cord, (2) magnesium pemoline did not change the amount of C14 formate incorporated into newly synthesized RNA, and (3) malononitrile dimer increased incorporation of C14 formate into newly synthesized RNA. General conclusions are as follows: (1) elevation of neural RNA is not necessarily accompanied by improvements in learning ability, and (2) patterns of change in brain metabolism and learning ability produced by these interventions demonstrate the inadequacy of several theories and may eventually lead to an increased understanding of the biological basis of learning. Author (TAB)

N68-12963*# Naval School of Aviation Medicine, Pensacola, Fla.
THE EFFECT OF WATER IMMERSION ON PERCEPTION OF THE OCULOGRAVIC ILLUSION IN NORMAL AND LABYRINTHINE-DEFECTIVE SUBJECTS
Ashton Graybiel, Earl F. Miller, II, Bernard D. Newsom, and Robert S. Kennedy 14 Sep. 1967 19 p refs
(NASA Order R-93)
(NASA-CR-91451; NAMI-1016) CFSTI: HC $3.00/MF $0.65 CSCL 06S

The separate and combined influences of otolith and nonotolith sensory inputs upon perception of the oculogravic illusion were investigated by manipulating the visual and gravitoinertial force environments. By comparing the visually perceived direction of space by four naval aviators and four deaf persons with bilateral labyrinthine defects when dry and when immersed in water up to neck level, the contributions of (1) field force receptors in the vestibular organs and (2) non-vestibular proprioceptors stimulated by external contact support could be differentiated. Under these various conditions it was found that in normal persons, the vestibular contribution is predictable in terms of the direction of the gravitoinertial force vector but that the nonvestibular contribution varies; it may be relatively great or small. In persons with bilateral labyrinthine defects a nonvestibular contribution was always present but there was great individual variance. The significance of the findings in terms of tests measuring the function of the otolith organs is discussed. Author

N68-12977# Sperry Rand Research Center, Sudbury, Mass.
SUPPRESSION AND FUSION IN STEREOPSIS Final Report, 1 Aug. 1964–31 Jul. 1967
Lloyd Kaufman Sep. 1967 192 p refs
(Contract DA-49-193-MD-2654)
(SRRC-CR-67-36; AD-661647)

The behavioral studies reports have led to the conclusion that sensory fusion of disparate binocular stimuli cannot be distinguished from suppression. Singleness of vision under these circumstances may be attributed to the suppression of parts of each eyes input. The stimulus dimension most relevant to stereopsis appears to be disparity in relative brightness. Moreover, stereopsis can occur when the contours imaged on the two retinas are rivalrous. Hence rivalry is not incompatible with stereopsis. Brightness disparities may be superposed on any pattern of contours, even those which are classically deemed fusable, and stereopsis may be predicted from the distribution of brightness. Although contour is not necessary to the occurrence of stereopsis, recent evidence suggests that it may be sufficient. It would appear that two parallel systems can operate to mediate binocular depth perception: a system which includes a spatial brightness-averaging mechanism and a system which includes a contour processing mechanism. Both systems involve a scheme which entails correlation of arrays along either a brightness or a contour dimension. Hence some form of monocular pattern recognition may occur during stereopsis. An effort was made to verify reports of others that rivalry is accompanied by changes in the evoked response. This was not verified in a number of experiments. Nonlinear interaction between inputs to corresponding places to the two eyes will occur regardless of the nature of the stimuli. Author (TAB)

N68-12983# Kansas State Univ., Manhattan.
VISION RESEARCH IN MILITARY AND GOVERNMENT LABORATORIES
John Lott Brown Dec. 1967 27 p refs
(Contract Nonr-3634(04))
(AD-661870)

Contents: Summary of laboratories by services (U. S. Air Force, U. S. Army, U. S. Navy, NASA); Special visual problems associated with military operations (aircraft landing; low-altitude, high-speed flight; continuous visual control); Optical aids; Visual displays; Search, detection, recognition, and reconnaissance; information displays; night vision; flash blindness; various stresses; visually-guided control functions; space flight; special processing of visual information; longitudinal studies; psychophysical studies of vision; electrophysiology; ocular-vestibular effects; Standards, testing, and screening. TAB

N68-13004# North American Aviation, Inc., Downey, Calif. Life Systems Dept.
ACCLIMATIZATION VERSUS TOLERANCE TO STRESS, VOLUME 2 AN ANNOTATED BIBLIOGRAPHY

J. T. Celentano, H. B. Kelly, and W. I. Lilley Brooks AFB, Tex. School of Aerospace Med. Sep. 1967 245 p refs
(Contract AF 41(609)-2335)
(SAM-TR-67-95, V. 2; AD-661572)

The volume is a continuation of the literature survey (AD-661 571) conducted to evaluate acclimatization versus tolerance to stress and contains a compilation of titles and abstracts dealing with altitude acclimatization as related to acute hypoxia, decompression, hypercapnia and hyperthermia. The bibliography is arranged alphabetically by authors names. Author (TAB)

N68-13024# Applied Psychological Services, Wayne, Pa.
DIMENSIONS OF VISUAL INFORMATION DISPLAYS
Arthur I. Siegel and M. A. Fischl Sep. 1967 64 p refs
(Contract N00014-66-C-0183)

The study sought to determine the nature and composition of the display-observer interface. Twelve air defense command and control visual information displays, representing all combinations of three densities of air threat, two different primary formats, and two conditions of information coding, were exposed to subject groups of three different degrees of experience and familiarity with the displays and the tactical concepts involved in their use. Independent multidimensional scaling analyses were performed on the data derived from each subject group. Seven fundamental dimensions, which were congruent across the subject groups, were derived. The patterns of factor loadings suggested interpretations along the lines of: (1) stimulus numerosity, (2) primary coding, (3) contextual discrimination, (4) structure scanning, (5) critical relationships, (6) cue integration, and (7) cognitive processing. These are consolidated into a model, which may serve as a basis for understanding the display-observer interface. Author (TAB)

N68-13042# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PERIPHERAL OR LOCAL REFLEXES
M. V. Sergiyevskiy 13 Mar. 1967 227 p refs Transl. into ENGLISH of the book "Perifericheskiye Ili Mestnyye Refleksy" Moscow, Izd. Med., 1964 p 1–200
(FTD-HT-66-685; AD-661895)

Contents: Basic histological data on sensory-nerve endings in the internal organs and the possibility of reflex-arc completion in the peripheral ganglia; Peripheral, or local reflexes and axon reflexes; Observations on isolated pelvic and digestive organs; Reactions of the urinary bladder to changes in pressure in the inferior mesenteric artery; Reflexes from the abdominal vessels to the spleen; Reflexes from the abdominal vessels to the kidneys; Lymphopoietic reflexes originating in the vascular receptor fields of the abdomen; Biligenetic reflexes originating in the abdominal vessels; Results of parallel observations of biligenesis and lymphopoiesis during changes in pressure in the abdominal arteries and organs; Brief summary and prospects for further resolution of the problem of peripheral reflexes. TAB

N68-13091# Explosives Research and Development Establishment, Waltham Abbey (England).
AN INVESTIGATION OF THE FUMES EVOLVED INSIDE VEHICLES DURING ENVIRONMENTAL TESTING
A. Davis and J. H. Golden 4 Aug. 1967 13 p
(ERDE-9/R/67; AD-661504)

The nature of the fumes evolved inside vehicles during environmental testing at 71C (160F) for 3 days was examined. Ten components were identified and one, formaldehyde, was quantitatively estimated. The concentration of formaldehyde was considerably in excess of the toxic limit but it is not known whether or not the other components exceeded their specific toxic limits. An investigation of the various individual plastics used in the vehicle during heating showed that the reinforced resins (phenol/formaldehyde, melamine/formaldehyde, polyester/styrene and silicone) gave rise to significant quantities of volatile materials of two major types, unused reactants and various organic solvents used during preparation. Methods for elimination of the fumes are briefly considered. Author (TAB)

N68-13100# Naval Medical Research Inst., Bethesda, Md. Translation Service.
ELECTRON-STIMULATED STATES OF THE BIOPOLYMERS. CHAPTER 2: ELECTRON-STIMULATED STATES OF PROTEINS
S. V. Konev 1965 64 p Transl. into ENGLISH from the book "Elektronno-Vozbuzhdennye Sosvoyaniya Biopolimerov" Minsk, Nauka i Tekhn., 1965 p 56–96
(Rept.-1203; AD-661174)

Topics include: Fluorescence of proteins containing tyrosine; Fluorescence of proteins containing tryptophan; Spectra of protein fluorescence; Quantum output fluorescence and protein macrostructure; Conformation and luminescence of proteins; Duration of the stimulated state of protein fluorescence; polarization spectrum of protein fluorescence after absorption; Polarization spectra of protein fluorescence after emission; Fluorescence of albumins; Life span of albumin phosphorescence; Polarization spectra of protein phosphorescence after absorption and emission. TAB

N68-13107# Naval Medical Research Inst., Bethesda, Md.
ETIOLOGY OF DECOMPRESSION SICKNESS: CHARACTERISTICS OF BUBBLE FORMATION IN VIVO
Richard G. Buckles 9 Aug. 1967 32 p refs Presented at the Biomed. Eng. Symp., San Diego, Calif., 19 Jun. 1967
(Rept.-1; AD-661841)

In order to permit the testing of new decompression procedures in a reasonable time frame, a scaled animal preparation was developed. The technique permits the direct observation of bubble formation in vivo under highly controlled environmental conditions. This report presents the basis for such scaling and describes the instrumentation system that was developed. Author (TAB)

N68-13116* Pillsbury Co., Minneapolis, Minn.
MANUFACTURE AND TEST OF HIGH DENSITY FOOD PRODUCTS Final Report
Oct. 1967 33 p
(Contract NASw-1627)
(NASA-CR-91375) CFSTI: $3.00 CSCL 06H

Performance, acceptability, ease of preparation, and packaging of high density foods was evaluated on field trips to high mountain ranges and on arctic expeditions. Menu configurations contained about 4.50 to 4.79 calories/gram in compressed food bars, and consisted of frozen meat, rice, mashed potatoes, corn flakes, and milk. All foods proved extremely satisfactory in keeping the expedition members strong and healthy; but participants expressed a desire for more varied menus. G.G.

N68-13149* Harvard School of Public Health, Boston, Mass. Guggenheim Center for Aerospace Health and Safety.
HUMAN PERFORMANCE IN ADVERSE ENVIRONMENTS Final Report
Ross A. McFarland, Norman H. Mackworth, and Warren H. Teichner 1 Nov. 1967 35 p refs
(Grant NsG-718)
(NASA-CR-91444) CFSTI: $3.00 CSCL 06S

Three areas in the field of visual perception have been studied in relation to human performance in adverse environments. The first major area of research was concerned with the relationship of central and peripheral vision while carrying out selected tasks. The second major area dealt with prolonged attention and visual search, in relation to the performance of selected tasks. These experiments were carried out while subjects were exposed to simulated altitudes and other stressful situations. The third area dealt with pattern recognition and target detection. Emphasis was

placed on the development of new techniques and equipment for the measurements of performance under altered environments and stresses. Special attention was given to the improvement and use of a stand eye camera and a head-mounted eye camera for studies involving visual search. A new reflex eye camera has been designed for this purpose and a new apparatus was built for the measurement of prolonged visual search, attention, and task performance. Author

N68-13160* Franklin Inst., Philadelphia, Pa. Research Labs.
BLEPHARISMA GROWTH IN "NULL" MAGNETIC FIELD Final Report
R. J. Gibson, I. R. Isquith, and R. M. Goodman 31 Jul. 1967 104 p refs
(Contract NSR-39-005-020)
(NASA-CR-91399; F-B2375) CFSTI: $3.00 CSCL 06F

A slow-moving heterotrichous ciliate, Blepharisma intermedium, was studied to determine the effects of magnetic field on cells. Since the culture included bacteria necessary as a food supply for the Blepharisma, observed effects due to the lack of magnetic field must take into account the role played by the bacteria. Even though the magnetic diminution may have affected the growth of the Blepharisma, no drastic cytological changes were observed. The only possible cytological difference was that the cells grown under ambient conditions seemed slightly longer than those from the null field. If this is actually the case, it may be an indication that null field cells are dividing faster and, therefore, producing slightly smaller cells than the controls. Clonal frequencies and averages are discussed, and data from 30 clonal experiments are summarized. M.W.R.

N68-13172* General Electric Co., Philadelphia, Pa. Missile and Space Div.
A RESEARCH STUDY TO DEFINITIZE A BIO-ISOLATOR SUIT SYSTEM Final Report
A. A. Glass 15 Dec. 1967 89 p
(Contract NAS1-6537)
(NASA-CR-66441-A; GE-67SD2047) CFSTI: $3.00 CSCL 06K

An instruction manual is provided for the installation, operation, maintenance, and repair of the bio-isolator suit system (BISS) life support system console and supporting communication links. The BISS console monitors and controls air temperature, humidity, and volume passed to and from the isolation suit. The communication system provides for two way links between the test conductor console (TCC) and the BISS suit, and between the TCC, the life support system console, and the medical monitor unit; a horn warning system; and monitoring of communications between the TCC and the BISS suit at the life support console and the medical monitoring unit. The nomenclature and function of all operating controls and indicators are defined. Power requirements are specified and required test equipment is listed. Probable causes of, and corrective procedures for, malfunctions are tabulated. Schematic drawings are presented for circuitry and panel designs. E.J.S.

N68-13181# Joint Publications Research Service, Washington, D. C.
SPACE BIOLOGY AND MEDICINE, VOLUME 1, NO. 4, 1967
19 Dec. 1967 180 p refs Transl. into ENGLISH of Kosmich. Biol. i Med. (Moscow), v. 1, no. 4, 1967 p 1–88
(JPRS-43762)

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2. EXTRALABYRINTHINE SYMPTOMS OF MOTION SICKNESS UNDER SPACE FLIGHT CONDITIONS I. M. Khazen p 14–25 refs (See N68-13183 04-04)

3. CONTINUOUS CULTURE OF MICROALGAE AS PART OF A CLOSED ECOLOGICAL SYSTEM L. V. Kirenskiy, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskiy, B. G. Kovrov et al p 26–31 refs (See N68-13184 04-04)

4. GAS EXCHANGE BETWEEN MAN AND A CULTURE OF MICROALGAE IN A 30-DAY EXPERIMENT L. V. Kirenskiy, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskiy, B. G. Kovrov et al p 32–40 (See N68-13185 04-05)

5. PROLONGED CHLORELLA CULTIVATION WITH DIRECT RECOVERY OF THE MEDIUM G. I. Meleshko, Ye. K. Lebedeva, O. A. Kurapova, and Yu. N. Ul'yanin p 41–47 refs (See N68-13186 04-04)

6. DETERMINATION OF THE BIOLOGICAL VALUE OF ALGAL AND SOYBEAN PROTEINS IN WHITE RATS OF FOUR GENERATIONS N. S. Klyushkina, V. I. Fofanov, and I. T. Troitskaya p 48–52 refs (See N68-13187 04-04)

7. METHODS FOR EXPERIMENTAL STUDIES OF THE REFLEX INTERACTION OF ANALYZER SYSTEMS Z. Novotny p 53–59 refs (See N68-13188 04-05)

8. REACTIVITY AND TOLERANCE OF WARM-BLOODED ANIMALS L. L. Marfina p 60–71 refs (See N68-13189 04-04)

9. REACTIVITY OF ANIMALS TO CAFFEINE AND STRYCHNINE IN THE PERIOD OF AFTEREFFECT TO TRANSVERSE ACCELERATIONS V. Ye. Belay, P. V. Vasil'yev, G. D. Glod, and M. I. Bryuzgina p 72–81 refs (See N68-13190 04-04)

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11. OF THE EFFECT OF ELIMINATION OF AFFERENT SIGNALIZATION ON THE TONIC FUNCTION OF SKELETAL MUSCLES M. N. Murav'yev p 95–102 refs (See N68-13192 04-04)

12. HISTOCHEMICAL STUDY OF TISSUE ENZYMES IN HYPOTHERMIA AND HYPOBIOSIS V. V. Portugalov, I. B. Krasnov, Ye. I. Il'ina-Kakuyeva, N. N. Timofeyev, and L. L. Marfina p 103–108 refs (See N68-13193 04-04)

13. EFFECT OF HYPEROXIA ON FORMATION OF TOXIC LIPIDS IN RATS F. V. Babchinskiy and I. N. Savateyev p 109–113 refs (See N68-13194 04-04)

14. CHANGE OF THE PSYCHOPHYSIOLOGICAL STATE OF THE BODY BY AUTOGENOUS AND EXOGENOUS SUGGESTION G. I. Gurvich, V. L. Marishchuk, M. I. Tishchenko, G. D. Yefimenko, and B. S. Khvoynov p 114–118 refs (See N68-13195 04-04)

15. MODELING OF PSYCHOPATHOLOGICAL SYNDROMES BY SPACE PSYCHOLOGY METHODS O. N. Kuznetsov and V. I. Lebedev p 119–125 refs (See N68-13196 04-04)

16. A METHOD FOR USING AN ELECTRONIC COMPUTER FOR DETERMINING SOME MOTION CHARACTERISTICS IN BIOMECHANICAL INVESTIGATIONS B. A. Dushkov, V. P. Produnov, and S. A. Kosilov p 126–134 refs (See N68-13197 04-05)

17. COORDINATION STRUCTURE AND RECONSTRUCTION PHASES OF MOTOR HABITS UNDER CONDITIONS OF WEIGHTLESSNESS AND ACCELERATIONS I. F. Chekirda p 135–141 refs (See N68-13198 04-05)

18. EFFECT OF AN ELECTRICAL STIMULUS ON THE REACTION OF THE HUMAN VESTIBULAR APPARATUS CAUSED BY ACCLERATION G. V. Voronin p 142–152 refs (See N68-13199 04-04)

N68-13182# Joint Publications Research Service, Washington, D. C.
THE PROBLEM OF SENSORY DEPRIVATION IN SPACE MEDICINE
F. P. Kosmolinskiy *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 1–13 refs (See N68-13181 04-04)

A brief review is given of the principle results in various studies of human adaptation to prolonged space flight. Interrelationships

of afferent systems of the body with different forms of sensory deprivation are depicted for: (1) isolation of the individual accompanied with restriction of external afferentation; (2) limited motor activity in a space with limited volume; (3) weightlessness; and (4) a general decrease of the flux of external afferentation under monotonic conditions for the human body. G.G.

N68-13183# Joint Publications Research Service, Washington, D. C.

EXTRALABYRINTHINE SYMPTOMS OF MOTION SICKNESS UNDER SPACE FLIGHT CONDITIONS

I. M. Khazen *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 14–25 refs (See N68-13181 04-04)

This paper criticizes hypotheses on the dominant role of the vestibular apparatus in the genesis of so-called space motion sickness which have had wide acceptance for many years. On the basis of experimental data the paper gives an analysis of nervous and humoral mechanisms of extralabyrinthine effects on the development of autonomic disturbances during exposure of the human body to space flight factors. Author

N68-13184# Joint Publications Research Service, Washington, D. C.

CONTINUOUS CULTURE OF MICROALGAE AS PART OF A CLOSED ECOLOGICAL SYSTEM

L. V. Kirenskiy, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskiy, B. G. Kovrov et al *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 26–31 refs (See N68-13181 04-04)

. It is recommended that a continuous culture of unicellular algae grown with a constant density of the suspension be used as an autotrophic component of a closed ecological system. It is shown that under such conditions the stabilized concentration of the culture biomass causes a stability of every chemical parameter of the medium and culture productivity. An experimental cultivator with an automatic stabilization of the biomass concentration and culture temperature has been designed to meet the oxygen requirements of a single man. It is demonstrated that the efficiency with which the algal culture can use solar and artificial light is similar. Author

N68-13185# Joint Publications Research Service, Washington, D. C.

GAS EXCHANGE BETWEEN MAN AND A CULTURE OF MICROALGAE IN A 30-DAY EXPERIMENT

L. V. Kirenskiy, I. A. Terskov, I. I. Gitel'zon, G. M. Lisovskiy, B. G. Kovrov et al *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 32–40 (See N68-13181 04-04)

The biological regeneration of an enclosed atmosphere based on the use of algal photosynthesis has been performed. A 30-day experiment has demonstrated that man and unicellular algae (Chlorella vulgaris) are biologically compatible and their gaseous metabolites produce no toxic effect on either component. The discrepancy between the assimilation coefficient of algae and the respiration coefficient of man can be eliminated by corrections of the diet offered to test subjects, remaining within the physiological optimum. Author

N68-13186# Joint Publications Research Service, Washington, D. C.

PROLONGED CHLORELLA CULTIVATION WITH DIRECT RECOVERY OF THE MEDIUM

G. I. Meleshko, Ye. K. Lebedeva, O. A. Kurapova, and Yu. N. Ul'yanin *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 41–47 refs (See N68-13181 04-04)

This article describes a method for prolonged cultivation of Chlorella which has none of the disadvantages typical of the classical continuous culture method. In addition, it has advantages over the batch method. The data show that the direct method for recovery of the medium provides for necessary removal of insoluble products of algal and bacterial cell dissociation from the suspension. At the same time it stabilizes the content of soluble organic substances at a level which causes no decrease of productivity. Author

N68-13187# Joint Publications Research Service, Washington, D. C.

DETERMINATION OF THE BIOLOGICAL VALUE OF ALGAL AND SOYBEAN PROTEINS IN WHITE RATS OF FOUR GENERATIONS

N. S. Klyushkina, V. I. Fofanov, and I. T. Troitskaya *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 48–52 refs (See N68-13181 04-04)

White rats of four generations were used to study the effect exerted on the animal body by a diet with a bleached biomass of unicellular protococcal algae and soybean flour as the only protein source. The diet contained 18% proteins. Algal proteins showed a high biological value. Test animals exhibited no significant changes in the concentration of amine nitrogen in the urine, nitrogen balance, nitrogen and fat content in the liver and albumin concentration in the blood as compared with the control rats (fed diets containing casein). The biological value of soybean proteins appeared to be considerably lower than that of algal proteins. Author

N68-13188# Joint Publications Research Service, Washington, D. C.

METHODS FOR EXPERIMENTAL STUDIES OF THE REFLEX INTERACTION OF ANALYZER SYSTEMS

Z. Novotny *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 53–59 refs (See N68-13181 04-04)

The author describes the methods and instruments used in study of the effect of different analyzer systems on the change of human posture and spatial position. The apparatus, an unstable platform, is based in part on the "rocking chair" designed by Soviet specialists and in part on a device used by Chodera in investigating the conditioned falling reflex. In some cases the apparatus can simulate horizontal plane flight. Author

N68-13189# Joint Publications Research Service, Washington, D. C.

REACTIVITY AND TOLERANCE OF WARM-BLOODED ANIMALS

L. L. Marfina *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 60–71 refs (See N68-13181 04-04)

Studies on the tolerance of rats in a hypothermal state to very low atmospheric pressure were made. The hypothermal state was induced either by an exposure of the animals to increasing hypercapnia–hypoxia (cooling to 32–16°C) or by their premedication with lytic mixtures (cooling to 21–18°C). The total time of "ascent", "plateau" and "descent" of the rats in an altitude chamber was 15 minutes. Reduction of the reactivity of the animals was accompanied by a significant increase of their tolerance to hypoxic hypoxia. There was no noticeable difference in animal tolerance during the hypothermia brought about by the two methods. The rats which were fixed when exposed to hypoxic hypoxia revealed a slightly decreased tolerance, although the general trend towards an increase of tolerance in relation to the degree of hypothermia remained unchanged. Author

N68-13190# Joint Publications Research Service, Washington, D. C.

REACTIVITY OF ANIMALS TO CAFFEINE AND STRYCHNINE IN THE PERIOD OF AFTEREFFECT TO TRANSVERSE ACCELERATIONS

V. Ye. Belay, P. V. Vasil'yev, G. D. Glod, and M. I. Bryuzgina *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 72–81 refs (See N68-13181 04-04)

Chronic experiments on rabbits and dogs were carried out to study the characteristics of the pharmacological action of caffeine and strychnine during the period of aftereffect to transverse accelerations. The experiments revealed a decrease of the stimulant effect of the analeptics on the cardiac activity and respiration 5 to 25 minutes after exposure of the animals to accelerations. They also revealed a reduction of the stimulant effect of strychnine of the rate of spinal reflexes. These data make it possible to conclude that normalization of the ECG and respiratory indices used as indicators of the animal tolerance to accelerations cannot give evidence of a complete functional recovery of the animal body. Author

N68-13191# Joint Publications Research Service, Washington, D. C.

DEOXYGENATION OF THE BODY DURING ASCENT

Ye. A. Kovalenko *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 82–94 refs (See N68-13181 04-04)

Experiments were carried out on 21 dogs given a low amobarbital sodium anesthesia. The values of the pO_2, pCO_2 and pH in the arterial and venous blood of the brain and in the mixed venous blood of the pulmonary heart were measured during exposure of the animals to simulated altitudes of 4, 6, 8, 10 and 12 km. In addition, the ECG, respiration rate and EEG of the cerebral cortex and subcortical formations were recorded. Ascents to altitudes of 8 km or more at a rate of 20 m/sec caused a faster and lower decrease of pO_2 in the arterial blood than in cerebral venous blood and in the mixed venous blood. This indicates development of an altered gas exchange process, which is called deoxygenation of the body. The process promotes a distinct acceleration of acute hypoxic hypoxia at certain altitudes, in level. Calculations of the pO_2 decrease in the tissues of the cerebral cortex performed on a model of the tissue capillary cylinder were based on the pO_2 value measured in the blood. The data give evidence that the critical pO_2 level in cerebral tissues agrees well with the general picture of functional disturbances. Author

N68-13192# Joint Publications Research Service, Washington, D. C.

OF THE EFFECT OF ELIMINATION OF AFFERENT SIGNALIZATION ON THE TONIC FUNCTION OF SKELETAL MUSCLES

M. N. Murav'yev *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 95–102 refs (See N68-13181 04-04)

The motor activity of a frog and the functional state of a tonic specimen were studied over a three-month period after a unilateral deafferentation. This resulted in a disturbed motor coordination and a considerable decrease of the performance of the m. ileofibularis tonic apparatus of the deafferentated extremity. The muscle reactivity to acetyl choline increased immediately after the operation but became lower than usual by the 60th and 90th days after the operation. Changes of the excitability and functional lability of the tonic apparatus of the ileafibular muscle were less distinct after the tenotomy of nerve roots. Author

N68-13193# Joint Publications Research Service, Washington, D. C.

HISTOCHEMICAL STUDY OF TISSUE ENZYMES IN HYPOTHERMIA AND HYPOBIOSIS

V. V. Portugalov, I. B. Krasnov, Ye. I. Il'inakakuyeva, N. N. Timofeyev, and L. L. Marfina *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 103–108 refs (See N68-13181 04-04)

Histochemical methods were used in studying the effect of a two-hour period of hypothermia brought about under conditions of increasing hypercapnia–hypoxia and a 24-hour period of hypobiosis brought about using neuroplegic mixtures to affect the activity of oxidative enzymes involved in carbohydrate and fat metabolism, synthesis of nucleic acid precursors and enzymes responsible for electron transfer in the liver, kidney, heart and cellular formations of the somesthetic analyzer and macrocellular nuclei of the hypothalamic part of the rat brain. The specific metabolism of the nerve tissue was judged from the level of cholinesterase activity. Changes in the activity of the enzymes which developed under hypothermal and hypobiotic conditions are described and their probable functional significance is determined. Author

N68-13194# Joint Publications Research Service, Washington, D. C.

EFFECT OF HYPEROXIA ON FORMATION OF TOXIC LIPIDS IN RATS

F. V. Babchinskiy and I. N. Savateyev *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 109–113 refs (See N68-13181 04-04)

Experiments were carried out on white male rats exposed to different hyperoxic atmospheres for 20 days. The accumulation of toxic lipids in rat liver was determined by their hemolytic activity, evaluated using a method described earlier. In a 94–96% oxygen atmosphere at sea level pressure the hemolytic activity of the lipids experienced a small increase in 24 hours, followed by a high increase by the 48th and 60th hours of the experiment. In a nitrogen–oxygen mixture (70% O_2, 30% N_2) and in an oxygen atmosphere at a total pressure of 567 mm Hg (in both cases the partial oxygen pressure was 488 mm Hg) the hemolytic activity of the lipids increased by the 15th day. In the 50% O_2–50% N_2 atmosphere the hemolysis of erythrocytes remained unchanged throughout the experiment. It was concluded that an evaluation of the hemolytic activity of lipids may be used as a nonspecific indication of the oxygen toxic effect. An accumulation of toxic lipids is dependent on partial oxygen pressure and the duration of exposure. The partial oxygen pressure of 488 m Hg therefore may be regarded as a subtoxic value for a 20-day period of continuous exposure. Author

N68-13195# Joint Publications Research Service, Washington, D. C.

CHANGE OF THE PSYCHOPHYSIOLOGICAL STATE OF THE BODY BY AUTOGENOUS AND EXOGENOUS SUGGESTION

G. I. Gurvich, V. L. Marishchuk, M. I. Tishchenko, G. D. Yefimenko, and B. S. Khvoynov *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 114–118 refs (See N68-13181 04-04)

The objective of this study was an investigation of changes of the activity of organs and systems of the human body subjected to prolonged bed rest by autogenous or exogenous suggestion. Six test subjects underwent a 70-day bed rest. Three test subjects served as controls. The other three subjects were trained for the first two weeks on how to stress or relax different muscle groups with subsequent sleep suggestion. According to ECG and EEG recordings and myotonometric and actographic data sleep began in the seventh–fifteenth minute after the second–third week of the experiment. Beginning with the fifth week the test subjects engaged in autosuggestion, attaining similar results. Exogenous suggestion also was performed, employing a radio and a tape recorder. The procedure described provided sound refreshing sleep of the test subjects at the scheduled time. Author

N68-13196# Joint Publications Research Service, Washington, D. C.

MODELING OF PSYCHOPATHOLOGICAL SYNDROMES BY SPACE PSYCHOLOGY METHODS

O. N. Kuznetsov and V. I. Lebedev *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 119–125 refs (See N68-13181 04-04)

Psychic changes occurring during sensory deprivation and brief weightlessness are considered as models of some psychopathological syndromes. The hypothesis of their origin is demonstrated by a clinical analysis. Adaptation activity of the individual in an unusual environment is believed to play the leading role in the genesis of specific psychic changes. Criteria have been formulated on how to discriminate normal and pathological states when evaluating the mentioned psychic changes; these may be used in neuropsychiatric examinations. Author

N68-13197# Joint Publications Research Service, Washington, D. C.
A METHOD FOR USING AN ELECTRONIC COMPUTER FOR DETERMINING SOME MOTION CHARACTERISTICS IN BIOMECHANICAL INVESTIGATIONS
B. A. Dushkov, V. P. Produnov, and S. A. Kosilov *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 126–134 refs (See N68-13181 04-04)

An algorithm has been formulated for determining the basic parameters of human movements by use of an electronic computer. The algorithm makes possible a considerable reduction of the time spent in computations and a speedup in obtaining final biomechanical information. Author

N68-13198# Joint Publications Research Service, Washington, D. C.
COORDINATION STRUCTURE AND RECONSTRUCTION PHASES OF MOTOR HABITS UNDER CONDITIONS OF WEIGHTLESSNESS AND ACCELERATIONS
I. F. Chekirda *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 135–141 refs (See N68-13181 04-04)

The author has made an analysis of the coordination structure of some movements of man subjected to weightlessness and accelerations during jet flight along a Keplerian trajectory. A relationship was established between the coordination structure of movements and the field of force. Different phases in the reconstruction of movements in a state of weightlessness were defined. It is recommended that cyclogrammometric techniques be used in studying movements as tests for selection and training of cosmonauts for orbital flights. Author

N68-13199# Joint Publications Research Service, Washington, D. C.
EFFECT OF AN ELECTRICAL STIMULUS ON THE REACTION OF THE HUMAN VESTIBULAR APPARATUS CAUSED BY ACCELERATION
G. V. Voronin *In its* Space Biol. and Med., Vol. 1, No. 4 19 Dec. 1967 p 142–152 refs (See N68-13181 04-04)

The purpose of this investigation was to establish the possibilities of an electrical control of human vestibular responses to accelerations. Experiments with a combined (adequate and electrical) effect on the vestibular apparatus of man indicated that: the vestibular reactions to accelerations can be increased or decreased by exposure of the surface of the head to an electrical current; electrical inhibition of vestibular reactions to accelerations can be brought about in two ways—blocking and compensation; a quantitative evaluation of the effect of a 7.5 mA current on the postnystagmus duration following rotation upon a stop-stimulus showed that the blocking effect of the current decreases the intensity and duration of vestibular responses to accelerations. Author

N68-13200# Sperry Rand Research Center, Sudbury, Mass.
CONTOUR DESCRIPTOR PROPERTIES OF VISUAL SHAPE Final Report, 1 Feb. 1966–31 Jan. 1967
L. Kaufman et al Sep. 1967 90 p refs
(Contract AF 19(628)-5830)
(SRRC-CR-67-43; AFCRL-67-0525; AD-662005)

The results of a one year program to elucidate the problems underlying shape perception are presented. Following a review of the field, extensive studies of spontaneous fixation tendencies in visual forms are reported. These studies indicate that visual shape is a stimulus to fixation, suggesting that the peripheral inputs, per se, are not the primary determiners of spontaneous fixation tendencies, but that the already organized cortical representation of shape is such a factor. Experiments with flow patterns in visual noise suggest that the visual system does behave as if it has field or global properties. Finally, studies of illusions indicate that a second class of visual illusions can be designated on the basis of dependency on converging lines or line segments as the inducing feature. Illusions in this inclination-dependent class are all such that if the illusion inducing lines are rotated so they are parallel or normal to the test lines the illusion is eliminated. This classification permits a number of apparently different illusions, including the Hering, Zollner, and Ponzo illusions, to be considered related. Author (TAB)

N68-13203# RAND Corp., Santa Monica, Calif.
COMMENTARIES ABOUT THE USE OF THE COMPUTER IN THE INVESTIGATION OF THE NERVOUS SYSTEM [COMENTARIOS ACERCA DEL USO DE LA COMPUTADORA EN LA INVESTIGACION DEL SISTEMA NERVIOSO]
Donald H. Perkel Dec. 1967 7 p In SPANISH Presented at the 8th Congr. of the Latin Am. Assoc. of Physiol. Sci., Mexico, 11–15 Aug. 1967 Sponsored in part by the AF
(Grant PHS-NB-07325)
(P-3659; AD-662006)

The discussion covers four applications of the computer in the investigation of the nervous system. In the first, the computer is used as a calculating machine to make the computations needed during (real time) or after a neurophysiological experiment. In the second application, the computer performs a controlling role, for example, when the presence or the intensity of a response determines the selection of the following stimulus. The third mode consists of using the computer as a simulator to create models or representations of certain aspects of a nervous system function such as a neural net. Finally, the computer has a theoretical application in the ideas of communication and control which constitute the science of cybernetics. Because comparisons are often made between the computer and the brain in which the former is referred to as an "electronic brain," the essential differences between the two are explained. Transl. by R.N.A.

N68-13207*# Research Triangle Inst., Durham, N. C. Engineering and Environmental Science Div.
BIOMEDICAL APPLICATIONS TEAM Quarterly Progress Report, 15 Sep.–14 Dec. 1967
14 Dec. 1967 26 p
(Contract NSR-34-004-045)
(NASA-CR-91387; EU-349; QPR-2) CFSTI: HC $3.00/MF $0.65 CSCL 06C

An overview is presented on the effort of the applications team to match problems that medical and clinical researchers may have with NASA technology results that may provide solutions. Personal contacts with the medical school consultants are discussed in relation to proposed programs which may offer opportunities for technology transfer. Specific examples are included of problem abstracts which accurately define the specific problem in engineering terminology, and which are prepared after comprehensive discussions with the individual researchers. M.G.J.

N68-13257 Bureau of Mines, Pittsburgh, Pa. Health and Safety Research and Testing Center.
MINIATURE OXYGEN DEFICIENCY ALARM
Merle L. Bowser and Robert A. Bradburn Jan. 1968 11 p
(BM-IC-8358)

The Bureau of Mines has constructed a miniature oxygen deficiency alarm system using an electrochemical cell as the sensor. Distinct audible signals are produced at either of two preselectable oxygen levels which can be varied from approximately 10 to 20.9% oxygen. The high or cautionary range produces a 500-cycle-per-second tone pulsed at about a 1-cycle-per-second rate, whereas the lower or more dangerous oxygen level produces a continuous 500-cycle-per-second tone. Author

N68-13286# Systems Technology, Inc., Hawthorne, Calif.
CARDINAL RECONSTRUCTION THEORY OF TOOL FOR ESTIMATING EFFECTS OF DISPLAY SCANNING
Warren F. Clement 1 Mar. 1967 45 p refs
(Contract N00014-66-C-0072)
(TM-163-B; AD-661854)

A review of sampling processes and forms of continuous signal reconstruction therefrom has revealed several forms which may be useful in modeling the average display scanning behavior of the human operator. The most promising form appears to be cardinal reconstruction. Low frequency approximations to the effective time delay for truncated cardinal reconstruction are only slightly less than for linear reconstruction. The influence of sampled first derivative and of sampled dwell time appear analogous to the influence of sampled prediction in reducing the effective reconstruction time delay. The implications of these results for the measurement and interpretation of multi-instrument display tracking are discussed. Author (TAB)

N68-13304*# Douglas Aircraft Co., Inc., Huntington Beach, Calif. Advanced Research Lab.
RADIATION PROTECTION BY AUXIN ANALOGUES AND ANTIVIRAL AGENTS
D. Norman, R. D. Schultz, and C. W. Steers Jun. 1966 19 p refs Sponsored in part by NASA
(Contract PH-43-64-865)
(NASA-CR-91340; Douglas Paper-4079) CFSTI: HC $3.00/MF $0.65 CSCL 06R

Although plant growth modifiers were found to be totally devoid of radiation-protective activity, their structural analogues were found to protect male Webster white Swiss mice against lethal doses of ^{60}Co γ-radiation. A broad-spectrum antiviral agent, statolon, which alone exhibited no activity, was found to synergize the protective action of certain growth modifying analogs. The possibility of latent virus involvement in radiation damage in a manner similar to bacterial lysogeny is also discussed. Author

N68-13316*# Drexel Inst. of Tech., Philadelphia, Pa. Dept. of Chemistry.
MECHANISMS FOR THE EFFECTS OF ELECTRIC AND MAGNETIC FIELDS ON BIOLOGICAL SYSTEMS Semiannual Status Report, Jun.–Dec. 1967
S. Kusabayashi, T. M. Laronge, and M. M. Labes Dec. 1967 10 p refs
(Grant NGR-39-004-015)
(NASA-CR-91523; SASR-1) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Molecular level explanations are considered for the influence of weak electrical and magnetic fields on biological systems. A liquid crystalline phase is being used as a model for the biological organelles. To examine the response of the transport properties of liquid crystalline materials to modest magnetic fields, studies are being made of the charge carrier transport, viscosity, and diffusion in liquid crystals. M.W.R.

N68-13432*# Israel Program for Scientific Translations, Ltd., Jerusalem.
BIOCHEMISTRY OF THE NERVOUS SYSTEM
A. V. Palladin 1967 136 p refs Transl. into ENGLISH of the publ. "Voprosy Biokhimii Nervnoi Sistemy" Kiev, Izd. Naukova Dumka, 1965 Publ. for NASA and NSF
(NASA-TT-F-439; TT-67-51375) CFSTI: HC $3.00/MF $0.65 CSCL 06A

Metabolism of the brain in various functional states, problems related to biochemistry of the brain and nervous system, and the use of radioactive isotopes for biochemical studies of the nervous system are discussed in reprints of conference papers. Other papers deal with the nervous system of hibernating animals, activity and localization of various subcellular cerebral functions separable by electrophoresis in agar gels, and the use of neurotropic drugs. M.W.R.

N68-13436*# Public Health Service, Washington, D. C.
EVALUATION OF LEAKAGE OF MICROBIAL CONTAMINATION FROM GEMINI SPACE SUIT Final Report
Oct. 1967 10 p
(NASA Order R-137)
(NASA-CR-91468) CFSTI: HC $3.00/MF $0.65 CSCL 06K

An adult male clothed in a pressurized Gemini space suit participated in an experiment to measure the leakage of microorganisms from the space suit into an ambient environment. Microbial leakage was measured in both a plastic-film shedding chamber and in a stainless steel shedding chamber or microbiotank. Microspores were not observed in any of the tests, although it was shown that viable microorganisms shed into the Gemini space suit leaked into the ambient temperature. The amount of shedding varied, although it was not determined whether this was due to the actual rate of microbial shedding or the amount of leakage. M.W.R.

N68-13474# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
COMMUNICATIONS BIOPHYSICS
S. K. Burns, P. R. Gray, R. W. Henry, P. G. Katona, N. P. Moray et al *In its* Quart. Progr. Rept. No. 87 15 Oct. 1967 p 169–189 refs (See N68-13461 04-23)
(Grant NIH-1-P01-GM-14940-01)

Preliminary work on a model of binaural hearing, in which the firing patterns on the auditory nerve are regarded as inputs to a central processor, rests on the assumptions that: (1) the activity in the nerves is characterized by the firing times of the fibers, (2) the inputs to the processor are sample functions from random-point processes, and (3) the central processor has no absolute time reference. The limitations on performance imposed by the peripheral transformation are separated from the limitations imposed by the central processor and the results are then used to form a more realistic model of the processor. Comparison of model predictions with empirical data showed consistency for the case of interaural amplitude, and better than real performance predictions for the case of interaural time. Studies of the effect of a just-previous trial on a subject's response in the context of a monaural, two-alternative-forced-choice, intensity-discrimination task showed a strong individual dependency of the discriminating threshold. G.G.

N68-13475# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
NEUROPHYSIOLOGY
W. S. McCulloch, J. Y. Lettvin, P. D. Wall, M. Blum, J. E. Brown et al *In its* Quart. Progr. Rept. No. 87 15 Oct. 1967 p 191–229 refs (See N68-13461 04-23)
(Contract NSR-22-009-138; Grant NIH-5-R01-NB-04985-04)

The state transition matrix is used to analyze shift register netowrks regarded as a neural net of N neurons and M external inputs and defined by a set of N Boolean equations. The network corresponds thus to a shift register of N delay elements, which is

linear or nonlinear, depending upon the nature of the Boolean function of external inputs and outputs. Also formulated is a psychophysiological sensory receptor model that uses the Mach band mechanism to yield an output from which the conversion of color to colored things can be derived. G.G.

N68-13479*# National Aeronautics and Space Administration, Washington, D. C.
PROBLEMS RELATING TO DRYNESS IN THE UPPER AIR LANES *DURING JET FLIGHTS* [*TOERHEDSPROBLEMER* IOEVRE LUFTVEJE UNDER JET FLYVNING]
J. Fritze Dec. 1967 8 p refs Transl. into ENGLISH from Militaerlaegen (Denmark), v. 72, 1965 p 13–21
(NASA-TT-F-11295) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Problems in high-altitude jet flying are discussed from the physiological and psychological viewpoint. Emphasis of the investigation is on possible permanent or transient damage to the organism by low relative humidity of cabin air. Remedial measures are mentioned, including individual humidifiers, wearing of *artificial noses familiar from post-tracheotomy therapy*, and careful supervision of otologic conditions of crew members. Author

N68-13489# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A LOOK FORWARD (SCIENTISTS COMMENT ON THE FLIGHT) [ZAGLYADYVAYA VPERED]
N. Gurovskiy and B. Yegorov 21 Feb. 1967 9 p Transl. into ENGLISH from Izv. (Moscow), 25 Mar. 1965 p 3
(FTD-HT-66-427; AD-661765)

It is believed that the training of cosmonauts for future multiplace spaceships should be designed to fit the professional training of each candidate. Previous flights have shown that difficulties encountered in weightlessness were a result of the *individual peculiarities of the organism and were not a reflection* of the degree of physical training. The health requirements and the training program itself should reflect the fact that crews of future flights will consist of specialists of various professions. Although spaceship commanders will have to meet the strictest requirements *and train far more intensively* than cosmonauts performing a scientific or other specialty role, the need for cosmonauts to have ideal health is no longer considered an inflexible requirement. Cosmonauts for future flights may be selected on the basis of their professional training even if they have certain defects in the condition of their health or the level of their general physical training. Author (TAB)

N68-13491# Technische Hochschule Munchen (West Germany).
EASILY SEPARATED PROTECTIVE GROUPS FOR AMIDO ACID FUNCTIONS [LEICHT ABSPALTBARE SCHUTZGRUPPEN FUER SAEUREAMIDFUNKTIONEN]
Jonas Bjarnason (Ph.D. Thesis) [1967] 99 p refs In GERMAN

Various N-substituted benzamides were prepared. Using a new type of C-N dissociation, it was possible in many instances to separate the N-substituents with trifluor acetic acid. The reversibility of the dissociation was proven for N-benzhydryl amides. Of the residuals that were examined, the 2,4 dimethoxybenzyl group appears to be best suited for protection of the amino acid amides. Kinetic studies of the DMB dissociation with trifluor acetic acid on several glycine DMB amide derivatives and on N-TFA-DL-met-NH-DMB showed that the separation of the DMB residue is retarded by a free amino or thioether group in the molecule. Several N,N-bis-DMB amide derivatives of asparagine and glutamine were prepared. The compound Z-gly-L-(N-DMB)phe-OH was prepared and condensed to a tripeptide using L-val-OtBu. Peptide derivatives protected by the DMB residue are clearly better soluble in organic solvents than unprotected compounds. Transl. by K.W.

N68-13496# Advisory Group for Aerospace Research and Development, Paris (France).
PROBLEMS OF VISION IN LOW LEVEL FLIGHT [LES PROBLEMES VISUELS DU VOL A BASSE ALTITUDE]
A. Mercier, G. Perdriel, and T. C. D. Whiteside 1967 85 p refs In FRENCH and ENGLISH
(AGARDograph-107; AD-661164) CFSTI: HC $3.00/MF $0.65

The problem areas considered seem to fall naturally into four broad categories. These are: the external environment; mans response to this environment; human engineering considerations as a result of mans limitations; and, finally, selection and training for this arduous task of low-level flying, in which the tolerable margin of error is probably less than in most other phases of flight. Author (TAB)

N68-13552# Cornell Univ., Ithaca, N. Y.
THE RELATION OF PROTEIN STRUCTURE TO THE CATALYTIC PROPERTIES OF ENZYMES Final Report, 1 May 1958–30 Sep. 1967
George P. Hess 30 Sep. 1967 14 p refs
(Contract Nonr-401(35)
(AD-661450)

Investigations of structural and functional relationships in reactions catalyzed by enzymes, mainly the hydrolytic enzyme chymotrypsin, were carried out through elucidation of individual reaction steps. This was done by characterizing and measuring physical and chemical changes in the enzyme which accompany the reactions under various conditions of pH and temperature and with various substrates and by making kinetic studies of these physical changes. This approach yields information not obtainable with the usual steady state approach, which may yield only combinations of rate and equilibrium constants. Results obtained in these experiments with enzyme in solution correlate well with independent x-ray diffraction studies of crystalline chymotrypsin by Blow and coworkers, and indications are that the approach and methods developed and used in this project, in conjunction with *future x-ray* diffraction experiments on crystalline materials, can provide detailed information needed for an understanding of the specificity and efficiency of reactions catalyzed by chymotrypsin and other hydrolytic enzymes. The work done so far has led to the development of an hypothesis concerning the *conversion of chymotrypsinogen to* chymotrypsin, a resulting pH-dependent equilibrium between enzyme conformations and the binding of substrate to enzyme. Other results obtained include the measurement by flow and relaxation techniques, of six rate constants (five not previously determined) *pertaining to intermediates in chymotrypsin-catalyzed* reactions. Author (TAB)

N68-13556* National Aeronautics and Space Administration, Washington, D. C.
THE SUBJECTIVE EFFECTS OF TIME SHIFT (POLL TAKEN AMONG THE FLIGHT PERSONNEL OF AIR FRANCE) [LES EFFETS SUBJECTIFS DES DECALAGES HORAIRES (UNE ENQUETE AUPRES DU PERSONNEL NAVIGANT D'AIR-FRANCE)]
J. Lavernhe, E. Lafontaine, and R. Laplane Nov. 1967 11 p refs Transl. into ENGLISH from Rev. Med. Aeron. (Paris), v. 4, no. 15, 1965 p 30–36
(NASA-TT-F-11370) CFSTI: $3.00 CSCL 06N

The effects of time shifts on crews in long-distance flights are discussed, with a comparison of Transatlantic and Far-East flights. Changes in eating, sleeping, and nervous habits are tabulated for various age groups of flying personnel. Least trouble was experienced by older crew members who retained the time schedule *of their country of origin during layover in other countries.* Ideal stay during layover, under present conditions, is one day and one night. Reduction in harmfulness of time-change effects is expected from change-over to supersonic transports. It is suggested to keep

flying personnel within a sector of relatively homogeneous time shifts, avoiding flights with repeated crossing of the international date line. Author

N68-13609*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A PILOTED FIXED-BASE SIMULATOR STUDY OF LOW-SPEED FLIGHT CHARACTERISTICS OF AN ARROW-WING SUPERSONIC TRANSPORT DESIGN
William D. Grantham and Perry L. Deal Jan. 1968 39 p refs
(NASA-TN-D-4277) CFSTI: HC $3.00/MF $0.65 CSCL 01B

A piloted fixed-base simulator study has been made to determine the low-speed flight characteristics of an arrow-wing supersonic transport configuration. The transport-type cockpit was equipped with normal flight controls and a flight instrument display representative of those found in current transport aircraft. The results indicated that although the longitudinal short-period damping ratio was at a good level (0.84), the pitch damping appeared to be low to the pilot because of the low frequency of the short-period oscillation. This low pitch damping and the sluggish pitch response made the longitudinal handling qualities of the basic configuration unsatisfactory. When the static stability, the damping in pitch, the elevator effectiveness, and the elevator to column gearing were increased by a sufficient amount. The lateral-directional handling qualities of the basic configuration were said to be unacceptable because of the poor roll control characteristics and the uncontrollable Dutch roll. When the effective dihedral was decreased by a sufficient amount, and the damping in roll and yawing moment due to roll were increased by a sufficient amount, the Cooper rating was improved to 2.5. Author

N68-13621* National Aeronautics and Space Administration, Washington, D. C.
ANTHROPOTECHNIQUE AS A SCIENTIFIC DISCIPLINE [DIE ANTHROPOTECHNIK ALS WISSENSCHAFTLICHE DISZIPLIN]
R. Bernotat Dec. 1967 14 p Transl. into ENGLISH from German Presented at Ann. Meeting of WGLR, Bad Godesberg, West Germany, 4–8 Oct. 1966
(NASA-TT-F-11390) CFSTI: $3.00 CSCL 05H

Subjects and problems treated in anthropotechnique—a new science defined as the science pertaining to the relationship between man and machine—is discussed. The environmental layout, the dynamic adaptation of the machine to man, and the limits of intelligent machine handling are the aspects discussed specifically. Simulation methods are regarded as the most effective aids to the scientist who works in the field. Author

N68-13638*# Case Inst. of Tech., Cleveland, Ohio. Solid State Electronics Lab.
[INVESTIGATION OF IMPLANTABLE MULTICHANNEL BIO-TELEMETRY SYSTEMS] Semiannual Report, Mar.–Sep. 1967
W. H. Ko, E. Yon, and W. Thompson Nov. 1967 26 p
(Grant NGR-36-003-079)
(NASA-CR-91524; SAR-2) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Continued research conducted under a program designed to develop a system design and fabrication techniques for multiple channel, physiologically implantable, telemetering systems is reported. The design is to be flexible, allowing several channels of information to be handled simultaneously, and to be able to telemeter a wide range of physiological signals. The single channeled FM/FM strain gage system which was implanted in a dog performed well for a period of four months, failure being attributed to a wire breakage. A system having four strain gage pickups was fabricated using microminiature standard components, and a receiving and demodulating system was constructed for this transmitter. This four channel system was implanted and performed satisfactorily initially; however, water proofing failed after a period of one week. Hybrid integrated circuits were designed and fabricated for a four channel strain gage system. These circuits are being tested in a breadboard unit and are functioning well with the addition of a few external components. These integrated circuits will be packaged for a four channel strain gage unit. Circuitry has been breadboarded and incorporated into the integrated circuit test unit which will allow EKG signals to be handled. The breadboard has eight information channels plus sync and AGC channels. The receiving and demodulating system is being expanded to handle this system. S.C.W.

N68-13711# Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
APPLICATIONS OF THERMOLUMINESCENCE DOSIMETRY IN HEALTH PHYSICS
J. Cluchet and H. Joffre *In* NRL Luminescence Dosimetry Apr. 1967 p 349–358 refs (See N68-13681 04-14)

The physical problems of photon dosimetry for the exact evaluation of the biological risks for any energy between 10 keV and 10 MeV are discussed, and the conditions that must be satisfied by the detecting medium and the materials in contact with it (e.g., outside wall) are derived. Applied to thermoluminescence dosimetry, the principles defined lead to a choice of compounds of low atomic number (LiF and $Li_2B_4O_7$) for detecting mediums. It is also necessary to study carefully the thickness and the composition of the walls and materials making up the dosimeter. Author

N68-13712# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
THE PLACE OF LUMINESCENCE DOSIMETRY IN THE CONTROL OF OCCUPATIONAL HAZARDS OF IONIZING RADIATION
W. A. Langmead *In* NRL Luminescence Dosimetry Apr. 1967 p 359–362 (See N68-13681 04-14)

The objectives of a personnel monitoring program are reviewed, and the main characteristics of systems based on the film badge and luminescent devices are discussed. The requirements to meet the main objectives are summarized; it is suggested that the following dosimeter components satisfy these requirements: a lithium fluoride dosimeter that may be incorporated into the film holder or worn separately adjacent to the badge, a multifilter film badge that may act as a simple spectrometer as well as a dosimeter, and small lithium fluoride dosimeters for special purposes.
Author (NSA)

N68-13714# Hammersmith Hospital, London (England).
EXIT DOSES FOR LUNG AND PHARYNX TREATMENT FIELDS MEASURED BY LITHIUM FLUORIDE THERMO-LUMINESCENCE
Vesna Svarcer, J. F. Fowler, T. J. Deeley, and E. Shuttleworth *In* NRL Luminescence Dosimetry Apr. 1967 p 372–379 refs (See N68-13681 04-14)

Lithium fluoride thermoluminescence dosimetry powder was used in capsules to measure the exit doses in patients having treatment to the thorax with 8-MV X-rays. Exit doses for fields passing through lungs were up to 60% higher than doses calculated on the assumption of homogeneous-density tissue. The dose received at the tumor would thus be increased by approximately half this percentage. Such increases could be satisfactorily explained because the X-rays passed through air-containing lung tissue. Where growth, fluid, or fibrosis was present in the lung, the discrepancy was smaller. In cases where the exit does was lower than expected, the central rays had passed through the spine. In most of the

cases, it was possible to explain the observed exit dose after the measurement was made. However, the variation from patient to patient was extremely large, and this could not have been assessed from radiographs or clinical examination. It is therefore not possible to apply general correction factors, and either the exit dose must be measured on each patient, or special techniques of tomography must be employed, if accurately known doses are required. The results of placing an array of LiF capsules on the exit side of air-containing pharynx fields are also presented. Author (NSA)

N68-13715# Texas Univ., Houston.
USE OF LITHIUM FLUORIDE DOSIMETERS FOR IN VIVO MEASUREMENT OF TRANSMISSION THROUGH BONE AND LUNG
E. H. Crosby, M. L. M. Boone, P. R. Almond, B. R. Worsnop, M. C. McGoodwin et al *In* NRL Luminescence Dosimetry Apr. 1967 p 380–392 refs (See N68-13681 04-14)
(Grant PHS-CA-06294)

A study of the physical characteristics of LiF dosimeters has been carried out. Under optimum conditions (irradiation with ^{137}Cs γ rays), the reproducibility of response was $\pm 1\%$. For normal laboratory exposures producing doses in the range 50 to 300 rads, the reproducibility was $\pm 2\%$ to $\pm 5\%$. A study of the decay of thermoluminescence after irradiation showed an initial decay of about 10% during the first 24 hr and then a steady decay of another 4% in 50 days. A marked decrease in response of about 10% as compared to ^{60}Co γ rays has been noticed at high energies with the use of 6 to 18-MeV electrons and 22-MeVp X-rays. The dosimeters have been used for a series of dose intercomparisons between different laboratories. Agreement between preirradiated controls which stayed in Houston and those which went to the other institutions was $\leq 1\%$. The effects on depth dose of nontissue-equivalent materials such as bone and lung have been studied by in vivo measurements in dogs and patients for high-energy electron beams. *Author*

N68-13716# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
IN VIVO THERMOLUMINESCENCE DOSIMETRY OF GAMMA RAYS FROM INGESTED CESIUM-137 IN SHEEP
C. R. Watson and R. O. McClellan *In* NRL Luminescence Dosimetry Apr. 1967 p 393–401 refs (See N68-13681 04-14)
(Contracts AT(45-1)-1350; AT(45-1)-1830)

Dosimetry of internally deposited γ-ray emitters is complicated by nonuniform distribution of the radionuclide and transient irradiation from nonabsorbed radionuclide in the gastrointestinal tract. The LiF thermoluminescence dosimetry (TLD) was used to measure γ-ray doses in vivo in male sheep ingesting ^{137}Cs. Two commercial TLD systems were found satisfactory for measurements of 500 to 800 mR after a nitrogen purge of the readout chamber was added. Specially fabricated Teflon capsules (4 mm wall thickness) shielded the LiF from the β radiation of ^{137}Cs without appreciably attenuating the γ radiation. Dosimeters were surgically implanted and exposed in vivo for 15 days to measure γ-ray dose rates of 20 to 60 mrad/day (total dose, less than 1 rad) in sheep with body burdens of approximately 300 μCi of ^{137}Cs. Dosimeters were implanted in another group of sheep prior to the feeding of 50 μCi of ^{137}Cs per day. These animals were killed at intervals to study the accumulation of γ-ray dose at various organs during the month of ^{137}Cs feeding. Tissue acceptance of the dosimeters was excellent, and dose distribution patterns were similar to those reported earlier. These measurements support the National Committee on Radiation Protection recommendations that assume that designation of the whole body as the critical organ will adequately consider the dose to the gonads in the case of a relatively uniformly distributed γ-ray-emitting radionuclide. Author (NSA)

N68-13717# Edgerton, Germeshausen and Grier, Inc., Goleta, Calif. Santa Barbara Div.
A MINIATURE THERMOLUMINESCENT DOSIMETER AND ITS APPLICATION IN RADIOECOLOGY
Arthur C. Lucas and Norman R. French (Calif. Univ., Los Angeles) *In* NRL Luminescence Dosimetry Apr. 1967 p 402–411 refs (See N68-13681 04-14)
(Contract AT(29-1)-1183)

A glass-capillary dosimeter, having an outside diameter of 0.8 mm and a length of 6.0 mm, was constructed and used in radiation tests with reptiles and rodents serving as subjects. The glass tubes are filled with powdered CaF_2:Mn or LiF (TLD-100 or TLD-700). The dosimeter is externally heated by a coil of Nichrome wire. The emitted light is measured with a photomultiplier used in conjunction with an electrometer. The dosimeter was designed for use in a radioecology study involving irradiation of a 20-acre desert site with ^{137}Cs γ rays. The dosimeters were utilized in the 1- to 1000-R range of exposures and were found to have a precision of ± 0.1 R or $\pm 3\%$, whichever is greater. Measurements of γ-ray exposure vs. depth have been performed with both CaF_2:Mn and LiF to depths in the earth of 30 cm, with the measurement period extending over 1 month. Single dosimeters were attached to individual members of a periodically trapped rodent population, and measurements were made of the actual exposures given the irradiated animals. Author (NSA)

N68-13718# California Univ., Los Angeles. Dept. of Radiological Sciences.
APPLICATION OF LITHIUM FLUORIDE (TLD-100) TO TISSUE-DOSE MEASUREMENTS IN HIGH-ENERGY CHARGED-PARTICLE BEAMS
C. A. Sondhaus, J. K. Ashikawa (Univ. of Southern Calif., Los Angeles), L. K. Kleppe (Calif. Univ., Berkeley, Lawrence Radiation Lab.), F. W. Miller, H. W. Patterson et al *In* NRL Luminescence Dosimetry Apr. 1967 p 412–417 refs (See N68-13681 04-14)

A LiF thermoluminescent dosimetry system was built which is capable of accurately measuring γ-ray exposures from 10 mR to more than 30,000 R. Response curves were obtained for γ radiation from ^{60}Co and radium X-rays of 100 and 250 kVp, high-energy protons and α particles, and both 5-MeV and thermal neutrons. The problems of reducing variations in the PM-tube dark-current magnitude and increasing the overall stability of the system were solved by use of an infrared filter, by standardization of the operating procedure, and by cooling of the face of the PM tube with room-temperature dry-nitrogen gas. This LiF dosimetry system is currently being used in a variety of biomedical applications, among which are cancer research and space medicine. Other applications include determining the field pattern of X-ray machines and, in the future, personnel monitoring. The system has also been used to study shock- and strain-induced thermoluminescence in limestone. Author (NSA)

N68-13727 System Development Corp., Santa Monica, Calif.
EXPERIMENTAL STUDIES OF RELEVANCE JUDGMENTS. VOLUME 1: PROJECT SUMMARY Final Report
30 Jun. 1967 130 p refs
(Contract NSF C-424)
(TM-3520/001/00, V. 1)

This is the first volume in a three-volume report on a project to develop empirical information on human relevance assessment. Evidence has been developed that suggests that relevance judgments can be and are influenced by the skills and attitudes of the particular judges used, the documents and document sets used, the particular information requirement statements, the instructions and setting in which the judgments take place, the concepts and definitions of relevance employed in the judgments, and the type of rating scale or other medium used to express the judgments. These findings cast serious doubt on the wisdom of treating

relevance scores as stable criteria for system or subsystem evaluation in those instances where the sources of variation cited above have not been recognized and properly controlled. The practical and research implications of these findings are discussed and recommendations are made for priority work on the interface between the user and the information system. Author

N68-13728 System Development Corp., Santa Monica, Calif.
EXPERIMENTAL STUDIES OF RELEVANCE JUDGEMENTS. VOLUME 2: DESCRIPTION OF INDIVIDUAL STUDIES Final Report
30 Jun. 1967 136 p refs
(Contract NSF C-424)
(TM-3520/002/00, V. 2)

This is the second volume in a three volume report on a project to develop empirical information on human relevance assessment. Detailed descriptions are presented of the fifteen individual studies performed during the course of the project. Each description contains details on the background, purpose, experimental procedures, data analysis, results, and conclusions. Some of the materials and forms used in the studies are included where needed for adequate understanding. A complete display of materials and forms for all experiments is contained in Volume III, while cross study comparisons and integration of findings from individual studies can be found in Volume I. R.N.A.

N68-13729 System Development Corp., Santa Monica, Calif.
EXPERIMENTAL STUDIES OF RELEVANCE JUDGEMENTS. VOLUME 3: COMPILATION OF FORMS, GUIDES, SCHEDULES, AND INSTRUCTIONS USED IN THE STUDIES Final Report
30 Jun. 1967 234 p refs
(Contract NSF C-424)
(TM-3520/003/00, V. 3)

This is the third volume in a three-volume report on a project to develop empirical information on human relevance assessment. The project involved fifteen individual studies. These appendices include all materials developed and used in the experiments and studies conducted during the course of the project. Materials for each experiment or study are presented in a separate appendix. Author

N68-13772* Chicago Univ., Ill. Dept. of Biophysics.
INTEGRATED RESEARCH AND TRAINING IN SPACE-MOLECULAR BIOLOGY Annual Progress Report, 1 Jan.–31 Dec. 1967
Humberto Fernandez-Moran 31 Dec. 1967 84 p
(Grant NsG-441-63)
(NASA-CR-91527) CFSTI: $3.00 CSCL 06C

Refinements in the electron microscope, improvements in laboratory techniques, and research at the microbiological level are reported. Specific developments are described in the methodology for collecting and identifying extraterrestrial particles, preparation techniques, and superconducting cryo-electron microscopy. Research activity, illustrated with electron photographs with resolutions of 4–15 Å, is discussed in the following areas: membrane organization, and particularly nerve membrane systems; DNA conformations associated with membranes in chloroplasts; nerve myelin sheath and frog retinal rod outer segments; hemagglutinin isolated from *Limulus polyphemus*; and the binding of RNA polymerase to different types of DNA. N.E.N.

N68-13773*# George Washington Univ., Washington, D. C. Biological Sciences Communication Project.
SCIENTIFIC COMMUNICATION RESEARCH IN SPACE BIOLOGY Annual Progress Report, 1 Jan.–31 Dec. 1967
29 Dec. 1967 163 p refs
(Contract NSR-09-010-027)
(NASA-CR-91507) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Bibliographies on planetary quarntine are presented, and research activities in exobiology are briefly reviewed. The bibliographies are divided into the areas of policy, environmental microbiology, and engineering parameters. N.E.N.

N68-13776* California Univ., Berkeley. Dept. of Nutritional Sciences.
CLINICAL NUTRITIONAL STUDY OF MINIMUM PROTEIN AND CALORIC REQUIREMENTS FOR MAN Annual Report, Sep. 1965–Sep. 1966
Sheldon Margen and Doris Howes Calloway Sep. 1966 77 p refs
(Grant NGR-05-003-068)
(NASA-CR-91287) CFSTI: $3.00 CSCL 06A

Systems proposed for regeneration of cabin atmosphere in prolonged space flight and planetary stations are most effective when they serve a dual role, as sources of both oxygen and food. Presently conceived chemical systems produce in high yield only carbohydrates or carbohydrate-like substances and require that supplies of protein or amino acids be stored or regenerated by a second, complementary system. Thus, a first limitation of these schemes would appear to be the minimum amount of protein that must be provided. On the other hand, in systems involving a biological agent as the regenerator, high growth rate of the agent is required and the cellular product thus includes high concentrations of protein and of genetic material, nucleic acids. These systems might require supplementation with additional non-protein energy sources if the protein yield exceeds man's tolerance for this nutrient form. If a supplementary energy source were to be carried, fat would be the more desirable form because it yields more calories per unit weight and volume than does carbohydrate. Author

N68-13781 Atomic Energy Commission, Washington, D. C. Technical Information Div.
RADIATION TRANSPORT AND BIOLOGICAL EFFECTS
D. K. Trubey, ed. [1966] 107 p refs Presented at the Am. Nucl. Soc. Meeting, Pittsburgh, 1 Nov. 1966
(ANS-SD-4; CONF-661125, Sup. 1) CFSTI: $3.00

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11. ENERGY-LOSS DISTRIBUTIONS AND FRACTIONAL CELL LETHALITY S. B. Curtis (Calif. Univ.) p 97–115 refs (See N68-13792 04-04)

N68-13782 Oak Ridge National Lab., Tenn. Radiation Shielding Information Center.

RADIATION TRANSPORT AND BIOLOGICAL EFFECTS

D. K. Trubey *In* AEC Radiation Transport and Biol. Effects [1966] p 3–10 (See N68-13781 04-04)

Problems of establishing radiation protection criteria are summarized, along with a review of papers presented on radiation transport calculations or the interpretation of biological effects. Criteria for radiation criteria are discussed in terms of permissible dose to critical organs and fast neutron dose weighting factors for man-rated SNAP reactors. In reviewing this session oriented toward biological shielding, the need for continued research on the physical and biological parameters in radiation environments is stressed. M.W.R.

N68-13783 Atomic Energy Commission, Washington, D. C. Technical Information Div.

CRITERIA FOR RADIATION PROTECTION: PERMISSIBLE DOSE TO CRITICAL ORGANS

Harald H. Rossi *In its* Radiation Transport and Biol. Effects [1966] p 13–17 (See N68-13781 04-04)

A careful and conservative attitude is stressed in relation to selection of maximum permissible doses for radiation exposure. Major biophysical variables influencing radiation effects and major late effects of chronic irradiation are noted, and basic limits are given for both occupational and nonoccupational exposure. M.W.R.

N68-13784 Atomic Energy Commission, Washington, D. C. Technical Information Div.

FAST NEUTRON DOSE WEIGHTING FACTORS FOR MANRATED SNAP REACTORS

G. W. Spangler and C. A. Willis *In its* Radiation Transport and Biol. Effects [1966] p 21–23 (See N68-13781 04-04)

Radiation protection considerations during space flight are discussed; and, while it is noted that several unusual considerations accompany the use of space reactors, only minimal safety margins are required. An appropriate basis for the choice of fast neutron dose weighting factors is not readily apparent, and the relationship between biological effects and the weighting factor is, therefore, considered. Additional studies are required to determine radiation effects in space, particularly the hazards due to radiative additivity from different sources. Mention is made of reduction of shielding weights for SNAP reactors. M.W.R.

N68-13785 Atomic Energy Commission, Washington, D. C.

DISTRIBUTION OF DOSE AND DOSE EQUIVALENT IN AN ANTHROPOMORPHIC PHANTOM RESULTING FROM BROAD-BEAM SOURCES OF MONOENERGETIC NEUTRONS

W. S. Snyder, J. A. Auxier, M. D. Brown, T. D. Jones, and R. T. Boughner *In its* Radiation Transport and Biol. Effects [1966] p 27–45 refs (See N68-13781 04-04)

A Monte Carlo-type program was coded for a digital computer to estimate dose in a tissue phantom from a variety of neutron sources with neutron energy not exceeding 14 meV. The program allows for elastic and inelastic scattering as well as for some 14 absorption interactions. The phantom, consisting of a right circular cylinder with a radius of 15 cm and a height of 60 cm, is a reasonable approximation of a human torso. It is considered to be homogeneous and composed of H, C, N, and O in the proportions indicated for man. With some rewriting of the source subroutine, the program may be used for a wide variety of sources, but only results for a monodirectional, monoenergetic, broad, lateral beam of neutrons are reported here. Author

N68-13786 Atomic Energy Commission, Washington, D. C. Technical Information Div.

ON DEPTH-DOSE CALCULATIONS IN AN EVALUATION OF FALLOUT SIMULATORS AND FALLOUT FIELDS

C. W. Garrett and R. L. French *In its* Radiation Transport and Biol. Effects [1966] p 51–56 ref (See N68-13781 04-04)

Several real and simulated fallout situations were studied, and Monte Carlo simulations indicate that dose distributions for actual fallout and compact simulators are very similar. For fallout field models, radial distributions are relatively flat. Comparison of three geometries illustrates how depth dose calculations aid in evaluating the effectiveness of a simulator, even though there are differences in photon spectra. Distributions for a phantom placed in a foxhole are compared with above-ground fallout field dose patterns; and while the radial distributions are similar, the axial distributions are completely different. M.W.R.

N68-13787 Atomic Energy Commission, Washington, D. C. Technical Information Div.

A NEW TECHNIQUE FOR THE COMPUTER REPRESENTATION OF THE HUMAN BODY

Phillip S. Mittelman and Walter Guber *In its* Radiation Transport and Biol. Effects [1966] p 59–65 (See N68-13781 04-04)

A geometrical description technique is presented that can be used for the computer representation of the human body. A computer-produced description of the heart is presented, as is a simple body model built from an elliptical cylinder, ellipsoids, and a wedge. The technique requires a minimum of a computer memory and has simplified geometric input. Rapid tracking of radiation through the configuration is possible, and dosage calculations can be made with great accuracy by using the body description technique with the UNC-SAM II Monte Carlo program. M.W.R.

N68-13788 Atomic Energy Commission, Washington, D. C. Technical Information Div.

PHYSICAL AND BIOLOGICAL DOSE CALCULATIONS FOR PROTON AND ALPHA FLUXES INCIDENT ON A SHIELDED MAN MODEL

C. W. Hall, K. M. Simpson, Jr., and W. B. Ritchie *In its* Radiation Transport and Biol. Effects [1966] p 69–78 (See N68-13781 04-04)

A sphere, two cylinders, and a reasonable facsimile of the human body were used as models for the calculation of proton and alpha incident fluxes on a shielded man. The influence of performing transport calculations on doses to specific organs is investigated and a thin shield is used. The phantoms yield very similar results except in the case of widely distributed BFO's. It is concluded that spherical man models may be used to estimate dose to skin, eyes, midline, and possibly blood-forming organs in parametric studies with fairly uniform shields. More detailed phantoms will be needed for nonuniform shielding. M.W.R.

N68-13789 Atomic Energy Commission, Washington, D. C. Technical Information Div.

DOSE AND DOSE-EFFECT RELATIONSHIP MODIFYING FACTORS IN PREDICTING THE DEGREE OF BIOLOGICAL RESPONSE

V. P. Bond *In its* Radiation Transport and Biol. Effects [1966] p 81 (See N68-13781 04-04)

It is noted that the dependence of biological effect on dose rate is slight in the case of accidental massive radiation doses that occur over a period of seconds to hours, and that the RBE for high-LET radiations usually encountered is close to unity for the bone marrow syndrome. The degree of inhomogeneity of dose distribution on a macro scale is considered to be the chief modifying factor for use in determining the early effects of massive exposure, and it is with exposure over months to years that dose rate becomes a major factor. Although the mean dose is not particularly useful in predicting early mortality, it may be of use in predicting cancer induction. M.W.R.

N68-13790 Atomic Energy Commission, Washington, D. C. Technical Information Div.

RADIATION RESPONSES OF MAN IN THE INTERMEDIATE DOSAGE RANGE

Wright H. Langham *In its* Radiation Transport and Biol. Effects [1966] p 85–89 (See N68-13781 04-04)

Early and late somatic effects to intermediate radiation dosages are described. This discussion of dose-response relationships in man is based on exposures to penetrating X-rays or gamma rays; and is subject to modification factors such as radiation quality, dose protraction, nonhomogeneities in dose distribution, and variations in the population receiving the dosages. Skin erythema and desquamation, prodromal response, hematological depression, decreased fertility and actual sterility, and early lethality are noted as the early effects; while the later or delayed effects are permanent or delayed skin changes, increased incidence of cataracts as well as of leukemia and other neoplastic diseases, and general life shortening. Genetic effects are not referenced in this summary report. M.W.R.

N68-13791 Atomic Energy Commission, Washington, D. C. Technical Information Div.

CELLULAR AND MAMMALIAN RADIATION EFFECTS AND THEIR INTERPRETATION IN RELATION TO MANNED SPACE FLIGHT

Paul Todd *In its* Radiation Transport and Biol. Effects [1966] p 93–95 (See N68-13781 04-04)

Various factors which modify the effects of ionizing radiation on human reproductive organs are discussed, and the effects of radiation on biological response to environmental agents as well as the effect of these agents on radiation response are summarized. Modification of radiation effects have been ameleiorated by removal of oxygen, cysteamine protection, and dosage spacing and dosage reduction. Prior irradiation results in occasional debilitated cells which produce radiation-sensitive progeny that are eventually outgrown by normal surviving cells. Ultrasonically irradiated cells increase chromosome breakage and reduce survival, and chromosome deletions produced by beta radiation are produced at a greater frequency in the gravity-free state. Particulate radiations with a higher rate of energy loss inactivate cells more effectively, although particulate radiations do not appear to be different from X-rays in their dependence upon atomic number of the material surrounding the cells. Environmental agents considered in relation to responses are acceleration, cold, excitement, exercise, heat, radiation, vibration, and weightlessness. M.W.R.

N68-13792 California Univ., Berkeley. Lawrence Radiation Lab.

ENERGY-LOSS DISTRIBUTIONS AND FRACTIONAL CELL LETHALITY

Stanley B. Curtis *In* AEC Radiation Transport and Biol. Effects [1966] p 97–115 refs (See N68-13781 04-04)
(UCRL-17283)

Inactivation cross sections are suggested for quantifying biological effects such as energy loss distribution and fractional cell lethality caused by radiation exposure. These cross sections, discussed in relation to particle energy loss, are analagous to nuclear reaction cross sections because they represent the probability for unit flux density of the proliferative capacity of the cell being destroyed. Such an approach may be of value in determining accumulated damage over a long period of time, such as would occur during extended space flights. In terms of the ratio of inactivation hits/cells of heavy components to protons, results indicate that the Fe–Ni ions cause about one and half times as much damage as protons under 0.2 g/cm^2 shielding from galactic cosmic radiation. For solar particle events, the He ion contributed slightly less than the protons, and the heavier components contributed less than the He ions. Increasing shielding causes a further drop in heavier component effects. Results also indicate that, during large-particle solar events, up to 7% of the cells of a seated astronaut would have been inactivated 4 cm inside the body at the waist behind 1 g/cm^2 vehicular shielding. M.W.R.

N68-13840*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

ORBITING EXPERIMENT FOR STUDY OF EXTENDED WEIGHTLESSNESS Final Report

J. M. Smith and J. A. Dippel 13 Jan. 1968 619 p refs
(Contract NAS1-6972)
(NASA-CR-66520) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Studied were preliminary design, mission, and development of a system for orbiting two 13-lb female Rhesus monkeys for a period of six months to one year to determine the psychological and physiological effects of extended weightlessness. The spacecraft is to be placed in orbit by a vehicle of the Apollo Application Program (AAP). Recovery is to be effected by the command module of a subsequent AAP flight. AAP Cluster B mission profiles were found to be compatible with the objectives. Flight 216 was selected as the launch vehicle and Flight 221 as the retrieving mission. A reliability assessment and tradeoff analyses were conducted. The design includes a thermal and atmosphere control subsystem, a waste management subsystem, a retrieval subsystem, a radiation—mass measurement subsystem, a data management subsystem, a solar cell electric power subsystem, and a sun-seeking attitude control subsystem. The mission analysis included prelaunch, launch, on-orbit, and recovery operations. Also considered were the steps, time spans, facilities, and equipment required for the program. It is concluded that the objectives are achievable with existing technology and that the desired flight date of mid-1970 can be met. K.W.

N68-13901# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.

TIME DOMAIN IDENTIFICATION OF HUMAN OPERATOR DYNAMIC RESPONSE

S. Suh Dec. 1967 67 p refs
(RM-392)

The problems encountered in the human operator identification process in the time domain are examined, and a solution is suggested. The problems are identified as selection of an identification technique, selection of an error signal on which the identification system is based, and determination of a correct measurement that leads to noise-unbiased parameters of the human operator model. The major portion of the work is devoted to detailed analysis of three selected identification techniques with a view to their further improvement and application. An important finding is that the human operator identification process should be carried out with closed-loop measurements and with the output error based system. Author

IAA ENTRIES

A68-13193 *
TEST AND DEVELOPMENT OF A REGENERATIVE CO_2 REMOVAL SYSTEM FOR POSSIBLE USE IN THE APOLLO APPLICATIONS PROGRAM.
Sam H. Davis, Jr. (NASA, Manned Spacecraft Center, Houston, Tex.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670843. 9 p.
Members, $0.75; nonmembers, $1.50.

The paper reports basic adsorption data for CO_2 and water vapor on molecular sieves and silica gel, a mathematical model used to predict the behavior of regenerative adsorption multibed systems, and prototype tests of an Apollo-size system and comparison of this system with model predictions. The basic data include equilibrium isotherm data and nonequilibrium adsorption and desorption data taken in a small cross-section bed. The prototype tests were performed in a 6 x 6 x 6 in. adsorption bed packed with silica gel and molecular sieve. (Author)

A68-13196 •
WATER-VAPOR ELECTROLYSIS CELL WITH PHOSPHORIC ACID ELECTROLYTE.
J. E. Clifford (Battelle Memorial Institute, Columbus, Ohio).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670851. 11 p. 7 refs.
Members, $0.75; nonmembers, $1.50.
Contract No. NAS 2-2156.

An oxygen-producing water electrolysis cell with phosphoric acid electrolyte can operate on the water vapor in recirculated cabin air and accomplish concurrent dehumidification. The development of the concept over the past three years involved research to define the components of electrode overvoltage and design analysis to provide a small, lightweight unit to compensate for the electrolysis power. Theoretical equations based on electrochemistry, fluid dynamics, and heat and mass transfer correlate with the observed steady-state operation obtained in extended testing of experimental cells for over 1000 hr. Data on electrode life, gas purity, and voltage characteristics combined with size, weight, and power estimates indicate that the new concept would be competitive with other methods of oxygen generation for advanced space missions. The recent satisfactory performance of a prototype module in an extended test of more than 1000 hr is reviewed. (Author)

A68-13197
WASTE MANAGEMENT IN MANNED SPACE VEHICLES.
L. Cooper, G. L. Fogal, and R. W. Murray (General Electric Co., Missile and Space Div., Valley Forge, Pa.).
Society of Automotive Engineers, Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967, Paper 670853. 12 p.
Members, $0.75; nonmembers, $1.50.

A simple and reliable concept for the collection, processing, disposal, or storage of human waste products has been developed for application under conditions of weightlessness. Psychological acceptance is achieved by utilization of a hardware design permitting conventional earth-like procedures. Bag-type containers are not used for collection and storage, thus manual handling of waste products and storage containers is not required. The system is capable of handling urine and fecal waste as well as vomitus and food debris. The solids are vacuum-dried to permit bacteriostatic storage and urine can be jettisoned to space. (Author)

A68-13214 #
COLLISION AVOIDANCE - INDICATIONS OF IMPROVEMENT THROUGH VISUAL TRAINING.
Alan A. Burrows and Richard F. Gabriel (McDonnell Douglas Aircraft Corp., Douglas Aircraft Co., Long Beach, Calif.).
IN: INSTITUTE OF NAVIGATION, NATIONAL AIR MEETING ON COLLISION AVOIDANCE, DAYTON, OHIO, FEBRUARY 23, 24, 1967, PROCEEDINGS. [A68-13207 03-21]
Washington, D.C., Institute of Navigation, 1967, p. 63-70. 8 refs.

Experimental study attempting to improve the probability of detection of collision hazard between aircraft. The experiments were conducted using simple simulation, but with adaptive training techniques. The object of the experiments was to determine how to improve existing aircrew capabilities and to ascertain whether the modified scan would improve detection performance. Very large gain in detection of collision hazards was shown during the experiments. M.F.

A68-13232
CARDIOPULMONARY RESPONSES OF RESTING MAN DURING EARLY EXPOSURE TO HIGH ALTITUDE.
James A. Vogel and Charles W. Harris (U.S. Army, Fitzsimons General Hospital, Medical Research and Nutrition Laboratory, Physiology Div., Denver, Colo.).
Journal of Applied Physiology, vol. 22, June 1967, p. 1124-1128. 11 refs.
(AD-657823)

Sixteen young male subjects were exposed to simulated altitudes of 2000, 11,000, and 15,000 ft in a hypobaric chamber and studied at sitting rest after 10, 20, 30, and 40 hr of exposure. Of those measurements made, only Pa_{O_2} (arterial pressure) changed significantly with time of exposure. Cardiac output rose from 71 at 2000 ft to 84 and 123 ml/min-kg at 11,000 and 15,000 ft, respectively. This was due to significant increases in heart rate at both higher elevations with no alteration in stroke volume. Mean arterial blood pressure was unaltered and, therefore, peripheral resistance fell concomitant with the rise in cardiac output. Mean Pa_{O_2} for the three altitudes was 94, 63, and 44 mm Hg; and percent Sa_{O_2} (arterial saturation) 99, 92, and 79. Largest changes in Pa_{CO_2} and pH were observed between 2000 and 11,000 ft and much less between 11,000 and 15,000 ft. Changes in cardiac output appeared best related to alterations in arterial O_2 content or saturation rather than tension, suggesting a peripheral rather than a central origin for the stimulus for the cardiovascular response to high altitude. The cardiac output response appears to follow an exponential relationship with altitude. (Author)

A68-13233 *
DIFFERENTIAL EFFECTS OF CHRONIC ACCELERATION ON SKELETAL MUSCLES.
R. R. Burton, E. L. Besch, S. J. Sluka, and A. H. Smith (California, University, Dept. of Animal Physiology, Davis, Calif.).
Journal of Applied Physiology, vol. 23, July 1967, p. 80-84. 25 refs.
Grant No. NGR-05-004-008.

Investigation of the differential effects of chronic exposure to an increased accelerative force on antagonistic muscle pairs, muscles which would not necessarily be affected proportionally by such a force. Chickens approximately 400 days of age were exposed to various levels of acceleration for several months in animal centrifuges. Results are reported concerning the effect of increased chronic acceleration on the size of the flexor and extensor hip muscles, on the size of the animal itself, and on glycogen and fat concentrations. R.B.S.

A68-13244 *
NEW HIGH-TEMPERATURE CHLORELLA.
Constantine Sorokin (Maryland, University, Dept. of Botany, College Park, Md.).
Science, vol. 158, Dec. 1, 1967, p. 1204, 1205. 10 refs.
NASA-supported research.

Comparison of growth characteristics of Chlorella 1-9-30, a new strain of green, high-temperature algae, with those of the widely used Chlorella 7-11-05. Under comparable conditions, Chlorella 1-9-30 has the same temperature range for growth as has Chlorella 1-11-05, but it generally has a higher growth rate. It also differs from Chlorella 7-11-05 morphologically. Because of its high capacity for organic synthesis, Chlorella 1-9-30 may be useful in biochemical, biophysical, and physiological research. P.v.T.

A68-13245 *

ACTION SPECTRUM FOR AN ENHANCEMENT OF ENDOGENOUS RESPIRATION BY LIGHT IN CHLORELLA.

Wolfgang Kowallik (Florida State University, Institute of Molecular Biophysics and Dept. of Biological Sciences, Tallahassee, Fla.).

Plant Physiology, vol. 42, May 1967, p. 672-676. 14 refs.
Grant No. NGR-10-004-018.

Discussion of the enhancement of oxygen consumption of a starved chlorophyll-free, yellow mutant of chlorella vulgaris by very small amounts of blue light (λ 450 mμ). A saturation level was reached at about 500 ergs/cm^2 sec. At that intensity the respiration is about three times greater than in the dark. An action spectrum for the enhancement of respiration shows two peaks around λ 450 and 375 mμ. Flavins and cis-carotenoids are discussed as the pigments involved. R.B.S.

A68-13265 *

ENHANCEMENT OF RESPIRATION AND FERMENTATION IN ALGAE BY BLUE LIGHT.

W. Kowallik and H. Gaffron (Florida State University, Institute of Molecular Biophysics, Tallahassee, Fla.).

Nature, vol. 215, Sept. 2, 1967, p. 1038-1040. 19 refs.
Grant No. NGR-10-004-018.

Study of the effect of blue light on respiration and fermentation in algae. In the dark, algae live on their reserve substances and respire very slowly. In this state a little blue light can stimulate their dark metabolisms considerably. It was thought that this regulatory effect could be the basis for several responses of plants to blue light. It is found that the blue-light effect does not act directly on respiration or on fermentation, but rather on the release of some carbohydrate by surprisingly small amounts of light. M.F.

A68-13491 *#

SYNTHETIC FATS AS PART OF A CLOSED-LOOP LIFE SUPPORT SYSTEM.

J. W. Frankenfeld (Esso Research and Engineering Co., New Investments Research Laboratory, Linden, N.J.), S. M. Kaback (Esso Research and Engineering Co., Technical Information Div., Linden, N.J.), A. Skopp (Esso Research and Engineering Co., Government Research Laboratory, Linden, N.J.), and J. Shapira (NASA, Ames Research Center, Moffett Field, Calif.).

Journal of Spacecraft and Rockets, vol. 4, Dec. 1967, p. 1671-1673.
Contract No. NAS 2-3708.

Examination of the possibility of synthesizing traditional calorie sources, such as fatty acids and lipids, from metabolic wastes, especially CO_2, under conditions of space travel. Experimental results indicate that the synthesis of fatty acids and glycerides from simple waste materials appears chemically feasible. The Ziegler growth reaction of ethylene to give α-olefins, followed by oxidative ozonolysis to acids, appears to be the most promising method. The synthesis is too complex from an engineering viewpoint, however, and the synthesis of glycerol is suggested as an alternative. T.M.

A68-13601 *

NUCLEOSIDE SYNTHESIS UNDER POTENTIALLY PREBIOTIC CONDITIONS.

C. Reid, L. E. Orgel (Salk Institute for Biological Studies, San Diego, Calif.), and C. Ponnamperuma (NASA, Ames Research Center, Moffett Field, Calif.).

Nature, vol. 216, Dec. 2, 1967, p. 936.

Investigation of certain aspects of the prebiotic nucleoside synthesis. It was found that well defined adducts of deoxyribose or ribose with adenine, cytosine or guanine are formed when the dry bases and sugar are heated together at temperatures in the range 130 to 170°C for a few minutes. It is demonstrated that none of the resulting products from this reaction are deoxyadenosine. R.B.S.

A68-13602

CYTOKINESIS IN THE GREEN ALGA FRITSCHIELLA.

Gordon E. McBride (California, University, Dept. of Botany, Berkeley, Calif.).

Nature, vol. 216, Dec. 2, 1967, p. 939.
NSF-supported research.

Investigation of the cytokinesis process in several ulotrichalean algae, including the subaerial parenchymatous Fritschiella tuberosa Iyengar. An electron micrograph is included showing a section of a cell in which two telophase nuclei are separated by a cell plate (a phenomenon quite characteristic of higher land plants). Dictyosome activity can be seen in this region, and vesicles apparently similar to those of dictyosome origin seem to be fusing with the cell plate. R.B.S.

A68-13665 *

AMMONIA AND THE REGULATION OF ACIDITY IN HUMAN ECCRINE SWEAT.

Taketoshi Morimoto (Kyoto Prefectural Medical College, Dept. of Physiology, Kyoto, Japan) and Robert E. Johnson (Illinois, University, Dept. of Physiology and Biophysics, Urbana, Ill.).

Nature, vol. 216, Nov. 25, 1967, p. 813, 814. 20 refs.
NASA-supported research.

Examination of the correlation between acidity and electrolytes of human eccrine sweat. Sweat was collected from nine men and two women from January to May 1966, with intervals of one or more weeks between collections from each subject. Considerable care was taken to obtain "pure sweat," that is, fluid free of particulate matter when reviewed at a magnification of 430. From the examination of the sweat it was concluded that several buffer systems may be at work in eccrine sweat depending on the acidity. When the sweat is acid the ammonia-ammonium system predominates. Phosphate is absent. When sweat is alkaline the carbonic acid-bicarbonate system is predominant. Aminoacids may affect the acid-base balance at any acidity. P.v.T.

A68-13807

ASSOCIAZIONE ITALIANA DI MEDICINA AERONAUTICA E SPAZIALE, CONVENTION, SAN REMO, ITALY, MAY 5-8, 1966, REPORT AND PAPERS [ASSOCIAZIONE ITALIANA DI MEDICINA AERONAUTICA E SPAZIALE, CONGRESSO, SAN REMO, ITALY, MAY 5-8, 1966, RELAZIONE E COMUNICAZIONI].

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966. 479 p. In Italian.

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CONSIDERATIONS OF THE ADVANTAGES OF PHOTOFLUOROGRAPHY IN THE EVALUATION OF CARDIOMETRIC FINDINGS IN FLIGHT PERSONNEL [CONSIDERAZIONI SUI VANTAGGI DELLA SCHERMOGRAFIA PER LA VALUTAZIONE DEI DATI CARDIOMETRICI NEL PERSONALE AERONAVIGANTE]. P. Italiano, p. 320-332. 23 refs. [See A68-13814 03-04]

VESTIBULAR ADAPTATION OF JET PILOTS [SULL'ADATTAMENTO VESTIBOLARE NEI PILOTI DI AVIOGETTO]. E. De Francesco, p. 333-360. 34 refs. [See A68-13815 03-04]

PERCEPTIVE HYPOACUSIAS IN AIR FORCE TECHNICIANS CAUSED BY F 104 G JET NOISE [IPOACUSIE PERCETTIVE DEL PERSONALE SPECIALIST DELL'AERONAUTICA MILITARE PROVOCATE DA RUMORI DI AVIOGETTI F.104 G]. P. P. Castagliuolo, p. 361-373. 32 refs. [See A68-13816 03-04]

AIR SICKNESS PREVENTION IN PILOTS [SULLA PREVENZIONE DEL MAL D'ARIA NEI PILOTI]. G. Borghesan and R. Caporale, p. 374-397. 43 refs. [See A68-13817 03-04]

ACUTE HYPERBARIC OXYGENATION - PRELIMINARY REPORT ON THE BEHAVIOR OF THE EKG, SOME SERUM ENZYMATIC SYSTEMS, BLOOD SUGAR LEVEL AND ATP ACID IN THE RABBIT SUBJECTED TO 3 ABSOLUTE ATMOSPHERES, AND HISTOLOGICAL EXAMINATIONS OF VARIOUS ORGANS [L' OSSIGENAZIONE IPERBARICA ACUTA - NOTA PREVENTIVA SUL COMPORTAMENTO DELL'ECG, DI ALCUNI SISTEMI ENZIMATICI SERICI, DELLA GLICEMIA E DELL'ATP, NEL CONIGLIO SOTTOPOSTO A 3 ATMOSFERE ASSOLUTE, E CONTROLLI ISTOLOGICI IN VARI ORGANI]. C. Vacca (Istituto di Fisiologia Generale e Speciale degli Animali Domestici e Chimica Biologica, Rome, Italy), P. De Franciscis (Roma, Università, Rome, Italy), L. Vacca, and L. Causa, p. 430-442. 6 refs. [See A68-13818 03-04]

ALPHABETICAL INDEX OF THE AUTHORS OF THE REPORT AND OF THE PAPERS [INDICE ALFABETICO DEGLI AUTORI DELLA RELAZIONE E DELLE COMUNICAZIONI], p. 479.

A68-13808 #

PSYCHOLOGICAL AND PHYSIOLOGICAL SELECTION OF AIR FORCE PERSONNEL - CONSIDERATIONS OF STATISTICAL AND CLINICAL FINDINGS OBTAINED FROM SAMPLE GROUPS OF CANDIDATES [SELEZIONE FISIOPSICHICA DEL PERSONALE AERONAUTICO - CONSIDERAZIONI SU DATI STATISTICI E CLINICI OTTENUTI IN GRUPPI-CAMPIONE DI CANDIDATI].

A. Scano (Centro di Studi e Ricerche di Medicina Aeronautico e Spaziale, Rome, Italy) and G. Ruggieri (Istituto Medico-Legale per l'Aeronautica Militare, Rome, Italy).

(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Relazione.)

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 23-71; Discussion, p. 72-91. 102 refs. In Italian.

Review and updating of data concerning the selection of Air Force personnel, particularly, pilots. Statistical data obtained from numerous physiological parameters and physical findings recorded in over 4000 examinations and functional tests are shown. New possible improvements and simplifications of examinations are discussed. The causes of unfitness are tabulated, together with the most commonly disqualifying diseases and anomalies, the percentage of multiple causes, the changes of some causes in different groups, and the reliability and uniformity of selection standards. General and specialized diagnostic problems are briefly reviewed. M. M.

A68-13809 #

ELECTRONYSTAGMOGRAPHIC INVESTIGATION IN MAN SUBJECTED TO COMPLEX ACCELERATION [RICERCA ELETTRONISTAGMOGRAFICA NELL'UOMO SOTTOPOSTO AD ACCELERAZIONI "COMPLESSE"].

E. De Francesco, R. Caporale, and G. Mazza.

(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 145-159. 9 refs. In Italian.

Investigation of the effects of mild centripetal acceleration on nystagmus caused by variable angular acceleration. A few subjects underwent, on a suitably modified Toennies chair, rotatory stimuli, with their heads on the axis of the rotating system, and 15 and 30 cm from the axis, with both labyrinths equidistant from the axis. Latency time, nystagmic-response duration, number and amplitude of oscillations, slow-phase velocity, and vertigo severity were investigated. The results obtained point to a greater excitability of the vestibular apparatus stimulated at 15 cm from the rotation axis, warranting the hypothesis of the probable existence of a highest point of vestibular excitability in eccentric rotatory stimulation with a short radius, beyond which, when centripetal acceleration is increased, excitability tends to decrease gradually. M. M.

A68-13810 #

INFORMATION ON THE PSYCHOPHYSIOLOGICAL CONDITIONS OF SPACE PILOTS WHICH CAN BE DEDUCED FROM AIR-TO-GROUND AND GROUND-TO-AIR VOICE RADIO COMMUNICATIONS [DATI SULLE CONDIZIONI PSICOFISIOLOGICHE DEI PILOTI SPAZIALI DESUMIBILI DALLE COMUNICAZIONI RADIO VERBALI SPAZIO-TERRA E TERRA-SPAZIO].

A. Judica-Cordiglia.

(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 176-182; Discussion, p. 183-187. In Italian.

Discussion of the significance and value of space-to-ground conversations with astronauts under both normal and special conditions. Medical recording techniques are reviewed, with the emphasis on symptomatologies which are ascertainable through voice communications, mainly those pertaining to the body systems that are more likely to be damaged in the space capsule environment. Some space-to-ground voice communications are cited as examples. The emotional stresses affecting the astronaut due to the exogenous and endogenous stimuli on his organism are stressed. M. M.

A68-13811 #

IMPORTANCE OF THE STANDARDIZATION OF THE PHOTOMETRIC CHARACTERISTICS OF VISUAL ACUITY TESTS IN THE SELECTION OF AIR FORCE PERSONNEL [IMPORTANZA DELLA STANDARDIZZAZIONE DELLE CARATTERISTICHE FOTOMETRICHE DEI TESTS D'ACUTEZZA VISIVA PER LA SELEZIONE DEL PERSONALE AERONAUTICO].

G. Durazzini.

(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 208-216. 11 refs. In Italian.

Discussion of the importance of accurate and constant evaluation of visual acuity, both in the selection and checkup of military personnel and in medicolegal practice. The accurate study of the photometric characteristics of visual acuity tests and of the examination site is advocated. The clinical and technical findings in medical literature on the subject are quoted, and it is stressed that the most severe standardization of techniques of visual examination is necessary to obtain constant results in all examination sites. An apparatus consisting of a cylindrical tube, an end of which is suitably fitted to an examinee's face, is proposed. The other end is closed with a transparent optotype, thus properly insulating the examinee from the external environment. Lighting is provided by an artificial source equipped with a voltage regulator and a photometer controlling the constancy of the luminous flux. M. M.

A68-13812 #

EARLY RESULTS OF FUNCTIONAL TESTS PERFORMED ON SELECTED FLIGHT PERSONNEL [PRIMI RISULTATI DI PROVE FUNZIONALI SU PERSONALE AERONAVIGANTE SELEZIONATO].

G. Janigro and D. Russo.

(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 224-240. 17 refs. In Italian.

Description of the results of functional tests carried out during routine checkups of flight personnel aged 24 to 47, in order to ascertain the changes in respiratory and cardiocirculatory response due to the aging of healthy subjects. The entire group registered mean values of vital capacity and its fractions, and of maximum expiratory volume far higher than the theoretical values. These

values decrease progressively with aging, along with a parallel increase in the residual volume and in the residual volume/total lung capacity ratio. A slow decrease in the oxygen intake at rest and during muscular exercise and in the calories/pulmonary ventilation ratio (according to Margaria) was registered, while an increase in pulmonary ventilation and blood pressure was recorded during exercise. These changes are attributed only to the anatomical and functional aging of healthy subjects. M. M.

A68-13813 #
COMPARISON BETWEEN RESULTS OF VESTIBULAR TESTS AND TILT-TABLE TESTS [RAFFRONTO TRA I RISULTATI DELLE PROVE VESTIBOLARI E DELLE PROVE DEL TAVOLO RIBALTABILE].
P. P. Castagliuolo and A. Aurucci.
(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 241-252; Discussion, T. Lomonaco (Roma, Università, Scuola di Specializzazione in Medicina Aeronautica e Spaziale, Rome, Italy) and Cerguiglini, p. 253, 254. 21 refs. In Italian.

Investigation of mild neurovegetative disfunctions in air pilot candidates by comparing the results of tilt-table tests with those of vestibular tests. In an examination of 74 reserve pilot candidates, ten subjects were found to be affected with vestibular dysfunctions such as hyperreflexia, hyporeflexia, areflexia, and asymmetry. In six of these subjects, the tilt-table tests gave borderline results. Two other subjects, who had shown a neurovegetative dysfunction in the tilt-table test, gave a normal response to the vestibular test. The results obtained validate both tests in revealing mild neurovegetative dysfunctions which, although not disqualifying, warrant thorough investigation by checking the affected subjects during their flight training. M. M.

A68-13814 #
CONSIDERATIONS OF THE ADVANTAGES OF PHOTOFLUOROGRAPHY IN THE EVALUATION OF CARDIOMETRIC FINDINGS IN FLIGHT PERSONNEL [CONSIDERAZIONI SUI VANTAGGI DELLA SCHERMOGRAFIA PER LA VALUTAZIONE DEI DATI CARDIOMETRICI NEL PERSONALE AERONAVIGANTE].
P. Italiano.
(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 320-332. 23 refs. In Italian.

Recommendation of the substitution of photofluorography for telecardiography in the chest X-ray examination of flight personnel and pilot trainees, on the basis of the author's personal experience. This technique is to be considered as a screening photofluorography, to be supported by other collateral examinations such as heart clinical tests, EKG and phonocardiographic recordings. The advantages of this method are simplicity and practicality, appreciable time savings, as well as financial and personnel savings. The standardization of the radiology departments of the Air Force medicolegal Institutes is advocated to permit the availability, even after 20 years, of the records of examinations performed at each checkup, to evaluate heart size changes due to aging and diseases. M. M.

A68-13815 #
VESTIBULAR ADAPTATION OF JET PILOTS [SULL'ADATTAMENTO VESTIBOLARE NEI PILOTI DI AVIOGETTO].
E. De Francesco.
(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 333-360. 34 refs. In Italian.

Experimental investigation of different vestibular response in two groups of individuals consisting of ten inexperienced subjects and ten F 104 pilots, who were subjected to repeated and periodic rotatory stimuli. In order to derive a physiological meaning from the different response, it is believed that the onset of a physiological adaptation condition in the vestibular system of pilots may consist in a nystagmic and perceptive response originally conditioned by the intense flight activity performed by them. This hypothesis is supported by findings concerning nystagmus duration, the number and amplitude of the oscillation, and the mean angular velocity of the low oscillation, the average values of which are always smaller, after the first stimulus, than those recorded in inexperienced individuals. This conditioning could, perhaps, explain the attenuation of nystagmic response that occurs, through successive rotatory stimuli, to a less evident and appreciable degree, and with particular and distinctive characteristics, in adapted subjects such as pilots. M. M.

A68-13816 #
PERCEPTIVE HYPOACUSIAS IN AIR FORCE TECHNICIANS CAUSED BY F 104 G JET NOISE [IPOACUSIE PERCETTIVE DEL PERSONALE SPECIALISTA DELL'AERONAUTICA MILITARE PROVOCATE DA RUMORI DI AVIOGETTI F.104 G].
P. P. Castagliuolo.
(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 361-373. 32 refs. In Italian.

Phonometric determination of sound-pressure levels in an F 104 G and in a Grumman propeller airplane in two air bases. A clinical examination of the acoustic and vestibular systems was performed in technicians stationed at the two bases, and the results were compared. A detailed study concerned mainly young people under 30 who were selected through audiometric examination. Early cochlear damage and hearing loss were noticed, depending on the extreme sound pressure produced by the supersonic jet. In a few cases, damage to the posterior labyrinth was recorded, together with appreciable extraacoustical effects of noise on the body. The treatment administered and the results obtained are described. Recommendations are made for the prevention of acoustic and general damages. M. M.

A68-13817 #
AIR SICKNESS PREVENTION IN PILOTS [SULLA PREVENZIONE DEL MAL D'ARIA NEI PILOTI].
C. Borghesan and R. Caporale.
(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 374-397. 43 refs. In Italian.

Review of recent scientific findings on the pathogenetic mechanism of air sickness in order to cast light on the resources currently available to aviation physicians for reducing the relatively high number of pilots disqualified during advanced stages of flight training. The importance of the role played by the vestibular proprioceptor is pointed out. The reticular system, presently considered the most important control apparatus of the central nervous system, as well as the conduction and integration center of all sensorial stimuli, is indicated as the pathogenetic mechanism center of motion sickness. The impossibility of screening out air-sickness-prone individuals through the vestibular test only is pointed out. The results of treatment with drugs, and laboratory techniques used in the prevention of pilot air sickness are discussed. M. M.

A68-13818 #
ACUTE HYPERBARIC OXYGENATION - PRELIMINARY REPORT ON THE BEHAVIOR OF THE EKG, SOME SERUM ENZYMATIC SYSTEMS, BLOOD SUGAR LEVEL AND ATP ACID IN THE RABBIT SUBJECTED TO 3 ABSOLUTE ATMOSPHERES, AND HISTOLOGICAL EXAMINATIONS OF VARIOUS ORGANS [L'OSSIGENAZIONE IPERBARICA ACUTA - NOTA PREVENTIVA SUL COMPORTAMENTO DELL'ECG, DI ALCUNI SISTEMI ENZIMATICI SERICI, DELLA GLICEMIA E DELL'ATP, NEL CONIGLIO SOTTOPOSTO A 3 ATMOSFERE ASSOLUTE, E CONTROLLI ISTOLOGICI IN VARI ORGANI].
C. Vacca (Istituto di Fisiologia Generale e Speciale degli Animali Domestici e Chimica Biologica, Rome, Italy), P. De Franciscis (Roma, Università, Istituto di Fisiologia Umana, II[a] Cattedra, Rome, Italy), L. Vacca, and L. Causa.
(Associazione Italiana di Medicina Aeronautica e Spaziale, Congresso, San Remo, Italy, May 5-8, 1966, Comunicazione.)
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Dec. 1966, p. 430-442. 6 refs. In Italian.

Experimental investigation of various changes in the rabbit subjected to hyperbaric oxygenation at 3 absolute atmospheres. The changes observed - variations in EKG depolarization and

repolarization, increase in circulating blood enzymes and blood sugar level, and the decrease in ATP acid - are related to hyperoxic stress, as well as to changes in cell membrane permeability due to hyperoxia per se. In addition to the pulmonary epithelium, the heart's muscular cells are also affected, due to the onset of early EKG signs of polarization and depolarization changes, definitely due to changes in the permeability of muscular cells to ions and enzymes. The enzymatic-electrolytic imbalance, connected with changes in cell membrane permeability, mainly of the heart and central nervous system, accounts for the well known hyperoxia toxic syndrome. M.M.

A68-13929
DESIGNING STERILIZABLE ELECTRONICS.
S. M. S. Alvi and S. M. Lee (North American Rockwell Corp., Autonetics Div., Anaheim, Calif.).
IN: NATIONAL ELECTRONICS CONFERENCE, CHICAGO, ILL., OCTOBER 23-25, 1967, PROCEEDINGS. VOLUME 23. [A68-13889 03-10]
Conference sponsored by the Illinois Institute of Technology, Region IV of the Institute of Electrical and Electronics Engineers, Northwestern University, and the University of Illinois.
Chicago, National Electronics Conference, Inc., 1967, p. 403-408. 6 refs.

Consideration of the problem of interplanetary transport of microorganisms, and of the necessity of sterilizing components. A space probe must be sterilized internally as well as on the surface. Many items in a spacecraft which have not been exposed to high enough temperatures and for long enough periods during processing contain microorganisms. Capacitors, encapsulated components, and solid fuels are examples of such carriers. Sterilization methods and approaches, and design problems and guidelines are discussed. F.R.L.

A68-13950 #
CYTOPHYSIOLOGICAL AND CYTOCHEMICAL ASPECTS OF HYPOKINESIA - EXPERIMENTAL STUDY.
V. V. Portugalov, O. G. Gazenko, E. I. Il'ina-Kakueva, V. B. Malkin, T. V. Artiukhina, I. A. Bukaeva, V. Ia. Gotlib, K. D. Rokhlenko, N. A. Roshchina, and V. I. Starostin (Akademiia Nauk SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper. 9 p.

Discussion of the results of physiological, cytochemical, histological, and electron-microscopic studies of the effects of hypokinesia on the voluntary muscular function and on the activity of the nervous system, the adrenal and thyroid glands, and the liver in a group of 71 experimental and 90 control mice at normal pressure and in an altitude chamber at 378 and 493 torr. An increase in the weight of the adrenal glands, a decrease in the weight of the spleen and in ribonucleoprotein content in the secretory hypothalamic nuclei, and colloid excretion from the thyroid follicles are observed in experimental mice. Various metabolic irregularities due to hypokinesia are also noted. V.Z.

A68-13951 #
HEART RATE RHYTHM AS AN INDICATOR OF HUMAN ORGANISM NEUROENDOCRINE REGULATION IN SPACE FLIGHT.
V. V. Parin, R. M. Baevskii, and G. A. Nikulina (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 18th, Belgrade, Yugoslavia, Sept. 24-30, 1967, Paper. 9 p.

Results of a mathematical analysis of the heart rate rhythm as a criterion of the accommodation of the endocrine function of humans to a space flight environment. Compound cardiointervalography applying to compound intervals of 10, 20, 30, and more cardiac cycles, and selective cardiointervalography developed by Lebed et al. are used in the heart rhythm examinations. Some statistical data are given for heart beat rates in relation to the neuroendocrine function of humans exposed to a simulated space flight environment. V.Z.

A68-14021 *#
CHEMICAL FOOD SYNTHESIS SYSTEMS FOR SPACECRAFT.
E. G. Lyman (NASA, Ames Research Center, Moffett Field, Calif.).
American Institute of Chemical Engineers, Annual Meeting, 16th, Symposium on Closed Ecology, Part 2, New York, N.Y., Nov. 26-30, 1967, Paper 20 B. 12 p. 12 refs.
$0.50.

Results of studies conducted to define feasible methods for chemical synthesis of food in spacecraft. Two different approaches for the synthesis of formaldehyde under spacecraft conditions were evaluated. The methods involve the use of either a methane or a methanol process. To date, attempts to synthesize formaldehyde via the methane route have been discouraging. Four methods of glycerol synthesis were examined: (1) direct hydrogenation of carbon monoxide, (2) synthesis from acetylene and formaldehyde, (3) trimerization of formaldehyde, and (4) hydrogenolysis of carbohydrate. The last two processes are considered to offer more promise on the basis of the results obtained. An alternative approach to carbohydrate synthesis involved the production of fructose and sorbose. Since this approach required the development of essentially the same techniques as that involved with glycerol synthesis, no particular advantage is noted. The possibilities for ethanol synthesis are discussed, together with some discouraging aspects involved in the process. T.M.

A68-14069 *
HEATED INFRARED CELL FOR INVESTIGATION OF SOLIDS IN A CONTROLLED ATMOSPHERE.
Theodore Wydeven and Mark Leban (NASA, Ames Research Center, Moffett Field, Calif.).
Analytical Chemistry, vol. 39, Nov. 1967, p. 1673, 1674. 7 refs.

Description of the construction and advantages of an IR cell for studying the decomposition of solids in the temperature range from 25 to 500°C in a controlled atmosphere. The cell can easily be accommodated by any spectrophotometer sample compartment in size to the Beckman IR-9. This cell permits continuous in situ quantitative analysis of IR active reactants and products. M.M.

A68-14185 #
STATISTICAL IDENTIFICATION OF A HUMAN-OPERATOR MODEL IN CONTROL SYSTEMS SUBJECTED TO RANDOM PERTURBATIONS [STATYSTYCZNA IDENTYFIKACJA MODELU CZLOWIEKA-OPERATORA W UKŁADACH STEROWANIA PODDANYCH DZIAŁANIU ZAKŁÓCEŃ PRZYPADKOWYCH].
Andrzej Piotr Firla.
Pomiary, Automatyka, Kontrola, vol. 13, Nov. 1967, p. 518-522. 13 refs. In Polish.

Description of a method for the statistical identification of the dynamic properties of a human operator in control systems subjected to random perturbations, assuming a quasi-linear model for the human operator. The study is restricted to one-dimensional manual control systems with compensation. A quasi-linear model is formulated for the operator, and the problem of the statistical identification of its parameters is analyzed. On the basis of the model, certain frequency characteristics of the human operator are determined for some common control situations. The proposed quasi-linear model may be satisfactorily used for the statistical identification of controlled plants only in the case where the plant action is close to linear. The method loses its advantages at higher plant dimensionality due to computational difficulties. If in the presence of cross-couplings it is not possible to differentiate between the action of the individual plant inputs, the method leads to nonsingular results. T.M.

A68-14354
A QUANTITATIVE IMPEDANCE PNEUMOGRAPH.
George E. Bergey (U.S. Naval Material Command, Naval Air Development Center, Aerospace Medical Research Dept., Johnsville, Pa.).
IN: 1967 INTERNATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., OCTOBER 2-4, 1967, PROCEEDINGS. [A68-14334 03-07]
Conference sponsored by the International Foundation for Telemetering.
Tarzana, Calif., International Foundation for Telemetering (ITC Proceedings. Volume 3), 1967, p. 298-305.

Description of an impedance pneumograph capable of quantitatively measuring respiratory volumes. The technique differs from other systems in that the ac frequency applied to a pair of electrodes is considerably higher (300 kHz) than is normally used in impedance pneumography. The two electrodes, constructed of silver-coated nylon for flexibility, are insulated from the subject by a layer of polyethylene film forming a capacitive coupling of the electrode to the subject. This technique effectively eliminates changes in the skin-to-electrode resistance largely responsible for baseline drift encountered with previous impedance systems. The pneumograph thus responds only to variations in the actual impedance between the two electrodes. Empirically a nearly perfect linear correlation was found to exist between the transthoracic impedance measured by the pneumograph and the pulmonary volume. Physically, the device was designed to be compatible with a telemetry system capable of measuring other physiological parameters and measures only 3/8 x 5/8 x 7/8 in. T.M.

A68-14355
A SHORT RANGE UNDERWATER BIOTELEMETRY SYSTEM.
John W. Steadman (General Dynamics Corp., Convair Div., Life Sciences Section, San Diego, Calif.).
IN: 1967 INTERNATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., OCTOBER 2-4, 1967, PROCEEDINGS. [A68-14334 03-07]
Conference sponsored by the International Foundation for Telemetering.
Tarzana, Calif., International Foundation for Telemetering (ITC Proceedings. Volume 3), 1967, p. 316-324.

Description of a short-range biotelemetry system intended for monitoring the physiological functions of a test subject in underwater weightlessness-simulation activities. This system is unique in providing a multiple-channel underwater telemetry system using an electromagnetic carrier, as opposed to previous systems which used ultrasonic carriers. The biomonitor has been used to measure changes in the cardiac rate, body temperature, respiratory rate, and CO_2 production with various degrees of activity in both underwater and dry configurations. Although only short transmitting distances are involved, and the water was not as conductive as sea water, the system has applications for underwater data transmission under certain circumstances. The development of transducers used with the system to provide information on the work load imposed by various simulation tasks is also described. T.M.

A68-14389 #
MEASUREMENT OF PHYSIOLOGICAL PARAMETERS IN FLIGHT.
Zenichiro Fujie, Yoshihisa Yamazaki (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan), and Yoshio Asou (Air Self Defence Force, Air Proving Group, Gifu, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Oct. 1966, p. 50-57. In Japanese.

Discussion of experiments aimed at studying the physiological responses of a pilot to the flight stresses imposed. The tests were conducted during high altitude and supersonic flights. An additional flight objective was an in-flight test connected with the partial pressure suit. The F-104J jet aircraft was used for the experiment. The F-104 aircraft flew approximately 60 min with a maximum altitude of 65,000 ft and a maximum airspeed of 1.9 Mach. The flight was performed under VFR conditions. The electrocardiogram, respiratory rate, and other flight data, such as airspeed, G-forces, and flight altitudes, were recorded simultaneously. The pulse rate of the pilot showed a somewhat high level during takeoff, landing, and zooming up. No significant changes in the pulse rate were observed during a supersonic flight to 1.9 Mach before zoom up. M.F.

A68-14390 #
STUDIES ON PHYSIOLOGICAL FUNCTIONS WITH REFERENCE TO AGE IN JASDF JET FIGHTER PILOTS. II.
Zenichiro Fujie, Isao Matsumoto, Takao Watanabe, Yoshihisa Yamazaki, Kenji Nakahara, and Yoshinori Kurihara (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Oct. 1966, p. 58-72. 20 refs. In Japanese.

Account of blood pressure and electrocardiographic findings during tests conducted on 100 F-86F jet pilots. No difference was found between the systolic blood pressure of jet pilots and that of normal male adults under the age of 30; after 30 a slight tendency for pressure drop with age was noted in both groups. However, the diastolic blood pressure remained at a constant level or increased slightly with age. No difference was found in the EKG findings of the jet pilots and those of normal male adults. More than 20% of the individuals had heart rates less than 60 beats/min. More than 5% of the electrocardiographic abnormalities were found in 100 asymptomatic individuals. M.F.

A68-14391 #
EVALUATION TEST OF THE EXPERIMENTAL ANTIEXPOSURE SUIT.
Yoshiro Hagiwara, Yutaka Mine, Tetsuro Shima, and Masayuki Makino (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Oct. 1966, p. 78-83. In Japanese.

Results of evaluation tests designed to compare the experimental antiexposure suit with the standard type suit 3AG. Improvements in acceptability, comfort, movability, and durability were found in the experimental antiexposure suit. No significant differences in the ability of the two antiexposure suits to protect against the cold were noted. M.F.

A68-14392 #
COMMENTARY ON APPROACH LIGHTS (FROM THE VIEWPOINT OF VISUAL PERCEPTION).
Norifusa Iwataki and Hiroshi Kansaku (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Oct. 1966, p. 98-107. 10 refs. In Japanese.

Discussion of the optimal characteristics for an approach light to help pilots land at night or in bad weather. Factors such as color, intensity, and configuration of the approach light as a function of visual perception are discussed. Red was evaluated as the most desirable color for the approach light, and the optimal intensity of light was found to be related to the color of the light used. Since strong illumination will cause glare, the intensity of the approach light must be adjusted according to the environmental conditions on the airfield. Stroboscopic light was found to be effective for increasing conspicuity. The visual-approach slope-line indicator system was found to be the best configuration for an approach light. M.F.

A68-14393 #
CHANGES OF BLOOD GLUCOSE, LACTIC ACID AND SERUM PROTEIN FRACTION IN RATS DURING EXERCISE IN HYPOXIC ENVIRONMENT.
Hiroshi Fujiwara, Teturo Shima, Yoshihisa Yamazaki, and Tomeco Ako (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Dec. 1966, p. 29-32. 6 refs. In Japanese.

Results of experiments in which 80 male Wistar strain rats weighing between 160 and 200 g were exposed to simulated altitude of 0, 2000, 3000, 4000, and 5000 m. All rats in each group were made to run to the point of exhaustion. The blood glucose, blood lactic acid, and the protein content in the blood serum were measured. The blood glucose of running groups under altitude was found to increase by 26 to 36% in comparison with that of the running group at ground level. The blood lactic acid of running groups increased with an increase in altitude. The blood glucose of the nonrunning group did not show any change with an increase in altitude. The blood lactic acid of the nonrunning group increased markedly with an increase in altitude. The protein content in the blood serum showed no marked change either under altitude or under the effect of exercise. M.F.

A68-14394 #
A SIMPLE DESIGN OF TELEMETER FOR PULSE RATE MEASUREMENT.
Mikio Ono (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Dec. 1966, p. 33-35. In Japanese.

Description of the design and testing of a small, light, and inexpensive short-wave telemetry transmitter for the measurement of pulse rates in small animals. The transmitter weighed 14 g and was thus easily applicable to a normal size rat. The transmitted

heart pulse (R wave of EKG) was clearly recorded by a short-wave radio and recorder. The recording obtained showed a clear R wave and no drift in the base line. The transmittable distance is only three meters, but this instrument can, nevertheless, be useful in animal experiments. M. F.

A68-14395 #
AN EVALUATION OF THE PROTECTIVE CLOTHING OF ROCKET-FUEL HANDLERS.
Yoshiro Hagiwara, Yutaka Mine, and Sueyoshi Tokutome (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Mar. 1967, p. 7-12. In Japanese.

Evaluation of the protective garments utilized by personnel handling rocket fuels. A specific protective suit is described, and measurements of pulse rate, rectal temperature, and mean skin temperature are given for wearers at different ambient temperature and humidity. The garment constitutes a considerable burden to the wearer, due to its weight and lack of ventilation. Loss of body weight by perspiration was measured to be 930 g/hr which is comparable to that experienced by steel workers and miners in the summer season. The use of the garments could thus result in heat stroke or heat exhaustion. The application of forced ventilation to the suit or allowing permissible permeability of the garment are recommended. The use of a respirator or respiratory hoses from air compressors is judged to be preferable to the heavy air cylinders now carried individually. T. M.

A68-14396 #
ELECTROENCEPHALOGRAPHIC SCREENING OF PILOTS. I.
Hayao Hori and Hirofumi Furuya (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Mar. 1967, p. 24-30. 8 refs. In Japanese.

Results of research intended to establish a standard scale of electroencephalographic (EEG) evaluation and methodology for detecting unfit pilots. The results of EEG testing of 146 jet pilots indicate readings: (1) 90% above normal, (2)~9% at the borderline, and (3) 2% slightly below normal. EEG readings of candidate pilots indicated: (1) 82% normal, (2) 10% borderline, and (3) 8% slightly abnormal. No abnormal EEG readings (epileptic seizures, etc.) were taken. The EEG pattern of the pilot group consisted of alpha activity dominant in about 60%, theta activity found in 6 to 10%, and beta activity present in 2 to 10%. The reaction to stimulation was compared in EEG readings of the pilot group in terms of the latent time from disinhibition of alpha activity to its reappearance. T. M.

A68-14397 #
STUDIES ON PULMONARY FUNCTION AT ALTITUDE. I.
Zenichiro Fujie, Takao Watanabe, and Yoshihisa Yamazaki (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Mar. 1967, p. 31-39. 13 refs. In Japanese.

Results of spirographic measurements conducted for the purpose of determining the effects of reduced barometric pressure on pulmonary functions. Ten male adults were exposed to simulated ground level, 2300-m, 4000-m, and 6100-m altitudes. Tests were conducted in a standing position using a 9-liter respirometer without oxygen inhalation. Vital capacity decreased in proportion to the reduction in atmospheric pressure from a mean value of 4648 ml at ground level to 4415 ml at 6100 m. Maximal midexpiratory flow increased significantly from a mean value of 4.8 liters/sec at ground level to 6.0 liters/sec at 6100 m. Maximal voluntary ventilation increased significantly from a mean value of 134.8 liters/min at ground level to 159.4 liters/min at 6100 m. Expiratory volume per minute and respiration rate per minute both increased with a reduction in barometric pressure. T. M.

A68-14398 #
STUDIES ON HIGH-ALTITUDE TOLERANCE. V.
Hiroshi Fujiwara (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Mar. 1967, p. 40-44. 7 refs. In Japanese.

Experimental investigation of the lethal altitude for golden hamsters during linear ascension and of the lethal altitude 50 (LA 50) during continuous exposure at each 1000 m from 8000 to 13,000 m. Eleven hundred and sixty animals were tested in each of the four seasons. Approximate lethal altitudes during linear ascension were 12,000 m in the spring, 10,000 m in the summer, 12,500 m in autumn, and 13,500 m in winter. The LA 50 during continuous exposure to constant levels of altitude was 10,500 m in the spring, 9500 m in summer, 10,500 m in autumn, and 10,500 m in winter. Lethal altitude during linear ascension was always higher than the LA 50 during continuous exposure to constant levels of altitude by from 500 m to 1500 m. All the animals which were exposed to a constant level of 13,000 m died. T. M.

A68-14399 #
APPLICATION TEST OF A MODEL OF A HEART-PULSE TELEMETER FOR SEVERAL EXPERIMENTAL ANIMALS.
Mikio Ono, Masaaki Iwane, and Hiroshi Fujiwara (Air Self Defence Force, Aeromedical Laboratory, Tachikawa, Japan).
Japan Air Self Defence Force, Aeromedical Laboratory, Reports, vol. 7, Mar. 1967, p. 45-52. 17 refs. In Japanese.

Description of a telemetry unit for recording the heart pulse, together with some experimental results obtained with several animals. The described unit weighs 8.5 g and is easily applicable to a rat. It picks up only the R wave of the ECG and transmits it by a short-wave AM system up to a distance of 5 m. Tests were conducted with rats, a guinea pig, a rabbit, and a dog in free, fixed, and water-exercise conditions. The recorded results showed no drift in the base line and noise, regardless of the situation or posture. The pulse rate and the existence of arrhythmia can be clearly detected from the record. The described unit is considered to be useful and convenient both for human applications and animal experiments. T. M.

A68-14405 *
A COMBINATION MEDIUM FOR DEMONSTRATING STARCH AND GELATIN HYDROLYSIS.
Gordon S. Oxborrow and Martin S. Favero (U.S. Public Health Service, National Communicable Disease Center, Phoenix, Ariz.).
American Journal of Medical Technology, vol. 33, July-Aug. 1967. 2 p.
Contracts No. R-137; No. R-11-004-001.

Description of a modified medium designed for the simultaneous detection of starch and gelatin hydrolysis. Trypticase soy agar is used as the basal medium, to which the appropriate amounts of gelatin or soluble starch are added. The efficiency, reliability, and sensitivity of the combination medium, as compared to the individual media, are tested by using both pure cultures of known microorganisms and cultures isolated from spacecraft assembly areas and industrial clean rooms. V. P.

A68-14406 *
BONE DEMINERALIZATION OF FOOT AND HAND OF GEMINI-TITAN IV, V AND VII ASTRONAUTS DURING ORBITAL FLIGHT.
Pauline Beery Mack, George P. Vose (Texas Woman's University, Research Institute, Denton, Tex.), Paul A. LaChance (NASA, Manned Spacecraft Center, Biomedical Research Office, Flight Food and Nutrition Div., Houston, Tex.), and Fred B. Vogt (Texas Woman's University, Research Institute, Denton; Texas, University, Graduate School of Biomedical Sciences, Houston, Tex.).
American Journal of Roentgenology, Radium Therapy and Nuclear Medicine, vol. C, July 1967, p. 503-511. 16 refs.
Grants No. NsG-440; No. NsG-44-013-001.

Discussion of studies aimed at determining the effect of prolonged weightlessness and partial immobilization on the human skeletal system. Roentgenographic densitometry of several appendicular bones of astronauts participating in the Gemini 4, 5, and 7 orbital space flights revealed the occurrence of small but significant losses in bone mass. The lowest negative bone-mass change occured in the 14-day Gemini 7 flight, while the highest occurred during the 8-day Gemini 5 flight, showing that the duration of a space mission does not correlate with the extent of bone-mass loss. A statistically significant correlation coefficient is found between the mean dietary calcium intake of each astronaut during the respective flights and their losses in bone mass in 6 anatomic sites. The lower bone losses observed for Gemini 7 are attributed to the fact that the astronauts consumed more calcium than the Gemini 4 and 5 astronauts and, in addition, participated in a special program of isometric and isotonic exercise. V. P.

A68-14407 #
SPACE FLIGHT FEEDING SYSTEMS - CHARACTERISTICS, CONCEPTS FOR IMPROVEMENT, AND PUBLIC HEALTH IMPLICATIONS.
Norman D. Heidelbaugh (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Performance Physiology Section, Brooks AFB, Tex.).
American Veterinary Medical Association, Journal, vol. 149, Dec. 15, 1966, p. 1662-1671. 20 refs.
USAF-sponsored research.
(SAM-TR-66-277)

Discussion of the current status of the development of space-flight feeding systems required to comply with stringent specifications imposed by biological, engineering, and operational constraints. The individual constraints are discussed, and the characteristics of a "zero-g feeder pack" are examined in detail. Special production requirements and current concepts of improving existing types of food for space feeding systems are reviewed. The implications of these concepts for future public health standards are considered. V.P.

A68-14408 •
EFFECTS OF RADIATION ON THE HYPOTHALAMUS IN MONKEYS.
M. Z. M. Ibrahim, Webb Haymaker, Jaime Miquel (NASA, Ames Research Center, Moffett Field, Calif.), and Arthur J. Riopelle (Tulane University, Delta Regional Primate Research Center, Covington, La.).
Archiv für Psychiatrie und Nervenkrankheiten, vol. 210, 1967, p. 1-15. 21 refs.

Description of the delayed pathological changes observed in the brains of monkeys receiving X- and γ-radiation to the head in a dose of 2000 R given at 50 R/min. The pathological changes observed in the hypothalamus and in the rest of the brain strongly suggest a vascular factor as of overriding pathogenic importance in the inception of lesions. M.M.

A68-14439 •
STERILIZATION REQUIREMENTS FOR SPACE EXPLORATION.
J. J. McDade (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), M. S. Favero (U.S. Public Health Service, Communicable Disease Center, Phoenix, Ariz.), and L. B. Hall (NASA, Planetary Quarantine Office, Washington, D.C.).
(International Association of Milk, Food, and Environmental Sanitarians, Annual Meeting, 53rd, Minneapolis, Minn., Aug. 15-18, 1966, Paper.)
Journal of Milk and Food Technology, vol. 30, June 1967, p. 179-185. 29 refs.
NASA Contracts No. R-137; No. R-11-004-001.

Demonstration that the levels and types of microbial contaminants recovered from space hardware, or from test surfaces exposed within assembly areas, depend upon the degree of environmental and personnel control. Since the intramural environment may become a reservoir of contamination, especially when environmental control measures are inadequate, it appears that one of the best means for maintaining microbial contamination at a low level is the use of vertical-laminar-flow clean rooms. P.v.T.

A68-14476 •
THE BIOPHYSICAL BASIS AND CLINICAL APPLICATIONS OF RHEOENCEPHALOGRAPHY.
John H. Seipel (Georgetown University Hospital, Dept. of Neurology, Washington, D.C.).
(American Academy of Neurology, Annual Meeting, Philadelphia, Pa., Apr. 29, 1966, Paper.)
Neurology, vol. 17, May 1967, p. 443-451. 47 refs.
Research supported by the Georgetown University Hospital;
Grant No. NsG-388.

Survey of experience obtained during five years of research into the biophysics of rheoencephalography (REG) and its clinical applications. The electrochemical and biophysical bases of REG are examined. A theoretical analysis shows that REG is a reliable method for reproducing quantitatively changes in cranial blood volume (the effect of blood flow in REG is negligible). A standardized reproducible tracing procedure is proposed as a standard method for future REG studies. Individual extra- and intracranial REG contributions are demonstrated, showing that these components permit quantitative evaluation of the patient's cranial circulation and that the extracranial components are well suited for representing the external carotid arteries. Incidences and patterns of arterial involvement and collateral compensation are discussed, and several previously unreported REG syndromes are described. V.P.

A68-14477 *
MODELS FOR OPTIMIZING THE LEARNING PROCESS.
G. J. Groen and R. C. Atkinson (Stanford University, Stanford, Calif.).
Psychological Bulletin, vol. 66, Oct. 1966, p. 309-320. 29 refs.
Office of Education Grant No. OE 5-10-050; Grant No. NGR-05-020-036.

The paper shows how certain instructional problems can be reformulated as problems in the mathematical theory of optimization. A common instructional paradigm is outlined, and a notational system is proposed which allows the paradigm to be restated as a multistage decision process with an explicit mathematical learning model embedded within it. The notion of an optimal stimulus presentation strategy is introduced, and some problems involved in determining such a strategy are discussed. A brief description of dynamic programing is used to illustrate how optimal strategies might be discovered in practical situations. (Author)

A68-14491 *
THE INFLUENCE OF WEAK ELECTROMAGNETIC FIELDS ON THE CIRCADIAN RHYTHM IN MAN [ÜBER DIE BEEINFLUSSUNG DER CIRCADIANEN PERIODIK DES MENSCHEN DURCH SCHWACHE ELEKTROMAGNETISCHE FELDER].
Rütger Wever (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andechs über Starnberg, West Germany).
Zeitschrift für vergleichende Physiologie, vol. 56, 1967, p. 111-128. 21 refs. In German.
Grants No. NsG-259-62; No. NsG-52-015-001.

Examinations of human circadian rhythms in a specially designed underground bunker containing two living rooms, one of which is shielded against electric and magnetic fields. In this room, the influence of artificial weak electric ac fields varying at 10 cps is tested; such a field, simulating one of the natural fields in the earth's atmosphere, cannot be perceived. The results of all experiments in the shielded room as compared to those in the nonshielded room indicated that natural electromagnetic fields have an effect on circadian rhythms. The mean period value, averaged over 29 experiments in the shielded room, was 25.65 hr; the corresponding value, averaged over 24 experiments in the nonshielded room, was 25.00 hr. Moreover, "internal desynchronization" was observed exclusively in the shielded room (in nine experiments). In the nonshielded room, the periods of activity and of vegetative functions were synchronized either in a 1:1 or in a 2:1 ratio (circa-bi-dian activity periods in five experiments). With these results it was concluded that the weak artificial 10-cps field and the natural terrestrial field have similar effects on human circadian rhythms. P.v.T.

A68-14523 *
STATISTICS AND DYNAMICS OF PROCARYOTIC CELL POPULATIONS.
A. G. Fredrickson, D. Ramkrishna, and H. M. Tsuchiya (Minnesota, University, Institute of Technology, Chemical Engineering Dept., Minneapolis, Minn.).
Mathematical Biosciences, vol. 1, 1967, p. 327-374. 54 refs.
Grants No. NsG-79-60; No. NsG-24-005-001; No. NGR-24-005-056.

The formulation of a mathematical theory of a cell population requires the ability to specify quantitatively the physiological state of individual cells of the population. In procaryotic cells (bacteria and blue-green algae), the intracellular structure is of a relatively simple nature, and it is postulated that the physiological state of such a cell is specified by its biochemical composition. If we postulate further that the growth rate of a cell and its fission probability depend only on the cell's current physiological state and on the current state of the cell's environment, then an equation of change for the distribution of physiological states in a population can be derived. In addition, an equation of change for the state of the cellular environment can be obtained. These equations allow us to predict the statistical and dynamical behavior of a cell population from information obtained by analysis of cellular and subcellular structure and function. (Author)

A68-14529 #
DIGITAL INSTRUMENT FOR AUTOMATIC MEASUREMENT OF THE MOMENT OF MINIMUM RANGE OF AN ARTIFICIAL EARTH SATELLITE FROM AN OBSERVATION POINT [TSIFROVOE USTROISTVO DLIA AVTOMATICHESKOGO IZMERENIIA MOMENTA NAIMEN'SHEGO UDALENIIA ISZ OT PUNKTA NABLIUDENIIA].
A. I. Aleksandrov and V. M. Lazarev.
Izmeritel'naia Tekhnika, no. 6, 1967, p. 29-31. In Russian.

A digital instrument is briefly described that is based on the linear variation of a satellite's radial velocity in the minimum-range region and on the averaging of several moments that correspond to precalculated satellite speeds. Approaching the traverse (minimum distance to the observation station), the satellite will have radial velocities $-\dot{R}_1$ and $-\dot{R}_2$ at moments t_1 and t_2; past the traverse, the satellite will acquire velocities $+\dot{R}_3$ and $+\dot{R}_4$ at moments t_3 and t_4. By measuring the four time moments and averaging them, the traverse time t_0 can be determined with high accuracy. The radial velocity can be measured by isolating the Doppler frequency with respect to the carrier frequency. With a specified error of 10^{-5} or 10^{-6} and $t - t_0 \approx$ (0.03 to 0.1) sec, it can be assumed that the radial velocity of the satellite varies linearly. The digital instrument operating on the above basis promises high accuracy (maximum error in Doppler-frequency period, 1 μsec; maximum time-lock error, 0.5 μsec). (ATD/LC)

A68-14533 #
INCREASED RADIOSENSITIVITY WITH INACTIVATION OF THE LABYRINTH - PROBLEM OF SPACE-FLIGHT RADIATION SAFETY [POVYSHENIE RADIOCHUVSTVITEL'NOSTI PRI VYKLIUCHENII LABIRINTA - K PROBLEME RADIATSIONNOI BEZOPASNOSTI KOSMICHESKOGO POLETA].
N. I. Arlashchenko (Ministerstvo Zdravookhraneniia, Institut Medikobiologicheskikh Problem, Moscow, USSR).
Radiobiologiia, vol. 7, no. 3, 1967, p. 350-356. 14 refs. In Russian.

Discussion of experiments in which rabbits subjected to labyrinthectomy (unilateral and bilateral) were gamma-irradiated after 15 min, 1 day, and 35 days with a single dose of 650 rads. Survival of the animals was recorded over a period of 30 days. The results indicate that the degree of radiation damage to the animals depends on the magnitude of neural shifts resulting from disturbances of the vestibular function. Irradiation after a 25-day period led to a death rate of 60% but was 100% when applied shortly after the labyrinthectomy - the period of highest vestibular disturbance. Inasmuch as the effect of weightlessness on the vestibular function is comparable to a vestibular functional disturbance, an increase in the radiosensitivity of the crew may be expected. V.P.

A68-14566 #
GLUCOSE ABSORPTION BY THE SMALL INTESTINE DURING RESPIRATION OF VARIOUS GAS MIXTURES [VSASYVANIE GLIUKOZY V TONKIKH KISHKAKH PRI DYKHANII RAZLICHNYMI GAZOVYMI SMESIAMI].
N. Sh. Amirov (Akademiia Meditsinskikh Nauk SSSR, Institut Normal'noi i Patologicheskoi Fiziologii, Laboratoriia Fiziologii i Patologii Pishchevareniia, Moscow, USSR).
Fiziologicheskii Zhurnal, vol. 53, no. 6, 1967, p. 705-710. 18 refs. In Russian.

Discussion of glucose absorption tests performed with rats under respiration conditions in which the oxygen content in the gas mixture was varied from 60% down to 10% and where the carbon dioxide content was varied between 53 and 5% in a mixture with normal oxygen content. The test confirmed the importance of oxygen in the absorption function of the small intestine and demonstrated the resistance of this intestine to hypoxic respiration. Increased glucose absorption observed under hypercapnic conditions is attributed to increased blood circulation in the portal system of the large intestine. V.P.

A68-14596 #
INFLUENCE OF INCREASED OXYGEN AND AIR PRESSURE IN THE CASE OF EXPERIMENTAL HYPOXIA CAUSED BY ACUTE POISONING BY METHEMOGLOBIN-FORMING SUBSTANCES [O DEISTVII POVYSHENNOGO DAVLENIIA KISLORODA I VOZDUKHA PRI EKSPERIMENTAL'NOI GIPOKSII, VYZVANNOI OSTRYM OTRAVLENIEM METGEMOGLOBINOOBRAZOVATELIAMI].
B. R. Glants and V. D. Tonkopii.
Voenno-Meditsinskii Zhurnal, no. 5, 1967, p. 31-34. 8 refs. In Russian.

Investigation of the effectiveness of air and oxygen respiration at excess pressures as a means of treating hemic hypoxia caused by poisoning by anilines, aniline derivatives, and similar agents. Tests performed with guinea pigs showed that this type of treatment assured 100% survival in all cases. To be effective, respiration must continue long enough to support vital activity until the methemoglobin can recover to the normal level. V.P.

A68-14597 #
HYPOXIA AND ITS EFFECT ON THE HUMAN ORGANISM [GIPOKSIIA I EE VLIIANIE NA ORGANIZM CHELOVEKA].
G. I. Gurvich.
Voenno-Meditsinskii Zhurnal, no. 5, 1967, p. 51-54. 14 refs. In Russian.

Survey of Soviet and foreign studies concerning the effects of hypoxia on the human organism. Some results obtained with people acclimatized to rarefied atmospheres indicate that acclimatization to oxygen deficiency is an efficient means to improve human resistance to unfavorable flight factors and to improve physical tolerance in general. V.P.

A68-14598 #
DATA ON THE CONDITION OF SUBJECTS DURING THE FIRST MINUTES FOLLOWING EXPOSURE TO CONDITIONS OF LIMITED MOTOR ACTIVITY [NEKOTORYE DANNYE O SOSTOIANII ISSLEDUEMYKH V PERVYE MINUTY POSLE PREBYVANIIA V USLOVIIAKH OGRANICHENNOI MYSHECHNOI DEIATEL'NOSTI].
V. V. Bazhanov, A. A. Baranov, Iu. V. Vaniushina, M. A. Gerd, R. V. Komotskii, G. I. Neverov, N. E. Panferova, V. I. Slesarev, and N. I. Taranov.
Voenno-Meditsinskii Zhurnal, no. 5, 1967, p. 54-57. 8 refs. In Russian.

Discussion of experiments in which the functional indices of human subjects were monitored immediately following immersion of a duration from 1.5 to 7 days and from 8.5 to 11.5 days. Hypodynamia was found to sharply reduce cardiovascular tolerance of the orthostatic test for the first 15 to 20 min after leaving the water. However, most symptoms of the hypodynamic syndrome disappeared during the first 10 to 40 min, though weakness and unsureness of movement persisted for two or three days. In the very first minutes all subjects could not walk unaided and were incapable of any muscular effort. The biomechanics of the walking cycle were also effected - the subjects held their bodies, arms, and legs in unusual ways and performed unusual movements to retain their balance while walking. The generally rapid improvement of the functional state (after 10 to 40 min) is seen to indicate that the disturbances observed are mostly of a reflex character. The first to recover are the reflexes regulating such frequent and automatic functions as motor coordination while walking. Restoration of the mechanisms governing more exact and delicate functions - e.g., balancing on one leg or walking on a rail - is less rapid. V.P.

A68-14631
SOME TRENDS IN SHORT-WAVE COMMUNICATIONS.
V. M. Rozov.
(Elektrosviaz', vol. 21, Apr. 1967, p. 18-25.)
Telecommunications and Radio Engineering, Part I - Telecommunications, vol. 21, Apr. 1967, p. 15-19. 14 refs. Translation.

A68-14639
CARRIER-FREQUENCY DISCRIMINATION OF RF PULSE SEQUENCES.
S. A. Iatskaer.
(Radiotekhnika, vol. 22, Apr. 1967, p. 71-74.)
Telecommunications and Radio Engineering, Part II - Radio Engineering, vol. 22, Apr. 1967, p. 122-125. 5 refs. Translation.

A68-14642 #
EFFECT OF DIFFERENT ACCELERATIONS ON CONDITIONED-REFLEX ACTIVITY OF RATS [VLIIANIE RAZLICHNYKH USKORENII NA USLOVNOREFLEKTORNUIU DEIATEL'NOST' KRYS].

S. I. Nudman (Akademiia Nauk SSSR, Institut Fiziologii, Laboratoriia Sravnitel'nogo Ontogeneza Vysshei Nervnoi Deiatel'nosti, Leningrad, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 17, no. 3, 1967, p. 566, 567. In Russian.

An earlier study showed that relatively low accelerations (0.6 g) affect indices related to conditioned motor reflex orientation, while temporal indices of the reflex remain practically unchanged. The present study investigated the effect of higher accelerations (5.3 and 10 g) on higher nervous activity of rats. Twelve Wistan rats aged 5 to 7 months were conditioned to Fedorov's maze method using light (170 lux) and a bell (60 db) as conditioned stimuli and an electric shock as an unconditioned stimulus. The conditioned reflex consisted of running to the left in the maze in response to the bell, and running to the right in response to the light. Centrifugation began after the conditioned motor reflex was established. In the first experimental series, animals were rotated at 120 rpm (5.3 g), and in the second series animals were rotated at 210 rpm (10 g). Animals were rotated for 1 min and tested 1 min later. Indices for conditioned-reflex activity included: number of incorrect responses, reaction time, latent period, and running time in the maze. A comparison of earlier and current data shows that the relatively low acceleration values (0.5 to 0.6 g) primarily affect the indices related to conditioned motor reflex orientation, and increase the number of incorrect responses, especially to sound stimuli. Higher acceleration values (5.3 and 10 g) significantly increase the temporal indices of a conditioned motor reflex,but affect the number of incorrect responses to a lesser degree. With relatively low acceleration values, the auditory analyzer is affected, while with higher acceleration values, the visual analyzer is affected. Changes of the conditioned reflex can be attributed to inhibition of cortical and subcortical structures. (ATD/LC)

A68-14660 #
ADAPTIVE RADAR DETECTION WITH REGULATED ERROR PROBABILITIES IN EXTENDED CLUTTER TARGET ENVIRONMENTS.
Harold M. Finn (Radio Corporation of America, Defense Electronic Products, Moorestown, N.J.).
IN: ANNUAL ALLERTON CONFERENCE ON CIRCUIT AND SYSTEM THEORY, 5TH, UNIVERSITY OF ILLINOIS, MONTICELLO, ILL., OCTOBER 4-6, 1967, PROCEEDINGS. [A68-14643 04-10]
Edited by J. B. Cruz, Jr. and T. N. Trick.
Conference sponsored by the University of Illinois, and the Circuit Theory Group and Automatic Control Group of the Institute of Electrical and Electronics Engineers.
Urbana, Ill., University of Illinois, 1967, p. 502-512.

Sequential detection modes designed for employment in statistically nonstationary extended clutter target environments are described. The statistical hypothesis tests developed are adaptive in the sense that spatially sampled maximum likelihood estimates of the clutter target scattering function, made on the first sequential step control the clutter discrimination policy of the second step. In addition, updated estimates of these quantities are employed to control the second step detection thresholds. The adaptive modes are shown to yield a false alarm probability invariant to changes in the clutter noise power density, and a detection probability which is greater than a specified lower bound for an hypothesized target and range of clutter levels. (Author)

A68-14753 *
STEROLS OF CHLORELLA. II.
Glenn W. Patterson (Maryland, University, Dept. of Botany, College Park, Md.).
Plant Physiology, vol. 42, Oct. 1967, p. 1457-1459. 7 refs.
Grants No. NsG-70; No. NsG-21-002-003.

Description of the isolation and identification of each of the two unknown sterols occurring in C. vulgaris. These sterols were isolated by column chromatography, and identification was by means of gas chromatography. One of the sterols isolated was identified as Δ^7 chondrillastenol, and the second one was shown to be Δ^7 ergostenol. This represents the first reported isolation of Δ^7 chondrillastenol from natural sources, and the first reported isolation of Δ^7 ergostenol from green plants. It is pointed out that C. vulgaris differs from C. ellipsoidea in its apparent inability to convert the steroid Δ^7 double bond to the Δ^5 double bond as most plants do. R.B.S.

A68-14757
THE EFFECT OF FLIGHT STRESSES ON SEVERAL BLOOD COMPONENTS [DIE AUSWIRKUNG FLIEGERISCHER BELASTUNG AUF EINIGE BLUTKOMPONENTEN].
H. M. Wegmann, K. E. Klein, and H. Brüner (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 23, 1967, p. 293-304. 24 refs. In German.
(DVL-649)

Determination of the physiological effects of flight stress in jet pilots who fly the Starfighter F 104G. Stress reactions to flying were evaluated by blood determinations including ATP, blood sugar, ascorbic acid, the free 11-hydroxycorticosteroids, and the activities of four cell enzymes. The following conclusions are presented: (1) flying this aircraft caused significant responses of most parameters; (2) relations were found between the responses and the stress intensity; and (3) in some cases flying the aircraft caused stress values which were no longer within the normal clinical range. R.B.S.

A68-14761 *
INDIRECT PILOT VIEWING FOR REENTRY VEHICLES AND SST's.
H. G. Gaidsick, G. P. Layton, Jr., and W. H. Dana (NASA, Flight Research Center, Edwards AFB, Calif.).
Space/Aeronautics, vol. 48, Sept. 1967, p. 118-121.

Discussion of two systems of indirect pilot viewing presently under study - namely, short-eye-relief see-through optics, in which entrance and exit pupils necessarily have the same size, and a long-eye-relief infinity viewing system, in which some aperture-widening device like a transmission or reflection screen makes it possible to combine a large exit pupil with a comparatively small entrance pupil. The first configuration is being studied in the form of overlapping monoculars, and the second in the form of a panoramic display consisting of four modules. The overlapping monoculars seem better suited to the reentry vehicle. The infinity viewing system seems applicable mainly to the SST. The overlapping monoculars system consists of two wide-angle 90° unity-magnification periscopes arranged so that their fields of view overlap by about 50°, providing a combined lateral angular coverage of roughly 130°. M.G.

A68-14765
INVESTIGATION OF THE EFFECTS OF ANTHOCYANIN GLUCOSIDES ON THE NIGHT VISION OF FLIGHT PERSONNEL [ETUDE DES EFFETS DES GLUCOSIDES D'ANTHOCYANE SUR LA VISION NOCTURNE DU PERSONNEL NAVIGANT].
L. Belleoud, D. Leluan, and Y. Boyer.
Revue de Médecine Aéronautique et Spatiale, vol. 6, Sept. 1967, p. 5-10. 9 refs. In French.

Demonstration of the effectiveness of the short-term use of Difrarel 100 by flight personnel. Four different effects were observed: (1) lowering of the night vision threshold in all pilots, particularly when the initial threshold was poor; (2) reduction of dazzle drawbacks; (3) reduction of visual fatigue; and (4) improvement of adaptation to night vision. M.M.

A68-14766
INFLUENCE OF AIR TRAVEL FROM EAST TO WEST AND VICE VERSA ON THE CIRCADIAN RHYTHMS OF DIURESIS AND OF URINARY ELIMINATION OF SODIUM AND POTASSIUM [INFLUENCE DES VOYAGES AERIENS EST-OUEST ET VICE-VERSA SUR LES RYTHMES CIRCADIENS DE LA DIURESE ET DE L'ELIMINATION URINAIRE DU SODIUM ET DU POTASSIUM].
E. Lafontaine, J. Sirot, J. Pasquet, and J. Lavernhe (Compagnie Nationale Air France, Service Médical, Paris, France).
Revue de Médecine Aéronautique et Spatiale, vol. 6, Sept. 1967, p. 11-15. 13 refs. In French.

Measurement of diuresis and of the urine elimination of sodium and potassium in a group of ten subjects, in order to establish the circadian oscillations of these eliminations. The following results were obtained: (1) a flight of approximately 11 hr brings about a significant decrease in diuresis and sodium and potassium elimination during flight, and a rebound phenomenon with hypersecretion, following the flight; (2) following a rapid round trip with 20-hr exposure to a negative time lag of 11 hr, the circadian elimination rates of water, sodium and potassium are immediately restored to their pre-

existing control values; (3) at the time of a trip involving a five-day exposure to a negative time lag of 11 hr, the circadian elimination rates of these elements begin to adapt to the local time on the third day, the adaptation being complete on the fifth day; and (4) urine potassium seems to play a particularly significant role in the study of the circadian hydroelectrolytic changes in the human system. M. M.

A68-14837 #
STRUCTURAL AND FUNCTIONAL DISORDERS IN CERTAIN SYSTEMS OF THE ORGANISM DUE TO EXTREMAL EFFECTS IN EXPERIMENTS ON ANIMALS [STRUKTURNO-FUNKTSIONAL'NYE NARUSHENIIA NEKOTORYKH SISTEM ORGANIZMA PRI EKSTREMAL'NYKH VOZDEISTVIIAKH V EKSPERIMENTE NA ZHIVOTNYKH].
V. V. Parin and I. M. Khazen.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 17-24. 34 refs. In Russian.

Review of various structural and functional disorders observed, according to recent Soviet papers, in humans and experimental animals exposed to extremal effects of acceleration, hypoxia, and other stresses. It is pointed out that most of these disorders are latent, do not substantially affect the general conditions and performance of an organism, and require special techniques for detection. V. Z.

A68-14838 #
MATHEMATICAL SIMULATION OF TEMPERATURE AND HUMIDITY CHANGES IN COMPARTMENTS OF HERMETICALLY SEALED SPACE-VEHICLE CABINS [MATEMATICHESKOE MODELIROVANIE TEPLOVLAZHNOSTNYKH PROTSESSOV V OTSEKAKH GERMETICHESKIKH KABIN KOSMICHESKIKH KORABLEI].
B. A. Adamovich, A. V. Kostetskii, V. A. Kurochkin, and G. G. Ter-Minas'ian.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 25-30. 8 refs. In Russian.

Development of a mathematical model for simulating air conditioning of spacecraft cabins, based on the Olizarov differential equation for temperature variations in a sealed air-conditioned volume. The model is used for a computer-programed study of moisture-content and temperature variations in the three compartments of an experimental space cabin. V. Z.

A68-14839 #
EFFECT OF A DIET CONTAINING A BIOMASS OF UNICELLULAR ALGAE ON THE COMPOSITION OF THE INTESTINAL MICROFLORA OF ANIMALS [VLIIANIE DIETY, SODERZHASHCHEI BIOMASSU ODNOKLETOCHNYKH VODOROSLEI, NA SOSTAV KISHECHNOI MIKROFLORY U ZHIVOTNYKH].
V. M. Shilov, N. N. Liz'ko, V. I. Fofanov, and N. S. Kliushkina.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 31-34. 14 refs. In Russian.

Investigation of the intestinal microflora in two groups of two generations of white rats kept for three months on different diets with casein, soybeans, or Chlorella as a protein source. It is found that a casein diet suppresses Lactobacillus, while a Chlorella diet vigorously stimulates sporiferous anaerobic bacteria. A soybean diet, on the other hand, produced no appreciable changes in the intestinal flora. V. Z.

A68-14840 #
EFFECT OF TRANSVERSE ACCELERATIONS ON THE ACETYLCHOLINE CONTENT AND THE CHOLINESTERASE ACTIVITY IN THE BLOOD OF EXPERIMENTAL ANIMALS [VLIIANIE POPERECHNYKH PEREGRUZOK NA SODERZHANIE ATSETILKHOLINA I KHOLINESTERAZNUIU AKTIVNOST' V KROVI EKSPERIMENTAL'NYKH ZHIVOTNYKH].
N. V. Korneeva and A. S. Ushakov.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 34-38. 11 refs. In Russian.

Investigation of the integral volume of erythrocytes, the acetylcholine content, and cholinesterase activity in the blood of a group of rabbits subjected to single 7 to 10-min spine-to-breast accelerations of 8 g. The insignificant or quickly recoverable changes established in all three characteristics are discussed. V. Z.

A68-14841 #
CORRELATION BETWEEN THE EEG FLUCTUATIONS AND ALIMENTARY CONDITIONED-REFLEX ACTIVITY IN RABBITS SUBJECTED TO INCREASING HYPOXIA [KORRELIATSIIA IZMENENII EEG I PISHCHEVOI USLOVNOREFLEKTORNOI DEIATEL'NOSTI U KROLIKOV PRI DEISTVII NARASTAIUSHCHEI GIPOKSII].
L. V. Kaliuzhnyi, N. A. Agadzhanian, and I. N. Zakharova.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 38-46. 32 refs. In Russian.

Investigation of the effects of increasing hypoxia on the EEG and a light-flash-conditioned alimentary reflex of a group of rabbits subjected to simulated ascents to an altitude of 10,000 m at a rate of 25 m/sec in a pressure chamber. Stimulation of the subcortical system of the brain - namely the anterolateral sections of the hypothalamus - is observed in the experimental animals at pressures corresponding to altitudes of 2000 to 3000 m. V. Z.

A68-14842 #
EXPERIMENTAL APPLICATION OF PROPHYLACTIC AND THERAPEUTIC COMPLEXES UNDER CONDITIONS OF REPEATED EXPOSURE TO IONIZING RADIATION [OPYT ISPOL'ZOVANIIA PROFILAKTICHESKIKH I LECHEBNYKH KOMPLEKSOV V USLOVIIAKH MNOGOKRATNOGO VOZDEISTVIIA IONIZIRUIUSHCHEI RADIATSII].
M. N. Trushina.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 46-52. 17 refs. In Russian.

Investigation of the protective and rehabilitating effect of combinations of vitamins B_1, B_6, C, and P, histidine, tryptophan, and folic and orotic acids on a group of dogs exposed repeatedly over a period of two months to X-ray doses of 30 or 40 r making a total dose of 600 r. The drugs reduced the clinical symptoms of radiation damage and prevented the death of all protected dogs, while the death rate of unprotected dogs was 43%. The preirradiation application of this protective technique also reduced radiation effects in dogs. V. Z.

A68-14843 #
INTERPRETATION OF THE BIOLOGICAL EFFECT OF CHRONIC γ-IRRADIATION [NEKOTORYE ISTOLKOVANIIA BIOLOGICHESKOGO EFFEKTA KHRONICHESKIKH γ-OBLUCHENII].
A. F. Khoruzhenko, A. I. Laptev, I. G. Oreshkin, V. N. Malakhovskii, and V. A. Rezontov.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 52-57. 15 refs. In Russian.

Analysis of the radiation damage occurring in 976 rats divided into groups exposed continuously to doses of Co^{60} γ-irradiation ranging from maximum nonlethal to minimum absolutely lethal for periods ranging from 1 to 90 days. Empirical formulas for radiation-damage accumulation and repair indicate a damage-restoration process which is monotonic up to 80% of the sustained cumulative damage, and a 20% irreparable damage in experimental rats after cessation of irradiation. Radiation doses lethal for 50% of the rats after 60 days of irradiation are given. V. Z.

A68-14844 #
EFFECT OF THE COMBINED ACTION OF TWO MONTHS OF HYPOKINESIA AND ACCELERATIONS ON THE CARDIOVASCULAR SYSTEM [VLIIANIE KOMPLEKSNOGO VOZDEISTVIIA DVUKHMESIACHNOI GIPOKINEZII I USKORENII NA SERDECHNO-SOSUDISTUIU SISTEMU].
G. P. Mikhailovskii, T. V. Benevolenskaia, T. A. Petrova, I. Ia. Iakovleva, O. I. Boikova, M. P. Kuz'min, A. A. Savilov, and S. N. Solov'eva.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 57-61. 14 refs. In Russian.

Investigation of the effect of transverse accelerations of 12 to 14 g on the cardiovascular system and the regional blood circulation of a group of six male subjects confined to bed rest for 62 days. Muscular-vessel tonus reduction, ophthalmic-function and nasal blood-circulation disorders, and orthostatic-tolerance suppression are established in all these individuals. Also indicated are certain cardiac irregularities and changes in the circulatory adaptation function under physical stress. V. Z.

A68-14845 #
FUNCTIONAL CHANGES IN THE NERVOUS SYSTEM AND CERTAIN ANALYSORS UNDER COMBINED EFFECTS OF HYPOKINESIA AND RADIAL ACCELERATIONS [IZMENENIE FUNKTSII NERVNOI SISTEMY I NEKOTORYKH ANALIZATOROV PRI KOMPLEKSNOM VOZDEISTVII GIPOKINEZII I RADIAL'NYKH USKORENII].
T. N. Krupina, A. Ia. Tizul, N. M. Boglevskaia, V. P. Baranova, E. I. Matsnev, and E. A. Chertovskikh.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 61-66. 17 refs. In Russian.

Investigation of the function of the nervous system and vestibular and auditory analysors in a group of 6 male subjects confined to bed rest for two months between exposures to breast-to-spine accelerations at the tolerance limit reached at a rate of 0.15 to 0.2 g/sec. Various temporary functional disorders of the vegetative nervous system and acoustic analysors, and the development of asthenic conditions are noted. V. Z.

A68-14846 #
BASAL METABOLISM IN HUMANS DURING PROLONGED RESTRICTION OF MOTOR ACTIVITY [OSNOVNOI OBMEN PRI DLITEL'NOM OGRANICHENII DVIGATEL'NOI AKTIVNOSTI CHELOVEKA].
B. S. Katkovskii.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 67-71. 9 refs. In Russian.

Investigation of the basal metabolism in a group of ten male subjects restricted to bed rest for 20 or 62 days, preceded and followed by spine-to-breast tolerance-limit accelerations reached at a rate of 0.1 and 0.2 g/sec below and above 4 g, respectively. Decreased oxygen consumption rates in all the test individuals and decreased basal metabolic rates and a virtually unchanged pulmonary function in individuals who did not perform physical exercises during the 62-day bed rest are noted. V. Z.

A68-14847 #
RESULTS OF PHYSIOLOGICAL STUDIES IN A SLOWLY ROTATING CHAMBER [NEKOTORYE ITOGI FIZIOLOGICHESKIKH ISSLEDOVANII V MEDLENNO VRASHCHAIUSHCHEISIA KAMERE (MVK)].
R. R. Galle and M. D. Emel'ianov.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 72-79. 11 refs. In Russian.

Results of a series of 16 sessions of observations of the effects of centripetal and Coriolis accelerations on the vestibular function of a group of eight male subjects subjected for seven days to steady rotation at a rate of 10 or 40°/sec in a special chamber. EKG, heart-beat rate, nystagmus, arterial pressure, cutaneous galvanic reaction, equilibrium preservation in the complex Romberg position, and fluctuations of the center of gravity are covered by observations. A certain reduction of adaptation capability during prolonged exposure to slow rotation is established. The 40°/sec rate of rotation is not considered to be the tolerance rate. V. Z.

A68-14848 #
INTERACTION BETWEEN ANALYSORS DURING WEIGHTLESSNESS [O VZAIMODEISTVII ANALIZATOROV V NEVESOMOSTI].
L. A. Kitaev-Smyk.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 79-83. 12 refs. In Russian.

Review of the effects of weightlessness on the organism, as observed in a total of 270 individuals who took part in flights along parabolic trajectories. It is concluded that, under conditions of brief weightlessness, the emotional, psychic, vestibular-vegetative, and motor reactions are closely interrelated and that the spatial-orientation perception of humans and animals is a result of the interpretation of information supplied by both the visual analysor and receptors reacting to the loss of the force of gravity. V. Z.

A68-14849 #
CHARACTERISTIC FEATURES OF THE REACTION OF THE ACOUSTIC ANALYSOR OF HUMANS TO CERTAIN FACTORS OF SPACE FLIGHT [OSOBENNOSTI REAKTSII SLUKHOVOGO ANALIZATORA CHELOVEKA PRI VOZDEISTVII NEKOTORYKH FAKTOROV KOSMICHESKOGO POLETA].
Iu. V. Krylov.
Kosmicheskaia Biologiia i Meditsina, vol. 1, Sept.-Oct. 1967, p. 84-89. 22 refs. In Russian.

Attempt to determine the dynamics of the differential and threshold sensitivity of the acoustic analysor of humans under the action of space-flight factors such as noise, confinement, hypodynamia, and conditions of the gaseous medium of a space cabin. The auditory function of individuals exposed for 8 hr to 30 days to continuous 75-db noise at 800 to 2000 Hz is examined by measuring the auditory threshold at 125 to 10,000 Hz, the dynamics of differential auditory thresholds above 1000 Hz, and the recovery time of the auditory function after 3-min exposure to 90-db white noise. The results indicate a significant adaptation potential of the human acoustic analysor to space-flight environments. V. Z.

A68-14988
LINEAR PROGRAMMING APPLIED TO OPTIMIZATION OF INSTRUMENT PANEL AND WORKPLACE LAYOUT.
Louis E. Freund and Thomas L. Sadosky (Michigan, University, Ann Arbor, Mich.).
Human Factors, vol. 9, Aug. 1967, p. 295-300.

Investigation of the application of several linear programing algorithms to the problems of workplace and instrument panel design. The various approaches described depend primarily on the type of problem constructed - i.e., on the structure of constraints and available information. Two types of optimization functions are described, one based on the distance between available positions and the other based on minimum eye travel. One formulation incorporates the probability of transition between any pair of available positions as a design parameter. The results indicate that solution of these problems is possible by several algorithms, primarily the transportation algorithm and the assignment algorithm. A solution using Simplex was attempted for one type of design, and the constraint structure proved to be complex. (Author)

A68-14989
THE RELATIONSHIP OF NEAR-VISION PERIPHERAL ACUITY AND FAR-VISION SEARCH PERFORMANCE.
Dorothy M. Johnston (North American Rockwell Corp., Columbus, Ohio).
Human Factors, vol. 9, Aug. 1967, p. 301-303. 5 refs.

Evaluation of a near-vision peripheral acuity test and a far-vision search task given to 35 subjects who did not wear glasses or contact lenses and with foveal acuity of 20/30 or better monocular and binocular far and near vision. The results, which showed a low correlation between near-vision peripheral acuity and far-vision search performance are consistent with Giese's (1946) findings of low correlations between near and far foveal acuity. P. v. T.

A68-14991
USING THE NULL HYPOTHESIS IN HUMAN ENGINEERING EVALUATIONS.
Newton C. Ellis (Life Sciences, Inc., Fort Worth, Tex.).
Human Factors, vol. 9, Aug. 1967, p. 321-324.
Contract No. N-61339-1889.

Proposal of some practical suggestions regarding the appropriate use and interpretation of the null hypothesis (H_0) in human engineering research. The coverage of the topic is neither meant to be restrictive nor exhaustive, but represents a simple and concise treatment of a very real methodological problem. The paper is offered as a single collective source of several research arguments underlying using and interpreting H_0 as an experimental hypothesis. (Author)

A68-14992 #
WHAT DOES THE OPERATOR DO IN COMPLEX SYSTEMS?
Julien M. Christensen (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Human Engineering Div., Wright-Patterson AFB, Ohio) and Robert G. Mills (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Human Engineering Div., Systems Research Branch, Wright-Patterson AFB, Ohio).
Human Factors, vol. 9, Aug. 1967, p. 329-340. 21 refs.

Data from tests and paper and pencil analyses were used in a study of human activities in complex operational systems, since very little usable data have been gathered on human activities under operational or field conditions. These data were classified by two raters according to an adopted taxonomy. It was generally concluded that where activity data have been gathered under operational conditions, they have been useful to design engineers, human factors specialists, and systems analysts. It is further noted, however,

that additional effort must be devoted to the development of better methods for obtaining data and corresponding criteria of human performance under operational conditions. A discussion of the taxonomy and other techniques indicated that collection of activity data should be feasible under operational conditions. In addition it is suggested that increased standardization and use of operational definition in the development of these techniques might result in improvement of their general applicability. (Author)

A68-14993 *

THE USE OF FULL SCALE MISSION SIMULATION FOR THE ASSESSMENT OF COMPLEX OPERATOR PERFORMANCE.

Milton A. Grodsky (Martin Marietta Corp., Martin Co., Man-Machine Engineering Dept., Baltimore, Md.).

Human Factors, vol. 9, Aug. 1967, p. 341-348. 5 refs.
Contracts No. NASw-833; No. NASw-1187.

Description of the use of full-scale high fidelity simulation as a technique for the evaluation of the performance of the human operator in an aerospace vehicle context. The specific implementation of this approach used an Apollo simulation with highly trained aerospace research pilots as subjects. The major advantages of the approach are considered to derive from the relative ease with which generalizations can be made from the research vehicle to the vehicle being simulated. The ultimate criterion, in-flight validation, is not as yet attainable, but the prediction is made that this approach would be fully supported by the outcome of such an evaluation. A requirement exists for the examination of this approach in relation to more commonly employed laboratory situations and tasks so that a tie-in with such research can be established. (Author)

A68-14994

PERFORMANCE ASSESSMENT BASED ON AN EMPIRICALLY DERIVED TASK TAXONOMY.

Edwin A. Fleishman (American Institutes for Research, Washington, D.C.).

(Journal of Applied Psychology, vol. 51, no. 1, 1967, p. 1-10.)
Human Factors, vol. 9, Aug. 1967, p. 349-366. 41 refs.
NSF Grant No. GB-1742; Contract No. DA-49-193-MD-2632.

Review and discussion of a number of the methodological questions relating to the application of an experimental-correlational approach to the problem of assessing complex performance. The basic point of departure is the specification of the requirements for a task taxonomy and an analysis of the values of factor analytic investigations in combination with experimental methods in providing the framework for such a taxonomy. The way in which this approach has been applied in the past and the expected benefits of its successful implementation are discussed. It is concluded that experimental-correlational studies offer considerable promise in attacking complex performance but that a more extensive research program is needed. The general outlines of such a program are described. (Author)

A68-14995

THE IDENTIFICATION OF PERFORMANCE DIMENSIONS THROUGH FACTOR ANALYSIS.

James F. Parker, Jr. (BioTechnology, Inc., Arlington, Va.).

Human Factors, vol. 9, Aug. 1967, p. 367-373. 16 refs.

The problems encountered in trying to relate factor-analytically derived performance measures to real world, complex work situations are described. A particular implementation of this approach to the problem of assessing the performance capabilities of the on-orbit astronaut is described in relation to the task demands of the predicted space vehicle performance requirements. The general approach as outlined is restricted to the measurement of perceptual motor functions of the sort traditionally looked at by factor analysts in relation to the ability requirements of aircraft operators. Relatively mild stressors - sleep loss and heat - have not resulted in significant alterations of performance on these tasks. (Author)

A68-14996

METHODOLOGY IN THE USE OF SYNTHETIC TASKS TO ASSESS COMPLEX PERFORMANCE.

Earl A. Alluisi (Louisville, University, Louisville, Ky.).

Human Factors, vol. 9, Aug. 1967, p. 375-384. 13 refs.
Contract No. DA-49-193-MD-2567.

The application of synthetic tasks to the assessment of complex performance is discussed in relation to the tradeoffs involved in achieving adequate levels of face validity and in specifying the exact changes in psychological functions that may result from particular environmental manipulations. It is argued that the multiple-task performance battery approach can provide levels of face validity adequate to maintain the motivation of subjects while at the same time permitting the identification of changes in specific performance functions. The characteristics of this approach are discussed in relation to a program of research on the effects of confinement and demanding work-rest schedules on crew performance. (Author)

A68-14997 #

METHODOLOGY IN THE ASSESSMENT OF COMPLEX PERFORMANCE - DISCUSSION AND CONCLUSIONS.

W. Dean Chiles (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Sciences Laboratory, Training Research Div., Operator Training Branch, Wright-Patterson AFB, Ohio).

Human Factors, vol. 9, Aug. 1967, p. 385-392.

Summary of a discussion which took place at a conference on the methodology involved in the assessment of complex performance. The most significant conclusions relate to the criterion problem, task taxonomies, the reliability of measures, and the role of face validity in the design of research apparatus. Thirty-five assertions concerning semantic differential instructions and summary statistics with accompanying response (i.e., whether or not data exist relative to the assertion, and if so, whether the data contradict or verify the assertion) are given in an appendix. R.B.S.

A68-15003

RELATION BETWEEN GANGLION CELL ACTIVITY AND THE LOCAL ELECTRORETINOGRAM OF CAT RETINA.

Roy H. Steinberg (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).

Nature, vol. 216, Dec. 9, 1967, p. 1008-1010. 19 refs.

Observation of an effect of stimulus intensity on the discharge pattern of cat ganglion cells. The effect is relevant to previous work indicating that certain off-responses of the visual system might be related to the late receptor potential if they could be delayed by increases of stimulus intensity. The on-response, at high intensities, continued into the off-period instead of terminating at the "off" of the flash. In addition, this ganglion cell effect seemed to be related to the behavior of the dc component of the local electroretinogram. F.R.L.

A68-15010 *

THE DEVELOPMENT OF A FASTER MONITORING SYSTEM.

W. J. Whitfield and J. C. Mashburn (Sandia Corp., Sandia Laboratory, Albuquerque, N. Mex.).

Contamination Control, vol. 6, Dec. 1967, p. 10, 11.
NASA-supported research.

Description of an experimental device that samples air for very low concentrations of small airborne particles at the rate of 1 ft^3/min. The monitoring device uses an optical system from a standard photometer with a two-stage pulse amplifier. The amplifier output is fed into a conventional pulse counter, and the system is calibrated to count all particles which are .5 μ in size or larger. The experimental counter showed good repeatability to almost zero-count conditions while at approximately 4000 particles/ft^3 the device suffers loss, due to particle coincidence in the sensing zone. At concentrations above 6000 particles/ft^3, the loss is so severe that the results are unreliable. Several tests conducted with the system are discussed. It is judged that the device provides in improved means of monitoring very clean environments. T.M.

A68-15035

DIRECTION OF CHAIN GROWTH IN POLYSACCHARIDE SYNTHESIS.

P. W. Robbins, D. Bray, M. Dankert, and A. Wright (Massachusetts Institute of Technology, Dept. of Biology, Cambridge, Mass.).

Science, vol. 158, Dec. 22, 1967, p. 1536-1542. 54 refs.
PHS Grant No. AM 06803-15.

Study of the biosynthesis of a bacterial polysaccharide - the surface O-antigen of Salmonella newington - differing in several respects from the more classical example of glycogen synthesis. Sugars are not transferred directly to the antigen from sugar nucleotide precursors but are transferred first into lipid-linked oligosaccharides. Growth of the polysaccharide chain then occurs by assembly of these lipid-linked precursors at the reducing end of

the polymer rather than at the nonreducing end as in glycogen. This method of assembly, in which nascent chains are transferred to the next subunit, is analogous to the growth of proteins or fatty acids. It seems possible that these differences reflect the more complex requirements of a surface polysaccharide synthesized by membrane-bound enzymes. If this is the case, then several other polysaccharide systems may be synthesized by comparable mechanisms. P.v.T.

A68-15038 *

ENZYME REACTION RATES AT LIMITED WATER ACTIVITIES.

J. J. Skujins and A. D. McLaren (California, University, Dept. of Soils and Plant Nutrition, Berkeley, Calif.).

Science, vol. 158, Dec. 22, 1967, p. 1569, 1570.
Grant No. NsG-704-05.

A well-mixed powder consisting of dry urea and urease exposed to air containing discrete amounts of water vapor showed a release of carbon-14 dioxide above 60% relative humidity. The relative activity of urease followed the water-vapor adsorption isotherm of urease. The minimum amount of water required for the reaction observed was 1.3 moles per mole of side-chain polar groups of the urease protein. (Author)

A68-15164

THERMAL ACTIVATION ENERGIES IN LITHIUM FLUORIDE, SODIUM FLUORIDE, AND SODIUM CHLORIDE CRYSTALS.

H. Levin, C. C. Berggren, and V. R. Honnold (Hughes Aircraft Co., Culver City, Calif.).

Journal of Physical Chemistry, vol. 71, Dec. 1967, p. 4228-4232. 17 refs.
Contract No. AF 33(615)-2050.

Thermoluminescence measurements have been carried out on LiF, NaF, and NaCl single crystals X-irradiated in air at 293 and 373°K. Resultant glow curves have been analyzed to obtain thermal activation energy values corresponding to glow peaks representing thermal release of electrons from bound electron centers. Provisional identification of such electron trapping levels was based on computation of electron-trapping cross sections. These computations indicate that the F' level exists at 1.06 ev in LiF, 0.72 ev in NaF, and 0.62 ev in NaCl. (Author)

A68-15172 #

THE EXPERIMENTAL EVALUATION OF AN OXYGEN REBREATHER LOOP.

A. D. Babinsky and G. L. Mrava (TRW, Inc., Equipment Laboratories, Cleveland, Ohio).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 5TH, SAN DIEGO, CALIF., SEPTEMBER 26-28, 1967, PROCEEDINGS. [A68-15171 04-02]
Symposium sponsored by Granger Associates, Essex Cryogenics, the General Dynamics Corp., and the Sierra Engineering Co.
San Diego, Calif., Survival and Flight Equipment Association, 1967, p. A 1-A 13. 7 refs.

Discussion of a rebreather loop capable of conserving and reusing the oxygen from an aviator's expired breath by removal of heat, moisture, CO_2, and nitrogen. An experimental loop incorporating these essential elements has been fabricated and tested on a laboratory basis. The results of this analysis and the anticipated problems of eventual incorporation of the device into a fighter aircraft are presented. The allowance for nitrogen elimination is a very important part of the design. A design is evaluated which represents a workable engineering compromise between continuous and cyclic purging of the circuit. F.R.L.

A68-15173 *#

AIRCRAFT OXYGEN SUPPLY SYSTEM.

R. G. Huebscher, R. A. Wynveen, and A. D. Babinsky (TRW, Inc., Equipment Laboratories, Cleveland, Ohio).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 5TH, SAN DIEGO, CALIF., SEPTEMBER 26-28, 1967, PROCEEDINGS. [A68-15171 04-02]
Symposium sponsored by Granger Associates, Essex Cryogenics, the General Dynamics Corp., and the Sierra Engineering Co.
San Diego, Calif., Survival and Flight Equipment Association, 1967, p. A 15-A 31. 7 refs.
Research supported by TRW and NASA.

Description of a water electrolysis cell as a means of generating oxygen aboard an aircraft. A rebreather circuit is used to economize on the oxygen to be generated. The logistics problem is essentially eliminated, since addition of water is the only normal service requirement between flights. CO_2 and water removal devices are located in the rebreather loop, in which a continuous flow of gas is maintained by an in-line type blower. As the pressure in the rebreather loop drops, a demand regulator admits oxygen generated by the electrolysis cell unit. Flow of inhaled and exhaled gases into and out of the closed loop is accomplished by a valve built into the oxygen mask. Test results indicate the feasibility of the processes. F.R.L.

A68-15174 #

A NEW APPROACH TO AIRCRAFT EMERGENCY OXYGEN.

George E. Hanff.

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 5TH, SAN DIEGO, CALIF., SEPTEMBER 26-28, 1967, PROCEEDINGS. [A68-15171 04-02]
Symposium sponsored by Granger Associates, Essex Cryogenics, the General Dynamics Corp., and the Sierra Engineering Co.
San Diego, Calif., Survival and Flight Equipment Association, 1967, p. A 33-A 38.

Discussion of solid-state chemical oxygen as a means of obtaining appreciable weight and volume savings in continuous flow operations. Chemical oxygen sources are active sodium chlorate generators and passive alkali-metal superoxide generators. Chlorate chemical oxygen is attractive for emergency systems because of its extreme simplicity and reliability. Details concerning its use are given. Superoxide oxygen supply for aircraft use is suitable only for closed rebreathing demand circuits, but it would excel as a source of first-aid oxygen, since it would provide effectively a 100% oxygen atmosphere instead of merely enriched air. Both systems are capable of indefinite storage. F.R.L.

A68-15175 #

NEW DEVELOPMENTS IN OXYGEN BREATHING REGULATORS.

Robert L. Cramer (Bendix Corp., Instruments and Life Support Div., Davenport, La.).

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 5TH, SAN DIEGO, CALIF., SEPTEMBER 26-28, 1967, PROCEEDINGS. [A68-15171 04-02]
Symposium sponsored by Granger Associates, Essex Cryogenics, the General Dynamics Corp., and the Sierra Engineering Co.
San Diego, Calif., Survival and Flight Equipment Association, 1967, p. A 39-A 44.

Discussion of the familiar panel-mounted diluter demand regulator and a new chest-mounted diluter demand regulator. Both developments are intended to provide for complete checkout, including simulated altitude functions, as installed in the aircraft. Tests which were carried out on the panel regulator are described. It is believed that the testing concept offers extended regulator time compliance with reduced logistic costs, a convenient means of checking out crew-member complaints, and improved flying safety. The Bendix chest-mounted diluter demand regulator, which performs all the functions of a panel-mounted regulator, is described. It saves weight and space and reduces breathing effort. F.R.L.

A68-15176 #

PRIVATE AIRCRAFT OXYGEN SYSTEMS FOR PLEASURE OR EMERGENCY.

W. K. Ansite.

IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 5TH, SAN DIEGO, CALIF., SEPTEMBER 26-28, 1967, PROCEEDINGS. [A68-15171 04-02]
Symposium sponsored by Granger Associates, Essex Cryogenics, the General Dynamics Corp., and the Sierra Engineering Co.
San Diego, Calif., Survival and Flight Equipment Association, 1967, p. A 45-A 54. 8 refs.

Analysis of one type of oxygen system used in private aircraft. The system has a continuous flow of oxygen supplied by an altitude-sensitive regulator to a one-liter flexible bag. The oxygen is then inhaled from the bag through a valve in which a phased dilution valve

is incorporated. It is shown that this system is not capable of supplying sufficient oxygen during energetic piloting or during emergencies, or for the physically large pilot whose tidal volume is above the average. F.R.L.

A68-15270
NEW POLYMERIC MATERIAL HOLDS KEY TO PERVAPORATIVE SPACE SUIT COOLING.
H. J. Bixler (Amicon Corp., Lexington, Mass.), A. S. Hoffman (Massachusetts Institute of Technology, Dept. of Chemical Engineering, Cambridge, Mass.), and L. A. Spano (U.S. Army, Materiel Command, Natick Laboratories, Clothing and Organic Materials Div., Natick, Mass.).
Space/Aeronautics, vol. 48, Dec. 1967, p. 107, 108, 110, 113.

Discussion of the process of "pervaporation" as a new means for cooling space suits. It has been found that about 1000 Btu can be removed for every pound of water evaporated through a space suit with a moisture-permeable barrier material. The main difficulty is that the barrier material must combine low air permeability with high moisture permeability. Only a suit of such "permselectivity" will prevent excessive loss of life-supporting air. In addition, the permselective barrier material should be either reasonably tough and flexible or suitable for laminating to a fabric or foam serving as a reinforcing structure. Recent analytic and experimental work shows that there is every reason to expect that these requirements can be met by a multilayer suit wall configuration whose key element is a new polymeric material of the polyion-complex type. P.v.T.

A68-15281
INFRARED IDENTIFICATION OF THERMOSETTING RESIN TYPE IN FIBERGLASS-REINFORCED ARTICLES.
R. M. Bly and P. Harold Parker, Jr. (Chevron Research Co., Richmond, Calif.).
Applied Spectroscopy, vol. 21, Nov.-Dec. 1967, p. 357-360.

Qualitative determination of resin type in articles from fiberglass-reinforced polymerized thermosetting resins is possible by the use of IR spectroscopy. The technique involves grinding the resin and glass to a fine powder and measuring the spectrum in a potassium bromide pellet. Three types of thermosetting resins can be easily distinguished in the presence of high (60-70%) concentration of fiberglass. These are (1) unsaturated polyester styrene, (2) anhydride-cured epoxy, and (3) amine-cured epoxy. (Author)

A68-15284
OPTIMIZATION OF THE CRITICAL INSTRUMENTAL PARAMETERS FOR ACHIEVING MAXIMUM SENSITIVITY AND PRECISION IN FLAME-SPECTROMETRIC METHODS OF ANALYSIS.
M. L. Parsons and J. D. Winefordner (Florida, University, Dept. of Chemistry, Gainesville, Fla.).
Applied Spectroscopy, vol. 21, Nov.-Dec. 1967, p. 368-374. 22 refs.
Grant No. AF AFOSR 1033-67.

Study of the optimization of critical instrumental parameters for achieving maximum sensitivity and precision for flame-emission, atomic-absorption, and atomic-fluorescence flame spectrometry. Suggested methods for optimization are discussed. The experimental design and observed experimental values of SNR for three experiments are tabulated. B.B.

A68-15338 *
TISSUE COMPOSITION OF RATS EXPOSED TO CHRONIC CENTRIFUGATION.
Jiro Oyama and Benjamin Zeitman (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
American Journal of Physiology, vol. 213, Nov. 1967, p. 1305-1310. 20 refs.

Alterations in tissue composition of female Sprague-Dawley rats exposed continuously for 1 year to either 3.5 or 4.7 g by centrifugation were studied. Compared with control animals, chronically centrifuged rats showed increases in plasma cholesterol and calcium levels; plasma Mg, phosphate, K, and free fatty acid levels were unaffected. Changes were noted in plasma phospholipids, total fatty acids, and total protein. There was a marked depletion of body-fat depots in centrifugal rats and a significant decrease in liver and kidney tissue lipids. Significant changes in the fatty acid composition of adipose and kidney tissue lipids occurred, although the percentages of saturated and unsaturated fatty acids remained constant. The femur bone mass was reduced by centrifugation while the ratio of femur mass to body mass was significantly increased over control values. Chemical analyses of the femur shaft indicated no compositional changes except a small increase in phosphorus and a decrease in magnesium content. Radiographs showed that chronic centrifugation markedly altered the normal curvature of the spinal column. (Author)

A68-15342 *
DIPEPTIDYL ARYLAMIDASE III OF THE PITUITARY - PURIFICATION AND CHARACTERIZATION.
Stanley Ellis and Joanne M. Nuenke (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
(American Society of Biological Chemists, Annual Meeting, 51st, Chicago, Ill., Apr. 16-21, 1967, Paper.)
Journal of Biological Chemistry, vol. 242, Oct. 25, 1967, p. 4623-4629. 21 refs.

Discovery of an aminopeptidase in the bovine anterior pituitary which hydrolyzes dipeptidyl residues from the amino terminus of peptides containing a minimum of four residues. Tetraalanine and hexaalanine are completely hydrolyzed to dialanine, whereas pentaalanine is cleaved to dialanine and trialanine. Tetralysine and tetraphenylalanine are hydrolyzed to the respective dipeptides; tetraglutamic acid and tetraglycine are not attacked. B.B.

A68-15528
WATER REUSE IN SPACE.
Fred P. Rudek (General Electric Co., Philadelphia, Pa.).
Chemical Engineering Progress, Symposium Series, no. 78, 1967, p. 210-217. 16 refs.

Examination of the problem of spacecraft water-recovery systems. The systems described are: electrodialysis, vapor pyrolysis, vapor compression, and air evaporation. However, no direct system tradeoffs were presented (partly because of a lack of direct comparative data). The system offering the greatest potential for minimizing expendables and electrical requirements appears to be the radioisotope-powered, vacuum-distillation, vapor pyrolysis unit. This system has been operated for thirty consecutive days, providing potable water from urine and wash water. No pre- or posttreatment chemicals or filters were required. The 1200°F pyrolysis temperature insures a bacteria free vapor. M.G.

A68-15602 #
ON GAS-PHASE CHEMICAL KINETICS IN THE BURNING OF PARTICULATE BORON IN DRY AIR.
Gilbert S. Bahn (Marquardt Corp., Van Nuys, Calif.).
Combustion Institute, Western States Section, Fall Meeting, Seattle, Wash., Oct. 30, 31, 1967, Paper WSCI 67-26. 23 p. 13 refs.

An equation was derived to convert the particle burning rate constant ($\gamma = \Delta d^2/t$) to the form of the Arrhenius reaction rate equation, so that the surface burning of particulate boron could be considered as a pseudogaseous reaction. This reaction was added to a set of bimolecular and termolecular reactions involving the conversion of BO or B_2O to B_2O_3. Rates for the gas-phase reactions were estimated from collision theory. A rate for the controlling surface reaction (indicated by calculations to be $B + O_2 = O + BO$) was estimated from a particle burning rate constant value which had been derived previously by Coffin and Brokaw on the premise that diffusive processes control the particle burning rate. A finite-kinetics computer calculation was performed with the foregoing set of reactions. The results indicated that the gas-phase reactions to complete the oxidation of BO to B_2O_3 in air could not keep up with production of BO by the assigned surface reaction, for the assigned conditions. A limited recalculation, using 1/100 of the previous surface reaction rate, indicated much closer agreement with the gas-phase kinetics. It was concluded that, for the burning of a cloud of microscopic boron particles, gas-phase kinetics must be considered in the formulation of a complete analytical model. The results and conclusions apply to the burning of boron alone in dry air. (Author)

A68-15611 #
THE THERMAL DISSOCIATION OF OXYGEN DIFLUORIDE. I.
Jay A. Blauer and Wayne C. Solomon (USAF, System Command, Research and Technology Div., Rocket Propulsion Laboratory, Edwards AFB, Calif.).
Combustion Institute, Western States Section, Fall Meeting, Seattle, Wash., Oct. 30, 31, 1967, Paper WSCI 67-33. 12 p.

Investigation of the thermal dissociation of OF_2 behind incident shock waves with Ar diluent in the temperature range of 860 to 1680°K. The course of the dissociation was followed by means of UV absorption spectroscopy utilizing a light beam centered at 220 mμ. The dissociation exhibits two phases, a slow initiation phase followed by an accelerating rate. Initial slope measurements gave a first order rate constant of $k = 10^{8.0} e^{-21900/RT}$ sec^{-1}. Changing the incident shock pressure by a factor of 15 has little effect upon the apparent initial first-order rate constant. The results are interpreted as being indicative of a chain mechanism. P.v.T.

A68-15612 #
THE THERMAL DISSOCIATION OF OXYGEN DIFLUORIDE. II.
W. C. Solomon, J. A. Blauer, and F. C. Jaye (USAF, Systems Command, Research and Technology Div., Rocket Propulsion Laboratory, Edwards AFB, Calif.).
Combustion Institute, Western States Section, Fall Meeting, Seattle, Wash., Oct. 30, 31, 1967, Paper WSCI 67-34. 20 p.

Investigation of the thermal decomposition of oxygen difluoride in aluminum reactors at 563 to 634°K. The reaction has an induction period followed by a first order decay in the pressure region from 10 to 5500 mm Hg. The observed first-order constant is $10^{9.0}$ exp $[-30,100/RT]$ sec^{-1}. The data are understood to show decomposition proceeding via a chain reaction involving OF and F as chain carriers. A steady-state solution to these kinetics is presented. P.v.T.

A68-15614
THE NATURE OF TRANSITION METAL HYDRIDES.
B. A. Kolachev (Moskovskii Aviatsionnyi Tekhnologicheskii Institut, Moscow, USSR).
(Zhurnal Fizicheskoi Khimii, vol. 41, Mar. 1967.)
Russian Journal of Physical Chemistry, vol. 41, Mar. 1967, p. 339, 340. 5 refs. Translation.

Discussion of the role of electron concentration in the absorption of hydrogen by transition metals. The amount of hydrogen absorbed by titanium-oxygen alloys decreases with the oxygen content, becoming zero when the latter is 46.5 at. %. Thus, like titanium-molybdenum and molybdenum-rhenium alloys, titanium-oxygen alloys do not absorb hydrogen when the electron concentration is more than 5.78. Therefore, exothermic absorption of hydrogen can occur only when free states are still present in the bonding-electron band. The stoichiometric composition of transition metal hydrides is determined by the number of unfilled states in the bonding-electron band and therefore, the formulae of the hydrides of Groups IIIb-Vb should be $MH_{2.78}$, $MH_{1.78}$, and $MH_{0.78}$, instead of MH_3, MH_2, and MH usually adopted. M.G.

LC ENTRIES

A68-80269
CEREBRAL CARBOHYDRATE METABOLISM OF MAN DURING RESPIRATORY AND METABOLIC ALKALOSIS.
S. Craighead Alexander, Theodore C. Smith, George Strobel, George W. Stephen, and Harry Wollman (Pa. U., School of Med., Dept. of Anesthesia, Philadelphia).
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 66–72. 42 refs.
Grants NIH 5-T1-FM-215-09, NIH 5-K3-GM-25,153-03, NIH 1-K3-GM-34,902-01, NIH 5-T1-GM-215-08, and PHS GM-09070-05.

In eighteen lightly anesthetized (70% nitrous oxide–30% oxygen) male volunteers cerebral carbohydrate metabolism was studied under conditions of normal acid-base balance, respiratory alkalosis, and combined respiratory and metabolic alkalosis. At Pa_{CO2} 19 torr (arterial pH 7.60) the brain metabolic pattern was different from that present during normocarbia; a lesser fraction of brain glucose consumption could be related to oxygen uptake and a greater proportion of glucose was converted to lactate. When Pa_{CO2} was decreased to 10 torr (arterial pH 7.76) there was a 10% reduction of cerebral metabolic rate of O_2, a 15% increase in cerebral glucose consumption, and an elevated cerebral venous "excess lactate" level. These changes could have been due to the Bohn effort or to reduced brain perfusion. In an effort to separate the two factors, Pa_{CO2} was held at 19 torr while $NaHCO_3$ was given intravenously with the expectation that a change in arterial pH similar to that produced by severe hypocarbia would occur without a change in cerebral blood flow. Additional metabolic changes did not develop with the increase of pH from 7.63 to 7.79. This is attributed to the counterbalancing of the Bohr effect by an unexpected increase in cerebral blood flow. Since the infusion of sodium bicarbonate required an additional 90 min. of hypocarbia, study of the time factor became necessary. When hyperventilation was sustained (without bicarbonate infusion) for an additional 90-min. period, no additional changes occurred in any measure of cerebral metabolism.

A68-80270
EFFECT OF LIPID MATERIALS ON HEAT RESISTANCE OF BACTERIAL SPORES.
N. Molin and B. G. Snygg (Swed. Inst. for Food Preserv. Res. (SIK), Göteborg).
Applied Microbiology, vol. 15, Nov. 1967, p. 1422–1426. 22 refs. Swed. Found. for Nutr. Res. supported research.

The apparent heat resistance of spores of *Bacillus megaterium, B. subtilis, B. cereus, B. stearothermophilus,* and *Clostridium botulinum* type E in lipids was investigated and compared with the resistance of the spores in phosphate buffer solution. The most pronounced increase in heat resistance was noted for *B. subtilis* and *C. botulinum* type E, the increase varying with the type of lipid used. A high water content of the lipids used as heating menstruum lowered the heat resistance of the spores. Possible explanations for the high heat resistance of spores in lipids are discussed.

A68-80271
QUANTITATIVE ANALYSES OF CERTAIN ENTERIC BACTERIA AND BACTERIAL EXTRACTS. II. DISCRIMINATION OF SONIC EXTRACTS BY INTERFACIAL DENSITOMETRY OF PRECIPITIN SYSTEMS.
William G. Glenn, James R. Ralston, and Warren J. Russell (USAF School of Aerospace Med., Biosci. Branch, Microbiol. Sect., Brooks AFB, Tex.)
Applied Microbiology, vol. 15, Nov. 1967, p. 1402–1408. 10 refs. USAF supported research.

Bacterial extracts prepared by ultrasonic disruption were reacted with both narrow- and broad-spectrum reference (homologous) and cross-reacting (heterologous) precipitins produced in rabbits. Quantitation of the reaction was obtained by densitometry of the antigen–antibody interface. Comparisons were made of sonic extracts from various starting populations all equated to the same nitrogen concentrations, and of various nitrogen levels derived from five bacterial population levels prepared separately. Sources of error are probed to show under what circumstances cross-reactions would be of greater magnitude than reference ones. The feasibility was shown of using quantitative densitometry of the interface combined with broadly reacting precipitins to identify bacteria on an intergeneric and interspecies scale. Problems associated with the use of absorbed or monospecific precipitins are explained.

A68-80272
QUANTITATIVE ANALYSES OF CERTAIN ENTERIC BACTERIA AND BACTERIAL EXTRACTS. I. STANDARDIZATION AND SONIC DISRUPTION OF EIGHT ENTERIC BACTERIAL SPECIES, EACH AT FIVE POPULATION LEVELS.
William G. Glenn, James R. Ralston, and Warren J. Russell (USAF School of Aerospace Med., Biosci. Branch, Microbiol. Sect., Brooks AFB, Tex.)
Applied Microbiology, vol. 15, Nov. 1967, p. 1399–1401. 6 refs. USAF supported research.

Standardized individual preparations of five population levels of eight enteric organisms [*Escherichia coli* (04:H3), *E. coli* (0111:B4:H12), *Salmonella enteritidis, S. paratyphi B, S. typhimurium, Shigella boydii, S. dysenteriae,* and *S. sonnei*) were prepared. Dry weights, calculated mean cell weight, and nitrogen content of bacterial suspensions before, and of supernatant fluids after, ultrasonic disruption are tabulated. Percentages of disruption, estimated from nitrogen concentration ratios of the suspensions and supernatant fluids, are given. These data are presented as guidelines for the preparation of bacterial extracts prior to precipitin analyses.

A68-80273
RECOVERY OF MICROORGANISMS SHED BY HUMANS INTO A STERILIZED ENVIRONMENT.
G. W. Sciple, D. K. Riemensnider, and C. A. J. Schleyer (PHS, Natl. Commun. Disease Center, Epidemiol. Program, Biophys. Sect., Atlanta, Ga.)
Applied Microbiology, vol. 15, Nov. 1967, p. 1388–1392. 18 refs.

An apparatus and technique for quantitative comparison of the aerobic bacterial flora disseminated by human subjects has been developed. Dissemination from three healthy subjects was studied weekly for three wk. Viable particles recovered ranged from 100,000 for one subject during a 30-min. period to 620,000 for another subject during a 10 min. period. One of the three subjects showed appreciably less variation in numbers of organisms shed than did the other two subjects. When the subjects were examined on consecutive days while wearing sterilized clothing, total particles recovered were reduced and variations in recoveries from run to run were slightly lessened. Three consistent nasal carriers of *S. aureus* were measured for dissemination. No viable *Staphylococcus aureus* was recovered from two of the carriers. However, 460,000 typable *S. aureaus* particles were recovered during a 60-min. period from the third carrier.

A68-80274
EFFECT OF MICROWAVES ON ESCHERICHIA COLI AND BACILLUS SUBTILIS.
Samuel A. Goldblith and Daniel I. C. Wang (Mass. Inst. of Technol., Dept. of Nutr. and Food Sci., Cambridge).
Applied Microbiology, vol. 15, Nov. 1967, p. 1371–1375. 7 refs.

Suspensions of *Escherichia coli* and *Bacillus subtilis* spores were exposed to conventional thermal and microwave energy at 2,450 MHz. The degrees of inactivation by the different energy sources were compared quantitatively. During the transient heating period by microwave energy, approximately a six log cycle reduction in viability was encountered for *E. Coli*. This reduction was nearly identical to what is expected for the same time-temperature exposure to conventional heating. Heating of *B. subtilis* spores by conventional and microwave energy was also carried out at 100°C. in ice and for transient heating. The degree of inactivation by microwave energy was again identical to that by conventional heating. In conclusion, inactivation of *E. coli* and *B. subtilis* by exposure to microwaves is solely due to the thermal energy, and there is no *per se* effect of microwaves.

A68-80275
MICROBIAL PENETRATION AND UTILIZATION OF ORGANIC AIRCRAFT FUEL-TANK COATINGS.
M. G. Crum, R. J. Reynolds, and H. G. Hedrick (Gen. Dyn., Fort Worth Div., Appl. Sci. Labs., Tex.)
(Am. Soc. for Microbiol., 67th Ann. Meeting, New York, May 4, 1967).
Applied Microbiology, vol. 15, Nov. 1967, p. 1352–1355. 10 refs.

Microorganisms have been found as contaminants in various types of aircraft fuel tanks. Their presence introduces problems in the operation of the aircraft, including destruction of components such as the organic coatings used as protective linings in the fuel tanks. Microbial penetration and utilization of the currently used organic coatings, EC 776, DV 1180, PR 1560, and DeSoto 1080, were determined by changes in electrical resistances of the coatings; mycelial weight changes; growth counts of the bacteria; and manometric determinations on *Pseudomonas aeruginosa* (GD-FW B-25) and Cladosporium resinae (QMC-7998). The results indicate EC 776 and DV 1180 to be less resistant to microbial degradation than the other coatings. Organic coatings, serving as a source of nutrition, would be conducive to population buildups in aircraft fuel tanks.

A68-80276
USE OF ULTRASONIC ENERGY IN ASSESSING MICROBIAL CONTAMINATION ON SURFACES.
John R. Puleo, Martin S. Favero, and Norman J. Petersen (PHS, Bur. of Disease Prevent. and Environ. Control, Natl. Commun. Disease Center, Phoenix, Ariz.)
Applied Microbiology, vol. 15, Nov. 1967, p. 1345–1351. 15 refs.
NASA Contract R-137.

Ultrasonic tanks were evaluated for their ability to remove viable microorganisms from various surfaces for subsequent enumeration. Test surfaces were polished stainless steel, smooth glass, frosted glass, and electronic components. The position of contaminated surfaces in relation to the ultrasonic energy source, distance of the ultrasonic source from the test surfaces, and temperature of the rinse fluid were some of the factors which influenced recovery. Experimental systems included both naturally occurring microbial contamination and artificial contamination with spores of *Bacillus subtilis* var. *niger*. The results showed that ultrasonic energy was more reliable and efficient that mechanical agitation for recovering surface contaminants. Conditions which increased the number and percentage of microorganisms recovered by ultrasonic energy were: using a cold rinse fluid, placing the sample bottle on the bottom of the ultrasonic tank, and facing the contaminated surfaces toward the energy source. It was also demonstrated that ultrasonic energy could be effectively used for eluting microorganisms from cotton swabs.

A68-80277
SYNERGISTIC EFFECTS IN SONOCHEMICAL STERILIZATION.
Raymond M. G. Boucher, Michael A. Pisano, George Tortora, and Edward Sawicki (Macrosonics Corp., Rahway, N. J. and St. Johns' U., Dept. of Biol., Jamaica, N. Y.)
Applied Microbiology, vol. 15, Nov. 1967, p. 1257–1261. 9 refs.
NASA Grant NsG-684.

The synergistic effects observed during the sterilization of *Bacillus subtilis* var. *niger* ATCC 9372 by the combined action of ethylene or propylene oxide with high-intensity airborne sound waves (34.8 kc/sec.) were investigated. It has been shown that the number of surviving spores deposited on paper strips decreases exponentially with the sound intensity at sample level. Reductions of the order of one-third of the time required for standard propylene oxide sterilization have been observed by using the combined action of sound waves with gaseous sterilization. At the present time, maximal synergistic effects seem to be achieved for the following experimental conditions: propylene oxide concentration, 500 to 1,000 mg./liter; acoustic intensity, 161 to 162 db., contact time, 80 min.; temperature, 60°C.; and relative humidity, 40%. The basic mechanism involved in sonochemical sterilization seems to be more of a physical (accelerated gas diffusion) than a chemical nature.

A68-80278
EFFECT OF CIRCULATORY OCCLUSION ON TIME TO MUSCULAR FATIGUE.
Stanley J. Myers and William P. Sullivan (Aerospace Med. Res. Labs., Environ. Physiol. Branch, Wright-Patterson AFB, Ohio).
(Federation of Am. Soc. for Exptl. Biol., 51st Ann. Meeting, Chicago, Apr. 16–21, 1967)
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 54–59. 23 refs.

Eight young adult male subjects held 25% of a maximum voluntary isometric contraction of the right biceps to fatigue. Four conditions were studied: (1) control, with no occlusion of the circulation; (2) proximal occlusion (1-inch pneumatic circumferential cuff inflated to 300 mm. Hg) at the right axillary fold; (3) distal occlusion of the right active forearm; and (4) distal occlusion of the left inactive forearm. The subjects held the control contraction longest (mean of 293 sec.). Proximal occlusion was held the shortest (135 sec.). The right (215 sec.) and left (239 sec.) distal occlusions were held longer than the proximal occlusion but shorter than the unoccluded control. Upon repetition of conditions, the reliability coefficient was 0.94. There was no statistical difference between times to fatigue in the two distal forearm occlusion groups. All other differences were significant at the 0.01 level. This study shows that while occlusive restriction of blood supply to an isometrically exercising muscle enhances the onset of fatigue in that muscle, occlusion of circulation elsewhere also results in a more rapid onset of fatigue.

A68-80279
EFFECTS OF RESPIRATORY PATTERN ON AGE DIFFERENCES IN VENTILATION UNIFORMITY.
Norman H. Edelman, Charles Mittman, Arthur H. Norris, and Nathan W. Shock (NIH, Natl. Inst. of Child Health and Human Develop., Gerontol. Branch, Bethesda and Baltimore City Hosp., Md.)
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 49–53. 19 refs.

The uniformity of distribution of pulmonary ventilation was assessed in healthy men ranging in age from 20 to 103 yr. The limitations of the lung clearance index (LCI) due to its dependence upon anatomic dead space, FRC, and tidal volume are outlined. A mixing ratio (MR) which is free of these limitations was used. The data from a study of 117 men, in which one N_2 washout was done on each subject, demonstrated that ventilation was significantly less uniform in older men than in young men. Ventilation uniformity improved with increasing tidal volume in the older group only. Studies of smaller groups in which each subject served as his own control confirmed that old men could improve their uniformity of ventilation by increasing their tidal volumes. Thus, there was no age difference in ventilation uniformity during deep breathing. It was also demonstrated that a single forced expiration prior to N_2 washout impaired the ventilation uniformity of old men but not of young men. It is postulated that these findings indicate that the lungs of old men are more susceptible to localized alveolar collapse than are the lungs of young men.

A68-80280
HOMEOSTASIS IN ANIMALS (SUS DOMESTICUS) DURING EXPOSURE TO A WARM ENVIRONMENT.

J. C. Forrest, J. A. Will, G. R. Schmidt, M. D. Judge, and E. J. Briskey (Wis. U., Dept. of Med., Vet. Sci. Dept., and Dept. of Meat and Animal Sci., Madison).

Journal of Applied Physiology, vol. 24, Jan. 1968, p. 33–39. 22 refs.

Grants PHS UI-00266-09 and PHS 5-F2-HE-22,784-03; Am. Meat Inst. Found. supported research.

The "stress-susceptible" animals (genetic strain known to have poor heat tolerance), without anesthesia, showed significant increases in heart and respiration rates during the first ten min. of exposure to a warm environment, after which there were marked reductions in heart rates and sharp declines in respiration rates. Venous blood carbon dioxide tension increased significantly while oxygen tension and pH dropped sharply in these stress-susceptible animals. Immediately after exsanguination the skeletal musculature had a low pH and high degree of myolactosis. Esophageal temperatures and cardiac outputs increased initially in the stress-susceptible animals (anesthetized); subsequently, however, the cardiac outputs as well as aortic pressures fell. The "stress-resistant" animals (genetic strain known to have good heat tolerance) showed the capacity to maintain physiological homeostasis, during exposure to a warm environment, with or without anesthesia. The hyperthermic treatment appeared to cause tissue hypoxia in the stress-susceptible animals and represents a phenomena of obvious import to the circulatory and respiratory functions as well as state of myolactosis in the animal. Potassium concentrations and hemoglobin types were not shown to be different as in some animals with hemoglobin which has low oxygen affinity.

A68-80281
POSITIVE WORK DONE BY A PREVIOUSLY STRETCHED MUSCLE.

Giovanni A. Cavagna, B. Dusman, and R. Margaria (Milan U., Ist. di Fisiol. Umana, Italy).

(Assn. des Physiol., 35th Réunion, Milan, Jun. 1967).

Journal of Applied Physiology, vol. 24, Jan. 1968, p. 21–32. 17 refs. Ital. Natl. Res. Council supported research.

The positive work done by a muscle which shortens immediately after being stretched in the contracted state, W', was found to be greater than the positive work done by the same muscle during shortening from a state of isometric contraction, W, the speed, the length, and the extent of shortening being the same. The experiments were made on isolated toad sartorius and frog gastrocnemius, and in man on the forearm flexors. W' and W were measured at different speeds of stretching and shortening and, on isolated muscles only, at different average lengths of the muscle: W'/W increases both with speed and length up to 2.5. The greater amount of work done after stretching is not entirely accounted for by the elastic energy stored during the stretching. The contractile component itself is responsible in part for this increase. The force developed by the contractile component, when the muscle shortens after being stretched, is greater than that developed, at the same speed and length, when it shortens starting from a state of isometric contraction.

A68-80282
PERSONALITY AND THE ALPHA RHYTHM.

George W. Fenton and Leila Scotton (Middlesex Hosp., Med. School, Acad. Dept. of Psychiat., London, Great Britain).

British Journal of Psychiatry, vol. 113, Nov. 1967, p. 1283–1289. 56 refs.

Med. Res. Council supported research.

Electroencephalographic examinations were performed on 54 healthy subjects. The alpha index, mean alpha amplitude and the alpha blocking responses to serial paired flashes of light were determined for each subject. No significant correlation was found between any of these variables and extraversion or neuroticism as measured by the Maudsley Personality Inventory. The degree of habituation of the alpha blocking responses to the serial visual stimulation was examined in those subjects with high and low extraversion scores. There was no difference in the rate or extent of habituation in these two groups. The previous literature on the relation between personality and the alpha rhythm was reviewed.

A68-80283
PSYCHOLOGY AND ITS PLACE IN AVIATION AND MILITARY MEDICINE [PSIKHOLOGIIATA I MIASTOTO I V AVIATSIONNATA I VOENNATA MEDITSINA].

I. Khariev and K. Zlatarev.

Voenno Meditsinsko Delo, vol. 22, Jun. 1967, p. 38–43. 6 refs. In Bulgarian.

Psychology is more and more closely connected with medicine. The mutual relation between psychology on one hand and aviation and military medicine on the other become greater and greater. The work of an aviator presents great and different demands to the psychial sphere of the aviator. It renders assistance to aviation medicine in selecting the aviators and in studying the effect of the flight on the physique and psychics of the aviators in the analysis of flight accidents. Medical psychology has a great importance for the diagnosis and treatment in military hospitals and in individual units, for the physiology and the sanitation of the soldier's work.

A68-80284
ONTOGENIC DEVELOPMENT OF SLEEP–DREAM CYCLES IN MAN [DIE ONTOGENEITISCHE ENTWICKLUNG DES SCHLAF-TRAUMZYKLUS BEIM MENSCHEN].

Howard P. Roffwarg (Columbia U., Coll. of Physicians and Surgeons, New York, N. Y.), Joseph N. Muzio (N. Y. State Psychiat. Inst., New York), and William C. Dement (Stanford U., School of Med., Palo Alto, Calif.)

Naturwissenschaftliche Rundschau, vol. 20, Sep. 1967, p. 363–377. In German.

From studies of sleep with rapid eye movement (REM) or "dreams", the unexpected fact that younger individuals experience more REM sleep than adults was determined. Data were submitted which showed that newborns spend a third of the day and half of their sleep time in the REM state. This high level decreased with age. By utilizing this high level of REM sleep, an attempt was made to determine the most important function of REM sleep during

early development. During this stage of sleep the central nervous system (CNS) functioned with intensities as large or larger than during wakefulness and these were experienced in vivid hallucinations (dreams). An hypothesis for the REM mechanism was presented. The critical function of the REM sleep mechanism during development consists of an autostimulation of the forming structures and the relative capacity of the CNS.

A68-80285
ENCAPSULATED MAN.
Graham Chedd.
New Scientist, vol. 36, Oct. 12, 1967, p. 80.

A report is made of the reactions of men sitting in enforced inactivity in a confined space for long periods. Muscle activity was measured by electromyogram, heart rate was measured with an electrocardiograph, skin temperature was recorded using thermocouples and an ankle cuff was used for measurement of the swelling in the ankle joint. The results have not yet been fully analyzed, but some trends were observed. During arithmetic tests, the subjects were still while during vigilance tests, they moved about frequently. The work may be important for seat design and standardization of the minimum space given to passengers in coaches and aircraft.

A68-80286
SUBJECTIVE VERTICAL AS A FUNCTION OF BODY POSITION AND GRAVITY MAGNITUDE.
H. Schöne, D. E. Parker, and H. G. Mortag (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen, West Germany).
Die Naturwissenschaften, vol. 54, Jun. 1, 1967, p. 288. 5 refs.
Grant PHS MH-12,310.

The subjective vertical as a function of body position and gravity magnitude was investigated. Subjects were tightly restrained with head position fixed so that the utricular maculae was approximately in the horizontal plane. Subjects were then tilted laterally 5, 15, 30, 45, 60 and 75° and centrifuged at force levels of 1.0, 1.2 and 1.8 g. A linear relationship was illustrated between the angle between a luminous line and the head vertex-base axis and utricular shear over over a range of zero to 0.8 g. Beyond 0.8 g, there were deviations from linearity and after 1.0 g, the curves appeared flat. An interaction between the utricles and other gravity receptors was suggested.

A68-80287
INVERSION OF THE EFFECT OF INCREASED GRAVITY ON THE SUBJECTIVE VERTICLE.
H. Schöne and D. E. Parker (Max-Planck-Inst. für Verhaltensphysiol., Seewiesen, West Germany).
Die Naturwissenschaften, vol. 54, Jun. 1, 1967, p. 288–289.

The effect of increased gravity fields during lateral body tilts was investigated. Four subjects were studied in body positions of 45, 60, 75, 90, 105 and 120° (angle α) at force levels of 1.0, 1.2, 1.4, 1.6 and 1.8 g. The subjective vertical was recorded at the angle between a luminous line and the head vertex-base axis (angle β). In body positions below 90° an increase in g produced an increase in β up to the saturation level. For body positions above 90°, the opposite effect was produced. Data plotted in terms of β as a function of α clearly indicated the inversion effect.

A68-80288
A DESIGN OF SPACE CAPSULE FOR SMALL ANIMAL.
Ryohei Yurugi, Haruo Ikegami, Mamoru Furuya.
Japanese Journal of Aerospace Medicine and Psychology, vol. 4, Jun. 1967, p. 33–37. In Japanese.

A small and light space capsule for a small animal such as a rate or a mouse was designed. This capsule is made of plastic material, and is spherical in shape being 24 cm. in diameter and 7.4 kg. in weight. It accommodates one animal cage, two cells for sodalime and silicagel, an air pump for air circulation, a heater with a thermostat and a telemeter set for pulse rate measurement. Oxygen is supplied through a demand type regulator from a cylinder outside the capsule. It was revealed that several improvements are necessary in the oxygen supply system and the heating device to keep the inside environmental conditions within some reasonable ranges in which normal physiological functions of the animal are not affected for a period up to one day.

A68-80289
ON THE GROWTH AND LIFE-SPAN OF MICE IRRADIATED AT THE LOW DOSE RATE.
Yori Ueno and Eiichi Kano (Kyoto U., Fac. of Med., Dept. of Exptl. Radiol., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 4, Jun. 1967, p. 38–43. 33 refs. In Japanese.

The life-span, the incidence of chest tumor and body weight of C3H female mice irradiated at the low dose rate of 50 r/5 w. (1.43 r/day) till the death of all mice, were observed. The life-span of irradiated mice was reduced to 78% of control. The percent survival was reduced and the mortality rate per day was higher in the irradiated group than in the control group. No effect on the incidence of chest tumor by irradiation and on its latent time, were observed. The body weight was smaller in the irradiated group than the control and did not increase after exposure of accumulated dose 250 r in the former, while it increased in the latter (correspondent to accumulated dose 1,000 r). In consideration of a long trip in space, an experiment for long term effects at a low dose rate of less than 0.1 r/day on mammals should be undertaken in the future.

A68-80290
PSYCHOLOGICAL STUDIES ON SENSORY DEPRIVATION.
Seiro Kitamura (Tohoku U., Sendai, Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 4, Jun. 1967, p. 44–50. 11 refs. In Japanese.

The results of previous studies since 1961 were summarized, and an attempt was made to integrate the differentiating effects of sensory deprivation. The results seem to indicate that the isolation impaires the higher mental functions and facilitates the lower ones.

A68-80291
EEGS AND CARDIO-VASCULAR RESPONSES UNDER SIMULATED GRAVITATIONAL STRESS INDUCED BY LOWER BODY NEGATIVE PRESSURE.
Genyo Mitarai, Shigeo Mori, and Sadaharu Takagi (Nagoya U., Res. of Environ. Med., Dept. of Aviation Physiol., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 4, Jun. 1967, p. 51–60. 23 refs. In Japanese.

Changes of the electroencephalogram (EEG), heart rate, respiration and blood circulation of the cerebral surface induced by the lower body negative pressure (LBNP) of −30 mm. Hg to −120 mm. Hg were observed in 20 unrestrained rabbits. The LBNP was produced by sucking the air out of the box where the lower half of the body of a rabbit was tightly enclosed. With the LBNP less than −70 mm. Hg, the heart rate in unanesthetized rabbits was increased 30 to 50% within five to 10 sec. and maintained its level during suction. When suction was stopped, it was immediately decreased below the resting level and then gradually recovered within about 30 sec. In spite of this hypotension, however, the EEG showed activated pattern consisting of high voltage fast waves or predominant basic rhythms of five to six c./sec. as long as the reflex compensation was present. Corresponding with these, the cerebral surface was congested with dilatation of

arterioles after a short period of initial ischemia. Under this condition, therefore, the blood supply in the brain may still be sufficient to sustain the nervous function, suggesting that the effect of gravitational stress on the cerebral circulation is different from that in the other part of the body. When the LBNP was repeated frequently or was more than −70 mm. Hg, the heart rate slowed irregular rhythms even from the beginning of suction, indicating circulatory decompensation. Simultaneously with these changes, the EEG became slow and flat, and high voltage slow wave bursts were frequently observed at the end of suction, which appeared to be the epileptic seizure pattern as found previously in the centrifuged monkey. From the results obtained, it is concluded that the changes of EEG by positive acceleration at least can be well simulated by LBNP, and that these should be analyzed in relation to the changes of cardio-vascular responses.

A68-80292
THE EFFECT OF PROLONGED LACK OF SENSORY STIMULATION UPON HUMAN BEHAVIOR.

Sukeo Sugimoto (Nagoya U., Res. Inst. of Environ. Med., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 4, Jun. 1967, p. 61–66. In Japanese.

Reaction patterns of subjects who underwent 72 hr. of sensory deprivation were obtained and psychologically analyzed. We continuously observed the detail change of the subject's behavior, making an entry in our tentative 'observation notes of behavior' in every min. Three male subjects individually confined in a cylinder shaped isolation chamber semisoundproofed, 7 ft. in diameter and 11 ft. in length. A subject seated in a comfortable arm chair under dim light, but was not restricted to depart the chair. Tape recordings of all spontaneous comments were obtained through ceiling microphones. Continuous observation of subject's behavior was made during the experimental hr. by means of an intercommunication television system. All subjects were carefully interviewed at the end of the confinement period to evaluate the nature of specific behavior or sensory experiences reported. The range and variety of reactions to the lack of sensory stimulation were broad, probably because of differences in personality and preferred modes of defense. All subjects, however, presented several typical reaction patterns. Such phenomena might be considered that subjects tried to keep normal ego-functioning and then unavoidably tended to deterioration of it. Phantasic play of reaction patterns is accessible defense mechanism for a isolated person. As the secondary process thought that had amused subjects at the beginning of the experiment was getting impaired, the primary process thought began to control them at the middle period of sensory isolation and concurrently vocalization and impulsive action came out. At the latter part of the experiment, subjects fell into motivational losses and two of them occasionally reported auditory hallucination.

A68-80293
METABOLIC BALANCE STUDIES DURING INDUCED HYPERTHERMIA IN MAN.

William R. Beisel, Ralph F. Goldman, and Robert J. T. Joy (U.S. Army Med. Unit, Fort Detrick, Frederick, Md. and U.S. Army Res. Inst. of Environ. Med., Natick, Mass.)
(Am. Physiol. Soc., Ann. Fall Meeting, Providence, R. I., Aug. 1964).
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 1–10. 31 refs.

Metabolic responses in men were studied during hyperthermia induced by humid heat. Conditions in an environmental chamber were adjusted to increase rectal temperatures 0.1–0.2°C./hr. for 18 hr. and to hold them at 39.4°C. for 6 hr. After rising initially, skin temperature followed a similar pattern. Urinary 17-OHCS, 17-KS, and pregnanetriol increased during hyperthermia and afternoon plasma 17-OHCS concentrations failed to fall. Negative nitrogen, potassium, and magnesium balances were produced by diminished dietary intake, increased urinary excretion, and sweat losses. Urinary sodium and chloride fell abruptly; their renal retention persisted three days following heat exposure. Orally administered tap water during a continuing production of sweat caused dilutional decreases in concentration of serum inorganic elements. Hypophosphatemia was exaggerated, possibly because of respiratory alkalosis. Phosphate losses in urine and sweat were minimal, preventing appreciable loss of body phosphorus. Adrenal responses and alterations in nitrogen metabolism during artificial hyperthermia resembled changes seen in infectious fevers. In contrast, body salt and water metabolism was influenced by greater sweat losses during induced hyperthermia.

A68-80294
EFFECTS OF EXTREMES OF RESPIRATORY AND METABOLIC ALKALOSIS ON CEREBRAL BLOOD FLOW IN MAN.

Harry Wollman, Theodore C. Smith, George W. Stephen, Ethan T. Colton III, Harriet E. Gleaton, and S. Craighead Alexander (Pa. U., School of Med., Dept. of Anesthesia, Philadelphia).
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 60–65. 29 refs.
Grants NIH GM-09070-05, NIH 5-T1-GM-215-09, NIH 1-K3-GM-34,902-01, and NIH 5-K3-GM-25,153-03.

Cerebral blood flow has been measured during steady states of both respiratory and metabolic alkalosis in lightly anesthetized man. When mechanical hyperventilation decreased arterial P_{CO_2} (Pa_{CO_2}) from 37 to 19 torr, cerebral blood flow was lowered from 44.1 to 25.3 ml./100 g. per min., a 43% diminution. Additional reduction of Pa_{CO_2} to 10 torr lowered mean cerebral blood flow an additional 17% to 21.0 ml./100 g. per min. In two subjects minimum values of cerebral blood flow were achieved at Pa_{CO_2} levels near 19 torr, but in four others only at greater degrees of hypocarbia. The mean value for maximum cerebral vascular resistance during hyperventilation and respiratory alkalosis was 3.5 torr/ml. per 100 g. per min. Metabolic alkalosis induced by sodium bicarbonate infusion, with Pa_{CO_2} controlled at 19 torr, raised arterial pH from 7.63 to 7.79; and cerebral blood flow was increased from 26.1 to 31.3 ml./100 g. per min. This 17% increase in cerebral blood flow occurred despite a decrease in blood pressure, and was significant at the 0.01 level. It is concluded that metabolic alkalosis can exert a slight dilating effect on cerebral vessels.

A68-80295
EFFECTS OF ACETAZOLAMIDE AND HYPOXIA ON CEREBROSPINAL FLUID BICARBONATE.

Richard S. Kronenberg and Stephen M. Cain (USAF School of Aerospace Med., Physiol. Branch, Brooks AFB, Tex.)
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 17–20. 9 refs.

Because of the importance of cerebrospinal fluid (CSF) pH in respiratory acclimatization to altitude, which may involve an active transport of HCO_3^-, and because of the unknown role that carbonic anhydrase found in choroid plexus and nervous tissue may play in this, alterations of CSF HCO_3^- in relation to arterial levels were measured in men exposed to altitude. Subjects were placed in a low-pressure chamber at either 14,000 ft. (447 torr) or 3,000 ft. (681 torr) for 24 hr. Before entering the chamber, each subject took a total of 750 mg. of acetazolamide or a placebo. End-tidal P_{CO_2} was measured every two hr. except during sleep. At 24 hr., samples of arterial blood and CSF were analyzed for pH, P_{O_2}, P_{CO_2}, HCO_3^-, and lactate (CSF only). Arterial and CSF HCO_3^- were lower in treated subjects at both altitudes. Altitude shifted the linear relationship of CSF to arterial HCO_3^- downward about 3 mEq./liter. This was three times the amount that could be accounted for by the increase in CSF lactate at the higher altitude.

Changes in CSF HCO_3^- at 24 hr. could not be ascribed to any direct effect of acetazolamide on secretory mechanisms.

A68-80296
ENERGY METABOLISM OF THE ALBINO RAT AT MINIMAL LEVELS OF SPONTANEOUS MUSCULAR ACTIVITY.
Pietro O. Bramante (Ill. U., Coll. of Med., Dept. of Physiol., Chicago).
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 11–16. 30 refs.
Grant PHS HE 10373 and Ill. U. supported research.

Quantitation and analysis by original technique of recorded oxygen consumption and spontaneous muscular activity (SMA in arbitrary units) in normal rats showed the following: (1) Least observed metabolic rate (LOMR, i.e., lowest V_{O_2} when SMA = 1.0 u), detected 50 times in 119 experiments, yielded the allometric relationship: LOMR = 10.77 (weight)$^{.62}$ ±4%. (2) In 48% of 1,019 10-min. observed periods, the value of SMA was 1.0, 1.1, or 1.2 units. These "microactivities" corresponded to a mean V_{O_2} value defined minimal observed metabolic rate (MOMR). V_{O_2} differences among the three levels of minimal activity were not significant; however, MOMR was statistically different from LOMR ($\Delta = 5\%$; $P < .001$). (3) At each level of activity (up to 2.9 units), $V_{O_2}/W^{.6} = k_i$, i.e., V_{O_2} per unit of "standard body size" (SBS) could be represented by a series of constants of increasing value, from 10.47 for LOMR to 15.54 for SMA = 2.9 units. (4) Oxygen consumption per unit of SBS, calculated as a function of SMA, yielded the equation $V_{O_2}/W^{.6} = 8.26 + 2.33$ (SMA) ± 0.17. (5) It is proposed to utilize the frequently found MOMR in lieu of the rare LOMR as a precisely defined index of the resting metabolic rate of the rat.

A68-80297
EXPLANATION OF MASKING-LEVEL DIFFERENCES THAT RESULT FROM INTERAURAL INTENSIVE DISPARITIES OF NOISE.
Terrence R. Dolan and Donald E. Robinson (Ind. U., Commun. Lab., Bloomington).
Journal of the Acoustical Society of America, vol. 42, Nov. 1967, p. 977–981. 17 refs.
AFOSR, NSF, and United Cerebral Palsy Res. and Training Found. supported research.

The detectability of a monaurally presented 500 c.p.s. signal was measured at each of several values of interaural correlation for a wide-band noise masker. The results, when expressed in terms of masking-level differences are in agreement with data reported by Whitmore and Wilbanks and show a function of similar form to that described by Robinson and Jeffress. Additionally, the detectability of a monaural signal was investigated as a function of the interaural intensive relations of a wide-band noise masker. The data are in agreement with results originally shown by Hirsh, and since, replicated several times. That is, detectability is greatest when the level of the noise masker at the two ears is equal, and decreases as the level of the masker at the nonsignal ear is attenuated. The data are used to estimate parameters for a simple model that attempts to account for changes in detectability that occur when a monaural signal is presented with binaural, correlated noise having an interaural level difference. The model proposes that at low external noise levels, internal noise leads to a decrease in interaural-noise correlation. Predictions from the model are in reasonable agreement with data reported previously.

A68-80298
MASKER LEVEL AND SINUSOIDAL-SIGNAL DETECTION.
Richard A. Campbell and Elaine Z. Lasky (Western Reserve U., Cleveland, Ohio).
Journal of the Acoustical Society of America, vol. 42, Nov. 1967, p. 972–976. 9 refs.
NSF supported research.

Threshold signal-to-masker ratios were obtained for a 1,000-Hz signal presented with either an identical frequency sinusoidal masker or a complex masker consisting of the same frequency as the signal plus two sidetones 300 hz on either side of the central component. Data considered include signal durations of 20, 400, and 1,000 msec. with masker durations either equal to that of the signal or continuous for the block up-and-down, two-interval, forced-choice threshold run. The parameters of primary interest were the level of the masker and whether the masker was gated or continuous. The thresholds appeared to indicate that when the excitation pattern of the masker was increased (by shortening its duration or adding sidetones) so as to equal or surpass that of the signal, masked thresholds tended toward an inverted-N function, as related to masker level, rather than being independent of masker level. Also, differences between the gated and continuous masker thresholds did not appear to be related to changes in signal uncertainty as reflected in the slopes of psychometric functions.

A68-80299
CELL YIELDS OF BACTERIA GROWN ON METHANE.
Patricia S. Vary and Marvin J. Johnson (Wis. U., Dept. of Biochem., Madison).
Applied Microbiology, vol. 15, Nov. 1967, p. 1473–1478. 13 refs.
NASA Grant NsG[P]-23 and Grant PHS AI02967-08.

Several mixed cultures of methane-oxidizing bacteria were isolated. Among them, culture HR (consisting of two gram-negative rods, one 0.5×1.0μ, the other 0.8×2 to 3μ) was found to be the fastest-growing and to give the highest yields. Optimal conditions for rapid growth and high cell yields from methane were found to be: 30°C., NH_4^+ as nitrogen source, and pH 6.5. Requirements for CO_2 and Cu^{++} were observed. Under these conditions, generation times of approximately three hr. and cell yields from methane between 65 and 70% could be attained. Culture HR can utilize methane, methanol, ethyl alcohol, l-propanol, n-butyl alcohol, and glucose, but not propane, for growth. Yeast and beef extracts are inhibitory. Carbon balances demonstrate that few if any products other than cells and CO_2 are produced from methane under the growth conditions used. Cell analyses for carbon, hydrogen, nitrogen, and amino acid content of culture HR were also made.

A68-80300
EFFECT OF ENVIRONMENT ON STAPHYLOCOCCAL LESIONS IN MICE.
Jerome P. Schmidt, Joseph T. Cordaro, and Robert J. Ball (USAF School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.)
Applied Microbiology, vol. 15, Nov. 1967, p. 1465–1467.

The influence of reduced barometric pressure on the development and healing of staphylococcal skin lesions in mice was investigated by exposing groups of animals to the test environment before, after, or before and after subcutaneous inoculation with 3.5×10^8 colony-forming units of a phage type 80 strain of *Staphylococcus aureus*. Similarly infected control animals were not exposed to the experimental environment. The results indicate that the lesions which developed in mice exposed to the test environment prior to infectious challenge were larger and healed at a slower rate than those in mice maintained at ground level before infection. Exposure after inoculation produced no demonstrable effect in the size or healing rate of the experimental lesions.

A68-80301
BACTERIOPHAGE AEROSOL CHALLENGE OF INSTALLED AIR CONTAMINATION CONTROL SYSTEMS.
Marcus M. Jensen (Calif. U., School of Med., Dept. of Med. Microbiol. and Immunol., Los Angeles).
Applied Microbiology, vol. 15, Nov. 1967, p. 1447–1449. 7 refs.

The effectiveness of installed air contamination control systems for removal of airborne microorganisms was determined. Seven separate systems were challenged with aerosolized T1 bacteriophage. Air samples were collected with Anderson samplers containing agar plates that had been swabbed with susceptible *Escherichia coli*. The advantages of using bacteriophage for testing air-handling systems are discussed. The air systems employed both filtration and ultraviolet irradiation and air-flow rates varied from 600 to 18,000 $ft.^3$/min. Reduction rates of airborne bacteriophage passing through the various air systems ranged from 99.8 to 99.99%.

A68-80302
LACK OF PHYSICOCHEMICAL EQUILIBRIUM BETWEEN BLOOD AND BONE CALCIUM IN THE ISOLATED PERFUSED DOG LIMB.

G. A. Rodan, U. A. Liberman (Weizmann Inst. of Sci., Beilinson Hosp., Rehovoth, Israel), M. Paran (Petah Tikva and Sorek Nucl. Res. Center, Yavneh, Israel), and M. Anbar.

Israel Journal of Medical Sciences, vol. 3, Sep.–Oct. 1967, p. 702–713. 6 refs.
Grants NIH 5X5121 and NIH 5X5122.

The isolated perfused dog limb was found to be a suitable system for the investigation of the involvement of bone mineral in blood calcium homeostasis. The response of this system to hyper- and hypocalcemia was studied by following the calcium concentration in the circulation and the kinetic behavior of Ca^{47} tracer. After a calcium load, the calcium concentration and ionic activity stabilized at a proportionally higher level, but no change in the size of the isotropic exchangeable pool was observed. Following the administration of EDTA, a small amount of calcium which had not been in isotopic equilibrium with the blood was irreversibly mobilized. These findings exclude the possibility that a physicochemical crystal-solute equilibrium plays a role in calcium homeostasis. The experimental findings strongly support the concept of a biological membrane selective to calcium ions separating blood from bone. It was also concluded that the fast, isotopically exchangeable bone pool does not contain calcium in a solid form

A68-80303
ERYTHROKINETICS IN HIGH-ALTITUDE-ADAPTED ANIMALS (LLAMA, ALPACA, AND VICUNA).

César Reynafarje, José Faura, Alfredo Paredes, and Doris Villavicencio (San Marcos U., Fac. de Med., Inst. de Biol. Andina, Lima, Peru).

(Intern. Symp. on Metab. Adaptation to Temperature and Altitude, Kyoto, Japan, Sep. 1965).
Journal of Applied Physiology, vol. 24, Jan. 1968, p. 93–97. 14 refs.
Grant NIH HE-07416.

The morphological aspects of the hematology and the kinetics of red call formation were studied in alpacas, llamas, and vicuñas at 4,200 m. altitude. The results of these investigations indicate that these animals have a high red cell count (above 13,000,000); however, the hemoglobin ranges between 13 and 15 g. and the hematocrit between 35 and 40%. This is due to the fact that the red cells are small. These animals have a greater red cell production and destruction results in a red cell mass which is less than that possessed by human natives at altitude. No secretion of erythropoietin was found under normal conditions at 4,200 m., but the titer of this hormone was found elevated in the plasma of an alpaca which had been bled.

A68-80304
A FULLY AUTOMATIC PORTABLE BLOOD PRESSURE RECORDER.

Robert A. Schneider (Okla. U., Med. Center, Dept. of Med. and Neurocardiol. Res. Program, Oklahoma City).

Journal of Applied Physiology, vol. 24, Jan. 1968, p. 115–118.
Grant NIH HE 06286-06.

A fully automatic portable device, weighing 4.75 lb., has been developed to record systolic and diastolic pressures and heart rates in subjects at work and home, while driving, and during sleep at home. A timer activates a magnetic valve releasing N_2 to inflate a conventional cuff and to move a spring-loaded piston which controls the electronic circuitry and gas flow and records the pressure in the system at 10-mm. steps from 240 to 20 mm. Hg. These pressure signals and the Korotkoff sounds from a crystal microphone are modulated onto tape as frequencies which are later demodulated to voltages which drive a conventional direct-current penwriter. Sixty recordings are possible from the N_2 tank needs recharging. Recordings can be programmed at intervals of 1–60 min. The calibration scale has proved accurate and the recorded blood pressures agree within 2–4% with simultaneously recorded auscultatory values. The device is unique in that the subject is totally uninvolved and a blood pressure scale is recorded with each pressure determination.

A68-80305
HEART RATE RESPONSE TO SUBMAXIMAL EXERCISE IN THE STANDARDBRED HORSE.

William P. Marsland (Ohio State U., Dept. of Vet. Physiol. and Pharmacol., Columbus).

Journal of Applied Physiology, vol. 24, Jan. 1968, p. 98–101. 10 refs.
Central Ohio Heart Assn. supported research.

Heart rates at rest, during submaximal exericse and during recovery from submaximal exercise, are described for 22 Standardbred horses who were actively competing in races at the time of the study. Endurance training of two previously unraced horses produced a reduction in heart rates at rest, during submaximal exercise, and during recovery from submaximal exercise. A method for evaluating physical fitness in the Standardbred horse is also described. Finally, a highly significant correlation was found between maximum heart rate during submaximal exercise and racing performance ($r = 0.899$, $P = < .01$). This correlation suggests that those horses with lower maximal heart rates during submaximal exercise had faster winning times in races.

A68-80306
A RECIRCULATION SYSTEM FOR THE DETERMINATION OF BLOOD GASES BY GAS CHROMATOGRAPHY.

F. Gimeno Ortega and G. J. Tammeling (State U., Med. Dept., Pulmonary Div., Groningen, The Netherlands).

Journal of Applied Physiology, vol. 24, Jan. 1968, p. 119–123. 16 refs.
Netherlands Organ. for Health Res., T.N.O. supported research.

A recirculation system for the determination of the oxygen and carbon dioxide content of blood by gas chromatography is described. Respiratory gases are evolved from the blood in a cuvette by appropriate reagents. This cuvette is part of a circuit, the gases of which are recirculated by a membrane pump. After equilibrium has been attained, a constant fraction of the gas is transferred to the chromatograph columns by a commercial gas-sampling valve. The reproducibility of the method is similar to that of the Van Slyke–Neill technique under comparable operating conditions. The recirculation system allows a duplicate determination of both oxygen and carbon dioxide content in approximately 15 min. If the volumetric estimation of blood gases is preferred over direct measurement of gas tensions in blood, this method is recommended.

A68-80307
NOTE ON PERCEIVED MOVEMENT AND APPARENT DISPLACEMENT.
Leonard Brosgole (St. John's U., New York, N. Y.)
Acta Psychologica, vol. 26, Oct. 1967, p. 233–235.

A criticism was presented which was directed toward the paper "Some relations between autokinetic motion and space localization" reported by Glick, et al. Issue was taken with the style of the paper rather than with substantive content. It was felt that the work conveyed a distinct impression that a paradoxical relationship was found between perceived motion and egocentric space localization, and that the authors did not demonstrate in inverse relationship between motion and displacement. It was also thought that a concise statement about the alleged paradox being clearly resolved by the reports of apparent body movement should have been included.

A68-80308
RADIOPROTECTION OF VICIA FABA BY SEROTONIN-CREATININE SULFATE COMPLEX.
R. Villalobos-Pietrini and A. Laguarda-Figueras (Mexico, Natl. Autonomous U., Inst. of Biol. and Inst. of Med. and Biol. Studies, Mexico City).
Radiation Botany, vol. 7, Oct. 1967, p. 369–373. 21 refs.

Experiments were performed to determine if serotonin-creatinine sulfate complex (S-CS C) decreases the lethal effects of X-rays on *Vicia faba*. The same substance has been found to protect mammals against ionizing radiations in which serotonin's mechanism of action is purported to be due to vasoconstriction, thereby decreasing the oxygen tension inside the tissues. This hypothesis cannot explain the radioprotective effects in plants. Reducing agents containing sulfur groups have been previously shown to be effective radioprotectors. This electron donor mechanism as well as formation of radioresistant complexes with radiosensitive sites, interference with biochemical reactions or scavenging of free radicals, might explain the radioprotection effectiveness of serotonin-creatinine sulfate complex in plants. But at this time none of these possibilities can be considered sufficient explanation of the results obtained.

A68-80309
PURKINJE SHIFT IN THE HUMAN ELECTRORETINOGRAM.
William R. Biersdorf (Walter Reed Army Inst. of Res., Dept. of Exptl. Psychophysiol., Washington, D. C.)
American Journal of Ophthalmology, vol. 64, Oct. 1967 p. 757–760. 12 refs.

A shift from rod functioning under dark adaptation to complete cone functioning in light adaptation (Purkinje shift) was obtained for the b-wave of the human electroretinogram. The technique utilized was: (1) slow square wave flickering stimulation to allow simultaneous rod and cone functioning; (2) full visual field adaptation with a smaller test field to minimize stray light effects; and (3) a low criterion electroretinogram amplitude obtained by response averaging. The light-adaptation level found necessary for cone functioning was below that required for psychophysical rod saturation. The duplicity theory was thus shown applicable to electroretinal measures of human visual functioning.

A68-80310
X-RAY DIFFRACTION AND INFRARED ANALYSIS OF BONE SPECIFIC GRAVITY FRACTIONS IN THE GROWING RAT.
N. Quinaux and L. J. Richelle (Liège U., Inst. de Therap. Exptl., Belgium).
Israel Journal of Medical Sciences, vol. 3, Sep.–Oct. 1967, p. 677–690. 17 refs.
Grant PHS DE 01931-03-04.

X-ray diffraction and infrared spectrometry were applied to bone specific gravity fractions obtained by density gradient separation. On the basis of a symbolic model, considering bone as a heterogeneous population of elementary volumes, these data were related to the sequence of events leading to the mineralization of bone. The various steps comprise the precipitation of an amorphous material, the appearance of an initial and final crystalline precipitate. The initial crystal line precipitate is a highly calcium-deficient apatite; the final precipitate is hydroxyapatite.

A68-80311
EFFECT OF CARRIER CALCIUM LEVEL ON THE COMPARATIVE METABOLISM OF CALCIUM-45 AND STRONTIUM-89 IN THE RAT.
J. Menczel, G. A. Pakis, and R. C. Likins (Natl. Inst. of Dental Res., Lab. of Biochem., Bethesda, Md.; Hebrew U.-Hadassah Med. School; and Hadassah U. Hosp., Dept. of Med. A and Metab. Unit for Bone Diseases, Jerusalem, Israel).
Israel Journal of Medical Sciences, vol. 3, Sep.–Oct. 1967, p. 697–701. 13 refs.

A chemically defined liquid diet containing either 0.1 or 0.5% calcium was given as a single oral dose to rats. The effect on Ca^{45} and Sr^{89} metabolism was investigated in a short-term experiment. The absorption of Ca^{45} from the gastrointestinal tract and the incorporation into bone was larger than that of Sr^{89} under all circumstances. The low calcium diet resulted in a twofold increase in the absorption of both isotopes. The plasma concentration and the retention of Ca^{45} and Sr^{89} by bone was higher in the animals who received the low calcium diet.

A68-80312
MEASUREMENT OF THE PROTON DOSAGE OF THE GEMINI ASTRONAUTS WITH NUCLEAR EMULSIONS [MESSUNGEN DER PROTONENDOSIS DER GEMINI-ASTRONAUTEN MIT KERNEMULSIONEN].
Hermann J. Schaefer (Naval Aerospace Med. Inst., Pensacola, Fla.)
Biophysik, vol. 4, no. 1, 1967, p. 63–76. 5 refs. In German.
NASA supported research.

Small film packs with nuclear emulsions were carried on the Gemini flights. The analysis of the path tracks in Ilford –G.5 and –K.2-emulsion pairs permitted an accurate determination of discharge and energy loss spectrum and with it the dosage of proton radiation to which the Gemini capsule was exposed in flight through the south Atlantic radiation belt. More than 40% of the local dosage in the emulsion was produced by protons. As the results of this spectral composite showed, that were large differences in the radiation level in the capsule. The dosages of the three measuring places directly from the astronauts on the 14-day Gemini flight GT-VII varied from 159 to 233 millirad. The electron and gamma background appeared very small but was not separately determined. The dosage contribution of heavy nuclei was determined by estimation of the atomic number with the help of an order of magnitude comparison scale and showed as little as ten millirad. It appeared extraordinarily complex to fix the true radiation load and the highest permissible dosage for whole body radiation exposure in such bizarre radiation fields as the ones from which the measurements were taken.

A68-80313
LIGHT SUMMATION AND THE PERCEIVED LENGTH OF MOVING LINES.
Gordon Stanley (Ind. U., Bloomington).
Acta Psychologica, vol. 26, Oct. 1967, p. 260–264. 6 refs.

Twenty-four subjects viewed an arc-line with red and green sections rotating at 60 r.p.m. around a central point of fixation. When the leading half of the arc was red and the second half green, subjects reported seeing red followed by yellow. With order of color reversed, subjects reported seeing green followed by orange.

The apparent length of the arc-line was shorter when rotating than when stationary. An explanation was proposed in terms of excitation-inhibition, funneling and light summation.

A68-80314
THE RELATIONSHIP BETWEEN PERCEIVED MOVEMENT AND APPARENT DISPLACEMENT: A REPLY TO BROSGOLE.
Joseph Glick and Seymour Wapner (Yale U., Dept. of Psychol., New Haven, Conn. and Clark U., Worcester, Mass.)
Acta Psychologica, vol. 26, Oct. 1967, p 236–240.
Grants PHS MH 00348 and PHS HD 02570.

A reply to criticism by L. Brosgole of a previous paper was presented involving the relationship between perceived movement and apparent displacement.

A68-80315
GLUTTONY. 2. THERMOGENESIS IN OVEREATING MAN.
D. S. Miller, Pamela Mumford, and M. J. Stock (London U., Queen Elizabeth Coll., Great Britain).
American Journal of Clinical Nutrition, vol. 20, Nov. 1967, p. 1223–1229. 23 refs.

Eleven young adult overeating men and women had their oxygen consumption measured under various conditions of activity. Basal metabolic rate was not increased while overeating. The small increase in oxygen consumption in the resting state did not account for the increased heat production of overeating subjects. However, the consumption of oxygen over 24 hr. was considerably raised while overeating, and the apparent paradox may be resolved by the observation that the thermic effect was greatly increased while exercising. Oxygen consumption reached a peak about one hr. after the consumption of a meal and was directly related to the caloric intake. The results indicate that the factorial method for calculating calorie requirement is inadequate particularly with subjects in the dynamic phase of obesity.

A68-80316
GLUTTONY. 1. AN EXPERIMENTAL STUDY OF OVEREATING LOW- OR HIGH-PROTEIN DIETS.
D. S. Miller and Pamela Mumford (London U., Queen Elizabeth Coll., Great Britain).
American Journal of Clinical Nutrition, vol. 20, Nov. 1967, p. 1212–1222. 34 refs. Med. Res. Council supported research.

Sixteen young adult men and women were fed, for periods of four to eight wk., diets containing either about 2.8 or 15% of protein calories, and providing an excess of about 1,400 kcal./day above their normal intake. Measurements were made of body weight, activity, urinary output of nitrogen and creatinine, digestibility of the food, basal metabolic rate, total body potassium, subcutaneous fat, and total body water. The mean weight gain of the low-protein groups was 1.1 kg. compared with a theoretical figure of 5.0 kg. if the excess calories are calculated as being converted to adipose tissue containing 66% fat; for the high-protein groups the mean weight gain was 3.7 kg. compared with a theoretical figure of 5.4 kg. Since none of the indices of body composition showed any real change during the experimental period, and since activity was both low and unchanged, it is clear that the excess caloric intake of the subjects was disposed of by an increased heat production. This view is supported by the measurement of oxygen consumption reported in a following paper and has implications in the etiology of obesity.

A68-80317
EFFECTS OF RECUMBENCY AND SPACE FLIGHT ON BONE DENSITY.
Pauline Beery Mack and Paul L. LaChance (NASA, Manned Spacecraft Center, Biomed. Res. Office, Houston and Tex. Woman's U., Res. Inst., Denton).
(Space Med. Branch Res. Coord. Meeting, Second Ann., Houston, Feb. 17, 1966).
American Journal of Clinical Nutrition, vol. 20, Nov. 1967, p. 1194–1205. 16 refs.
NASA Grant NsG-440 and NASA Contract BG721-27-7-152P

Evaluations of bone mass changes in terms of calcium hydroxyapatite equivalency were made for the central section of the os calcis and for hand phalanx 5-2 of men participating in seven bed rest units consisting of an equilibration period, a 14-day bed rest period, and a reconditioning period, with the level of calcium intake during bed rest ranging from 300 to 2,000 mg. daily. The same type of bone mass determinations was made on the crews of the Gemini IV, Gemini V, and Gemini VII missions. The method of radiographic bone densitometry was used in evaluating skeletal changes in both groups of subjects. A significant negative coefficient of correlation was found between bone mass losses in the central section of the os calcis and the mean levels of daily calcium intake after 14 days of horizontal bed rest. Significant positive correlations were found between intake of dietary calcium and outgo of urinary and of urinary and fecal calcium. In four bed rest units in which the same level of dietary calcium was fed in the pre-bed rest ambulatory equilibration period as during the bed rest phase, the urinary and the combined urinary and fecal calcium output during bed rest surpassed that during ambulation by significant differences throughout. With respect to the three groups of astronauts, the duration of the orbital flight evidently was not the sole factor in losses of bone mass, since the astronauts engaged in the longest space flight experienced the lowest negative changes in bone density. Although mean daily calcium consumption was found to be related negatively to bone density losses in subjects during bed rest, the same could not be stated unequivocally concerning astronauts during space flight with the evidence now in hand because of uncontrolled variables, such as stress and dietary factors in addition to calcium. Also the exercise program introduced into the Gemini VII flight imposed a new variable which contributed to the reduction of bone mass in the os calcis as supported by ground based trials with bed rest subjects. Because of the small number of subjects in the space flight study to date, further data will need to be acquired from future flights in order to understand the interrelationships more fully.

A68-80318
EFFECT OF REDUCED PROTEIN INTAKE ON NITROGEN LOSS FROM THE HUMAN INTEGUMENT.
Ellen Rehr Sirbu, Sheldon Margen, and Doris Howes Calloway (Calif. U., Dept. of Nutr. Sci., Berkeley).
(Federation of Am. Soc. for Exptl. Biol., 51st Ann. Meeting, Chicago, Apr. 1967).
American Journal of Clinical Nutrition, vol. 20, Nov. 1967, p. 1158–1165. 27 refs.
NASA Grant NGR-05-003-068.

Nitrogen losses from the integument were studied in 20 male subjects ranging in age from 20 to 39 yr. under nonsweating, resting conditions in conjunction with a nitrogen balance study designed to ascertain minimal protein requirements for man. Subjects wore long underwear for repeated collection periods of three or six days. Hair and beard were weighed and nail growth was measured from serial nail markings. Nitrogen in bath and laundry water ranged from 59 to 204 mg./day with a mean of 119 mg. for subjects on a control diet containing 12.3 g. of nitrogen. When the subjects were given 0.6 or 3.8 g. of nitrogen daily there was a significant decrease in the amount of nitrogen lost in the dermal excretions. Blood area nitrogen and dermal excretion of nitrogen were positively correlated. Varying the levels of nitrogen intake did

not affect the rate of hair and beard growth. The nails grew an average of 0.093 mm./day and average total head hair growth was 160 mg./day. An average daily loss of 24 mg. of nitrogen was attributed to head hair and nail replacement.

A68-80319
EFFECTS OF IONIZED AIR ON STRESS BEHAVIOR.
James R. Nazzaro, Donald E. Jackson, and Lloyd E. Perkins (U.S. Naval Weapons Lab., Dahlgren, Va.)
Medical Research Engineering, vol. 6, Third Quarter, 1967, p. 25–28. 11 refs.
Grant PHS MH-08710-01.

The differential effect of negative and positive ions on a conditioned emotional response in six white rats was demonstrated. Following a five day control period, half the animals were subjected to positive and half to negative ions. After eight days, the conditions were reversed. Five animals showed significant changes in the response rate following exposure to ions. The predictions were based on the hypothesis that negative ions parallel the action of reserpine. Results suggest that negative ions, like reserpine reduce anxiety but facilitate learning, whereas positive ions may increase anxiety but interfere with learning. The possibility that individual differences in ion sensitivity exist was discussed. facilitate learning, whereas positive ions may increase anxiety but interfere with learning. The possibility that individual differences in ion sensitivity exist was discussed.

A68-80320
BREATH-BY-BREATH CO_2 ELIMINATION BY ANALOG COMPUTER TECHNIQUES.
Joseph A. Lipsky and Alfonso Angelone (Ohio State U., Coll. of Med., Dept. of Physiol., Columbus).
Medical Research Engineering, vol. 6, Third Quarter, 1967, p. 11–15. 9 refs.
Grant PHS HE-0878-03.

A special purpose on-line analog computer was designed to rapidly and repetitively determine CO_2 elimination on a breath-by-breath basis. It was utilized in the computation of CO_2 outputs within the range 175 to 900 cc. CO_2/min. The mean difference between computer results and data obtained by standard methodology was less than two cc. CO_2/min. The CO_2 computer provides a means of rapidly analyzing large numbers of breaths, and enables real time quantitation of transient CO_2 responses.

A68-80321
COPPER AND CALCIUM METABOLISM IN THE RAT: RELATIONSHIP TO THE PINEAL GLAND.
R. E. Wiederanders and G. W. Evans (Harmon Park Res. Lab., Williston, Great Britain).
Journal-Lancet, vol. 87, Dec. 1967, p. 467–472. 37 refs.

Normal and pinealectomized rats were tested for calciphylaxis formation, epiphysial closure rate, plasma calcium, fasting blood sugar, total blood copper and plasma copper, plasma ceruloplasmin, and tissue copper deposition in the developing rat. No significant differences were found between the two groups of rats.

A68-80322
PERCEPTION BIBLIOGRAPHY: XLVIII. PSYCHOLOGICAL ABSTRACTS, 1935, VOLUME 9, FIRST HALF.
R. B. Ammons and C. H. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 493–496. 100 refs.

One-hundred references to work on various aspects of sensory perception are listed alphabetically.

A68-80323
RESPONSE TIMES TO ELECTROCUTANEOUS STIMULATION.
Mark Hofmann (S. Dak. U., Vermillion).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 509–513. 17 refs.

Response times were obtained from nine subjects responding to DC electrocutaneous signals. Each subject received a series of 160 signals varying randomly in inter-signal interval (response to onset of next signal) and location. The results indicated that of the five inter-signal intervals employed, those being seven, ten, and twelve sec. in duration produced faster mean response times than those of two and four sec. Response times to the locations, the left hand, left foot, right hand, and right foot, did not differ significantly from one another but significantly interacted with subjects.

A68-80324
THE VASOMOTOR COMPONENT OF THE ORIENTATION REACTION AS A CORRELATIVE OF ANXIETY.
Barrie T. Jackson and W. F. Barry (Ottawa U., Canada).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 514–516. 6 refs.

Forty-six males were administered the Institute for Personality and Ability Testing Anxiety Scale and the obtained sten scores were correlated with the number of neutral auditory stimuli required to reach habituation. Habituation was defined by the absence of digital vasoconstriction (a component of the orientation reaction) to the stimuli. The Spearman rho was .788. The results were interpreted in terms of activation theory and the hypothesis was forwarded that the high arousal level of the anxious subject interferes with the recording of the properties of the stimulus and thus subsequent identical stimuli are perceived as being novel.

A68-80325
MOTOR SKILLS BIBLIOGRAPHY: LXXVII. PSYCHOLOGICAL INDEX NO. 20, 1913.
C. H. Ammons and R. B. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 522–524. 59 refs.

An alphabetical listing of 59 references to work on motor skills is given.

A68-80326
PERCEPTION BIBLIOGRAPHY: XLIX. PSYCHOLOGICAL ABSTRACTS, 1935, VOLUME 9, SECOND HALF.
C. H. Ammons and R. B. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 545–548. 99 refs.

Ninety-nine references to work on perception are listed alphabetically.

A68-80327
TEMPORAL INTEGRATION OF VIBROTACTILE STIMULATION.
Birgitta Berglund, Ulf Berglund, and Goesta Ekman (Stockholm U., Psychol. Labs., Sweden).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 549–560. 27 refs.
Contract AF 61(052)-878.

The perceived intensity of vibrotactile stimulation at 250 c.p.s. was measured by a psychophysical scaling method under different conditions of intensity (32–54 db.) and duration (30–1200 msec.) of stimulation. It was found (1) that perceived intensity grows as a logarithmic function of stimulus duration up to about one sec., whereafter it remains constant, and (2) that the exponent of the psychophysical power function decreases from 0.7 at the

shortest duration and approaches a constant value of about 0.4 for the longest durations.

A68-80328
MOTOR SKILLS BIBLIOGRAPHY: LXXVII. PSYCHOLOGICAL INDEX NO. 21, 1914.
R. B. Ammons and C. H. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 567–568. 58 refs.

Fifty-eight references to research on motor skills are given alphabetically.

A68-80329
A THEORY OF THE MUELLER–LYER ILLUSION.
A. W. Pressey (Manitoba U., Canada).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 569–572. 6 refs.

The Mueller–Lyer illusion is explained on the basis of the central tendency effect which refers to errors of overestimation and underestimation that occur whenever repeated judgments of a series of stimuli are made. It was noted that the theory could be extended to explain some, but not all, other types of geometrical illusions.

A68-80330
AN ENVIRONMENTAL CONTROL UNIT FOR LONG TERM OXYGEN THERAPY IN SMALL ANIMALS.
I. M. Gary Gourley (Minn. U., Coll. of Vet. Med., St. Paul).
Animal Hospital, vol. 3, Aug. 1967, p. 181–185. 6 refs.

An oxygen chamber environmental control unit for prolonged oxygen therapy for small animals was described. This type of unit has been in use at the University of Minnesota for two and one-half yr. and has proven to effectively control the environment of an oxygen chamber. The unit can be constructed readily by a veterinarian and a refrigeration consultant.

A68-80331
FATAL NECK INJURIES CAUSED BY USE OF DIAGONAL SAFETY BELTS.
Tom Saldeen (Lund U., Dept. of Forensic Med., Sweden).
Journal of Trauma, vol. 7, Nov. 1967, p. 856–862.

Three traffic accident cases are described in which the subjects slipped out of diagonal safety belts and were ejected from their cars, and in which the belts caused fatal injuries of the neck. In one case the belt damaged the left atlanto-occipital joint and injured the medulla oblongata, and in the other two it caused decapitation. These cases reflect the risk involved with the combination of inadequate car door locks and a diagonal belt in the event of a collision in which the subject is thrown against the side where the high end of the belt is attached and ejected from the car. It is not possible to assess the frequency of injuries to the cervical spine because they are readily missed at clinical examination and at necropsy. Moreover, the connection between the safety belt and the injury is not always so evident as in the three cases described. It is stressed that the cervical spine should receive special attention in the examination of a traffic accident victim ejected from a car and wearing a diagonal safety belt at the time of the accident.

A68-80332
AUDITORY AND CUTANEOUS TEMPORAL RESOLUTION OF SUCCESSIVE BRIEF STIMULI.
George A. Gescheider (Hamilton Coll., Clinton, N. Y.)
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 570–572.
Grant NIMH MH 11966.

The temporal resolution thresholds for pairs of brief stimuli presented in rapid succession were found to be 5–10 times higher for stimulation of the ring and index fingertips of the same hand than for binaural hearing. The sensation level of the stimuli and the intensity relations between the first and delayed stimulus had remarkably similar effects on auditory cutaneous temporal resolving power. It was concluded that similar neural mechanisms may operate for both modalities in the resolution of successive stimuli.

A68-80333
TRANSFER OF TRAINING FROM ONE MONITORING TASK TO ANOTHER.
E. L. Wiener (Miami U., Dept. of Ind. Eng., Coral Gables, Fla.)
Ergonomics, vol. 10, Nov. 1967, p. 649–658. 30 refs.
Grant PHS AC00250.

Two experiments were performed to determine whether groups trained on a visual meter-watching task with knowledge of results (KR) would detect more signals than a control group trained without KR in a later session in which a different watchkeeping task was used. The transfer tasks in the two experiments consisted of detecting a brief interruption of (1) a continuously illuminated light, and (2) a pure tone mixed with continuous white noise. The group trained with KR did significantly better ($p<0.05$) when transferred to the other visual task. Results on the transfer to auditory task were not significant at the 0.05 level, but the combined results of the two experiments were significant at the 0.025 level. No difference was found in commissive errors (false reports) in either experiment.

A68-80334
PERIODIC EYE TRACKING IN THE MONKEY.
A. F. Fuchs (Johns Hopkins U., Dept. of Med. and Biomed. Eng., Baltimore, Md.)
Journal of Physiology, vol. 193, Nov. 1967, p. 161–171. 11 refs.
Grants PHS HSP-17,237 and PHS AM-05524.

Eye movements were measured in monkeys trained for visual tracking. In response to periodic square wave target movements, monkeys did not show a significant reduction in the latency of saccadic movements. Under similar conditions, human beings subconsciously reduced their latency and after several cycles were in step with the target. In response to sinusoidal targets, monkeys showed a latency or phase lag which increased monotonically with frequency starting at 0.3 c.p.s. Human beings can remain in phase with the target at frequencies up to 1.0 c.p.s. Hence, monkeys do not exhibit the human predictive tracking response.

A68-80335
EFFECTS OF DISCRIMINATION TRAINING ON STIMULUS GENERALIZATION FOR HUMAN SUBJECTS.
Theodore J. Doll and David R. Thomas (Kent State U., Ohio).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 508–512. 10 refs.
Grants NIH-HD 00903-05 and NSF-GE-5159.

Three groups of 15 human subjects each were given wavelength discrimination training to respond to the S+ (530 mμ) but not to S− (540 mμ, 550 mμ, and 590 mμ, respectively). A fourth (control) group ($n=15$) received instructions to respond only to S+ but no discrimination training. All subjects were then tested for generalization to wavelengths on both sides of the S+. Relative to the control gradient, both the 540 mμ S− and 550 mμ S− groups showed displacement of the mode of responding from S+ in the direction opposite to S−. Contrary to the animal literature, however, the 550 mμ S− group exhibited the greater displacement, and the 590 mμ S− group yielded a gradient reliably flatter than that of the control group. These discrepancies are attributed to human subjects' use of stimulus labeling and categorization.

A68-80336
THE MONAURAL M.A.P. THRESHOLD OF HEARING AT FREQUENCIES FROM 1.5 TO 100 C/S.
N. S. Yeowart, M. E. Bryan, and W. Tempest (Salford U., Dept. of Elec. Eng., Lancashire, Great Britain).
Journal of Sound Vibration, vol. 6, Nov. 1967, p. 335–342. 9 refs.
Salford U. and Liverpool U. supported research.

The monaural minimum audible pressure threshold of hearing has been measured at frequencies from 100 to 1.5 c.p.s. with particular emphasis on frequencies below 25 c.p.s. The results show that the threshold rises smoothly with decreasing frequency over the whole range measured and the data obtained are in good agreement with Bekesy.

A68-80337
THE DESIGN AND USE OF AN FM/AM RADIOTELEMETRY SYSTEM FOR MULTICHANNEL RECORDING OF BIOLOGICAL DATA.
J. Rod Zweizig, Raymond T. Kado, John Hanley, and W. Ross Adey (Calif. U., Brain Res. Inst., Space Biol. Lab., Los Angeles).
IEEE Transactions on Bio-Medical Engineering, vol. BME-14, Oct. 1967, p. 230–238. 16 refs.
Grant AF-AFOSR 61-81.

A multichannel telemetry system for electroencephalographic recording was constructed for the study of animal or human behavior correlates under natural, unrestrained conditions. To be useful in research of this kind, the transmitted radio signal must be independent of the environment, so that changes in antenna loading and in signal level cause no artifact. Standard Inter-Range Instrumentation Group proportional-bandwidth FM subcarrier channels are used. These subcarriers are generated by twin-T oscillators, modulated in turn by the amplified data signals. The FM subcarriers are then linearly summed and impressed upon a crystalcontrolled AM transmitter. The system is also relatively insensitive to major shifts in supply voltage. Wherever possible, fabrication was by means of integrated circuits, thus reducing the bulk of the modules. When used in conjunction with appropriate sensing electrodes, this system yielded accurate records, with subjects both at rest and in motion, and for recording periods as long as 24 hr. Electrical seizure data were obtained in situations where an observer, looking for the typical tonic or clonic contractions, would have missed the pathological brain activity, since there were no associated motor signs. Recordings of longer duration than usual are possible due to increased freedom of movement by the subject.

A68-80338
THE EFFECT OF HYPERBARIC OXYGEN ON ADULT RABBIT RETINA.
V. G. Criswick and G. S. Harris (Brit. Columbia U., Dept. of Ophthalmol., Vancouver and Vancouver Gen. Hosp., Dept. of Ophthalmol., Canada).
Archives of Ophthalmology, vol. 78, Dec. 1967, p. 788–793. 7 refs.

Adult rabbits were exposed to three and four atmospheres pressure to observe the effect of hyperbaric oxygen on the retina. Vasoconstriction and venous arteriolization occurred without altering electroretinographic response or histological appearance following exposure to high pressure oxygen. No change in electroretinographic response or in retinal histology resulted from three hours exposure to 100% oxygen at three atmospheres absolute (ATA). Total electroretinographic extinction associated with extensive retinal folding occurred within three-hours exposure to 100% oxygen at four ATA.

A68-80339
PERCEPTUAL-MOTOR PERFORMANCE RELATED TO IMPULSIVENESS AND ANXIETY.
Ernest S. Barratt (Tex. U., Med. Branch, Galveston).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 485–492. 6 refs.
Contract NONR 1598-06.

Four groups of subjects were selected on the basis of varying levels of anxiety and impulsiveness and were tested on four perceptual-motor tasks. The high-impulsiveness, low-anxiety subjects consistently performed less efficiently on these tasks than did the other three groups of subjects. The results suggest that impulsiveness as a personality predisposition is related more to motor control than to sensory discrimination or cognition.

A68-80340
CHOICE REACTION TIME AS A FUNCTION OF AUDITORY S-R CORRESPONDENCE, AGE AND SEX.
J. R. Simon (Iowa U., Depts. of Psychol. and Ind. and Management Eng., Iowa City).
Ergonomics, vol. 10, Nov. 1967, p. 659–664. 16 refs.

This study was concerned with the effect of a reversal in auditory stimulus-response (S-R) correspondence on the reaction time of two disparate age groups; a younger group between 18 and 25 and an older group between 65 and 86. The task involved depressing the correct one of two finger keys upon onset of a 1,000 c.p.s., 85 db monaural tone presented through earphones. Subjects performed on two blocks of trials; one block involving uncrossed reactions (responding with hand ipsilateral to ear stimulated) and the other block involving crossed reactions (responding with hand contralateral to ear stimulated). Results revealed significant differences in reaction time as a function of age, sex and S-R correspondence. Reversal of the S-R relationship produced significantly greater slowing for older than for younger subjects and for females than for males.

A68-80341
THE PSYCHOLOGY OF MEMORY—1965: A BIBLIOGRAPHY.
C. Michael Levy and Karen Hartnagle (Fla. U., Gainesville).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 573–582. 255 refs.

Two-hundred-fifty-five contributions to the psychology of memory and forgetting published in 1965 are listed.

A68-80342
OCULAR DOMINANCE AND PERCEPTUAL ASYMMETRY.
T. Hayashi and M. P. Bryden (Waterloo U., Canada).
(Can. Psychol. Assn., Meeting, Montreal, Jun. 1, 1966).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 605–612. 21 refs.
Grant NRC, Canada APA-95.

Two experiments were performed to determine the relation of sighting and acuity dominance to tachistoscopic recognition. In both, single-letter material was exposed binocularly to either the left of right of fixation at brief durations. In Exp. I (N=32) visual field differences in recognition were unrelated to sighting dominance. The results of Exp. II (N=24) suggested that both acuity dominance and cerebral dominance affect visual field differences. While all were strongly right-handed (and presumably left cerebral-dominant), right acuity-dominant subjects displayed a large right-field superiority, whereas left acuity-dominant subjects exhibited no visual field difference. These results suggest an interaction between acuity dominance and cerebral dominance which may be mediated by the relative superiority of the crossed optic pathways.

A68-80343
VISUAL MEMORY OF CAPITAL LETTERS: MULTIDIMENSIONAL RATIO SCALING AND MULTIDIMENSIONAL SIMILARITY.
Teodor Kuennapas (Stockholm U., Psychol. Labs., Sweden).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 345–350. 7 refs.
Swed. Council for Social Sci. Res. supported research.

The similarity of nine capital letters, as judged on the basis of visual memory, was studied by direct multidimensional ratio scaling and by the method of similarity analysis. Three factors were isolated which were exactly the same as previously found in perception of these capitals and with nearly identical loadings.

A68-80344
WHOLE-BODY GAMMA-IRRADIATION, FOOD INTAKE AND GLUCURONIC ACID EXCRETION IN RATS.
J. Chiriboga (Puerto Rico U., Puerto Rico Nucl. Center, San Juan).
Experientia, vol. 23, Nov. 15, 1967, p. 903–904. 12 refs.
Contract AEC AT-(40-1)-1833.

Rats were exposed to various dosages of whole-body, gamma irradiation, and their daily food intake and daily excretion of total glucuronide were measured. A correlation between reduction of glucuronide excretion after irradiation and low food intake was observed. The excretion of glucuronides increased after irradiation in starved rats.

A68-80345
RADIOPROTECTIVE EFFECTS OF DIMETHYL SULFOXIDE VAPOR ON MICE.
W. S. Moos, H. LeVan, and H. C. Mason (Ill. U., Coll. of Med., Chicago and Ark. State Hosp., Little Rock).
Experientia, vol. 23, Nov. 15, 1967, p. 923. 10 refs.
Grant Ill. U. Found. 2-46-33-90-3-10.

The radioprotective effects of dimethyl sulfoxide (DMSO) vapor was investigated by exposing mice to DMSO vapor before and during X-ray irradiation and to vapors of various chemicals dissolved in DMSO. It was demonstrated that DMSO vapor alone, or in combination with dissolved Nembutal provided protection against X-irradiation.

A68-80346
AGE-DEPENDENT CHANGES OF ACID MUCOPOLYSACCHARIDE EXCRETION PATTERNS IN HUMAN URINE.
W. Teller and C. Krüger (Marburg U., Dept. of Pediat., West Germany).
Experientia, vol. 23, Nov. 15, 1967, p. 908–909. 9 refs.
Deut. Forschungsgemeinschaft supported research.

Acid mucopolysaccharide (AMP) excretion patterns were investigated in 37 normal subjects of various ages (infants to adults). Two changes of AMP patterns seemed to be age dependent. The percentage of carbazole positive material in the heparitin sulfate (HS) urine fraction decreased with increasing age, while the carbazole positive material in the chondroiten sulfate β fraction increased. The results of an age dependent decrease of HS excretion in urine could not be correlated with reported changes of AMP patterns in various tissues.

A68-80347
THE SUBSTRATE SUPPLY OF THE HUMAN SKELETAL MUSCLE AT REST, DURING AND AFTER WORK.
J. Keul, E. Doll, and D. Keppler (Med. U., Freiburg i Br., West Germany).
Experientia, vol. 23, Nov. 15, 1967, p. 974–979. 40 refs.
Deut. Forschungsgemeinschaft and Kuratorium für Sportmed. Forsch. supported research.

Determinations of arterio-femoral venous differences were carried out on fourteen normal, male subjects, aged 20–26 yr., before, during and after various work loads on a bicycle ergometer in order to determine the substrate uptake and discharge of the human skeletal muscle. The glucose level decreased during work and increased significantly during the recovery period. The arterio-venous differences were significant at rest, as well as during and after work. The arterial concentration of lactate increased with the work load. The highest values of the arterial pyruvate concentration occurred during the third min. of recovery. At rest and at 50 W, there was a significant pyruvate extraction. The lactate/pyruvate ratio increased during work and reached the highest mean value at 200 W. The concentration of free fatty acids in blood plasma decreased slightly at low work loads, increased with increasing work load and rose even higher following work. Oxygen tension decreased with increasing work loads and increased significantly following the cessation of work. A discussion of these results was included in which a review of some other studies was presented.

A68-80348
EFFECT OF HYPERBARIC OXYGEN ON LEUCOCYTE LYSOSOMES.
J. W. Harris (Calif. U., Med. Center, Lab. of Radiobiol., San Francisco).
Experientia, vol. 23, Nov. 15, 1967, p. 980–981. 13 refs
Australian Inst. of Nucl. Sci. and Eng. supported research.

Rabbit polymorphonuclear leukocytes (PMN) were obtained from peritoneal exudates for the examination of the effect of high pressure oxygen (OHP) on lysosomes of an isolated cell system. The results clearly showed that hyperbaric oxygen does not produce measurable lysosome damage during short exposures of either intact PMN cells or isolated PMN lysosomes. It was thought that it is unlikely that direct release of lysosomal enzymes by oxygen is the primary lesion of oxygen poisoning, either in tissues of intact animals or in isolated cells.

A68-80349
EFFECTS OF MILD CHRONIC HYPOXIA ON THE PULMONARY CIRCULATION IN CALVES WITH REACTIVE PULMONARY HYPERTENSION.
John H. K. Vogel, Dan G. McNamara, Grady Hallman, Harvey Rosenberg, Gail Jamieson, and J. D. McCrady (Colo U., Med. Center, Dept. of Med., Div. of Cardiol., Cardiovascular Lab.; Tex. Children's Hosp., Houston; and Tex. A and M. Coll., Dept. of Vet. Physiol., College Station).
Circulation Research, vol. 21, Nov. 1967, p. 661–669. 19 refs.
Grants PHS 5T1-HE-08999-03 and AHA 63G 158.

The effects of the mild hypoxia at an altitude of 5,280 ft. on the pulmonary circulation were examined in normal calves and calves with a preexisting stimulus to maintain a reactive pulmonary vascular bed. In a serial study, nine calves born at 5,280 ft. and nine calves born at sea level underwent left pulmonary artery (LPA) ligation; three calves born at 5,280 ft. and eight calves born at sea level underwent right pulmonary artery (RPA) ligation within 24 to 48 hr. after birth. Progressive pulmonary hypertension and right ventricular heart failure developed in all calves operated on at 5,280 ft. but not in those with LPA ligation performed at sea level until they were transferred to 5,280 ft. In contrast, in some animals with RPA ligation at sea level, progressive pulmonary hypertension was noted. The increased pulmonary blood flow consequent to LPA ligation does not result in progressive pulmonary hypertension at sea level but the addition of the mild hypoxia at 5,280 ft. appears to provide additional sufficient stimulus to result in progressive pulmonary hypertension. However, the slightly higher pulmonary blood flow subsequent to RPA ligation is capable of producing progressive pulmonary hypertension at sea level. Correlation was found between these results and human patients

with congenital unilateral absence of a pulmonary artery, indicating that, in subjects with some stimulus to maintain a reactive pulmonary vascular bed, the mild hypoxia of 5,280 ft. may exert a significant effect on the pulmonary circulation.

A68-80350
MONITORING CEREBRAL BLOOD FLOW AND OXYGEN, GLUCOSE, LACTATE AND AMMONIA METABOLISM. EXPERIMENTAL TRIALS IN ANIMALS.
John S. Meyer, F. Gotoh, M. Akiyama, and S. Yoshitake (Wayne State U., Detroit Gen. Hosp., Depts. of Neurol. and Wayne Center for Cerebrovascular Res., Harper Hosp., Detroit, Mich.)
Circulation Research, vol. 21, Nov. 1967, p. 649–660. 26 refs.
Grant PHS NINDB 3564 and Detroit Gen. Hosp. Res. Corp. supported research.

New application of methods for monitoring cerebral blood flow and cerebral arteriovenous oxygen, glucose, lactate and ammonia differences are described. Results of trials of their validity in monkeys during experimental procedures are also described. The apparatus includes infrared gas analyzers for monitoring arteriovenous differences after diffusion of nitrous oxide through silastic, electromagnetic flowmeters for monitoring cerebral venous outflow, the Technicon apparatus for measuring arteriovenous differences for lactate, glucose and ammonia, and the Guyton analyzer for monitoring cerebral arteriovenous oxygen differences. Cerebral blood flow in the monkey measured by the nitrous oxide method was 61 ml./100 g. brain per min., cerebral oxygen consumption was 2.8 to 3.35 ml./100 g. brain per min., cerebral glucose consumption was 3.52 mg./100 g. brain per min., cerebral arteriovenous lactate difference was 1.1 mg./100 ml., cerebral arteriovenous ammonia difference was 2 mg./100 ml. Inhalation of 100% oxygen, 5% CO_2 in air, 20% CO_2 in air and hyperventilation caused no change in cerebral oxygen, glucose, lactate, and ammonia metabolism. During anoxic anoxia, cerebral glucose consumption increased and cerebral oxygen consumption decreased significantly. During seizures, cerebral metabolic rate for oxygen increased. No important changes in ammonia metabolism were noted. It was concluded that it is feasible to apply these methods concurrently in patients with cerebrovascular disease before and after therapeutic trials.

A68-80351
THE HEMODYNAMIC EFFECT OF ACUTE BLOOD LOSS IN NORMAL MAN, WITH OBSERVATIONS ON THE EFFECT OF THE VALSALVA MANEUVER AND BREATH HOLDING.
John J. Skillman, John E. Olson, John H. Lyons, and Francis D. Moore (Harvard Med. School, Dept. of Surg. and Peter Bent Brigham Hosp., Boston, Mass.)
Annals of Surgery, vol. 166, Nov. 1967, p. 713–738. 25 refs.
(Contracts DA-49-193-MD-2337 and AEC AT(30-1)-2665; Grants NIH 5-R01-AM-06257-08 and NIH AM 5100-10.

The hemodynamic effect of acute blood loss (15% of the blood volume) was studied in nine normal male volunteers. Cardiac index decreased after hemorrhage in five of the seven subjects in whom it was measured, but this fall was not statistically significant. Stroke volume decreased significantly in all the bled subjects after hemorrhage ($p < 0.0005$). Arterial pressure pulse contours reflected this decrease in stroke volume. Contrary to predicted changes, calculated total peripheral resistance increased after hemorrhage in only two of the seven subjects in whom it was measured. The control subjects having exchange transfusions did not show these changes. Central venous pressure decreased during hemorrhage or in the recovery period. Pulse rate increased significantly during the hemorrhage period in eight of the nine subjects ($p < 0.025$). Rapid hemorrhages caused briefer and more precipitous changes in blood pressure, cardiac index, and stroke volume than did slow hemorrhages. Venous hemorrhages caused a greater and more prolonged drop in blood pressure than did arterial hemorrhages. The significance of these findings is discussed. The Valsalva maneuver is a challenge to the circulation which has pronounced cardiovascular effects. These effects are more noticeable in the presence of hypovolemia. Breath holding is a more gentle hemodynamic stress.

A68-80352
EXAMINATIONS OF THE GENITAL ORGANS AND STUDIES OF THE MENSTRUAL CYCLE IN WOMEN WORKING THE THE FIELD OF MICROWAVE RADIATION [BADANIA NARZADU RODNEGO I CYKLOW PLCIOWYCH U KOBIET ZATRUDNIONYCH W ZASIEGU DZIALANIA PROMIENIOWANIA MIKROFALOWEGO]
Jerzy Higier and Wanda Barańska.
Wiadomosci Lekarskie, vol. 20, Aug. 1967, p. 1435–1438. In Polish.

A group of 118 women working at microwave generators was studied with regard to the state of their genital organs, the reproductive functions, and the character of menstrual cycle. Careful history taking and gynecological examination were completed by cytohormonal and cytological investigations. Incidence of cervictis and erosions as well as menstrual disturbances with profuse and prolonged bleeding was observed.

A68-80353
EFFECTS OF LOW INTENSITY UHF RADIO FIELDS AS A FUNCTION OF FREQUENCY.
Susan F. Korbel and Herbert L. Fine (Ark. U., Fayetteville).
Psychonomic Science, vol. 9, Nov. 25, 1967, p. 527–528. 6 refs.
Grant NSF 12-5202.

Thirty-six naive male rats were used as subjects in two experiments to determine a possible relationship between frequency of low intensity ultra-high-frequency radio fields and activity level. In Experiment 1, a low frequency range (320 MHz–450 MHz) was used, while a higher frequency range (770 MHz–900 MHz) was used in Experiment 2. Identical low power levels were maintained for both experiments (.43 mW–.15 mW). Although the application of both high and low frequency ranges resulted in decreased activity, the lower frequencies were more effective in producing the activity change.

A68-80354
A STATISTIC ANALYSIS AS A METHOD OF ELECTRIC PHENOMENON ANALYSIS OF CEREBRAL CORTEX [STATISTIK ANALIZ—BOSH MIIA KOBIFINING ELEKTRIK KHODISALARINI ANALIZ KILISH METODIDIR].
M. N. Okhundi.
Uzbekskii Biologicheskii Zhurnal, no. 4, 1967, p. 33–34. In Russian.

The paper presents some material obtained in the study of young children while being awake, drowsy and asleep. Quantitative electroencephalogram estimation of each age group is given. This method can be used in different cases of pathologic conditions of cerebral cortex under clinical conditions.

A68-80355
FILTERING-REABSORPTION KIDNEY FUNCTION CHANGES DURING WATER AND SALT LOADING AND INFLUENCE WITH HIGH TEMPERATURE [IZMENENIE FIL'TRATSIONNO-REABSORBTSIONNOI FUNKTSII POCHEK PRI VODNOI I SOLEVOI NAGRUZKAKH I VOZDEISTVII VYSOKOI TEMPERATUROI].
A. IU. IUnusov, Z. T. Tursunov, and T. A. Abdullaev.
Uzbekskii Biologicheskii Zhurnal, no. 4, 1967, p. 23–26. 8 refs. In Russian.

Results are reported from a study on external high temperature and insolation influence on kidney excretory function during water

and salt loading. It is also found that during high temperature action diurea depression is principally conditioned by decrease of ball filtration and change of canal reabsorption.

A68-80356
CHANGES OF EVOKED POTENTIALS DURING THE INHALATION OF VARIOUS ETHER CONCENTRATIONS [IZMENENIE VYZVANNYKH POTENTSIALOV PRI VDYKHANII RAZLICHNYKH KONTSENTRATSII EFIRA].
E. K. Aganiants (Kuban Med. Inst., Dept. of Normal Physiol., Krasnodar, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 53, Sep. 1967, p. 1056–1063. 17 refs. In Russian.

A weakening influence of small and medium ether concentrations mixed with oxygen (2–3%) on the somato-sensory cortex potentials evoked by the stimulation of the sciatic nerve was found in the acute experiments on cats. The suppression of the evoked potentials of the thalamus under the influence of ether takes place earlier or simultaneously with the evoked potentials of the cerebral cortex. After the ceasing of ether inhalation the recovery of evoked potentials is observed.

A68-80357
THE EFFECT OF PRIOR EEG "COUPLING" UPON THE VISUAL EVOKED RESPONSE.
Gary C. Galbraith (Tulane U., School of Med., Dept. of Psychiat. and Neurol. and Delta Reg. Primate Res. Center, New Orleans, La.)
(Computers and Psychobiol. Workshop, Monterey, Calif., May 16–17, 1966).
IEEE Transactions on Bio-Medical Engineering, vol. BME-14, Oct. 1967, p. 223–229. 19 refs.

A unique statistical technique is described which appears to measure important interaction processes within the central nervous system (CNS). This statistic, termed "weighted-average coherence," or C, is derived primarily from parameters generated in cross-spectral frequency analysis. C has the useful property, however, of summarizing a larger amount of cross-spectral information into a more manageable form. By applying C analysis to the ongoing electroencephalogram (EEG), it has been possible to define unique patterns of interaction, or "coupling," between different brain areas. The total pattern of EEG coupling is taken to define a given state of functional brain organization. Moreover, since C is sensitive to changes in the EEG, it also reflects something of the dynamic properties of such brain organization. In the present study multiple EEG signals were recorded from a rhesus monkey with chronically implanted electrodes. Ongoing EEG activity recorded just prior to a sensory stimulus (light flash) was submitted to an extensive computer analysis in order to determine EEG coupling relationships. Results showed that such preceding brain coupling exerted a marked effect upon the subsequently occurring visual evoked response. These results support the meaningfulness of C as a measure of functional brain organization, and also provide a basis for understanding how such organization is effected in CNS.

A68-80358
LIFE ON THE SURFACE OF VENUS.
Carl Sagan (Harvard U., Cambridge, Mass.)
Nature, vol. 216, Dec. 23, 1967, p. 1198–1199. 17 refs.
NASA and Alfred P. Sloan Found. supported research.

The probability of life on the surface of Venus was discussed. It was concluded that the mean surface temperatures of Venus exclude terrestrial forms of life. Due to new evidence presented by the Soviet Venus 4 investigation of the atmosphere of Venus, the strictures against life occurring at the very poles were slightly relaxed.

A68-80359
TAPE RECORDINGS OF THE ECG OF ACTIVE MEN: LIMITATIONS AND ADVANTAGES OF THE HOLTER-AVIONICS INSTRUMENTS.
Lawrence E. Hinkle, Jr., Jerome Meyer, Michael Stavens, and Susan T. Carver (Cornell U., Med. Coll., Depts. of Med. and Psychiat., Div. of Human Ecol., New York, N. Y.)
Circulation, vol. 36, Nov. 1967, p. 752–765. 17 refs.
Grant PHS HE-07796.

The electronic and mechanical characteristics of the Holter-Avionics instruments for recording and analyzing the electrocardiogram of active men were measured in the laboratory, and during carefully standardized six-hr. recordings of 385 active subjects. Although late model recorders have a cumulative timing error of less than 1%, the frequency response of the system is limited at both the upper and lower ends of the range, producing significant distortion of the complex. Scanning the taped data at 60 times real-time is a helpful screening procedure, but accurate analysis of records requires photographic write-out of R–R intervals with real-time scanning and analysis of all potential areas of abnormality. If records are made with subjects under constant observation and stop-watch timed, they can yield significant data on phenomena of rate, rhythm, and conduction, under a variety of circumstances and over long periods of time; but changes in the shape of the ST segment and T wave must be interpreted with great caution because of distortions produced by the recording system and by changes in position and activity.

A68-80360
EFFECT OF HYPERVENTILATION ON PRECORDIAL T WAVES OF CHILDREN AND ADOLESCENTS.
J. H. Thomsen and R. H. Wasserburger (Wis. U., Med. School, Dept. of Med., Cardiovascular Res. Lab. and Veterans Admin. Hosp., Madison).
Circulation, vol. 36, Nov. 1967, p. 700–707. 13 refs.

Following the taking of 12-lead routine electrocardiograms, three precordial leads were recorded before, during and after 10 to 15 sec. of voluntary hyperventilation in 296 students, ranging in age from 8 to 17 yr. Fifteen % of the total group, comprising 212 Caucasians and 84 Negroes, inverted one or more previously upright precordial T waves following hyperventilation. The incidence of T-wave inversion in children 12 yr. of age and under was nearly four times greater in Caucasians than in Negroes. There was no significant difference when the older Negro and Caucasian students were similarly compared. Sinus tachycardia, T-wave flattening, and "tucking," short of frank inversion, as well as junctional depression of the ST segment, were commonly seen following hyperventilation. The similarity of the hyperventilation-induced T-wave inversion in children to those previously documented in adults is noted, and the clinical implication of this study requires continued cognizance of the occurrence of "nonpathological" T-wave inversion in adults, so as to avoid iatrogenic heart disease.

A68-80361
MOTOR SKILLS BIBLIOGRAPHY: LXXV. PSYCHOLOGICAL INDEX NO. 18, 1911.
C. H. Ammons and R. B. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 390–392. 56 refs.

Motor skills references (56) are listed alphabetically.

A68-80362
TWO METHODS OF DETERMINING BODY SENSITIVITY: A COMPARISON AND EVALUATION.
Gerald V. Barrett and Carl L. Thornton (Goodyear Aerospace Corp., Akron, Ohio).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 374–376.

Field independence, as measured by the magnitude of error in judging true vertical on the Rod and Frame test, has been considered to be related to the utilization of body cues by Witkin, et al. Benfari and Vitale have used one portion of the Rod and Frame test, analyzed in terms of direction of error from the vertical, to determine if subjects were "body-oriented." If field-independence and body-orientation measures tap the same attribute, then they should be highly correlated. Body orientation was not significantly related to field independence when data from 46 adult males were analyzed using both procedures.

A68-80363
EFFECTS OF FEEDBACK AND INSTRUCTIONAL SET ON THE CONTROL OF CARDIAC-RATE VARIABILITY.
Peter J. Lang, L. Alan Sroufe, and James E. Hastings (Wis. U., Madison).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 425–431. 19 refs.
Grant NIMH MH 10993.

This experiment with 60 male college students assesses their ability to control cardiac rate when they are provided with a continuous feedback display, and also when a comparable display is presented, not controlled by subject's own heart rate. It also evaluates changes in cardiac-rate variability induced by a simple tracking task, using the same display apparatus. All subjects viewed the display in a five-min.-on-five-min.-off format. The results provide a clear demonstration that subjects learn to significantly reduce heart-rate variability when appropriately instructed and provided with heart-rate feedback. Neither tracking task subjects, nor those misinformed about the feedback, showed a significant reduction in variability.

A68-80364
THE REBOUND FORCES OF THE BALL OF THE FOOT IN WALKING AND RUNNING [UBER DIE ABSTOSSKRAFTE DES FUSSBALLENS BEI GANG UND LAUF].
H. Schales, H. Groh, W. Baumann, and F. Kubeth (Bürgerhosp. Saarbrücken, Chir. Klin., West Germany).
Ergonomics, vol. 10, Nov. 1967, p. 683–697. 7 refs. In German.

Measurements of the rebound forces of the ball of the foot in walking and running were carried out with eight male subjects aged between 18 and 25 yr. The use of a telemetric device made it possible to measure the rebound forces of any given number of steps. These data were then transmitted to a recording oscillograph. The oscillograph showed the force as a function of time while the ball of the foot was in contact with the ground. The following results were observed: (1) the force of the ball of the foot on the ground is directly correlated to the body weight. Maximum values registered are about 300 kgf. (kilogram force); (2) the force increases with increasing speed of the type of sport. It exceeds the body weight in fast walking by 40%, in a slow run by 112%, in a medium fast run by 140%, in a fast run by 153% and in a jumping run by 176%; (3) the duration of the rebound process is 0.14 sec. in a fast run and 0.21 sec. in a fast walk; (4) a direct correlation exists between the rebound forces and the body weight. Maximum values of 10 to 25 kgf./sec. were recorded in a jumping run. On the average the correlation of these impulses in walking, running and a jumping run is 1 : 2 : 3. (5) with fast running the speed of the foot as it strikes the ground is reduced in a reflex-like manner. The duration of this slowing-down impulse was about 0.01 sec.; the amplitude was 15 to 30% of the maximum rebound force in each case.

A68-80365
SELF-INDUCED PHOTOGENIC EPILEPSY.
R. D. Harley, H. W. Baird, and R. D. Freeman (Temple U., Health Sci. Center and St. Christopher's Hosp. for Children, Philadelphia, Pa.)
(Am. Med. Assn., 116th Ann. Conv., Atlantic City, Jun. 20, 1967).
Archives of Ophthalmology, vol. 78, Dec. 1967, p. 730–737. 20 refs.
Grant NIH FR-0075.

Clinical descriptions of seizures precipitated by a repetitive light stimulus such as the fine flicker of television are well documented in the literature. However, self-induced photogenic epilepsy is rarely encountered. In this report four children with self-induced photogenic epilepsy are described. The common feature was the precipitation of the attacks by light falling on the patient's eyes. The phenomenon is unusual and should be of sufficient interest to the ophthalmologist so that he may recognize the bizarre qualities of the patient when the history is provided.

A68-80366
AN EVALUATION OF SUBJECTIVE PROBABILITY IN A VISUAL DISCRIMINATION TASK.
William C. Howell (Ohio State U., Columbus).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 479–486. 16 refs.
Contract AF 33(615)-2248.

Subjective probability (SP) was measured for 16 visual discrimination problems using a technique requiring riskless choices between specific discrimination problems and a series of objective probability (OP) displays. Each SP was expressed in terms of the OP which was found to be indifferent from it. Discrimination problems differed with respect to difficulty level, difficulty composition and information level. Obtained SPs varied as a function of difficulty, information level and their interaction, but not difficulty composition (the only variable not affecting OP). Systematic deviations of SP from OP, while in the general direction of conservatism, were not entirely consistent with this concept. OP values which occurred within both easy and difficult problem contexts produced different SPs. Adaptation-level theory was used to integrate these and earlier SP findings.

A68-80367
"MORNING" BODY TEMPERATURE OR "RESTING" BODY TEMPERATURE? [TEMPERATURA PORANNA CZY SPOCZYNKOWA?].
Wł/odzimierz Fijał/kowski, Eugeniusz Johanowicz, and Zdzisł/aw Reterski.
Endokrynologia Polska, vol. 18, Jul.–Aug. 1967, p. 465–467. 8 refs. In Polish.

Through modification of the measuring methods for the basal body temperature in women working on three-shifts, three diagrams were obtained excluding the night-shift. A proposal to change the term "morning temperature" to "resting temperature" was given.

A68-80368
HEMATOPORPHYRIN PHOTOSENSITIZATION OF RABBIT EYE TO VISIBLE LIGHT.
Robert G. Freeman and Douglas Troll (Baylor U., Coll. of Med., Houston, Tex.)
Archives of Ophthalmology, vol. 78, Dec. 1967, p. 766–768. 7 refs.
Grants PHS NB 03689-07 and FF 1952.

As a result of sensitization of the eye to visible light, five of seven pigmented rabbits given hematoporphyrin intraperitoneally developed retinal damage after exposure to incandescent lamps.

A68-80369
EFFECTS OF SEVERAL PRETRAINING PROCEDURES ON BRIGHTNESS PROBABILITY LEARNING.
N. J. Mackintosh and Valerie Holgate (Oxford U., Great Britain).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 629–637.
Contract ONR N62558-4286 and Med. Res. Council supported research.

Two experiments tested the hypothesis that the performance of rats on visual probability discriminations could be influenced by pretraining procedures designed to increase or decrease the strength of attention to the relevant cue. In Exp. 1, pretraining on a successive discrimination with brightness irrelevant interferred with brightness probability learning, but pretraining on a successive discrimination with brightness relevant had no effect. In Exp. 2, pretraining on an absolute brightness discrimination tended to benefit brightness probability learning. Although this effect was not entirely consistent, a second effect of absolute brightness pretraining, namely, on the pattern of errors made at asymptote, lent strong support to the original hypothesis.

A68-80370
THE PURIFICATION AND PROPERTIES OF ISOCITRATE LYASE FROM CHLORELLA.
P. C. L. John and P. J. Syrett (U. Coll. London, Dept. of Botany, Great Britain).
Biochemical Journal, vol. 105, 1967, p. 409–416. 35 refs.
Sci. Res. Council supported research.

Isocitrate lyase was purified from acetate-adapted cells of *Chlorella pyrenoidosa*. The final preparation was homogeneous by the criteria of sedimentation, diffusion and polyacrylamide-gel electrophoresis. The sedimentation, diffusion and polyacrylamide-gel electrophoresis. The sedimentation coefficient ($S_{20,W}$) was 9.04×10^{-13} sec. and the diffusion coefficient ($D_{20,W}$) 4.62×10^{-7} cm.^{2}/sec.; from these values the molecular weight of the enzyme was calculated to be 170,000 and its Stokes radius to be 4.63×10^{-7} cm. The elution of the enzyme from Sephadex G-100 was studied and estimates of molecular weight and Stokes radius were obtained from the elution data. The turnover number of the enzyme was 5,950 moles of glyoxylate formed/min./mole of enzyme at 30°C. With threo-D_s(+)-isocitrate as substrate, the K_m of the enzyme was 0.023mM.

A68-80371
SPECIFIC POTENTIATION AND ITS INTERACTION WITH UNSPECIFIC EFFECTS ON THE EXCITABILITY CYCLE OF THE VISUAL THALAMO-CORTICAL COMPLEX.
M. Steriade and M. Demetrescu (R.S.R. Acad., Inst. of Neurol. and Inst. of Endocrinol., Bucharest, Rumania).
Electroencephalography and Clinical Neurophysiology, vol. 23, Nov. 1967, p. 429–438. 37 refs.

Differentiation of specific (steady light or optic tract stimulation) from unspecific (reticular) influences upon the geniculo-striate system was studied by testing thalamo-cortical responsiveness with pairs of pulses separated by various delays, delivered to the lateral geniculate body. The second response from the pair evoked in the visual cortex was differently altered by specific versus unspecific stimulation. At short delays (between 7 and 15-20 msec.), steady light or optic tract stimulation induced enhancement of the second response, while reticular stimulation greatly reduced or suppressed this specific potentiation. At longer delays (up to 100 msec.), the specific facilitation was no longer exerted on the second response; moreover, it impaired the enhancement induced by reticular stimulation. The effects of bilateral optic tract transection resembled those exerted by steady illumination. On the background of high responsiveness achieved by interruption of the specific afferents, unspecific (reticular) stimulation still depressed the second, shortly delayed, response. After ipsilateral transection of the optic tract, steady light did not further enhance significantly the geniculo-striate responses. The facilitatory and inhibitory ascending influences and the interactions between specific and unspecific controls of visual cortex excitability are discussed.

A68-80372
AMPLITUDE RELATIONSHIPS BETWEEN EVOKED POTENTIAL COMPONENTS DURING TRACE CONDITIONING.
Donovan E. Fleming (Veterans Admin. Hosp., Phoenix, Ariz.)
Electroencephalography and Clinical Neurophysiology, vol. 23, Nov. 1967, p. 449–455. 16 refs.

The degree to which total amplitude excursion of photically evoked potentials is reflected by wave component amplitudes during behavioral conditioning was investigated in cats. Three positive–negative wave complexes were identified and examined. It was found that both total and component amplitudes, treated individually, were reliably affected by conditioning and extinction procedures. Intercorrelations between total and component amplitudes were of the same relative magnitude. There was a good deal of variability among cats, however. It was observed that the amplitude of a late positive–negative component reliably correlated with the conditioned response performance level of several cats.

A68-80373
SPECTRUM ANALYSIS OF RESIDUAL EEG CHANGES FOLLOWING POST-NATAL X-IRRADIATION IN RATS.
Satoshi Kobayashi and Eduardo Eidelberg (St. Joseph's Hosp., Barrow Neurol. Inst., Dept. of Neurobiol., Phoenix, Ariz.)
Electroencephalography and Clinical Neurophysiology, vol. 23, Nov. 1967, p. 463–467. 11 refs.
Grants PHS K3NB-15,437 and NSF GB-331.

The delayed effects of early post-natal X-irradiation upon cortical electrical activity were studied in albino rats. Spectral energy distribution analysis was used to quantify the electroencephalogram (EEG) changes. It was found that no residual EEG alterations could be detected following a single dose of 78 r. Doses of 200 and 300 r produced a definite decrease in energy content at the lower frequencies (below 10 c.p.s.), the effects being similar with both these doses. Pre-treatment of the animals with a radioprotective compound, β-aminoethylisothiuronium bromide (AET), prevented the changes induced by a dose of 200 r but failed to do so when a dose of 300 r was used. AET itself produced some mild but definite residual changes in the EEG.

A68-80374
SELECTED TRIAL AVERAGING OF SENSORY EVOKED BRAIN RESPONSES.
Marvin Schwartz and Osborne W. Hall (Cincinnati U., Dept. of Psychol., Ohio).
Electroencephalography and Clinical Neurophysiology, vol. 23, Nov. 1967, p. 480–482.
Grant PHS MH 11231.

An automatic programmer is described for controlling an average response computer and tape storage system. The programmer permits selected trial averaging of the stored data. Thus, different average responses may be separately computed from the total data on the basis of experimenter determined variables.

A68-80375
PERCEPTION OF DEPTH IN ROTATING OBJECTS: 2. PERSPECTIVE AS A DETERMINANT OF STEREOKINESIS.
Roy B. Mefferd, Jr. and Betty A. Wieland (Veterans Admin. Hosp., Psychiat. and Psychosomat. Res. Lab., Houston, Tex.)
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 621–628. 9 refs.

Ten subjects viewed under extreme reduction conditions five simple, plane, featureless figures and an Ames trapezoidal

window as they rotated slowly (five r.p.m.) in the frontoparallel plane. Judgments of shape, slant, and type of movement were obtained for four-min. periods first with binocular regard and later with monocular. As more perspective cues were introduced and as viewing time increased, there were progressive increases in depth indicants with all three types of judgments.

A68-80376
PREPARATION OF A COLLOIDAL SOLUTION OF ZIRCONYL PHOSPHATE WITH ^{32}P FOR RADIOTHERAPEUTIC PURPOSES. II. CHEMICAL STABILITY AND ACUTE TOXICITY STUDIES.

A. M. Hussein, A. A. Kassem, M. El-Garhy, M. K. Madkour, and E. Abdullah (Atomic Energy Estab., Nucl. Chem. Dept., Isotope Div., Cairo, UAR).

Atompraxis, vol. 13, no. 6, 1967, p. 262–265. 12 refs.

The estimation of free ^{32}P in a colloidal solution of zirconyl phosphate by centrifugation, dialysis and chromotography was carried out in order to confirm the finding that a colloid with definite coagulation time can be obtained by preparing it at a fixed temperature. The stability and acute toxicity of the colloid were also investigated. Preparation methods of the colloid were given.

A68-80377
ANATOMICAL AND BIOCHEMICAL ADAPTATIONS OF MUSCLE TO DIFFERENT EXERCISES.

Edward E. Gordon (Michael Reese Hosp. and Med. Center, Dept. of Med., Div. of Phys. Med. and Rehabil., Chicago, Ill.)

(Am. Med. Assn., 20th Clin. Conv., Las Vegas, Nov. 27, 1966). Journal of the American Medical Association, vol. 201, Sep. 4, 1967, p. 755–758. 15 refs.
Grant PHS AM-08776.

A review was presented of anatomical and biochemical adaptations of muscle to various exercises. The relationship between work and muscular hypertrophy was considered. The possibility of using specific training for improved performance in sports utilizing the knowledge of muscular adaptation gained from these studies was suggested.

A68-80378
CARDIAC CONTROL DURING BURDENING [HERZKONTROLLE BEI BELASTUNG].

Herbert Reindell and Helmut Roskamm.

Bild der Wissenschaft, vol. 4, Jul. 1967, p. 549–553. *In German.*

The use of a bicycle ergometer for the detection and treatment of heart disease, as well as its use in sports medicine, was examined. The ergometer made possible defined and definite levels of work with repeatable results. The patient trod against variable resistances of the bicycle pedal and measurements were made of the oxygen consumption, pulmonary ventilation volume, heart frequency and electrocardiogram. A correlation in heart size, oxygen consumption and work capacity was observed. This highly developed technique for physiological measurement is helpful for clinical investigation.

A68-80379
EFFECTS OF RESPONSE-INDUCED STIMULUS CHANGE ON HUMAN DISCRIMINATION.

F. Robert Treichler, Barbara Hann, and Sally J. Way (Kent State U., Ohio).

Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 453–456. 5 refs.
Grants NSF GE-4066 and NIMH 10335.

Two experiments on the effects of manipulating the display of discriminanda at the time of alternative selection were conducted. In the first, human subject demonstrated superior performances when only the correct alternative or both discriminanda were visible after choice. Termination of both stimuli or persistence of only the incorrect alternative yielded more error and this pattern of results was displayed throughout a range of problem difficulties. A second experiment indicated that performances under conditions of selective persistence of correct stimuli were dependent upon the nature of displayed information rather than solely upon its position.

A68-80380
THE DESIGN OF SCALES FOR TEST INSTRUMENTS.

D. G. James and K. F. H. Murrell (Welsh Coll. of Adv. Technol., Unit for Res. on Human Performance in Ind., Cardiff, Great Britain).

Ergonomics, vol. 10, Nov. 1967, p. 707–712.
Sci. Res. Council supported research.

Experimental evidence on which to base scale designs for test instruments was sought. Four types of scale were investigated requiring differing interpolations of scale spacing, readings being made under accuracy instructions only. Results indicate that the scale design requiring interpolation to one-half of the scale spacing is read with greatest accuracy, apart from having various other advantages.

A68-80381
FURTHER STUDIES OF THE ATTENTIONAL RESPONSE OF HUMANS AND SQUIRREL MONKEYS TO VISUAL PATTERNS.

Larry T. Brown (Okla. State U., Stillwater).

Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 397–406. 14 refs.
Grant PHS MH-10350-02.

Two experiments were performed to examine the importance of pattern elevation, curvature, hue, and dissimilarity of hue to human viewing time and to determine whether those properties found to affect human behavior similarly affect the attentional behavior of the squirrel monkey. Sixty human subjects served in Exp. I and ten monkeys in Exp. II. In Exp. I, patterns containing elevated components were viewed longer than patterns containing two-dimensional components ($P < .05$), and patterns containing components of dissimilar hue were viewed longer than those with components of similar hue ($P < .05$). In Exp. II a measure of attention based on performance in a discrimination-learning situation was employed. When the data were analyzed in terms of approach to the positive pattern, patterns containing elevated and curved components were found to have greater attentional value than patterns with two-dimensional or angular components ($Ps < .025$ and .05, respectively); however, when the data were analyzed in terms of avoidance of the negative pattern no significant differences were found. On the basis of both these findings and those of earlier studies it was concluded that, for both humans and squirrel monkeys, informational parameters tend to show greater intradimensional differences in attentional control than noninformational parameters.

A68-80382
MOTOR SKILLS BIBLIOGRAPHY: LXXVI. PSYCHOLOGICAL INDEX NO. 19, 1912.

R. B. Ammons and C. H. Ammons (Mont. U., Missoula).

Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 454–456. 54 refs.

Fifty-four references to items dealing with perceptual-motor skills are presented.

A68-80383
ADAPTATION EFFECTS IN CENTRAL BINOCULAR FLICKER DISCRIMINATION OF BRAIN-DAMAGED SUBJECTS.

Julian M. Burn and Oscar A. Parsons (Okla. U., Med. Center, Oklahoma City).
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 457–464. 14 refs.
Grant NINDB B-2507.

The role of local adaptation in flicker discrimination of brain-damaged (N = 16) and control (N = 16) subjects was investigated. Male adult patient's central binocular thresholds were measured before and after visual stimulation by a coarsely flickering light (10 c.p.s.) over 20 trials. In both groups there were significantly lower thresholds after stimulation and a progressive drop in both pre- and post-stimulation thresholds over trials. However, there were no significant group interactions. The methodological, empirical, and theoretical implications of these results are noted.

A68-80384
RELATIONSHIP BETWEEN ELECTRICAL POTENTIAL OF THE SKIN AND SKIN TEMPERATURE.
Walter W. Surwillo (Louisville U., School of Med., Ky.)
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 465–470. 13 refs.

The relationship between electrical potential of skin (SP) and temperature of the skin (ST) in the region of the recording electrodes was investigated in 112 healthy subjects. SP between palm and ventral surface of forearm was recorded during a one-hr. test session in which the subject was asked to watch for a rarely-occurring stimulus. Forearm ST and SP proved to be unrelated. The regression of SP on palm ST was statistically significant, but the low correlation suggested that, under the conditions investigated, SP and ST were largely independent.

A68-80385
INFRA-RED METHOD FOR ASSESSMENT OF SMALL AND LARGE EYE MOVEMENTS IN CLINICAL EXPERIMENTS.
Kenneth Gaarder, Julian Silverman, Dolf Pfefferbaum, Louise Pfefferbaum, and Catherine King (Natl. Inst. of Mental Health, Bethesda, Md.)
Perceptual and Motor Skills, vol. 25, Oct. 1967, p. 473–484. 16 refs.
Calif. Dept. of Mental Hyg. supported research.

Problems in measuring eye movements are briefly reviewed and a simple, inexpensive technique is presented for counting either the number of small eye movements during fixation or the number of small plus large eye movements during visual search. Details are given for building the system, which reflects infra-red light from the corneal-scleral margin of the eye to a photocell. The methods of operation and analysis of data are presented and the strengths and weaknesses of the technique are summarized. Examples of its use in particular experiments are presented.

A68-80386
FIXATION ERRORS IN EYE MOVEMENTS TO PERIPHERAL STIMULI.
Albert E. Bartz (Concordia Coll., Moorhead, Minn.)
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 444–446. 9 refs.
Grant PHS AC 00165.

Eye movements to peripheral visual stimuli were analyzed for duration and frequency of occurrence of over- and undershoots. The mean duration of undershoots was significantly greater than the duration of overshoots. When these errors occurred, subjects tended to undershoot the stimuli at large angles and overshoot the stimuli at smaller angles. This was shown to be consistent with pursuit tracking studies of body limbs where similar analyses were made.

A68-80387
AMOUNT OF UNCERTAINTY ASSOCIATED WITH DECODING IN FREE RECALL.
Marvin R. Mueller, Ed M. Edmonds, and Selby H. Evans (Tex. Christian U., Fort Worth).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 437–443. 5 refs.

Recent experiments have shown that the use of mnemonics or coding procedures is an important variable in the study of retention. Two components of the coding process are discussed—encoding and decoding. Results indicate that coding facilitated retention for subjects who had one or two alternative decodings; subjects with five alternative decodings recalled no more trigrams than did the control subjects with no coding instructions. Results were interpreted in terms of concepts from information theory. It was found that the percentage of trigrams recalled was a decreasing function of the amount of uncertainty associated with decoding.

A68-80388
BIOCHEMICAL ASPECTS OF OZONE INTOXICATION: A REVIEW.
Ahmed N. M. Nasr (Mich. U., Inst. of Ind. Health, Ann Arbor).
Journal of Occupational Medicine, vol. 9, Dec. 1967, p. 589–597 47 refs.

Some pertinent information on the biochemical aspects of ozone intoxication and the effects of other oxidants were reviewed. Included were: (1) physical properties of ozone; (2) its chemical properties; (3) the site of action of inhaled ozone; (4) biochemical changes in ozone intoxication; (5) effects of high pressure oxygen; (6) inhalation of hydrogen peroxide vapor; (7) nitrogen dioxide; (8) peroxyacetyl nitrate; (9) radiomimetic effect of ozone; (10) potentiation of ozone toxicity; and (11) protection against ozone toxicity.

A68-80389
AN ANALYSIS OF CERTAIN FACTORS RESPONSIBLE FOR NONMONOTONIC BACKWARD MASKING FUNCTIONS.
Charles W. Eriksen, James F. Collins, and Thomas S. Greenspon (Ill. U., Urbana).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 500–507. 11 refs.
Grants PHS MH-1206 and PHS K6-MH-22014.

In Experiment I test displays containing the forms A, T, and U, were followed by a ring masking stimulus at interstimulus intervals (ISIs) of 0–100 msec. A circular arrangement was used for the test-form displays. In the one-form displays only a single form was presented, located in one of six possible positions on the circumference of an imaginary circle centered on the fixation point. In the six test-form condition six forms were presented, one in each of the possible positions, and the subject was to identify the one form that was subsequently surrounded by the masking ring. Contrary to previous findings, masking was a monotonic decreasing function of ISI for both one and six test-form displays. In agreement with others, greater masking which extended over longer ISI values was obtained for six test-form displays. Experiment II revealed that this more extensive masking for six test-form displays was attributable to two independent summative processes: (a) the impairment in form identification due to surrounding the form with a ring at short ISIs and (b) a delayed indicator effect resulting from the delay of information as to which of the six forms the subject was to identify.

A68-80390
TIME AND EFFORT AS DETERMINERS OF TIME-PRODUCTION ERROR.

Lawrence R. Boulter and Mortimer H. Appley (York U., Toronto, Canada).
(Can. Psychol. Assn., Meeting, Vancouver, Brit. Columbia, Jun. 2, 1965).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 447-452. 6 refs.

In three experiments series of successive estimates (productions) of one-min. periods were required of human subjects under resting (R) and effortful (E) conditions. In Experiments I and II all subjects served in both conditions, their successive productions being made alternately under R and E. In Experiment III independent groups served in R and E, but all productions were made during a resting state. Mean time-production error markedly increased as a function of successive judgments in all three experiments. In Experiments II and III judgments were significantly longer in E than R, and this effect was greater in Experiment III and II. In Experiments I and II, interruption of the sequential task was followed by a temporary reduction in the magnitude of judgment errors. Discussion included the possible significance of these results with respect to properties of a presumed time-keeping mechanism.

A68-80391
A REVIEW OF QUASI-LINEAR PILOT MODELS.
Duane T. McRuer and Henry R. Jex (Systems Technol., Inc., Hawthorne, Calif.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-8, Sep. 1967, p. 231-249. 69 refs.
NASA and USAF supported research.

During the past several years, an analytical theory of manual control of vehicles has been in development and has emerged as a useful engineering tool for the explanation of past test results and prediction of new phenomena. An essential feature of this theory is the use of quasi-linear analytical models for the human pilot wherein the models' form and parameters are adapted to the task variables involved in the particular pilot-vehicle situation. This paper summarizes the current state of these models, and includes background on the nature of the models; experimental data and equations of describing function models for compensatory, pursuit, periodic, and multiloop control situations; the effects of task variables on some of the model parameters; some data on "remnant"; and the relationship of handling qualities ratings to the model parameters.

A68-80392
THE ADAPTIVE RESPONSE OF THE HUMAN CONTROLLER TO SUDDEN CHANGES IN CONTROLLED PROCESS DYNAMICS.
Duncan C. Miller and Jerome I. Elkind (Bolt Beranek and Newman, Inc., Cambridge, Mass.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-8, Sep. 1967, p. 218-223. 9 refs.
NASA Grant NsG 107-61 and Contract AF 33(657)-10124.

The model described above is able to provide reasonably accurate predictions of the behavior of well-trained human operators. It not only accounts well for their correct responses, but also frequently explains their mistakes. The major limitation of the model, from a practical standpoint, is that it concerns itself with the behavior of highly trained subjects who are expecting changes in the controlled process to occur, and who are trained to adapt to these changes. With less highly trained subjects, one would expect to see a great deal more variability in the results. However, the present model should serve as a limiting case for their behavior, and should at least provide a framework for interpreting their decisions and actions.

A68-80393
HUMAN PERFORMANCE IN A CROSS-COUPLED TRACKING SYSTEM.
Ernest P. Todosiev (TRW Systems, Redondo Beach, Calif.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-8, Sep. 1967, p. 210-217. 8 refs.
NASA Contract NAS 1-4419.

Human tracking performance in a two-axis system with cross-coupling was evaluated by modeling the human operator with an asymmetric lattice network. A spectral analysis technique was developed to precisely identify each element of the network. Approximate identification is possible by using a less complex model matching technique. Four compensatory tracking system configurations with various degrees of symmetrical and asymmetrical cross-coupling were investigated. Decoupling equations were analytically derived which permit prediction of the cross-coupling elements in the lattice model in terms of the uncoupled elements and the plant dynamics. Analysis of a tracking experiment indicated that a trained human operator could essentially uncouple a coupled two-axis system with second order plant dynamics, provided the coupling was such that the operator was not required to introduce a 180 degree phase shift in generating the decoupling signal.

A68-80394
TWO-DIMENSIONAL MANUAL CONTROL SYSTEMS WITH SEPARATED DISPLAYS.
William H. Levison and Jerome I. Elkind (Bolt Beranek and Newman, Inc., Cambridge, Mass.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-8, Sep. 1967, p. 202-209. 18 refs.
NASA Contract NAS2-3080.

The results of a current study of multi-variable manual control systems are presented. The objectives of this study are to investigate the human controller's behavior in multivariable control situations and to develop models of the controller which take into account both the monitoring and the control functions that he typically performs in such systems. A series of two-variable manual tracking experiments was performed in which subjects were required to view two separated displays and operate two control devices to control the system. Performance was measured as a function of the display separation, the forcing-function bandwidth, the task difficulty, and the controlled-element dynamics. Human controller describing functions, eye movement distributions, and normalized mean-squared tracking error were obtained. Measurements of human controller describing functions when a single display is viewed peripherally for control of a single variable system were also obtained. A model for the human controller in the two-axis control situation was developed. It was tested against the data and was found to be a good predictor of performance. Extensions of this model to higher-dimension systems are discussed.

A68-80395
THE EFFECT OF THE CENTRAL NERVOUS SYSTEM STIMULATORS ON THE MOTOR ACTIVITY OF RATS AND UPON THE NOREPINEPHRINE LEVEL IN THE BRAIN STEM [VLIIANIE STIMULIATOROV TSENTRAL'NOI NERVNOI SISTEMY NA DVIGATEL'NUIU AKTIVNOST' KRYS I SODERZHANIE NORADRENALINA V STVOLE GOLOV-NOGO MOZGA].
P. A. Sharov (USSR, Acad. of Med. Sci., Inst. of Pharmacol. and Chemotherapy, Lab. of Pharmacol. of Nervous System, Moscow). *Farmakologiia i Toksikologiia*, vol. 30, Sep.-Oct. 1967, p. 535-539. 24 refs. In Russian.

Given in small doses phenamine (benzadrine) and pyridrol (pipradrol), while somewhat augmenting the motor activity of rats, do not influence the norepinephrine level in the brain stem. An

increased dosage of drugs, along with raising the motor activity of rats, also intensifies the reduction of the norepinephrine level. This becomes most accentuated in rats presenting manifestations of stereotype. Caffeine, given both in small and large doses, increases the motor activity of rats, without affecting in any way the norepinephrine content in the brain stem.

A68-80396
ON THE CENTRAL COMPONENT IN THE MECHANISM OF ANTIRADIATION ACTION PRODUCED BY MEXAMINE AND BETA-MERCEPTO-ETHYLAMINE [O TSENTRAL'NOM KOMPONENTE V MEKHANIZME PROTIVOLUCHEVOGO DEISTVIIA MEKSAMINA I BETA-MERKAPTOETILAMINA].
R. B. Strelkov and L. A. Parasochko (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Sukhumi).
Farmakologiia i Toksikologiia, vol. 30, Sep.–Oct. 1967, p. 615–616. In Russian.

Suboccipital introduction of mexamine in a dose of 2.5 mg./kg., which was subcutaneous and intraperitoneal administration proves inactive, elicits a distinct protective effect. A subliminal protective dose (25 mg./kg.) of beta-mercapto-ethylamine introduced by suboccipital route fails to produce any protective action.

A68-80397
EFFECT OF NICOTINE ON THE FOOD MOTOR CONDITIONED REFLEX ELABORATION RATE IN ALBINO RATS [VLIIANIE NIKOTINA NA SKOROST' VYRABOTKI PISHCHEVYKH DVIGATEL'NYKH USLOVNYKH REFLEKSOV U BELYKH KRYS].
M. N. Liniuchev and M. IA. Mikhel'son (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem. and S. M. Kirova Mil.-Med. Acad., Leningrad).
Farmakologiia i Toksikologiia, vol. 30, Sep.–Oct. 1967, p. 543–547. 16 refs. In Russian.

When injected intraperitoneally in a dose of 0.1 mg./kg. daily, 15 min. before the commencement of the experiment, nicotine-base accelerated the elaboration of food motor conditioned reflexes in the labyrinth of young rats weighing about 100 gm. In adult rats weighing over 200 gm. given in doses of 0.1 and 0.2 mg./kg. under similar conditions, it exercised no significant influence on the rate of the reflex elaboration, while in doses of 0.3, 0.4 and 0.5 mg./kg. it was apt to appreciably retard such an elaboration. Thus, the young animals showed not only a higher sensitivity to nicotine, but in rats of different age the effect of the drug on food motor conditioned reflexes proved to show qualitative variations.

A68-80398
INTERNAL MODELS AND THE HUMAN INSTRUMENT MONITOR.
Richard D. Smallwood (Bolt Beranek and Newman, Inc., Cambridge, Mass.)
IEEE Transactions on Human Factors in Electronics, vol. HFE-8, Sep. 1967, p. 181–187. 8 refs.
NASA Contract NA1-5059.

A general structure for the quantitative modeling of human operator behavior is discussed. The primary features of this structure are: (1) the mathematical description of the updating of operating information state by an internal model of the environment, and (2) the assumption of optimal behavior on the basis of current state of information. An application to simple instrument monitoring is presented. A first- and second-order internal model are studied, and the second-order internal model is shown to predict human sampling behavior that is more consistent with the experimental data.

A68-80399
THE INFLUENCE OF FORMULATION ON SKIN ABSORPTION.
J. W. Hadgraft (Roy. Free Hosp., London, Great Britain).
Journal Mondial De Pharmacie, no. 3, Jul.–Sep. 1967, p. 309–321. 33 refs.

The problem of conflicting ideas and contradictory evidence on percutaneous absorption in man was reviewed. Included topics were: (1) nature of the epidermal barrier; (2) hydration of the epidermal barrier; (3) physical characteristics of the penetrant; (4) effect of solvents; (5) surface active agents; (6) pharmaceutical formulation; and (7) investigation of percutaneous absorption. Suggestions for areas of further study are given.

A68-80400
MEASUREMENT OF CONTROL SKILLS, VIGILANCE, AND PERFORMANCE ON A SUBSIDIARY TASK DURING 12 HOURS OF CAR DRIVING.
I. D. Brown (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 10, Nov. 1967, p. 665–673. 15 refs. Med. Res. Council supported research.

Eight subjects were given short driving tests at 0700, 1000, 1300, 1400, 1700 and 2000 hr. on two days: (1) under experimental conditions of continuous driving and (2) under control conditions in which they carried on with their normal work between tests. Car control skills and performance on a subsidiary task of time-interval production were measured on a 2.2 mile test circuit in city traffic. Pulse rate and oral temperature were also recorded. Vigilance was measured during main-road driving on the experimental day by scoring time taken to respond to a light signal. Vigilance improved significantly during the spell of prolonged driving. Time-interval production was reliably more variable under experimental conditions than under control, but this difference was independent of the duration of the driving period. Differences in car-control skills between conditions were slight and statistically unreliable. These results support previous findings that a virtually continuous 12 hr. period of driving during the normal working day need not affect either perceptual or motor skills adversely. The apparent discrepancy between present findings, that performance on the subsidiary task was worse on the day of prolonged driving, and previous findings, that it tended to be better, is briefly discussed in relation to the general problem of measuring performance by the dual-task method.

A68-80401
GENERALIZATION GRADIENTS AS INDICANTS OF LEARNING AND RETENTION OF A RECOGNITION TASK.
Harry P. Bahrick, Sandra Clark, and Phyllis Bahrick (Ohio Wesleyan U., Delaware).
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 464–471. 16 refs.
Grant NIH HD00926-05.

Subjects were required to select previously exposed pictures of common objects from among series of alternative pictures graded in similarity to the prototypes. Response frequencies were plotted in the form of generalization gradients, and such gradients were obtained following four stages of training and three retention intervals. In Part II, subjects were trained by exposing the same prototype stimuli, but recognition tests consisted of alternatives at one of three homogeneous levels of similarity to the prototypes. Learning curves based upon the three types of tests differ markedly in slope, reflecting the differential sensitivity of various dichotomous tests to the changes in the discriminability function. It was shown that the slope of each curve could be predicted accurately from

the gradients obtained in Part I. Thus, generalization gradients were shown to be sensitive, parsimonious representations of the recognition learning process.

A68-80402
EFFECT OF HYPOXIA ON THE CARDIAC ACTIVITY OF YOUNG AND OLD ANIMALS WITH EXPERIMENTAL ATHEROSCLEROSIS [VLIIANIE GIPOKSII NA SERDECHNUIU DEIATEL'NOST' MOLODYKH I STARYKH ZHIVOTNYKH S EKSPERIMENTAL'NYM ATEROSKLEROZOM].
L. P. Cherkasskii (UkrSSR, Inst. of Gerontol., Lab. of Pathophysiol., Kiev).
Kardiologiia, vol. 7, Oct. 1967, p. 119-122. 13 refs. In Russian.

Progressively rising hypoxia (experiments in a pressure chamber) was applied to old and young atherosclerotic and normal animals to make a comparative study of its effect upon their heart activity. The heart response thereto in old animals with experimental atherosclerosis differed from that in old normal animals and especially in young atherosclerotic ones by a less pronounced phase of quickened cardiac contractions and by a number of other important indices. The adaptive capacity of the organism with respect to progressively rising in time oxygen deficiency is distinctly reduced in old atherosclerotic animals. It is likewise (but to a lesser extent) reduced in normal old animals, as well as in young ones with experimental atherosclerosis.

A68-80403
THE VARIABILITY OF SINGLE EVOKED VERTEX POTENTIALS IN MAN.
S. Zerlin and H. Davis (Central Inst. for the Deaf, St. Louis, Mo.).
Electroencephalography and Clinical Neurophysiology, vol. 23, Nov. 1967, p. 468-472. 7 refs.
Grant PHS NB-03856.

The variability of single (not averaged) auditory evoked responses was studied in a subject with uniquely high voltage vertex potentials. Her N_1-P_2 amplitude averaged about 100 μV, at 80 db. hearing level (ISO) with 10 sec. inter-stimulus intervals. The voltages of single responses varied widely in approximately Gaussian distributions. No cyclical pattern of variation in amplitude was found. With shorter inter-stimulus intervals or with weaker stimuli the average responses were smaller, the distributions were still Gaussian and the standard deviations were smaller. This combination suggests the interaction of a random process with the parameters such as intensity and inter-stimulus interval that determine the amplitude of each response.

A68-80404
MUSCLE ACTION POTENTIAL AND HAND SWITCH DISJUNCTIVE REACTION TIMES TO VISUAL, AUDITORY, AND COMBINED VISUAL-AUDITORY DISPLAYS.
Michael J. Wargo, Charles R. Kelly, Daniel J. Prosin, and Meredith B. Mitchell (Dunlap and Assoc., Inc., Western Div., Santa Monica, Calif.).
(Eastern Psychol. Assn., Meeting, Boston, Mass., Apr. 1967).
IEEE Transactions on Human Factors in Electronics, vol. HFE-8, Sep. 1967, p. 223-226. 9 refs.
NASA Contract NAS 12-103.

Muscle action potential and hand switch disjunctive reaction times of three male subjects to visual, auditory, and combined visual-auditory display were observed. Muscle action potential responses were found to be considerably faster than hand switch responses. Within each response mode, reaction times with the combined display were faster than visual display reaction times.

A68-80405
HYPERBARIC CHAMBER AND DECOMPRESSION SICKNESS. AN EXPERIMENTAL STUDY.
Sun Shik Shim, Frank P. Patterson, and Marie J. Kendall (Brit. Columbia U., Div. of Orthopedic Surg., Vancouver and Vancouver Gen. Hosp.).
(North Pacific Orthopedic Soc., 42nd Ann. Meeting, Seattle, Wash., May 18-20, 1967).
Canadian Medical Association Journal, vol. 97, Nov. 18, 1967, p. 1263-1272. 32 refs.
Grant MRC, Canada MA-2642 and Brit. Columbia U. supported research.

Decompression sickness was studied experimentally in a large hyperbaric chamber. Rabbits were compressed for 90 min. at three to five atmospheres pressure absolute, and decompressed either by standard or rapid precedures. One of 31 rabbits died following standard decompression and nine of 18 died following rapid decompression. All surviving animals were sacrificed within a few hr. after decompression. Postmortem examination revealed many gas bubbles in the blood vessels and tissue spaces of animals that died during the experiment but none in the animals that survived. Many fat emboli, however, were found in the lungs of most of the animals that died as well as of those that survived. The origin and significance of the fat emboli are unknown. Paralyses of the extremities were observed. Aseptic necrosis of bone could not be produced despite repeated compression-decompression three times a wk. for three or four mo. Only cystic lesions were observed in the bone marrow of one animal. The risk of decompression sickness in hyperbaric therapy was emphasized.

A68-80406
THE INFLUENCE OF ETHANOL ON AVOIDANCE REFLEXES IN RATS AFTER SHORT-TERM AND LONG-TERM COLD ACCLIMATIZATION [DZIALANIE ETANOLU NA WARUNKOWE ODRUCHY UCIECYKI U SZCZUROW KROTKOTRWALE I DLUGOTRWALE AKLIMATYZOWANYCH DO ZIMNA].
Ryszard Molenda.
Acta Physiologica Polonica, vol. 18, Sep.-Oct. 1967, p. 833-840. 9 refs. In Polish.

Studies on the influence of ambient temperature and time of duration of cold acclimatization on avoidance reflexes after administration of ethanol in dose 3 g./kg. were performed. It was found that the depressant effect of ethanol in acclimatized rats was greater at temperature 4°C., particularly in short-term acclimatized rats. The effect of ethanol in an environment of 20°C. was smaller in acclimatized rats than in unacclimatized animals.

A68-80407
THE EFFECT OF ENDURANCE EXERCISE ON THE ELECTROPHORETICAL PATTERN OF LIVER, SKELETAL MUSCLE AND BLOOD SERUM PROTEINS IN RATS FED WITH DIETS OF DIFFERENT PROTEIN VALUES [WPLYW WYTRZYMALOSCIOWEGO WYSILKU FIZYCZNEGO NA ZMIANY ROZPUSZCZALNYCH FRAKCJI BIALEK WATROBY, MIESNI SZKIELETOWYCH ORAZ SUROWICY KRWI PRZY STOSOWANIU DIET O ROZNEJ WARTOSCI BIOLOGICZNEJ BIALKA].
Zenon Jendykiewicz, Lech Hryniewiecki, and Ryszard Bernat.
Acta Physiologica Polonica, vol. 18, Sep.-Oct. 1967, p. 765-776. 25 refs. In Polish.

Experiments were done on 60 adult rats divided into two equal groups fed for 43 days with isocaloric diets: high protein value (NDpCal%—9.3), and protein-free diet (NDpCal%—0.0). All the animals except those belonging to the control groups were run on a treadmill covering a distance of 1,825 m. in one hr. It was found

that this exercise brought about changes in the electrophoretic pattern of soluble liver and skeletal muscle as well as blood serum proteins. Total serum protein concentration as well as albumin, β and γ globulin levels increased one hr. after exercise in both groups of animals. After 24 hr. these alterations leveled off, and a decrease in serum albumin concentration was observed in rats fed with the diet of a high protein value. Also, 24 hr. after exercise in animals kept on high protein regimen a decrease in total liver soluble proteins and the fast moving electrophoretic fraction was observed. In the same period a significant rise in the second fraction of skeletal muscle soluble proteins was observed. The authors suggest that fast moving fractions of soluble liver proteins as well as the second myogen fraction of skeletal muscle-proteins may take part in the response of nitrogen metabolism to severe exercise and contribute to the so-called "labile protein pool"

A68-80408

ELECTRIC FUNCTION POTENTIALS OF THE AUDITORY ANALYSER [ELEKTRYCZNE POTENCJALY CZYNNOSCIOWE ANALIZATORA SLUCHOWEGO].

Jan Sekula and Jan Trabka.

Acta Physiologica Polonica, vol. 18, Sep.–Oct. 1967, p. 747–754. 15 refs. In Polish.

The material and methods of examination of bioelectric potentials in the organ of hearing in the cat are described. The microphonic potential of the cochlea, curves of functional currents of the acoustic nerve N_1 and N_2, a curve from the inferior colliculus of the medial geniculate body, and from the acoustic area of the cerebral cortex are presented. In acute experiments, leads were derived simultaneously from several points in the organ of hearing and auditory channels.

A68-80409

TOXICITY OF OXYGEN IN CONTROLLED VENTILATION IN EXPERIMENT [TOXICITA KYSLIKU PRI RIZENEM DYCHANI V EXPERIMENTU].

S. Pautler, I. M. Cimons (Mem. Hosp., Dept. of Anesthesiol., New York, N. Y.), R. Totten, and P. Safar (Presbyterian U. Hosp., Pittsburgh, Pa.)

Rozhledy v Chirurgii, vol. 46, Apr. 1967, p. 214–218. 10 refs. In Czech.

Controlled ventilation was carried out in ten dogs during pentobarbiturane anaesthesia and relaxation by succinylcholine. One lung was ventilated with pure oxygen, the other by air. Every animal served as its own control. After 48 hr. there were no changes found specific only for oxygen toxicity. Real atelectases were not proved. Microscopically interstitial emphysema, edema, hemorrhagia and cellular infiltration were observed. The rate of these findings was higher on the side ventilated by oxygen than on the opposite one. Their incidence and extent was directly dependent on the time of controlled respiration; therefore, it may be that they originated due to this respiration and were aggravated by pure oxygen.

A68-80410

THE EFFECT OF THIAMINTETRAHYDROFURFURYLDISULFIDE ON THE RADIATION SYNDROME [DER EINFLUSS VON THIAMINTETRAHYDROFURFURYLDISULFID AUF DAS STRAHLENSYNDROM].

E. H. Graul, W. Rüther, and G. Kovács (Philipps-U., Inst. für Strahlenbiol. and Med. Isotopenanwendung, Marbury/Lahn, West Germany).

Atompraxis, vol. 13, no. 6, 1967, p. 269–270. 14 refs. In German.

The antiradiation and therapeutic effects of thiamintetrahydrofurfuryldisulfide (TTFD) were compared with those of vitamin B_1-treated and unprotected control mice and rats. It was shown that weight loss was prevented in animals treated with TTFD. Cell damage in the epithelium of the small intestine was small and cellular kinetics remained essentially unchanged.

A68-80411

TREATMENT OF LEAD POISONING. A COMPARISON BETWEEN THE EFFECTS OF SODIUM CALCIUMEDETATE AND PENICILLAMINE ADMINISTERED ORALLY AND INTRAVENOUSLY.

Stig Selander (Göteborg U., Sahlgrenska Sjukhuset, Med. Serv. I., Sweden).

British Journal of Industrial Medicine, vol. 24, Oct. 1967, p. 272–282. 35 refs.

Grant MRC, Swed. W366+B67-61P-2094-01; Försäkringsföretaget Fölksam supported research.

In 16 workers with lead poisoning of varying degrees, a comparison was made between the therapeutic efficacy of sodium calciumedetate (Ca–EDTA) and penicillamine (PCA), administered intravenously and orally. The question of comparable dosages of ligands, forming metal complexes in different ways, was discussed. With the dosages given, intravenous Ca–EDTA promoted the greatest output of lead in the urine, followed by intravenous and oral PCA. These three agents also had a very satisfactory effect on the output of δ-aminolaevulinic acid (ALA) in urine. Oral Ca–EDTA was found to be greatly inferior in both these respects. In order to study the absorption of the agents and the renal excretion of the formed lead complexes, the urine was collected quantitatively and fractionated in consecutive four hr. periods, after which the lead excretion during each period was determined. It was found that the oral absorption of PCA was rapid and quantitatively great, whereas the oral absorption of Ca–EDTA was very slow and quantitatively small. The possible resorption of ligand-lead complexes was discussed and indications were found of resorption of the Ca–EDTA-lead complex but not of the PCA-lead complex. The renal excretion of the different ligand-lead complexes was very effective and reached its maximal level within four hr. However, in some subjects excretion of the Ca–EDTA-lead complex showed some delay. An investigation, in four subjects, of a blocking effect of porbenecid on the renal excretion of PCA and/or PCA-lead complexes gave no conclusive results. It was concluded that oral PCA is satisfactory in most cases of lead poisoning. However, in more severe cases intravenous treatment is preferable. Whether Ca–EDTA or PCA should be chosen appeared to be unimportant as both are quite satisfactory from the point of view of treatment, but Ca–EDTA may cause more serious side-effects. Oral Ca–EDTA was quite unsatisfactory and there was good evidence indicating that it caused a resorption of Ca–EDTA-lead complexes from the gastro-intestinal tract.

A68-80412

ASSESSING THE HEAT STRESS AND ESTABLISHING THE LIMITS FOR WORK IN A HOT MINE.

C. H. Wyndham, A. McD. Allan, G. A. G. Bredell, and R. Andrew (Human Sci. Lab., Johannesburg, South Africa and Mount Isa Mines Ltd., Queensland, Australia).

British Journal of Industrial Medicine, vol. 24, Oct. 1967, p. 255–271. 23 refs.

In order to determine which of the various heat stress indices most accurately predicts the effects of different heat stress factors and to judge the limits of heat stress exposure, oral temperatures were measured in 86 workmen after three hr. under ordinary work conditions and in volunteers after three hr. of stepping on and off a stool at a work rate of 1,560 ft. lb./min. Dry bulb air temperatures, wet bulb temperatures, velocity of air movements and globe temperature (GT) were measured in the microclimate of each worker. Work rate was estimated. From the

estimates and measurements, the predicted four-hourly sweat rate (P_4SR) and corrected effective temperature (CET) values were determined for each stress condition. P_4SR values varied between 0.9 and 6.5 and CET between 70° and 95°F. The results indicated that the emphasis given to GT and the P_4SR index is too great. It appeared that the P_4SR index should be revised. A simple graphical method was developed for use in determining when the level of work and environmental heat stress have reached such a point that work time must be reduced or stopped completely.

A68-80413
AUDITORY AND SUBJECTIVE EFFECTS OF AIRBORNE NOISE FROM INDUSTRIAL ULTRASONIC SOURCES.
W. I. Acton and M. B. Carson (Southampton U., Inst. of Sound and Vibration Res., Audiol. Group, and Mullard Ltd., Millbrook Works, Great Britain).
British Journal of Industrial Medicine, vol. 24, Oct. 1967, p. 297–304. 28 refs.
Grant MRC 965/268/C.

The possibility of hearing damage from industrial ultrasonic equipment was investigated. Ultrasonic washers and drills were used at a number of different locations in a factory, and girls working 12 ft (3.6 m.) away from one bank of three small washers complained of unpleasant subjective effects which included fatigue, persistent headaches, nausea, and tinnitus. As personnel working in the vicinity of similar washers in other parts of the factory did not complain of these effects, it seemed possible that the noise had been transmitted along a column of air in a bank of dry-boxes. Enclosure of these washers by a sliding screen of Perspex had completely abated the trouble. Sound pressure level measurements taken in the positions occupied by the operators indicated that, when these effects occurred, they were probably caused by high sound levels at the upper audio-frequencies present with the ultrasonic noise, and this was supported by a limited laboratory investigation. Audiometric investigation showed that hearing damage due to noise from these industrial ultrasonic devices is unlikely. However, extrapolations of currently accepted hearing damage risk criteria may be valid in predicting the occurrence of these subjective effects.

A68-80414
A STUDY OF THE SKIN ABSORPTION OF ETHYLBENZENE IN MAN.
Tadeusz Dutkiewicz and Halina Tyras (Med. Acad., Dept. of Toxicol. Chem. and Ind. Toxicol., Lódź, Poland).
British Journal of Industrial Medicine vol. 24, Oct. 1967, p. 330–332. 9 refs.

The absorption of ethylbenzene through the skin of the hand and the forearm in men was investigated experimentally. Both the absorption of liquid ethylbenzene and the absorption from aqueous solutions were studied. The rate of absorption of liquid ethylbenzene was 22 to 33 mg./cm.^{2}/hr., and the rates from aqueous solutions were 118 and 215 μg./cm.^{2}/hr. from mean concentrations of 112 and 156 mg./1. The mandelic acid excreted in urine was equivalent to about 4.6% of the absorbed dose—much less than after lung absorption. Urinary mandelic acid does not provide a reliable index of absorption when there is simultaneous skin and lung exposure.

A68-80415
EFFECT OF SUPPLEMENTAL VISUAL CUES ON ROTARY PURSUIT.
Norman B. Gordon and Merrill J. Gottlieb (Yeshiva U., New York, N. Y.)
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 566–568.
Grant PHS MH-08087.

The effects of supplemental visual cues on performance and learning of a rotary pursuit (RP) task were studied. Two forms of augmented visual feedback (AF) were compared with a no-feedback condition in which 15 naive, male, right-handed, undergraduate subjects participated per group. The supplementation consisted of a yellow light which illuminated the RP display when the subject was either on target (Group ONTAF), or off target (Group OFTAF). Thirty-three training and nine transfer 20-sec. trials (when AF was withdrawn) were given in two testing sessions, 21 trials to a session. Both modes of AF presentation were superior to the no-AF condition during both training and transfer. A slight superiority was noted for off-target AF.

A68-80416
IMAGE SIZE AND INSTRUCTIONS IN THE PERCEPTION OF DEPTH.
Albert J. Dinnerstein (New York Med. Coll., N. Y.)
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 525–528. 7 refs.

A life-size postage stamp was paired with one of three different sized pictures of a matchbook so as to isolate the variable of familiar size from heterogeneity of image size. Instructions preceding the stimulus stressed judging distances or were nondirective. Among both instruction groups familiar size determined the direction of perceived depth but not the choice between three dimensionality and two dimensionality. Heterogeneity of image size increased reports of three dimensionality, but only following nondirective instructions. The use of nondirective instructions uncovers effects of stimulation on perception which are concealed by traditional procedures.

A68-80417
STIMULUS LEARNING AND RECOGNITION IN PAIRED-ASSOCIATE LEARNING.
Harley A. Bernbach (Cornell U., Uthaca, N. Y.)
Journal of Experimental Psychology, vol. 75, Dec. 1967, p. 513–519. 14 refs.
Contract AF 49-(638)-1235.

The stimulus learning phase of paired-associate learing (PAL) was considered to result from the same process as recognition learning, the storage and retention of a stimulus tag. It was assumed that the availability of the tag is a requirement for the recall of a PAL response, and that if the tag is forgotten the association will be effectively lost. Retention of this stimulus tag was also assumed to be the basis of recognition-memory performance. These assumptions were tested by a continuous PAL experiment in which subjects were required to identify each of a series of 240 consonant trigrams as new or old in addition to anticipating a PAL response, one of the digits one, two, or three. Critical items appeared four times each, at intervals of two, five, or ten intervening items. Performance on the PAL task was no better than chance on items called "new," and the proportion of correct PAL responses increased with the number of consecutive times that the stimulus was called "old," independent of the number of presentations of the item. This proportion did not, however, increase with the total number of repetitions of the item if the number of consecutive recognitions was held constant.

A68-80418
GROUP RISK TAKING AND FIELD DEPENDENCE–INDEPENDENCE OF GROUP MEMBERS.
Michael A. Wallach, Roger B. Burt (Duke U., Durham, N. C.), and Nathan Kogan (Educ. Testing Serv., Princeton, N. J.)
(Am. Psychol. Assn., Meeting, New York City, Sep. 1966).
Sociometry, vol. 30, Dec. 1967, p. 323–338.

If groups of male adults are systematically composed in terms of the field dependence–independence of their members, they exhibit a number of differences in risk-taking phenomena. Although field-dependent and independent groups both shift on the average toward greater risk taking after discussion, longer discussion among field dependents enhances the risky shift, while longer discussion among field independents reduces or even reverses the risky shift. Further, among field dependents but not among field independents, the larger the individual's own risky shift, the stronger his tendency to attribute a risky shift to the group of which he is a member. These together with other findings support the view that responsibility diffusion causes enhanced risk taking by field-dependent groups.

A68-80419

COMPARISON OF VARIOUS CIRCULATORY REACTIONS DURING PHYSICAL AND MENTAL EXERTION INCLUSIVE OF THE DIFFERENTIAL QUOTIENT OF QRS [VERGLEICH VERSCHIEDENER KREISLAUFREAKTIONEN WAHREND KORPERLICHER UND GEISTIGER BELASTUNG EINSCHLIESSLICH DES DIFFERENTIALQUOTIENTEN VON QRS].

M. Blohmke, H. Schaefer, and O. Stelzer (Heidelberg U., Inst. für Social and Work Med., West Germany).

Ergonomics, vol. 10, Nov. 1967, p. 699–705. 12 refs. In German.

During mental exertion different values of cardiovascular regulation were measured in 22 male and female students. In particular the derivative of QRS as a speed measure of the myocardial spread of excitation was recorded continuously. Pulse rate, systolic blood pressure and the ratio of the R to T amplitudes of the electrocardiogram increased whereas the amplitude of the finger pulse curve, the amplitude of R in several leads and the height of the QRS derivative decreased. The QRS derivative increased, however, during physical work. Whether the reduction of the derivative of QRS is due to a decrease in the sympathetic tone, to an influence of the parasympathetic or to other influences is the subject of further studies.

Subject Index

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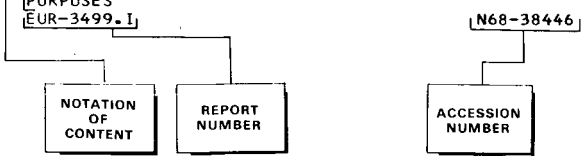

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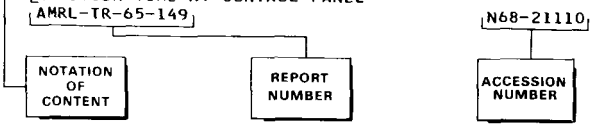
VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
AMRL-TR-65-149 N68-21110



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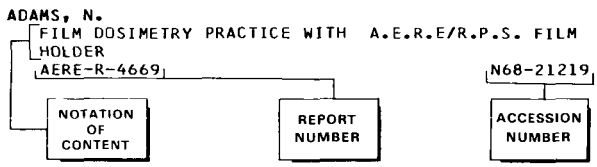

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