NASA SP-7011 (11)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (11)

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A CONTINUING BIBLIOGRAPHY

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during April, 1965.

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. MAY 1965

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

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:

a. NASA entries identified by their *STAR* accession numbers (N65-10000 series),
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Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

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(continued)

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For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

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Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

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a continuing bibliography MAY 1965

STAR ENTRIES

N65-16403 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PROBLEMS OF ENGINEERING PSYCHOLOGY IN COSMONAUTICS AND CERTAIN INVESTIGATIONAL RESULTS

V. G. Denisov, Ye. S. Zav'yalov, A. P. Kuz'minov, M. M. Sil'vestrov, and V. D. Yazdovskiy *In its* Cosmic Res., Vol. 2, No. 5, 1964 4 Nov. 1964 p 207–233 refs (See N65-16391 07-30)

The article presents a definition of engineering psychology and its problems in the development of spacecraft control systems, and the training of cosmonauts [astronauts] in their professional activities. A complex method is proposed for the evaluation of the closed operator-vehicle system in which, in conjunction with the application of cybernetics and information theory to provide engineering estimates for the technical elements, extensive use is also made of physiological recording of the biopotentials of various human functional systems characterizing the level of tension and ability of the operator to function. Certain of the problems involved in the development of training facilities are touched upon. A system consisting of complex, specialized, and functional training facilities is recommended for the solution of problems relating to the training and maintenance of skills on the parts of the cosmonauts. The development of onboard training facilities is recommended for the maintenance of skills in prolonged space flights. Author

N65-16404 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

REACTIVITY STATE OF ANIMAL ORGANISM AFTER SUBJECTION TO CERTAIN SPACE-FLIGHT FACTORS

V. V. Antipov, V. I. Davydov, E. F. Panchenkova, P. P. Saksonov, and G. A. Chernov *In its* Cosmic Res., Vol. 2, No. 5, 1964 4 Nov. 1964 p 234–246 refs (See N65-16391 07-30)

Data are given on the changes in the reactivity of animals of physical exertion following subjection to g-forces, the combined action of acceleration and X-irradiation, and irradiation by 120-MeV protons. The shifts detected indicate a persistent change in the stability to physical load following subjection to acceleration, ionizing radiation and combinations of these factors. The change in the tolerance of centrifuged animals to physical load correlates with ceruloplasmin shifts in the blood serum. Author

N65-16405 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL INVESTIGATIONS OF THE INFLUENCE OF LANDING IMPACT g-FORCES ON THE ANIMAL ORGANISM

S. A. Gozulov, G. P. Mirolyubov, N. N. Popov, and N. I. Frolov *In its* Cosmic Res., Vol. 2, No. 5, 1964 4 Nov. 1964 p 247–257 refs (See N65-16391 07-30)

The results of experimental studies of the effect of landing-impact g-forces on animals are reported. The manner in which morphological changes in the internal organs and the degree of disturbance to the functions of the cardiovascular system depend on the magnitude of the disturbance is determined. Author

N65-16422# George Washington Univ., Washington, D.C. Human Resources Research Office

RADAR TARGET DETECTION AS INFLUENCED BY EXPERIENCE AND TRAINING

A. D. Wright, Edward W. Frederickson, and James L. Claflin 20 Oct. 1964 61 p refs Sponsored by Army (AD-455767)

The performance of experienced and inexperienced radar observers in detecting targets on the plan position indicator display of radar systems was investigated. The performances of the following three groups of observers were compared: (1) experienced observers, (2) inexperienced observers given "show and tell" training, and (3) inexperienced observers without any training. Statistically reliable differences between the three groups were observed. A second test with a Nike Hercules system and the AN/MPQ-36 radar target and ECM simulator confirmed the findings of the first test. No reliable differences in detection occurred that were associated with the experience factor. G.G.

N65-16429*# Florida State Univ., Tallahassee. Dept. of Psychology

PERIPHERAL MECHANISMS OF HUMAN TEMPERATURE SENSITIVITY Status Report No. 5, 1 Sep. 1963–29 Feb. 1964

D. R. Kenshalo [1964] 4 p refs (Grant NsG-148-61) (NASA-CR-56192) OTS: HC $1.00/MF $0.50

In investigating the effect of variables which affect the temperature threshold of the skin when adapted to temperatures between 27° C and 42° C, the menstrual cycle was manipulated by the use of oral contraceptives, and the link between the change in threshold and a change in the hormone balance of the female was clearly indicated. In concurrent measurement of changes in the cutaneous vascular activity and the cool threshold as a function of the temperature to which the skin is adapted, the effect of adrenalin iontophoresis, increasing both

the warm and cool thresholds, was interpreted to mean that constricting smooth muscles directly affects the thermal threshold. In investigations of the spatial summation of warm stimuli to produce a threshold response, equations fitted to the curves of areal summation on the forehead, forearm, and back show that the equations for the curves have the general form of log I + K log A = a constant, where I is intensity, A is area, and K is a constant. In an investigation of the temporal course of adaptation to thermal stimuli, a method was devised in which the subject, by moving a key, can keep the stimulation just noticeably warm. R.L.K.

N65-16430*# Virginia Univ., Charlottesville. Medical College
[MECHANISMS OF CONTROL OF CEREBRAL CIRCULATION] Progress Report
[1962] 2 p ref
(Grant NsG-156-61)
(NASA-CR-50682) OTS: HC $1.00/MF $0.50

Experiments have been performed, using rapid manual sampling from the jugular bulb, which allow analysis of the simultaneous pattern of response of arterial CO_2 tension, cerebral blood flow, as indicated by cerebral $(A\text{-}V)O_2$, and jugular venous PCO_2 to a given level of inspired CO_2. The arterial PCO_2 takes approximately 2.5 to 3 minutes to achieve a plateau value. The jugular venous PCO_2 follows the arterial closely but may lag behind as much as one minute. Cerebral blood flow achieves its peak level in from 0 to 120 seconds after the arterial peak PCO_2 is reached, or as much as 4 minutes after initial exposure to carbon dioxide. The arterial lag time might well be primarily a result of the "buffer" effect of the lungs. The further delay of cerebral blood may well be due to the hysteresis phenomenon which is not of comparable magnitude in every individual. Observations of the overall pattern in these experiments reveal that while arterial and jugular CO_2 tensions are similar in their behavior, the changes in blood flow correspond more closely to the fluctuations in arterial CO_2 tensions. I.v.L.

N65-16431*# Naval School of Aviation Medicine, Pensacola, Fla.
THE PROBLEM OF MAN'S GRAVITATIONAL-INERTIAL FORCE ENVIRONMENT IN SPACE FLIGHT Progress Report No. 2, 1 Jun.–30 Sep. 1963
Ashton Graybiel [1963] 2 p refs
(NASA Order R-93)
(NASA-CR-51786) OTS: HC $1.00/MF $0.50

By exposing normal persons and deaf subjects with bilateral vestibular defects to centripetal force on a human centrifuge while submerged to the neck in water, the contribution of the otolith organs to postural and visual upright was demonstrated. Comparative measurements obtained (utilizing C-131 and KC-135 aircraft modified for exposing subjects to zero g and subgravity states) on normal persons and labyrinthine defective subjects included ocular counter-rolling, perception of the upright, and susceptibility to canal sickness. P.V.E.

N65-16432*# Republic Aviation Corp., Farmingdale, N. Y. Space Environment and Life Sciences Lab
STUDY OF THE NORMAL FECAL BACTERIAL FLORA OF MAN Quarterly Progress Report, Jul.–Sep. 1963
Lorraine S. Gall 7 Oct. 1963 5 p
(Contract NASw-738)
(NASA-CR-52232) OTS: HC $1.00/MF $0.50

Anaerobic and aerobic cultures of the normal fecal bacterial flora of man were studied. The preliminary results of the anaerobic culturing of human feces showed that strict anaerobes are present in approximately one trillion per gram of feces or more. These anaerobes are of diverse types, and each man carries a variety of strictly anaerobic organisms. Observations of gram stains revealed, in addition to the usually described bacteria, a predominance of extremely tiny rods and cocci, both gram negative and gram positive. The results of aerobic culturing showed that less than a billion aerobes were found in each sample. Five subjects had less than one million aerobes per gram of feces, and all but two showed less than 100 million per gram. Two subjects had roughly 200 to 550 million aerobes. These results point out the striking predominance of the strict anaerobes over the aerobes. I.v.L.

N65-16433*# Naval School of Aviation Medicine, Pensacola, Fla.
THE PROBLEM OF MAN'S GRAVITO-INERTIAL FORCE ENVIRONMENT IN SPACE FLIGHT Progress Report No. 4, 1 Jan.–31 Mar. 1964
Ashton Graybiel [1964] 4 p refs
(NASA Order R-93)
(NASA-CR-56358) OTS: HC $1.00/MF $0.50

Nystagmus habituation to both simple and complex vestibular stimulation is influenced by visual factors. The influence is specific to the direction of the reaction inhibited by vision. Evidence was obtained which supports the thesis that voluntary visual suppression of nystagmus by the subject is a subtle variable which partially controls nystagmus habituation. The decreasing functional response of the otolith organ as a function of decreasing levels of gravity-inertial force between the earth's gravity and weightlessness has been determined. Ten subjects with labyrinthine defects (L-D), one subject with a high threshold to thermal stimulation of the canals, and sixteen normal subjects were exposed to extremely heavy seas. Only one of the L-D subjects had symptoms suggesting seasickness. All of the normal subjects but one were sick. E.E.B.

N65-16436*# Northrop Space Labs., Hawthorne, Calif. Bioastronautics Lab.
BIOLOGICAL AND PHYSIOLOGICAL STUDIES OF *PEROGNATHUS* (POCKET MICE) Fifth Quarterly Status Report, 1 Mar.–31 May 1963
R. G. Lindberg, R. M. Chew, and P. Hayden [1963] 20 p refs
(Contract NASr-91)
(NASA-CR-50597) OTS: HC $1.00/MF $0.50

Results of investigations of biological rhythms in pocket mice have led to the following conclusions: (1) Pocket mice (*Perognathus longimembris* and *Perognathus inornatus*) demonstrate a circadian metabolic rhythm. (2) This rhythm is obviously in agreement with the natural phctoperiod. The mice, which are nocturnally active under natural conditions, show metabolic lows during daylight hours and metabolic highs during nighttime hours. This occurs even when animals are in continuous darkness for 6 to 7 days. (3) Starvation and low ambient temperatures accentuate the amplitude of the rhythm so that there is an occurrence of deep hypometabolism almost every day. (4) The approximate 24-hour period of the rhythm is not altered by keeping individual pocket mice in continuous darkness, isolating them from sound, exposing them to air with 4.5% CO_2 or to atmospheres saturated with water vapor, or exposing them to 1400 r Co^{60} irradiation. (5) There is a tendency for the rhythms of starved mice, when kept in groups, to become synchronized, and there is also a tendency for some individuals to "drop out of the

rhythm" for one or more days by remaining deeply hypometabolic. These conclusions have led to the preliminary design of a biological experiment in space. This experiment will study the effect of extraterrestrial residence on the circadian metabolic rhythm of pocket mice (*Perognathus longimembris*).
I.v.L.

N65-16478*# Resources Research, Inc., Washington, D. C.
RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE Quarterly Progress Report No. 10
Gilbert V. Levin et al 25 Sep. 1963 58 p refs
(Contract NASr-10)
(NASA-CR-55535) OTS: HC $3.00/MF $0.50

Pure cultures and microorganisms in soils continued to yield positive responses when cultured in a labeled M8 medium containing formate (0.13 mM, 3.3 μc/ml)-glucose (0.21 mM, 1.0 μc/ml)-lactate (0.44 mM, 2.2μc/ml). The study of acrolein for use as an antimetabolite showed it to be heat stable and chemically unreactive with the labeled substrates, but not completely effective as an inhibitor in the concentration employed. A preliminary photosynthetic determination was carried out with the alga *Scenedesmus quadricauda*. Five tests were performed with the Gulliver space probe. The results of the tests are presented.
R.T.K.

N65-16483*# Naval School of Aviation Medicine, Pensacola, Fla.
ENERGY DISSIPATION CHARACTERISTICS IN TISSUE FOR IONIZING RADIATION IN SPACE Progress Report No. 3, 1 Jun.–31 Aug. 1963
Hermann J. Schaefer [1963] 2 p ref
(NASA Order R-75)
(NASA-CR-51826) OTS: HC $1.00/MF $0.50

A method for improving the resolution of the linear energy transfer (LET) spectrum of heterogeneous proton beams at the upper end of the LET scale is described. The spectrum analysis covers the entire LET range of protons. Application has been confined to one typical flare-produced proton spectrum ($2g/cm^2$ and $8g/cm^2$) for the Watt spectrum of neutron recoil protons. Results show that though the fractional dosage effected at LET values about the Bragg peak generally remains at a few percent of the total ionization dosage, it changes markedly depending on the depth in tissue analyzed. Consequently, a complete measurement of the radiation load from a solar proton beam requires separate determination of total dosage and of the second maximum at the upper end of the LET scale.
R.E.S.

N65-16484*# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center
ENERGY DISSIPATION CHARACTERISTICS IN TISSUE FOR IONIZING RADIATION IN SPACE Progress Report No. 2, 1 Mar.–31 May 1963
Hermann J. Schaefer [1963] 2 p
(NASA Order R-75)
(NASA-CR-50471) OTS: HC $1.00/MF $0.50

The evaluation of emulsion packs flown on the MA-8 mission showed a pronounced directional effect of low and medium energy protons which were picked when the vehicle passed, on three of its six orbits, through the Capetown anomaly. This finding led to an investigation as to what extent the local hardware in the capsule would be responsible for the directionality of the radiation field inside. A greatly simplified model of a Gemini capsule, consisting of a conical part of low thickness with a spherical heat shield of large thickness as base, was assumed, and the radiation field inside was analyzed for three basic types of proton spectra. The distribution of the "air" dose inside the ship as well as the dosage field within a spherical target assumed at different locations inside the ship was determined. Results show that even for the greatly simplified model, a highly structured dose distribution prevails inside, due to different shield thicknesses offered to the incoming radiation for different directions. Furthermore the dose distribution within a compact target (human body) within the ship strongly depends on location and orientation. The magnitude of local air dose at a given location does not allow direct inferences on the dosage distribution that would develop in a compact target at that location. For instance, the dose to the lenses of the eyes changes only slightly with directional orientation of the head in the nose tip, but changes by a factor of two close to the heat shield. Quantitatively, the effects of low and medium energy protons depend on the steepness of the energy spectrum. They are more pronounced for the steeper spectra, such ast the ones reported for flare produced protons, but they are still quite significant, even for the smallest spectral slope reported for Van Allen Belt protons. The effects are completely reversed for the spectrum of the ordinary cosmic-ray beam due to the buildup phenomenon.
I.v.L.

N65-16485*# Naval School of Aviation Medicine, Pensacola, Fla.
CONDUCT RESEARCH ON THE EFFECT OF VERY STRONG FIELDS AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS Progress Report, 1 Feb.–30 Apr. 1964
D. E. Belscher [1964] 2 p
(NASA Order R-39)
(NASA-CR-56356) OTS: HC $1.00/MF $0.50

Four male volunteers were exposed to very low magnetic fields for 10 days. Also, as controls, two men were restricted to the same living conditions as the test subjects. Previous observations of flicker-fusion studies were confirmed. The scotopic flicker-fusion limit was reduced in all subjects during the 10 day exposure period by an average of 30% of its original value. Values returned gradually to control values during the after exposure control period.
E.E.B.

N65-16486*# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center
CONDUCT RESEARCH ON THE EFFECT OF VERY STRONG FIELDS AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS Progress Report, 1 Aug.–31 Oct. 1963
D. E. Beischer [1963] 3 p
(NASA Order R-39)
(NASA-CR-52453) OTS: HC $1.00/MF $0.50

A new procedure for the exposure of animals to very high magnetic fields was tried in coils used for pulse forming of metals. The experiments were made in a field of maximal 300000 gauss acting for a few microseconds during the discharge of the condenser. Mice survived this treatment, which is able to form metals of desired shapes. A human hand held a short distance from the coil feels a prickling sensation. Operating personnel described an involuntary stretching of the arm and considerable pain in the abdomen if this part of the body came in close proximity to a coil during the pulse discharge. These observations are of great interest since pulse forming is in the progress of being developed as a tool for metal forming in space. Also, the effects of the magnetic field on cell division of sea urchin eggs and on the heart rate of mammals were studied. The first stages of cell division of the eggs were delayed in fields of 140000 gauss. The heart rate of a squirrel monkey changed in rate and regularity during changes of magnetic fields of maximal 70000 gauss. I.v.L.

N65-16487*# Naval Medical Research Inst., Bethesda, Md.
[BASIC PHYSIOLOGICAL MECHANISMS WHICH DEFEND THE HUMAN BODY AGAINST HEAT AND COLD AND THE EXTENT AND EFFICIENCY OF ENERGY TRANSFORMATIONS IN THE HUMAN BODY AND IN ISOLATED BODY CONSTITUENTS AT THE MOLECULAR LEVEL] Quarterly Progress Report, 1 Jul.–30 Sep. 1963
T. H. Benzinger [1963] 7 p refs
(NASA Order R-38)
(NASA-CR-52183) OTS: HC $1.00/MF $0.50

Studies were continued in human energetics, including temperature regulation and the uses of gradient layer calorimetry, and in molecular energetics, including chemosynthesis. A tabular presentation is included for temperature stimuli, thermoreceptor firing rates, and regulatory responses in heat loss or heat production. J.E.T.

N65-16493*# General Mills, Inc., Minneapolis, Minn.
[RESEARCH TO DETERMINE THE EXISTENCE AND IDENTITY OF VIABLE MICROORGANISMS IN THE STRATOSPHERE] Quarterly Status Report No. 3, 19 Sep.–20 Dec. 1963
V. W. Greene [1963] 6 p
(Contract NASw-648)
(NASA-CR-53951) OTS: HC $1.00/MF $0.50

In order to improve postimpact protection, new anticontamination seals were developed consisting of nonabsorbent cotton plugs wrapped in gauze; these plugs were unaffected by autoclaving, pressure changes, or stratospheric temperatures, and performed well during altitude chamber tests. Sampling instruments were evaluated with regard to their sterilizability by autoclaving, their aerodynamic particle-trapping efficiency, and their postimpact contamination characteristics. The analytical results of the third flight are presented in which three samplers were used for measurement of the stratospheric contamination level and one sampler for flight control. The maximum limits of the contamination levels were established as less than 2×10^{-4} organisms per ambient cu ft at altitudes between 90 and 60 kft, and less than 1×10^{-3} organisms per ambient cu ft at altitudes between 60 and 40 kft. D.S.G.

N65-16497*# Resources Research, Inc., Washington, D. C.
RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE Third Annual Progress Report
Allen H. Heim 30 Mar. 1964 170 p refs
(Contract NASr-10)
(NASA-CR-56214) OTS: HC $5.00/MF $1.00

Gulliver III, the third model of the instrument designed to detect extraterrestrial life, successfully detected terrestrial microbial life in 12 field tests during the year. Four of the testing sites, specifically selected for their severe, adverse, environmental conditions, were Sheep Mountain, in the White Mountain Range of California, which was cold, rocky, barren terrain at an altitude of 12000 ft; Death Valley, California, which provided an arid, sandy environment; the salt encrusted desert flats of the Salton Sea in California; and Orange, Virginia, with its hard, iron-rich, clay surface. All of these extreme natural environment tests yielded good, positive responses in relatively short time periods. Work is also reported on the culture medium, on test microorganisms and responses, on anaerobic determinations, on other biological subjects, and also on instrumentation. D.E.W.

N65-16513 Joint Publications Research Service, Washington, D. C.
PALEONTOLOGY AND BIONICS
G. S. Al'tov *In its* Transl. from Priroda (Nature), Vol. 53, No. 11, 1964 25 Jan. 1965 p 34–36 (See N65-16510 07-30) OTS: $2.00

The study of fossils of extinct animals is discussed in relation to the possible application of knowledge gained to the design of better implements for modern industry. A double drilling bit designed on the basis of the triple teeth of the dinosaur *Saurolophus* is discussed, and devices designed after a study of the medusa and two types of ichthyosaurus are mentioned. D.E.W.

N65-16517# RAND Corp., Santa Monica, Calif.
THE ECOLOGICAL COMPLEX IN EXTRATERRESTRIAL BASES
S. H. Dole Nov. 1964 8 p refs Presented at 3d Ann. Meeting of the Working Group on Extraterrestrial Resources, 18–20 Nov. 1964
(P-3009; AD-608840)

The concept of an earth-style ecological complex created within an extraterrestrial base is examined, and compared with other kinds of life support systems that might be used in such bases. Per capita quantities of ecological supplies on earth are considered as an upper extreme (not feasibly reproducible in an extraterrestrial base). The lower extreme is approximated by the quantities of materials present in a minimal per capita volume of air plus a 1-day reserve (based on average metabolic requirements), which is assumed to be 700 cubic feet/man/day consisting of 50-50 oxygen-nitrogen at 7.5 psia. Food production and storage, energy supplies, and air and water regeneration atmosphere requirements are considered to be separate quantities. Types of food plants and production methods are discussed. Physicochemical and algal regenerative life support systems are compared with hydroponics. E.P.V.

N65-16593*# National Aeronautics and Space Administration, Washington, D. C.

CHANGES IN THE REGIONAL CIRCULATION IN PATIENTS WITH LESIONS OF THE MAIN BLOOD VESSELS OF THE HEAD (ACCORDING TO PLETHYSMOGRAPHIC AND RHEOENCEPHALOGRAPHIC DATA) [IZMENENIYA REGIONARNOGO KROVOOBRASHCHENIYA PRI PORAZHENIYAKH MAGISTRAL'NYKH SOSUDOV GOLOVY (PO DANNYM PLETIZMOGRAFII I REOENTSEFALOGRAFII)]

Kh. Kh. Yarullin Feb. 1965 12 p refs Transl. into ENGLISH from Klin. Med. (USSR), no. 9, 1963 p 61-67 Presented at the 2d Soviet-Romanian Sci. Congr., Bucharest, Sep. 1962 (NASA-TT-F-295) OTS: HC $1.00/MF $0.50

The characteristics of the circulation in the temporal and orbital regions were studied by pneumophotoplethysmography in 70 patients who had lesions of the main vessels of the head (carotid and vertebral arteries). All patients were also subjected to rheoencephalography to evaluate the cerebral circulation. In the great majority of patients with complete carotid obstruction due to thrombosis, the orbital plethysmogram often showed a distinct decrease in the pulse and spontaneous wave amplitudes with a simultaneous increase in the temporal plethysmographic pattern. Rheoencephalograms also showed a sharp decrease in the pulse wave amplitude on the side of the the obstructed carotid artery. All of these signs were most distinct during the first few months following an acute cerebral infarct due to thrombosis, and usually correlated with a drop in retinal pressure. Plethysmographic and rheoencephalographic asymmetry was also noted in cases of internal carotic artery stenosis. Rheoencephalography and especially ocular plethysmography can apparently reveal the slightest *and earliest symptoms of insufficiency in the system* of the affected internal carotid artery. In patients with lesions of the basilar-vertebral artery system, distinct asymmetry was observed only in the temporal plethysmographic patterns. This asymmetry was particularly marked in cases of combined vertebral and carotid artery lesions. Author

N65-16598*# National Aeronautics and Space Administration, Washington, D.C.

EXTRATERRESTRIAL LIFE, A BIBLIOGRAPHY. PART I: REPORT LITERATURE, 1952-1964

Sep. 1964 80 p refs

(NASA-SP-7015, Pt. I) GPO: HC $0.45; OTS: MF $0.75

Although this bibliography is primarily concerned with the general subjects of extraterrestrial life and exobiology, topics that are directly pertinent to the search for *extraterrestrial life* are included. Among these are the origin of life on earth, the suitability of other planets for the development of indigenous life, the possibility of intelligent extraterrestrial life forms, techniques and instrumentation for the detection of extraterrestrial life, the chemical basis of life including the synthesis of organic compounds from simple precursors, and terrestrial contamination of spacecraft. Several references, which describe the examination and analysis of meteorites and the relevance of such studies to the subject of extraterrestrial life, are also presented. Each entry consists of a standard bibliographic citation and an annotation in the form of an abstract or a brief descriptive notation. Entries are listed in reverse chronological order, with the most recent references appearing first. A subject index, a personal author index, a corporate source index, and a contract number index are provided. Author

N65-16601# Air Force Academy, Colo.

PROCEEDINGS OF THE FIRST ANNUAL ROCKY MOUNTAIN BIOENGINEERING SYMPOSIUM

[1964] 301 p refs Symp. held at AF Acad., Colo., 4-5 May 1964; sponsored jointly with IEEE

(AD-450818)

Symposium papers on bioinstrumentation, search for extraterrestrial life, biodynamics, biological mechanisms, physiology and medicine, and bioengineering education. For *individual titles see* N65-16602—N65-16630.

N65-16602 North American Aviation, Inc., Downey, Calif. Autonetics Div.

TRENDS AND DEVELOPMENTS IN BIONICS AND BIOENGINEERING

Victor W. Bolie *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 4-8 refs (See N65-16601 07-04)

Bioengineering is defined as the application of engineering principles to biology and medicine, and bionics involves the transfer of biological principles to engineering technology. Bionics research is aimed toward the automation of the higher level functions of the human brain, and covers interacting fields with bioengineering in the design of new recording instruments for body functions, systems analysis of interacting physiological functions, automation of routine medical tests, and computer diagnosis of diseases. G.G.

N65-16603 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

BIOENGINEERING CONTRIBUTIONS TO ACCELERATION STRESS RESEARCH AND SIMULATION

Randall M. Chambers (Pennsylvania Univ.) *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 9-25 refs (See N65-16601 07-04)

Using the human centrifuge and its associated instrumentation, techniques were developed for simulating the accelerations encountered in spacecraft during launch, reentry, and abort maneuvers. These simulations were found to be effective for the acceleration training of astronauts and test pilots, and for the testing of life support systems and associated cockpit instrumentation. Major bioengineering contributions were made in the development of techniques to measure the effects of acceleration on psychophysiological performance. Primary emphasis is given to the use of the human centrifuge and its associated instrumentation, which have been developed for scientific research. Author

N65-16604 Nebraska Univ., Lincoln.

THE MAGNETOCARDIOGRAM

Robert A. Stratbucker, Clyde M. Hyde, and Jerald Varner *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 26-33 refs (See N65-16601 07-04)

(Grant PHS-HE-0845801)

The recording of the magnetic signal associated with cardiac electrical activity was demonstrated. A mathematical relationship between the electrocardiogram and the magnetocardiogram was derived which shows good agreement between theoretical and experimentally observed results. The equations were modified to include the case of a magnetic sensing device located exterior to the body. Under these conditions the contribution of displacement currents is considered and it is shown that for the cardiac electrical conditions existing in the human body the magnetic field on the chest wall is about 10^{-15} gauss. Assuming in this case both a high permeability magnetic pickup path (i.e., $\mu > 10^4$) and windings in excess of 10^6 turns, it would be possible to record an induced emf of from 10^{-5} to 10^{-4} volts during ventricular depolarization. Author

N65-16605 Martin Co., Denver, Colo. Life Sciences Dept.
BIOPHYSICAL MONITORING OF EXPERIMENTAL ANIMALS
Harry A. Gorman and Roger B. Grau *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 34-48 (See N65-16601 07-04)

This paper describes and illustrates methods of monitoring biophysical parameters in experimental animals by miniature back-pack radio, by hardwire telemetry, and by transducer-transmitter systems. They have been developed to provide radio telemetry of physiological parameters such as electroencephalography, electrocardiography, electroculography, respiration, blood pressures, and temperatures. These telemetry principles and electronic measuring techniques were produced by teaming the disciplines of engineering and medicine. Author

N65-16606 Baylor Univ., Houston, Tex. Div. of Biomedical Engineering
A NUMERICAL INDICATOR FOR INDIRECT SYSTOLIC AND DIASTOLIC BLOOD PRESSURES
L. A. Geddes and J. Canzoneri (Houston Univ.) *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 49-55 refs (See N65-16601 07-04)

A device for numerically indicating systolic and diastolic blood pressures using the auscultatory method was developed. It employs the electrocardiogram R wave as an interrogating signal to actuate logic circuits to inquire for the presence of Korotkoff sounds at specified times during the deflation cycle of the arm-occluding cuff. Performance data and circuit modules are described by the authors. Author

N65-16607 Minnesota Univ., Minneapolis. Dept. of Physical Medicine
DEVELOPMENT OF AN ELECTRICAL IMPEDANCE PLETHYSMOGRAPH SYSTEM TO MONITOR CARDIAC OUTPUT
R. Patterson, W. G. Kubicek, E. Kinnen, D. Witsoe (Rochester Univ.), and G. Noren *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 56-73 refs (See N65-16601 07-04)
(Contract AF 41(657)-403; Grants NIH G-FR-05085-01; VRA-RT-2)

A method was developed that apparently measures pulmonary blood volume changes over the cardiac cycle. By measuring the electrical impedance changes on the surface of the thorax between one electrode band placed around the neck and one band placed around the lower portion of the thorax, pulmonary blood flow values were computed. The system was developed in three phases: (1) establishing an electrode arrangement and relationship to meet certain criteria that were felt necessary to quantitatively measure cardiac output; (2) determining the probable source of the impedance changes that were observed during the cardiac cycle; (3) modifying the plethysmographic system of phase one, developing a new relationship between the impedance variation and the cardiac output, and then correlating the impedance measured cardiac output with the Fick method of measuring cardiac output on 26 children with congenital heart defects. Author

N65-16608 Colorado State Univ., Fort Collins. Dept. of Botany and Plant Pathology
EXOBIOLOGY
Frank B. Salisbury *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 75-83 refs (See N65-16601 07-04)

Theories on the origin of life, and the presence of organic materials in meteorites suggest the existence of some form of extraterrestrial life, especially on Mars. The phenomena of the dark markings on Mars with their extensive and rapid changes are attributed to unknown plants that are different from our earth vegetation in both physiology and morphology. The Martian canal system, the existence of the two small satellites that revolve in near circular, equatorial orbits around Mars, and the observed short flashes of brilliant light on the Mars surface are assumed to be products of intelligence. G.G.

N65-16609 Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SYSTEMS CONSTRAINTS ON THE SEARCH FOR EXTRATERRESTRIAL LIFE
Dennis H. Le Croissette *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 84-87 refs (See N65-16601 07-04)

The most severe systems constraints imposed on the life detection instrumentation of a planetary landing capsule are (1) the limitation in the data rate to below 10 bits per second; (2) the relatively low scientific payload weight; and (3) the extreme impact which the capsule will sustain. The major problem of sterilization of the capsule to prevent contamination of the planet by terrestrial organisms may be solved by thermal soakage of the instrumentation at 135° C for 24 hours and resterilization of the exposed surfaces by a 9-to-1 mixture of ethylene oxide and freon. G.G.

N65-16610 Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

INSTRUMENTATION REQUIREMENTS FOR LIFE DETECTION SYSTEMS

Jerry L. Stuart *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 88–97 (See N65-16601 07-04)

The approaches taken in performing biological and chemical analyses on a planetary surface must differ from conventional techniques. Analytical and functional experiments should be performed in which both simple and highly specialized organic compounds are sought. Well-understood fundamental measuring techniques should be adapted and combined to give the instrumentation a wide versatile performance capability. Each class of instruments (e.g., wet chemistry, dry chemistry, morphological analyses, etc.) should be unified into an experimental instrument in order to economize the spacecraft systems constraints. A review of the sample collection problem is presented along with a brief discussion of several life detection instruments under development. Author

N65-16611 Rochester Univ., N. Y. Dept. of Biology

PRINCIPLES OF OPTICAL MEASUREMENTS APPLIED TO BIOLOGICAL GROWTH IN THE *WOLF TRAP*

Charles R. Weston *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 99–109 ref (See N65-16601 07-04)

The search for life on Mars will initially be directed toward detection of microorganisms. The relative concentration of microorganisms in a suspension can be estimated by measuring either the attenuation of a beam of light that passes through the suspension or the intensity of the light scattered by the organisms. The measurement of the scattered light, nephelometry, was selected to measure the growth of organisms in the Wolf Trap because of its inherently greater sensitivity. With the present optics in the two chambers of the engineering breadboard, the Wolf Trap gives a reliable signal at approximately 10^5 bacteria per ml. The breadboard is controlled from a battery-operated portable console that supplies power, simulates spacecraft interface functions, and provides a convenient method of monitoring the data. The entire breadboard can be heat sterilized at 145° C for 24 hours in line with the sterilization requirement for Martian landers. Author

N65-16612 Air Force Systems Command, Brooks AFB, Tex.

TUTORIAL SESSION IN BIODYNAMICS

John P. Stapp *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 113–122 (See N65-16601 07-04)

The relation between axis of orientation of the body to impact forces on a sled accelerated on rails into a water inertia brake, and the physiological and anatomical responses to limits of tolerance, injury and fatality were investigated on 58 human subjects and three animals. Seven different configurations of impact rate, duration, and magnitude simulated various types of landing surfaces comparable to the anticipated parachute landing impacts of the Apollo space cabin. A limit of 25 peak G at less than 2000 G per second onset and more than 60 millisecond durations was established for 16 different body positions tested. Inflated air cushions on each side of the head rest are recommended to prevent hyperflexion of the neck. G.G.

N65-16613 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

PROBLEMS IN PERSONAL PROTECTION AND PERFORMANCE DURING EXTRAVEHICULAR OPERATIONS

William L. Lee, Jr. *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 123–140 refs (See N65-16601 07-04)

Currently programed manned space systems plan for the initiation and extension of extravehicular operations. Extravehicular operations offer potential advantages in a variety of space missions, but several rather formidable personal protective and performance problems must be overcome to assure that safe and effective extravehicular operations become a reality. The extravehicular crewmember must be provided with reliable protection from the completely hostile space environmental factors of high order vacuum, electromagnetic and corpuscular radiations, and micrometeoroids. However, the means of providing such protection must not interfere with man's performance capabilities to such a degree as to preclude the effective accomplishment of extravehicular tasks. These factors combine to form the greatest challenge that personal protective technology has ever been called upon to meet. A multidisciplined scientific effort in personal protective technology complemented by interaction with spacecraft designers will be required to provide this extension of space operational capabilities. Author

N65-16614 Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

INSTRUMENTATION IN BEHAVIORAL RESEARCH

Gregg A. Gilbert *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 141–145 (See N65-16601 07-04)

The design and development of a research operant conditioning apparatus for the evaluation of animal performance in space environments is described. The apparatus consists of (1) the performance panel which provides the stimuli to which the subject is trained to make an overt response, (2) the equipment to provide positive and negative reinforcement, (3) the electronic controls of the behavioral programing equipment, and (4) the recording equipment. G.G.

N65-16615 Purdue Univ., Lafayette, Ind. School of Aeronautical and Engineering Sciences

A MULTIPLE DIPOLE MODEL OF THE HUMAN HEART

V. J. Eckelkamp and P. E. Stanley *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 147–165 refs (See N65-16601 07-04)

Bioengineering problems to develop a simple electrical model of the heart are discussed. In this analysis, a homogeneous conducting sphere, representing the human torso to a first approximation, is used to calculate the center of electrical activity within the body, and four current dipoles were used to simulate the four anatomical sections of the heart. The actual location and orientation of the dipoles was obtained from a study of the electrophysiology of the heart as well as the results obtained. The moments of each dipole were optimized to

achieve the least square error, and exploratory points were used to find the bipolar lead potentials. It was found that the developed model has little clinical value at present. The location of the dipoles appears to be a critical parameter. G.G.

N65-16616 Marquette Univ., Milwaukee, Wis. Dept. of Electrical Engineering

ELECTRICAL AXIS OF THE FETAL HEART

Saul D. Larks *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 166–174 refs (See N65-16601 07-04) (Grant PHS-G-HD-00558-03)

A method of calculating the electrical axis of the fetal heart is presented. It is shown that the mean value of the fetal cardiac electrical axis is 134 degrees. The mean value of 134 degrees is consistent with the relatively important role played by the right side of the fetal heart in intrauterine life. The electrical axis of the fetal heart should be utilized as a tool for the study of cardiac development, for the assessment of fetal well-being, for identification and study of congenital cardiac malformation, as well as for the investigation of drug effects upon the developing human fetus. Author

N65-16617 Colorado State Univ., Fort Collins. Dept. of Physiology

SOME PROBLEMS IN RECORDING THE ELECTROENCEPHALOGRAM DURING ELECTROANESTHESIA

Reginald A. Herin and R. John Morgan *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 175–186 refs (See N65-16601 07-04)

At times, especially at low current levels the EEG can be recorded during electroanesthesia. At other times a periodic wave pattern is obtained which has the same frequency as the EKG but a modified shape. The periodicity may occur at low as well as high current levels and at times is more pronounced than shown in the tracings. Investigation into this phenomenon is continuing. Author

N65-16618 Air Force Academy, Colo.

THE STUTTERING PROBLEM CONSIDERED FROM AN AUTOMATIC CONTROL POINT OF VIEW

Blaine R. Butler *In its* Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 187–209 refs (See N65-16601 07-04)

This paper discusses a simple model of the human speech system, considered as a feedback control mechanism. The speech system and the model are both normally stable. Stuttering is considered to be an unstable situation and the ear, which is a variable gain device, was chosen as a possible cause of this instability. There are certain known corrections to stuttering that are presently in use in speech clinics throughout the country. These corrections were applied to the model and restored the stability of the system. This analysis was done mathematically as well as on the analog computer and the results were compatible. Author

N65-16622 Air Force Academy, Colo.

DESIGN OF A MULTIPLE CHANNEL PHYSIOLOGICAL TELEMETRY SYSTEM

Richard J. Gowen and Alfred Mateczun, Jr. *In its* Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 227–232 refs (See N65-16601 07-04)

Several modulation systems for a telemetry package were considered for their application in physiological mobile monitoring systems, and pulse duration modulation was found to be feasible for a miniature telemetry system in terms of size, complexity, range, reliability, and power requirements. This system adapts to a digital-type design that makes it possible to break it up into modular functional blocks. This modular system provides versatility and servicability of the transmitter package. G.G.

N65-16624 Colorado Univ., Denver

DEVELOPMENTAL DISTURBANCES OF VERTEBRATE EMBRYOS INDUCED BY LASER RADIATION

Joseph C. Daniel, Jr., Kenneth R. Lang, and Frank S. Barnes *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 240–250 refs (See N65-16601 07-04)

Vertebrate eggs of several different kinds were subjected to laser beams to study the effect of monochromatic, coherent light on embryological development. The results show (1) Deformities can be the product of either the ruby or gas laser. (2) The higher intensities produce more deformities. (3) The effect of laser radiation varies with the growth stage or physiological state of the egg exposed. (4) Pigmentation increases the susceptibility of the subject. (5) Other variables may alter the influence of the laser beam. The quantum energy of laser radiations is too low to cause ionization, excitation or direct bond dissociation but conversion to heat energy is believed to generate free radicals and denature proteins. Unpigmented tissues have low absorption coefficients but the high energy density of incident radiation can cause localized destruction. Pigmented tissue is effected by much lower energy densities. Author

N65-16625 Colorado State Univ., Fort Collins. Dept. of Physiology

RATE AND MAGNITUDE OF TENSION PRODUCTION OF VENTRICULAR MUSCLE FROM HIBERNATING AND NON-HIBERNATING MAMMALS

Frank E. South *In* AF Acad. Proc. of the 1st Ann. Rocky Mt Bioeng. Symp. [1964] p 251–258 refs (See N65-16601 07-04)

Contractility and irritability of trabecular strips of cardiac muscle obtained from rats, control hamsters and hibernating hamsters were studied at temperatures from 0° to 38° C. Tension production, and its first derivative with respect to time were studied simultaneously through the use of an RCA 5734 transducer tube and dc coupled amplifiers, oscilloscope and simple differentiating circuit. The effects of temperature on the latent periods of the muscles did not differ significantly. The effects upon excitability, tension and its maximal rate of production were such that at low temperature the rat tissues were most impaired followed by those of control hamsters. Those of hibernating (5° C) animals were the least affected. These variations in response were related to inherent and adaptive differences in the intensity and duration of the active state process. Author

N65-16626 Illinois Univ., Urbana. Dept. of Physiology and Biophysics

THE EFFECTS OF DECOMPRESSION ON FLATUS PRODUCTION CARBON DIOXIDE CONTENT IN MAN

F. R. Steggerda *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 259–262 refs (See N65-16610 07-04)

The subjects assumed a reclining position in a decompression chamber 3 hours after the last meal. A lubricated catheter containing a number of 1-cm holes for 7 cm back from the tip was inserted into the rectum for a distance of 15 cm. The open end of the catheter was then connected with a series of previously calibrated cylinders containing a solution of saturated sodium sulfate in 5% sulfuric acid. By clamping the proper tubing to the various cylinders, flatus could be collected for periods of time at designated altitudes. The volumes of flatus

passed at various altitudes were recorded. The percentage carbon dioxide concentrations were determined after recompression had been produced at the end of the experiment. The partial pressure of the CO_2 was calculated on the basis of the altitude at which it was collected. Upon going to simulated altitudes of 35000 ft in the decompression chamber the collectable flatus volume progressively increases. Likewise the carbon dioxide increases in direct proportion to the volume charges. Author

N65-16627 Colorado Univ., Denver. Dept. of Radiology
KINETIC MODELS OF PHYSIOLOGIC SYSTEMS
Donald W. Brown *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 263–268 refs (See N65-16601 07-04)

Mathematical analysis of models of several physiologic systems is under study using both analog and digital computer techniques. Principal interest at this time is centered on the radioisotope renogram. A set of differential equations was derived which describes the known significant components of the renogram curve. Movement into and out of most of the compartments is handled as diffusion. Although the kidney and liver reactions are nonlinear, simplifications were made that allow their evaluation by linear equations. A most important finding was the evaluation of a mathematical transfer function that operates on the integrated renal concentration of the isotopically labeled substance under consideration by the time it is discharged from the field of the probe. This transfer function correlates closely with the concept of a renal transit time as well as differential urine volume. A value also occurs in the equations which corresponds to the differential renal plasma flow. Knowledge of these two rate constants should be helpful in the evaluation of patients with hypertension. Author

N65-16628 Colorado Univ., Boulder. Chemical Engineering Dept.
ENGINEERING PROBLEMS IN THE LARGE-SCALE GROWTH OF MICROORGANISMS
R. E. West *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 269–273 refs (See N65-16601 07-04)

The large-scale growth of microorganisms creates some unique problems in process design, operation, and control. This paper describes some of these problems such as pure-culture requirements and genetic changes. Some kinetic aspects of fermentation reactions, especially mass-transfer phenomena, are also discussed. Studies of the effects of agitation on the rate of lactic acid formation by the bacterium *Lactobacillus delbrueckii* indicate that there is little bulk liquid-phase resistance to mass transfer in fermentation media. The slight effect of agitation on rate in the *L. delbrueckii* fermentation may be due to an influence on the rate of mass transfer of an essential nutrient. Author

N65-16629 Air Force Academy, Colo. Dept. of Chemistry and Physiology
CHANGES IN THE EKG OF THE RAT DURING ACCELERATION STRESS
Grover J. D. Schock *In its* Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 274–280 refs (See N65-16601 07-04)

Centrifugation at +20 G produces profound adverse conditions for the cardiovascular system. It is surprising that the rat can tolerate such force for periods in excess of 4 to 5 minutes. The EKG changes produced by such force follow a remarkably similar pattern. Immediately after onset of centrifugation a transient bradycardia develops. This is followed by tachycardia and a more or less regular respiration. These last until decompensation begins. This is signaled by a phenomenon similar to fibrillation. Immediately after fibrillation the heart rate falls rapidly to a rate of 120 per minute or less. If centrifugation is stopped at this time, about 50% of the animals recover. The gross changes in the EKG during centrifugation are probably due to hypoxia. Author

N65-16630 Tennessee Univ., Knoxville. Agricultural Research Lab.
LARGE ANIMAL ELECTRO ANESTHESIA
C. E. Short, C. C. Turbes, (Veteran Admin. Hosp., Houston, Tex.) and J. J. Snyder (Electron. Med. Instr. Co., Fort Collins, Colo.) *In* AF Acad. Proc. of the 1st Ann. Rocky Mt. Bioeng. Symp. [1964] p 281–286 (See N65-16601 07-04)

Electroanesthesia was induced in seconds in sheep and cattle by 50 to 60 milliampere with one of the needle electrodes attached to the suture of the frontal bone at eye level, and the other to the occipital area of the head. During anesthesia all operations were successfully performed and the recovery was uneventful. Electro spinal anesthesia on a variety of large animals was effective. Nearly all animals were able to walk immediately after the operation upon removal of the current. It was found that experimental subjects tolerate a much higher level of current when they are in a sleep-like state. G.G.

N65-16641*# National Aeronautics and Space Administration, Washington, D. C.
THE USE OF AN INERT GAS IN AN ARTIFICIAL ENVIRONMENT [DE L'UTILITE D'UN GAZ INERTE DANS UNE ATMOSPHERE ARTIFICIELLE]
V. Strumza Feb. 1965 12 p refs Transl. into ENGLISH from The Man and Technol. in the Nucl. and Space Age, Proc. of the Intern. Congr., Milan, 18–21 Apr. 1962 Rome, Assoc. Intern Uomo Nello Spazio, 1963 p 487–492
(NASA-TT-F-9258) OTS: HC $1.00/MF $0.50

The type of atmosphere necessary to sustain man in space flight is considered. It is shown that a homogeneous atmosphere of pure oxygen at a pressure between 380 and 160 mm Hg has the advantage of simplicity. However, for an interplanetary voyage or for an observation satellite rotating around the earth for a long period of time, such an atmosphere would cause pulmonary disturbances, but the injection of a quantity of an inert gas into the oxygen atmosphere would prevent this condition. Helium is found to be preferable to nitrogen for the purpose. A technique is described for regenerating oxygen. Author

N65-16653# Library of Congress, Washington, D.C. Aerospace Technology Div.
SOVIET BIOASTRONAUTICS AND BIOTECHNOLOGY, 1964: COMPILATION OF ABSTRACTS Surveys of Soviet-Bloc Scientific and Technical Literature
11 Feb. 1965 122 p
(ATD-P-65-4)

CONTENTS:

N65-16657*# Honeywell, Inc., Boston, Mass. Honeywell Radiation Center

A SAMPLING THEORY FOR THE HUMAN VISUAL SENSE

John Merchant [1959] 45 p refs Prepared jointly with Allied Res. Associates, Concord, Mass. Submitted for Publication

(Contracts NASr-16; NASw-535)

(NASA-CR-60618) OTS: HC $2.00/MF $0.50

The nature of the sampling operation performed by the human visual sense, restricted to black and white, nonstereoscopic, photopic vision, is discussed. The hypothesis is presented that the human visual sense samples the power spectrum (in terms of spatial frequencies) of the input image, just as the aural sense samples the power spectrum of the input sound. Author

N65-16662# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering

HEARING SENSATIONS IN AMPLITUDE MODULATED RADIO FREQUENCY FIELDS

William Tarver Harvey and James Page Hamilton (M.S. Thesis) Aug. 1964 55 p refs

(GE/EE/64-11; AD-608889)

When the head is subjected to an amplitude modulated radiofrequency field, a hearing sensation results. This sensation was investigated by holding a small circular metal probe close to the skull. The probe was then excited at a radiofrequency of 3.5 megacycles. The audiofrequency components of the field existing between the probe and the head produced the threshold electromechanical pressures necessary for hearing. These electromechanical pressures were computed and compared to the pressures on the skull which were necessary to produce bone conduction hearing. These pressure values fall within the same limits, and produce a similar characteristic threshold curve. This leaves little doubt that the investigated hearing phenomenon is caused by the bone conduction mechanism. Author

N65-16668# Sandia Corp., Albuquerque, N. Mex. Environmental Health Dept.

INDUSTRIAL HYGIENE HANDBOOK

R. J. Everett, L. W. Brewer, G. W. Edwards, A. Juskiewicz, T. A. Linn, Jr. et al Feb. 1965 149 p refs

(SC-RR-64-562) OTS: $5.00

Occupational health hazards may be classified as chemical and physical. This handbook covers procedures, devices, and equipment for controlling possible occupational hazards. Author

N65-16669# Tactical Air Command, Langley AFB, Va.

OPERATIONAL TEST AND EVALUATION OF HIGH ALTITUDE LOW OPENING (HALO) PARACHUTE TECHNIQUES

Charles J. Corey, Marvin L. Payne, Medney E. Tardy, and Sven E. Wallin Nov. 1964 75 p

(TAC-TR-63-18; AD-452569)

A test was conducted with 14 parachutists and a C-130B aircraft to evaluate the parachuting of small teams of select parachutists at extremely high altitudes into remote areas, using the high altitude low opening (HALO) techniques established for altitudes up to 25000 feet. The feasibility of introducing small units into a combat area by HALO techniques was proven. Several modifications to the existing procedures, as well as additional crew and equipment, were required. The modifications and requirements, as well as recommendations for future HALO operations, are included in this report. Author

N65-16700# Vanderbilt Univ., Nashville, Tenn.

STUDIES IN ABSTRACTION LEARNING. VII: A SIMULATED CLASSROOM STUDY OF RETROACTIVE INHIBITION AS A FUNCTION OF THE METHOD OF TRAINING ON THE INTERPOLATED TASK

Leland E. Thune and Charles J. Long Jun. 1964 86 p refs

(Contract Nonr-2149(01))

(TR-11; AD-608482)

Studies were conducted to determine the effect of retroactive inhibition on the performance of a person who is trained to operate one complex device, shifted to a different but related device, and then returned to the original device. The task of learning to operate two different makes of desk calculators was selected for the study; 140 students were divided into 5 treatment groups, 2 experimental and 3 control, then subdivided into classes of 7 subjects each. The classes received various types and sequences of instructions, then were given proficiency tests. The results of the studies demonstrated the superior transfer effectiveness of conceptual training compared to direct machine practice, and showed that the superior transferability of abstraction learning is applicable to the learning of complex-conceptual-motor skills in a simulated classroom setting. D.S.G.

N65-16726# Joint Publications Research Service, Washington, D. C.

CURRENT PROBLEMS OF ELECTROPHYSIOLOGICAL INVESTIGATIONS OF THE NERVOUS SYSTEM

9 Feb. 1965 116 p refs Transl. into ENGLISH from the book "Sovremennyye Problemy Electrofiziologicheskikh Issledovaniy Nervnoy Sistemy" Moscow, Acad. of Med. Sci. USSR, 1964 p 115-131, 255-288, 393-401, 508-518

(JPRS-28687; TT-65-30303) OTS: $4.00

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1. ELECTROPHYSIOLOGY OF THE SPINAL CORD P. G. Kostyuk p 1-28 refs (See N65-16727 07-04)

2. CURRENT THEORIES OF THE ORIGIN OF CORTICAL RHYTHMICITY AND ANALYSIS OF THE ELECTROENCEPHALOGRAM L. A. Novikova p 29-79 refs (See N65-16728 07-04)

3. ELECTROMYOGRAPHY Yu. S. Yusevich p 80-93 refs (See N65-16729 07-04)

4. METHODS OF MEASUREMENT AND ANALYSIS OF BIOELECTRIC POTENTIALS V. A. Kozhevnikov p 94-111 refs (See N65-16730 07-05)

N65-16727 Joint Publications Research Service, Washington, D. C.

ELECTROPHYSIOLOGY OF THE SPINAL CORD

P. G. Kostyuk *In its* Current Probl. of Electrophysiol. Invest. of the Nervous System 9 Feb. 1965 p 1-28 refs (See N65-16726 07-04) OTS: $4.00

Various techniques employed in electrophysiological recording of reflex activity are described. Although these were helpful in reaching conclusions, a more effective approach was in direct derivation and analysis of the cerebrospinal electrical activity. Several pathways are available along which the electrical potentials of the cell elements located inside the spinal cord can be derived. A few characteristic patterns obtained by intracellular derivation are presented. Sufficient data are now available which disclose a detailed picture of the functional organization of the spinal cord. Principles of the organization are discussed. E.E.B.

N65-16728 Joint Publications Research Service, Washington, D. C.
CURRENT THEORIES OF THE ORIGIN OF CORTICAL RHYTHMICITY AND ANALYSIS OF THE ELECTROENCEPHALOGRAM
L. A. Novikova *In its* Current Probl. of Electrophysiol. Invest. of the Nervous System 9 Feb. 1965 p 29–79 refs (See N65-16726 07-04) OTS: $4.00

The nature of the slow oscillations recorded during overall derivation of electrical brain potentials; theories of the origin of the continuous rhythmic activity of the brain, and the connection between cortical rhythm and the afferent flow of impulses, are discussed. Investigations of the human EEG, as well as the animal, lead to the conclusion that the flow of afferent impulses is of enormous importance to the formation of the cortical rhythm. A lengthy analysis and discussion of EEG interpretation is given. There are two diagonally opposed points of view concerning the nature of changes appearing on the EEG during afferent stimulation, usually termed arousal response. Facts and considerations of both views are presented. E.E.B.

N65-16729 Joint Publications Research Service, Washington, D. C.
ELECTROMYOGRAPHY
Yu. S. Yusevich *In its* Current Probl. of Electrophysiol. Invest. of the Nervous System 9 Feb. 1965 p 80–93 refs (See N65-16726 07-04) OTS: $4.00

Nature, objectives, methods, and techniques employed in clinical electromyographic examinations are discussed. Two basic points are emphasized in the discussion on the nature and objectives of EEG. First, a close relationship exists between the oscillations of potentials and the functional state of both the muscle and the nuclear segmental motor neurons innervating it. Second, while an electromyogram reflects directly the electrical excitation index for a large number of motor neurons and muscle fibers, it also indirectly characterizes the changes in the afferent impulses which condition the activity of the neuromotor mechanisms. E.E.B.

N65-16730 Joint Publications Research Service, Washington, D. C.
METHODS OF MEASUREMENT AND ANALYSIS OF BIOELECTRIC POTENTIALS
V. A. Kozhevnikov *In its* Current Probl. of Electrophysiol. Invest. of the Nervous System 9 Feb. 1965 p 94–111 refs (See N65-16726 07-04) OTS: $4.00

Automatic measurement of biopotential intensity, automatic frequency analysis, correlation analysis, and probability methods of analysis are discussed. When measuring the voltage of electrical oscillations, mean and effective values of amplitude can be obtained. Amplitude values are normally determined directly from the oscillograms, but, in addition, mean values can be measured automatically. The methods of so-called correlation analysis are the basis for studying the time properties of complex oscillations. The correlation functions show statistically the mean degree of interrelation between two instantaneous values of the amplitude processes under investigation, as a function of the distance on the time axis between these values. E.E.B.

N65-16733 Joint Publications Research Service, Washington, D. C.
RESTORING THE INITIAL HEAT-RESISTING PROPERTIES OF MATERIALS BY INTERMEDIATE HEAT TREATING
I. I. Trunin *In its* Properties of Heat-Resisting Steels for Heat and Power Eng. 11 Feb. 1965 p 9–18 refs (See N65-16731 07-17) OTS: $3.00

The possibility of healing damages accumulated in an alloy at various stages of fracturing under creep conditions was investigated. An intermediate heat treatment was tried on three steel alloys. Test conditions are given, the variation of density during creep testing is shown, mechanical properties before and after the intermediate heat treatment are tabulated, and the variation of the density of a given forging alloy after stress rupture is displayed. Tests indicated that the intermediate heat treatment permits the elimination of most of the failure centers up to creep half-life. It is suggested that the service life of heat-resistant components of an electric power station can be increased by intermediate heat treatments performed after 25 to 30 percent of the design service life. D.E.W.

N65-16752# Instituto de Neurologia, Montevideo (Uruguay).
ATTENTION, HABITUATION AND CONDITIONING AS RELATED TO THE BRAIN WAVES Final Technical Report, May 1, 1960–Apr. 30, 1964
Elio Garcia-Austt, Jaime Bogacz, Adela Vanzulli, and Pablo Handler May 1964 17 p refs
(Grant AF-AFOSR-312-63)
(AFOSR-64-1841; AD-607374)

To study the mechanisms of sensory control, two investigations were conducted: (1) the visual and auditory evoked responses and changes on EEG background activity in man, and (2) the neural control of the cochlear input in the guinea pig. In the study of visual evoked responses (VER), the patterns of this potential were measured during wakefulness and sleep, during habituation to continuous and monotonous flicker stimulation, during photic habituation, and during interference of an attention-demanding task with extraneous stimuli. In all cases, a correlation was established between VER changes and subjective experience, and it was shown there was a close relationship between these changes and variation in attention. The effects of habituation, distraction, and sensory conditioning on auditory evoked responses (AER) were also studied. The sequence of changes in EEG background activity of a subject placed in a dark and quiet environment and then submitted to continuous flicker stimulation is reported. It was found that, although changes occurred simultaneously in VER and in background activity during habituation, VER was far more sensitive. D.S.G.

N65-16793# Space Technology Labs., Inc., Los Angeles, Calif.
HUMAN ENGINEERING OR ENGINEERING OF THE HUMAN—WHICH?
Robert S. Pogrund [1964] 42 p refs
(AD-608798) OTS: $2.00

The degree of compromise between the human engineer and the physiologist is a function of space flight duration. Short trips will permit the designing of the space capsule and its internal environment with a minimal degree of comfort to the human passenger. Medium length trips of interplanetary magnitude will require a duplicate of man's comfortable terrestrial environment, if he is to operate optimally as a scientific observer, capable of high performance levels. Extended interstellar space travel may not require the presence of incessant human intelligence, so that aids for ultimate survival are drawn from considerations of pharmacologic agents, hypothermia, adaptation, and yoga. Author

N65-16798# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OVERLOAD CENTRIFUGE FOR EXAMINING FLIGHT PERSONNEL

Z. Bielicki, S. Haduch, and S. Etmanowicz 19 Nov. 1964 8 p Transl. into ENGLISH from Wojskowy Przeglad Lotniczy (Warsaw), no. 8, 1963 p 59–63
(FTD-TT-64-70/1+2; AD-452367)

Described are the mechanical construction and operational procedure of a human centrifuge that reaches from 1 to 30 g at normal or reduced atmospheric pressure under conditions of effective overloads. The centrifuge records the endurance of the human organism to the simultaneous effects of high altitude and overloads. Position variations of the cabin and the chair in the centrifuge allow accelerations in negative, positive, or transverse directions. The direction of the overload effect is established prior to the start of the centrifuge by attachment of the balancing weights in a desired point of the cabin. G.G.

N65-16810*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STUDIES OF MANUAL CONTROL SYSTEMS Progress Report No. 5, 19 Jul.–18 Oct. 1964
1 Dec. 1964 41 p refs
(Contract NASw-668)
(NASA-CR-60697) OTS: HC $2.00/MF $0.50

Four groups of experiments were conducted to investigate (1) the difference between single-axis and two-axis performance for input signals of various bandwidths; (2) the difference between single- and two-axis tracking for controlled elements of various complexities; (3) the effect on two-axis performance of input coupling; and (4) the effects of output coupling. A single, highly experienced tracker was used. The results of these experiments indicated that with sufficient training the tracker can control each axis of a two-axis situation as well in either axis in a single-axis task when the conditions on the two axes are the same. Furthermore, the effects of input coupling can be greatly reduced with practice. Author

N65-16812*# Maryland Univ., College Park.
A STUDY OF PHYCOPHYSIOLOGY IN CONTROLLED ENVIRONMENTS Seventh Semiannual Status Report, 1 Apr.–1 Oct. 1963
Robert W. Krauss 1 Oct. 1963 43 p refs
(Grant NsG-70-60)
(NASA-CR-55554) OTS: HC $2.00/MF $0.50

CONTENTS:

1. ON THE VARIABILITY IN THE ACTIVITY OF THE PHOTOSYNTHETIC MECHANISMS C. Sorokin 10 p refs (See N65-16813 07-04)

2. BUFFERING ACTIVITY OF ALGAL CELLS AND ITS EFFECT ON CELL DIVISION [1, 2] C. Sorokin 20 p refs (See N65-16814 07-04)

N65-16813* Maryland Univ., College Park.
ON THE VARIABILITY IN THE ACTIVITY OF THE PHOTOSYNTHETIC MECHANISMS
Constantine Sorokin *In its* A Study of Phycophysiol. in Controlled Environ. 1 Oct. 1963 10 p refs Presented at the Symp. on Photosyn. Mech. of Green Plants, Warrenton, Va., 14–18 Oct. 1963 (See N65-16812 07-04) OTS: HC $2.00/MF $0.50

The variability in the activity of the photosynthetic mechanisms is investigated. Results are: (1) Studies on chlorophyll turnover in higher plants indicate that chlorophyll undergoes degradation in older tissues. (2) Observations on synchronized algal suspensions demonstrate that photosynthetic activity in older cells is inferior to that of cells of intermediate age even at intensities below light saturation where the rate of photosynthesis is assumed to be dependent on photochemical reactions. (3) Fluorescence intensity for older cells is shown to exceed that of younger cells. With the inverse ratio existing between fluorescence yield and photosynthetic activity, observations on the increase in fluorescence with the age of the cells provide the most direct proof of changes in the distribution of energy in the photochemical act, i.e., changes bound with cell development. Thus, a cell never stands still; it is in constant flux. An interplay of biological factors may explain the inconsistency of observations on the photosynthetic activity of cells. I.v.L.

N65-16814* Maryland Univ., College Park.
BUFFERING ACTIVITY OF ALGAL CELLS AND ITS EFFECT ON CELL DIVISION[1, 2]
Constantine Sorokin *In its* A Study of Phycophysiol. in Controlled Environ. 1 Oct. 1963 20 p refs (See N65-16812 07-04) OTS: HC $2.00/MF $0.50

Buffering capacity of cells was evaluated in terms of its effects on changes in pH of the suspending fluid and on cell division. Synchronized 7-hour cells of the green, high-temperature alga, *Chlorella* 7-11-05, were centrifuged out of a complete nutrient medium, resuspended in different concentrations of sulfuric acid, and supplied in darkness with atmospheric air. It was observed that the effect of buffering activity of cells on pH of the surrounding medium was a gradual, time-dependent phenomenon. Changes in pH and the degree of the completion of cell division depended on the initial acidity of the medium and on the amount of cells per volume of suspension. With the increase in acidity, the amount of cells required to buffer it increased disproportionately faster. Thus, within a certain range of acid concentrations, a doubling in acidity required a 2.2-times increase in the amount of cells necessary to buffer the new level of acidity. Factors affecting buffering activity of cells were discussed. Author

N65-16815*# Hazleton Labs., Falls Church, Va.
RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE Quarterly Progress Report No. 15
Gilbert V. Levin and Norman H. Horowitz Dec. 1964 43 p refs
(Contract NASr-10)
(NASA-CR-60709) OTS: HC $2.00/MF $0.50

Photosynthetic activity of pure cultures of algae by radiological detection methods is reported. Retention and evolution of $C^{14}O_2$ is given for green, blue-green, and red algae, and marine diatom. Two algae were tested for photosynthetic response in buffered systems since results of previous experiments indicated that pH of the test media affected $C^{14}O_2$ exchange. For both organisms, pH had no effect on net $C^{14}O_2$ fixation by live cells. Retention by killed cells in acidified aqueous solution was confirmed. There was no difference in $C^{14}O_2$ evolved in acid or neutral media but there was strikingly greater evolution of $C^{14}O_2$ in alkaline media. The nonmetabolic absorption of $C^{14}O_2$ during the light phase and evolution from controls during darkness at alkaline pH's was as high as metabolic exchange of $C^{14}O_2$, amounting to a complex masking of metabolic activity. The addition of 5% dimethyl sulfoxide did not appear to enhance the inhibitory effect of Bard Parker on *Saccharomyces cerevisiae*. Seven new test soils and five soil isolates produced positive responses from basal C^{14} media. A 50% final concentration of unlabeled L-glucose in a labeled inorganic salt medium did not inhibit the growth of *Escherichia coli*. E.E.B.

N65-16816*# Office of Naval Research, Washington, D. C.
[STUDIES OF AUDITORY INFORMATION PROCESSING EMPHASIZING THE APPLICATION OF SIGNAL DETECTABILITY\THEORY TO THE AUDITORY SENSORY|RESPONSES Second Quarterly Progress Report, 1 Sep.–30 Nov. 1964
Lloyd A. Jeffress 13 Jan. 1965 37 p refs
(NASA Order R-129; Contract Nonr-3579(04))
(NASA-CR-60441) OTS: HC $2.00/MF $0.50

Brief reports are given of work on three problems: receiver operating characteristics for visual detection, detection by multiple observers, and detection and response latency. The texts of four papers given at the October 1964 meeting of the Acoustical Society of America are presented: *Effect of Phase Difference Between Signal and Masker on the Detection of a Narrow-Band Noise Signal, Receiver Operating Characteristics by Rating Scale for Antiphasic Stimulation, Theoretical and Obtained ROC Curves for Antiphasic Stimulation,* and *Auditory Sensitization and the Method of Interpolated Trials.* R.L.K.

N65-16826*# George Washington Univ., Washington, D.C.
SPACE BIOLOGY AND SPACE BIOSCIENCE RESOURCES BSCP Communique
Charles W. Shilling and Joe W. Tyson 15 Feb. 1964 311 p refs
(Grant NsG-485)
(NASA-CR-53419) OTS: HC $7.00/MF $1.75

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2. ROTATED DESCRIPTORS OF SPACE BIOLOGY, FOLLOWED BY INDIVIDUAL'S NAME p 198–272
3. LABORATORIES AND ORGANIZATIONS ACTIVE IN SPACE BIOLOGY p 273–288
4. PARAMETERS OF SPACE BIOLOGY p 289–295
5. SPACE BIOLOGY IN THE U.S.S.R. p 296–308

N65-16878# San Diego State Coll., Calif. Dept. of Psychology
LEARNING SET PERFORMANCE OF SQUIRREL MONKEYS AFTER RAPID DECOMPRESSION TO VACUUM
Duane M. Rumbaugh and Joseph W. Ternes Brooks AFB, Tex., School of Aerospace Med., Oct. 1964 12 p refs
(Contract AF 41(609)-2281)
(SAM-TDR-64-42; AD-455372)

The experimental program entailed decompression of squirrel monkeys, *Saimiri sciureus,* to near vacuum (less than 2 mm Hg abs), and 6 days later, testing their capacity to perform a complex behavioral task learned prior to decompression. The behavioral task used is known as learning set, and is believed to be representative of the higher order mental processes characteristic of man. The major results were these: (1) No loss in learning set performance was detected among survivors. (2) Two animals died during or immediately after decompression, one in the group that was exposed to vacuum for 11 seconds, and one in the group that was exposed to vacuum for 90 seconds. (3) Animals in the more severe decompression groups required much more time to recover to apparent normality than animals of the other groups. They were less inclined to eat and drink within the first few hours after decompression and, also, lost significantly more weight than the other animals, particularly those under control conditions. Short-term interferences with vision and hearing was noted. (4) It was concluded that if life be spared, restoration of function is promising and to be expected in full measure. Author

N65-16879# Texas Univ., Austin.
STUDY OF A PHOTOSYNTHETIC GAS EXCHANGER. A QUANTITATIVE REPETITION OF THE PRIESTLY EXPERIMENT
James H. Eley, Jr. and Jack Myers Brooks AFB, Tex., School of Aerospace Med., Sep. 1964 35 p refs Submitted for Publication
(Contract AF 41(609)-1556)
(SAM-TDR-64-52; AD-455393)

The degree of balance achievable in gas exchange between an illuminated plant (*Chlorella*) and an animal (mouse) was studied. In the experimental design, carbon dioxide and oxygen analyzers allowed the respiratory activity of each to be measured independently and the concentration to be monitored when the components were coupled together. Microbial gas exchange was minimized by maintaining the bottom of the mouse chamber at low humidity. Constant internal pressure was provided by a pressure sensor and a variable volume component. Leakage was quantitatively measured by periodic mass spectrometer analyses on the high argon, low nitrogen system gas. With the above procedures, gas analysis on the closed system could be precisely measured. The maximum degree of balance achieved was 98% in a 24-day closed run. System performance during the run was measured using gas exchange, algal growth rate, and comparison with performance predicted from analyses on the algal cells produced. Author

N65-16880# Northrop Space Labs., Hawthorne, Calif.
GROWTH AND CULTURE CHARACTERISTICS OF CERTAIN MARINE ALGAL FLAGELLATES FOR MASS CULTURE
Richard W. Eppley, Denzel L. Dyer, and Frank M. Maciasr Brooks AFB, Tex., School of Aerospace Med., Oct. 1964 11 p refs
(Contract AF 41(609)-1608)
(SAM-TDR-64-63; AD-455416)

To determine the usefulness of marine algae in biologic regeneration of oxygen and food for space crews, *Dunaliella tertiolecta, D. primolecta,* and *Chlorella pyrenoidosa* TX71105 were grown in a continuous culture apparatus. The marine algae gave 50% to 70% the yield, in dry weight per day, obtained from *Chlorella.* In one case, *D. tertiolecta* attained 93% of the yield of *Chlorella.* The crude fiber content of *D. tertiolecta,* 0.6%, is only 20% to 25% of that for *Chlorella.* The first-order rate constant for sonic disruption of cells is a linear function of crude fiber content. While these marine forms are not likely to show oxygen production rates competitive with *Chlorella,* the relative fragility may indicate better nutritive value and perhaps greater usefulness for closed systems. Author

N65-16932*# Bio-Dynamics, Inc., Cambridge, Mass.
STUDY OF THE TRANSFERRAL OF SPACE TECHNOLOGY TO BIOMEDICINE Final Report
21 Feb. 1964 208 p refs
(Contract NASw-570)
(NASA-CR-60635) OTS: HC $6.00/MF $1.25

Examples of interdisciplinary innovation transfer, results of interviews and questionnaires, and a literature review were used to develop a series of recommendations for improving the transfer of space technology innovations into the life sciences. Several specific instances of transfer were documented, but the general impact of aerospace stimulation of entire fields of endeavor appears to be a more significant effect. NASA procedures for disseminating information were compared to

those of several other agencies, and the implications of the differences are discussed. It is concluded that there is evidence of a spin-off of space technology into biomedicine, that the rate of transfer can be improved, and that active efforts to produce transfer are justifiable. Author

N65-16979*# General Mills, Inc., Minneapolis, Minn. Electronics Div.
RESEARCH TO DETERMINE THE EXISTENCE AND IDENTITY OF VIABLE MICROORGANISMS IN THE STRATOSPHERE Quarterly Status Report No. 2, 19 Jun.–18 Sep. 1963
V. W. Greene 8 Oct. 1963 7 p
(Contract NASw-648)
(NASA-CR-52518) OTS: HC $1.00/MF $0.50

Activities in the investigation of viable microorganisms in the stratosphere, and the status of the evaluation of data obtained from two high-altitude balloon flights are discussed. Work on simulation experiments to aid interpretation of stratospheric data is also reported. P.V.E.

N65-16983*# Florida State Univ., Tallahassee. Inst. for Space Biosciences
ELECTRON MICROGRAPHS OF MICROSPHERES FROM THERMAL PROTEINOID
Sidney W. Fox and Takeshi Fukushima [1963] 15 p refs
(Grant NsG-173-62)
(NASA-CR-52474) OTS: HC $1.00/MF $0.50

Production of microspheres from thermal proteinoid is discussed. These microspheres will be used as experimentally stable models in the development of an adequate theory of cellular origins. Properties which have been found and studied in the proteinoid microspheres include: (1) uniformity of size, (2) abundance, (3) responses of swelling and shrinking to salt solutions of appropriate concentration, (4) segmentability under pressure, (5) phycological modes of association, (6) birefringence, and (7) a photographed tendency to undergo septate division with change in pH. The polyamino acid material used for these studies was a 2:2:1 proteinoid prepared by the thermal copolymerization of the eighteen amino acids common to protein. A number of electron micrographs of microspheres treated in various ways are presented. P.V.E.

N65-16984*# Stanford Research Inst., Menlo Park, Calif.
STUDIES ON THE HILL REACTION ACTIVITY OF SOLUBLE CHLOROPLAST EXTRACTS Quarterly Progress Report No. 2, 1 Jun.–31 Aug. 1963
Bruce Graham 25 Sep. 1963 6 p
(Contract NASr-49(11))
(NASA-CR-52090) OTS: HC $1.00/MF $0.50

Progress is reported in the following areas: (1) methods of preparation and the storage stability of chloroplasts and chloroplast fragments; (2) the use of digitonin in the preparation of active chloroplast fragments and fractions; and (3) attempts to improve Hill reaction activity of digitonin preparations by Sephadex chromatography and by dialysis. I.v.L.

N65-17007# Air Force Systems Command, Bedford, Mass. Decision Sciences Lab.
THE MODIFIABILITY OF DECISIONS MADE IN A CHANGING ENVIRONMENT
Richard S. Gibson and Elizabeth H. Nicol Dec. 1964 39 p refs
(ESD-TR-64-657; AD-610122)

This research questions whether or not a decision maker's sensitivity to incoming information undergoes any change after he has reached a decision. A dynamic decision task, embedded in a limited war context, was presented to the subject who was required to assess simulated reconnaissance reports and to estimate the location of the enemy's main force. After a certain number of trials in which the information samples pointed to one of the alternative locations, the subject was then presented with a growing body of contraindicative information. With this task, an experimental study of the factors influencing decision modification was designed to test the effect of three main variables: the nature of the original condition, the length of time over which expectations were built up, and the amount of change represented in the shift from the initial condition to the postdecision situation. The facility with which the subject modified his decision was inversely related to the amount of situational change and the amount of experience in the situation before a change was introduced. The results indicated also that more information is required to change a decision than is originally needed to make the decision. Comparison of the subjects' performance scores with those of an ideal Bayesian observer showed highly significant correlations, although the Bayesian predictions were on the average significantly better than the subjects' predictions. Author

N65-17012# Catholic Univ. of America, Washington, D. C.
PREDICTING DECISION MAKING BEHAVIOR FROM PERSONALITY AND COGNITIVE VARIABLES Final Report
John C. Townsend and Walter J. Smith Bedford, Mass., AFSC, Electron. Systems Div., Nov. 1964 71 p refs
(Contract AF 19(628)-2822)
(ESD-TDR-64-619; AD-610521)

In an attempt to write multiple regression equations predicting decision making behavior from personality and cognitive variables, a pilot study and a main study were conducted. Unselected, undergraduate college males and females from two separate universities served as subjects. Predictor groups of variables for each of 13 categories of decision making criteria were hypothesized. The results indicated that seven of the multiple regression equations through their beta coefficients yielded multiple correlation coefficients significant at $P<.01$, three at $P<.05$ and three at $P>.05$. All of the multiple correlations related to the prediction of goodness of decision were significant beyond the 0.01 level. The least profitable predictions resulted from attempts to predict decision time. Predictions of confidence in decision were intermediate. The largest amount of criterion variance accounted for was 16%. Low multiple correlation coefficients were expected due to the restricted range of personality and cognitive scores in persons normal in personality and above average in intelligence. Similar research in which normal individuals would be subjected to stress to reveal underlying personality differences is indicated. Author

N65-17025# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM NAUCHNYYE DOKLADY VYSSHEY SHKOLY, BIOLOGICHESKIYE NAUKI (SCIENTIFIC REPORTS OF THE HIGHER SCHOOLS, BIOLOGICAL SCIENCES), NO. 3, 1964
16 Feb. 1965 51 p refs Transl. into ENGLISH from Nauchn. Dokl. Vysshei Shkoly, Biol. Nauki, (Moscow), No. 3, 1964 p 26–29
(JPRS-28782; TT-65-30345) OTS: $3.00

CONTENTS:

N65-17039# David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.

MECHANICAL STIFFNESS OF MAN'S LOWER LIMBS

Arthur E. Hirsch and Leonard A. White Oct. 1964 21 p refs (DTMB-1810; AD-608762)

Measurements of the compressibility or mechanical stiffness of the lower limbs under static loads are reported. Deformations of the various portions of the limb structure are discussed, and major load-bearing regions of the foot are identified. Author

N65-17052*# Walter Reed Army Inst. of Research, Washington, D. C.

TIMING BEHAVIOR AND STIMULUS GENERALIZATION

J. V. Brady and Bernard Migler [1963] 5 p

(Grant NsG-189-61)

(NASA-CR-53693) OTS: HC $1.00/MF $0.50

During stimulus generalization testing after discrimination training, gradual rate of decrements extending from S^D to S^Δ are commonly observed. The behavior over this range is assumed, therefore, to have decreasing "strength" across the stimuli. An alternate explanation is that the behavior that occurs during stimulus generalization testing occurs at full strength, but only occasionally, its frequency being determined by the proximity of the test stimulus to the training stimulus. Using a single lever technique it is difficult to obtain appropriate measures to examine this possibility. The question has been examined in the present experiment by using a two-response procedure. If reinforcement is contingent upon a proper time delay from response A to response B, one can then examine these time delays as well as the overall rate at which they occur during stimulus generalization. Author

N65-17053*# Washington Univ., Seattle. Coll. of Fisheries

***DAPHNIA* SURVIVAL STUDIES Progress Report No. 1, Nov. 1, 1963-May 1, 1964**

Frieda B. Taub [1964] 19 p refs

(Grant NsG-519)

(NASA-CR-56112) OTS: HC $1.00/MF $0.50

Experiments were performed to define the most suitable conditions for a 7-day flight of *Daphnia*. The best culture medium developed is *Chlamydomonas reinhardti* culture diluted with aquarium water to 2.5×10^6 cells/ml plus calcium pantothenate (300 mg/l). The survival of 75% of the original animals and the birth of approximately 24 young per female can be expected if other factors do not become limiting. The flight chambers were designed on a modular basis. Each module contains two chambers each for four pregnant *Daphnia*, plus their algal food, one chamber for algae only, and necessary preservation equipment. Morphological studies were concerned with (1) normal morphology and embryology, (2) the feasibility of the use of exoskeleton markings as an index of cellular change, and (3) the induction of cyclomorphosis. Pictures of normal morphology, embryology, and exoskeleton structure are shown. A collection of 10 species were maintained to provide alternate species with a variety of environmental requirements. Author

N65-17054*# State Univ. of New York at Buffalo. School of Medicine

PRIMITIVE EARTH SYNTHESIS OF AMINO ACIDS AND POLYPEPTIDES Status Report, Jul. 1-Dec. 31, 1963

Charles U. Lowe 30 Jan. 1964 3 p

(Grant NsG-476)

(NASA-CR-53134) OTS: HC $1.00/MF $0.50

Studies were conducted to determine the contribution of a heavy metal contaminant in ammonium cyanide to the formation of amino acids and amino acid conglomerates under the influence of heat. Reaction products resulting from interaction of gaseous HCN with aqueous ammonia and of liquid HCN with aqueous ammonia were compared. Results indicated that the reactions progress to largely similar conclusions. The results of efforts to isolate polymers formed in the above process by combining continuous-flow electrophoresis and paper-strip chromatography are summarized in an abstract of a paper entitled *Incorporation of Glutamic Acid into Amino Acid Complexes in Aqueous NH_4CN*. D.S.G.

N65-17055*# Nevada Univ., Reno.

EXPERIMENTS ON THE EFFECTS OF LOW PRESSURES ON CELLULAR ULTRASTRUCTURE AND CYTOCHEMISTRY IN PLANTS Semiannual Progress Report, Apr. 1-Sep. 30, 1963

Hugh N. Mozingo [1963] 11 p refs

(Contract NsG-464)

(NASA-CR-55179) OTS: HC $1.00/MF $0.50

The effects of reduced pressure on the germination and distal displacement of the new cell plate in epidermal root tip division of timothy (*Phleum pratense*) and on the growth rate and photosynthetic rate of *Elodea* were investigated. A significant percentage of the timothy population retained its capacity to grow at reduced pressures, and *Elodea* exhibited feeble growth after 8 months at nearly complete vacuum. Light microscope studies revealed no significant change in the degree of distal displacement as a result of exposure to low pressures. Electron microscope studies revealed no major gross changes in the cellular structure of those timothy seedling roots which did grow under reduced pressure, although some changes in the numbers, distribution, and appearance of cellular organelles were noted. A new plastic embedding technique is reported which reduces handling of the specimen. M.P.G.

N65-17056*# Ohio State Univ. Research Foundation, Columbus.

BIOLOGICAL EFFECTS OF PROLONGED EXPOSURE OF SMALL MAMMALS TO CLOSED GASEOUS ENVIRONMENT Semiannual Report, 28 Feb.-31 Aug. 1963

E. P. Hiatt 22 Aug. 1963 9 p refs *Its* Rept.-2
(Grant NsG-295-62; RF Proj. 1492)
(NASA-CR-51657) OTS: HC $1.00/MF $0.50

Experimental work was conducted to determine the effects of prolonged exposure of small mammals to closed gaseous environments. Chicken embryos were used to screen a number of gaseous environments for deleterious effects and to obtain leads which can be validated through experimentation with mammals. Experimentation included a study of the effect of almost nitrogen-free environments; oxygen toxicity; the blood flow to bone marrow and other organs following varying periods of intermittent hypoxia in the rat; and the gas exchange and cardiovascular effects in short periods of intensive isometric exercise in man. C.L.W.

N65-17057*# Ohio State Univ. Research Foundation, Columbus.
BIOLOGICAL EFFECTS OF PROLONGED EXPOSURE OF SMALL ANIMALS TO UNUSUAL GAS ENVIRONMENTS Third Semiannual Progress Report, 1 Sep. 1963–29 Feb. 1964
E. P. Hiatt 1 Mar. 1964 9 p refs
(Grant NsG-295-62)
(NASA-CR-53543) OTS: HC $1.00/MF $0.50

Biological effects of (1) exposure of mice to pure oxygen at one atmosphere with varying daily periods of air breathing; (2) the influence of prolonged exposure of chickens to almost pure oxygen; and (3) tissue metabolism of chicken embryos incubated in an atmosphere of 79% helium plus 21% oxygen are reported. Mice survived exposure of oxygen better when they had a daily period of air breathing as short as two hours, and the benefit increased with the time of air exposure per day up to at least eight hours. The lungs of mice showed pathological changes when the mice were exposed to oxygen for periods of at least eight hours per day. Severity of damage increased with daily time of exposure to oxygen but reversed on exposure to air. Animals which survived a 20-day exposure of oxygen, with periods of air breathing, were not more vulnerable to effects of further exposure to oxygen than were unexposed mice. E.E.B.

N65-17058*# St. Louis Univ., Mo.
PHYSIOLOGICAL EFFECTS OF WEIGHTLESSNESS AND SPACE RADIATION ON HIBERNATORS Second Semiannual Status Report
X. J. Musacchia Jun. 1963 5 p
(Grant NsG-271-62)
(NASA-CR-50546) OTS: HC $1.00/MF $0.50

Irradiation of ground squirrels and hampsters with cobalt-60 facility is reported. The facility is described in detail. Also reported are the autoradiographic and other cytochemical techniques employed in regeneration of intestinal epithelium. The following observations were made: (1) Mitotic activity is localized in the basal layer of cells in the turtle intestinal epithelium. (2) Mitosis duration is estimated at 2 hours in the turtles maintained at 20° to 24° C. (3) Complete renewal of cell population of the intestinal epithelium takes about 8 weeks. (4) Mitotic activity in cold torpid turtles is suppressed and its reactivation upon warming the animals is retarded. Also, hibernating ground squirrels subjected to 2000 R of x-irradiation demonstrated decreased concentrations of catecholamines. E.E.B.

N65-17067*# Colorado State Univ., Fort Collins. Dept. of Botany and Plant Pathology
THE USE OF PATHOGEN-FREE PLANTS IN A MICROCOSM. THE EFFECTS OF HIGH INTENSITY LIGHT ON PLANT GROWTH
Ralph Baker 12 Dec. 1962 4 p
(Grant NsG-78-60)
(NASA-CR-50170) OTS: HC $1.00/MF $0.50

Results of investigations on the use of pathogen-free plants in a microcosm indicate that: (1) Plants grow more slowly in a germ-free environment. (2) Competition in a three-membered system exists. The system consists of a host (bean plant), a pathogen (*Fusarium solani* f. *phaseoli*), and an active competitive saprophyte (*Fusarium roseum*). The presence of the competitive saprophyte decreased the pathogenicity of the pathogen on the host. Pathogenicity was further reduced by manipulation of the soil environment so that nitrogen became limited. This is an example of the possibility of biological buffering of a soil to decrease the effects of harmful organisms and is believed to be the first demonstration of this phenomenon in a rigorous gnotobiotic system. Also presented are results of investigations on the influence of light intensity, air temperature, wind velocity, radiation environment, and light quality on plant temperature, as well as a discussion of the energy transfer mechanisms which control the exchange of energy between the plant and its surroundings. I.v.L.

N65-17068*# Lockheed-California Co., Burbank. Biophysics Research Div.
INVESTIGATION OF THE EFFECTS OF IONIZING RADIATION ON THE CENTRAL NERVOUS SYSTEM IN VIVO AND IN VITRO First Quarterly Progress Report, Jul. 16–Oct. 18, 1963
J. Ralph Meigs [1963] 5 p
(Contract NASw-787)
(NASA-CR-52231) OTS: HC $1.00/MF $0.50

An investigation of the effects of ionizing radiation on the central nervous system *in vivo* and *in vitro* was conducted. Included are both technological progress and experimental progress in studying the effects of ionizing radiation on the central nervous systems of X-irradiated rats and cats, and in studying the electrical characteristics associated with neurophysiological processes of neurons and neuroglia in tissue culture, and the subsequent effects of ionizing radiation. C.L.W.

N65-17069*# Martin Co., Baltimore, Md. Research Dept.
CHEMOSYNTHETIC GAS EXCHANGER Second Quarterly Progress Report, Sep. 3–Dec. 17, 1963
Leonard Bongers [1963] 19 p refs
(Contract NASw-713)
(NASA-CR-55188; ER-13270-2) OTS: HC $1.00/MF $0.50

The effect of oxygen upon growth rate, conversion efficiency, and cell composition was investigated. The effect of N-limited (nitrogen limited) growth on hydrogen bacteria is also discussed. R.T.K.

N65-17070*# Martin Co., Baltimore, Md. RIAS Div.
RESEARCH IN PHOTOSYNTHESIS Quarterly Report No. 3, 6 Dec. 1963–6 Mar. 1964
Bessel Kok [1964] 6 p
(Contract NASw-747)
(NASA-CR-53601) OTS: HC $1.00/MF $0.50

Research progress in chloroplast lipids, photoinhibition, photosynthetic electron transport, oxygen exchanges in chloroplast reactions, and photopotentiation of ATP hydrolysis are reported in relation to the study of photosynthesis. Results of the work on photoinhibition led to the conclusion that of the two photoreactions of photosynthesis, the one which evolves oxygen is the one most sensitive to inhibition by light. E.E.B.

N65-17071*# Connecticut Agricultural Experiment Station, New Haven.
PLANT LEAVES FOR THE PRODUCTION OF OXYGEN IN A CLOSED SYSTEM Fourth Quarterly Status Report
Dale N. Moss 20 May 1963 14 p
(Contract NASr-129)
(NASA-CR-50295) OTS: HC $1.00/MF $0.50

It has been found that the 1 ft^3 of oxygen per hr^{-1} required by man could be produced by 75 ft^2 of maize, sugarcane, or sunflower leaves, under ideal conditions. However, the weight and volume of the closed ecological systems containing the plants, plant chamber, accessory equipment must be reduced to render them feasible for the production of oxygen in space. To reduce the weight of such systems, vermiculite is used as a rooting medium, the water used by the system is reduced by recirculation, the number of lamps is reduced by installing a chromium reflector, and lightweight materials are used for the enclosure and accessory equipment. To reduce the systems' volume, many leaves are packed in a small space, illumination is increased, CO_2 concentrations are increased, and the temperature is optimized. Numerous plants have been screened for use in a closed ecological system. However, it has been found that sugarcane is possibly the most likely candidate for the final system since it has the lightest O_2 production per unit leaf of any plant tested, can be grown as a perennial, and can be quickly started from the root system; the optimum conditions for O_2 production are a temperature of 30° C, 0.1% CO_2, and intense light. A closed system that may support two men is discussed as well as the testing of production rates of cane in this system. D.E.R.

N65-17072*# Connecticut Agricultural Experiment Station, New Haven.
PLANT LEAVES FOR THE PRODUCTION OF OXYGEN IN A CLOSED SYSTEM Final Report
Dale N. Moss 22 Nov. 1963 3 p
(Contract NASr-129)
(NASA-CR-55131) OTS: HC $1.00/MF $0.50

Sugar cane was chosen as the plant for use in a closed ecological system. A closed system was designed to support two men. A single test was completed with this system, using sugar cane as the test plant. In that test, the two foot square area produced only one-tenth of the O_2 required to support man. The major difficulty was found to be chlorophyll bleaching in leaves nearest the lights. Thus, these leaves were not producing O_2 and, in turn, shaded other leaves cutting their production rate. However, of great promise was the fact that an extremely large area of leaves (estimated at 400 ft^2) was maintained in the chamber for three months. Thus, if only half the maximum rate of photosynthesis could be maintained, the chamber could support two men. I.v.L.

N65-17083# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN PHYSIOLOGICAL SHIFTS IN THE HUMAN ORGANISM DURING ACCLIMATIZATION IN THE INTRA-CONTINENTAL REGIONS OF ANTARCTICA
I. I. Tikhomirov 2 Dec. 1964 16 p refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (Moscow), v. 3, no. 17, 1962 p 74-82
(FTD-TT-64-286/1+2; AD-609790)

Numerous observations were made of many physiological variables in explorers enroute to an inland station in Antarctica and during their year-long stay there. Initial symptoms of mountain sickness are reported, a 6-month period of decreasing general tone of the organism is discussed, and a subsequent 5-month period of further acclimatization is described. Parameters measured included arterial pressure, pulse frequency, systolic pressure, respiratory frequency and volume, atmospheric pressure, oxygen and CO_2 content of the air, blood oxygenation level, body temperature, blood analysis, and leukocyte content of the blood. It is concluded that, during the course of a year's stay, significant changes, mostly adaptive, occurred in the bodies of the men; that the limits of human adaptation to environmental changes are quite narrow; and that future work should be devoted to improving the environment rather than the adaptation. D.E.W.

N65-17138# Ohio State Univ., Columbus.
A FACTOR ANALYTIC APPROACH TO HUMAN ENGINEERING ANALYSIS AND PREDICTION OF SYSTEM MAINTAINABILITY Final Report, Jan.–Jun. 1964
Donald A. Topmiller (Ph.D. Thesis) Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 88 p refs
(AMRL-TR-64-115; AD-610210)

A theoretical formulation is outlined which treats the measurement and prediction of system maintainability as a "components-of-variance" model. The sources of variance are identified as inter- and intra-man (personnel and social variables); machine (weight, volume, reliability, etc.) and man–machine interaction (human engineering design criteria). A restricted case of the formulation was investigated empirically in an attempt to predict maintainability of a sample of Air Force equipment from a questionnaire evaluation of the human engineering design features. The questionnaire contained 114 items concerning desirable human engineering maintainability design features. Questionnaire responses, factor-analyzed by the Wherry–Winer Method, yielded eight orthogonal (independent) maintainability design factors. On the basis of the obtained factor loadings, seven of the original eight factors were selected as the most potent predictors. Several regression analyses were performed using different assumptions concerning both heterogeneity of sampled equipment and questionnaire scale stability. Author

N65-17139# RAND Development Corp., Cleveland, Ohio.
THE USE OF LINES OF NONEXTENSION TO IMPROVE MOBILITY IN FULL-PRESSURE SUITS Technical Report, Mar. 1963–Mar. 1964
Arthur S. Iberall Wright-Patterson AFB, Ohio, AMRL, Nov. 1964 44 p refs
(Contract AF 33(657)-10992)
(AMRL-TR-118; AD-610519)

The program of investigation pursued was (1) to map out the lines of nonextension; (2) to test whether string elements of high elastic modulus, a connected network, could be laid along these lines of nonextension without providing any constraint to mobility; (3) to obtain a highly mobile pressure-retaining layer to be constrained by the net; and (4) to construct and demonstrate an entire pressure-retaining garment system that makes use of all necessary layers and string elements in a completely connected, netted covering for the body, with minimal constraint to mobility up to 5 psi. The technique, result, and collateral observations relevant to each of these phases are described. A mobile, pressure-retaining garment was developed by building each structural, functional layer into the composite garment in accordance with the basic design theory. Author

N65-17144# Mitre Corp., Bedford, Mass.
FURTHER RESEARCH ON THE EFFECT OF VIEWING ANGLE AND SYMBOL SIZE ON READING EASE

G. Kinney, S. Manning, and L. Smith Bedford, Mass., AFSC, Electron. Systems Div., Jan. 1965 21 p ref
(Contract AF 19(628)-2390)
(W-07004; ESD-TDR-64-633; AD-610421)

The effects of viewing angle and visual symbol size upon the time required to read familiar words were studied for angles of 90, 60, 45, and 30 degrees and for symbols whose height subtended 16 and 10 minutes of arc at the viewer's eyes. Recommendations for large-board, wall-display layout and viewer-seating arrangements are presented. Author

N65-17173# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BOOK REVIEW ON: "INFORMATION AND VISION"
N. D. Nyuberg 5 Dec. 1964 9 p Transl. into ENGLISH from Vestn. Akad. Nauk SSR (Moscow), no. 7, 1962 p 123-125
(FTD-TT-64-401/1; AD-610273)

The book is acknowledged to be one of only a few in the field, but its merits are glossed over. The hypothesis presented in the book of a volley of impulses in the optic nerve fiber as a result of a change in the dimensions of the receptive fields is regarded as purely speculative and is said to be without any solid basis. The book's consideration of the visual system as an ideal Shannon system is also challenged. Other points that are questioned include perception of contours, eye movement descriptions, brightness vs information content, the approach to ideality of the visual system, and the transmission rate capacity of the visual analyzer. The chief value of the book is asserted to lie in its stimulating treatment of numerous questions, rather than in what are called its debatable affirmations and indefinite conclusions. D.E.W.

N65-17194# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SENSORY REACTIONS OF MAN AND SENSITIVITY OF THE VESTIBULAR ANALYZER UNDER SHORT-TERM WEIGHTLESSNESS
Ye. M. Yuganov, I. A. Sidel'nikov et al. 8 Dec. 1964 15 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 3, 1964 p 369-375
(FTD-TT-64-1052/1+2+4; AD-610348)

Vestibular stability was studied in 30 men. They were divided into three groups: (1) those who endure weightlessness without physical impairment and a lowering of the capacity for work; (2) those who experience illusory sensations of the position of the body in space under a condition of weightlessness, and (3) those who experience unfavorable reactions very quickly, resulting in symptoms of airsickness. It was concluded that (1) the character and degree of sensor reactions under short-term weightlessness depend on the dissimilar vestibular sensitivity of persons subjected to this effect, (2) a man's capacity to work in short-term weightlessness can be predicted by vestibular testing, and (3) the degree of the sensitivity and stability level of inhibiting effects of the vestibular analyzer are dependent upon the individual being tested, i.e., to the degree the individual experiences motion sickness in weightlessness. E.E.B.

N65-17230# Lafayette Clinic, Detroit, Mich. Psychophysiology Lab.
VALIDATION OF THE AEROSPACE MEDICAL RESEARCH LABORATORIES 3-CHANNEL PERSONAL TELEMETRY SYSTEM
Alfred F. Ax Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 31 p refs
(Contract AF 33(657)-9352)
(AMRL-TR-64-124; AD-610589)

The art of physiological telemetry is borderline in three areas: (1) sensors, (2) transmitter, (3) data processing. This study assessed the AMRL three-channel personal telemetry from all three aspects. Analysis of the records transmitted from men in various graded intensities of physical activity revealed that of the three physiological variables (respiration, EKG and temperature), respiration was the least valid. Torso circumference changes sensed by rubber tube strain gages proved superior to the impedance method for measuring respiration. Some tentative findings on a stress interview study reveal the telemetry method to have promise. It was shown that the major difficulty preventing widespread use of physiological telemetry in significant field situations is the lack of a practicable high-speed data processing system that can distinguish and utilize the occasionally valid physiological signal emersed in artifact or noise produced by movements and changing environmental influences. The solution to the artifact problem is to sense and utilize movement and environmental influences, to gate out, and to correct the physiological data; and to develop automatic editing apparatus and computer programs for recognition and selection of the valid signal patterns. Author

N65-17242# Naval School of Aviation Medicine, Pensacola, Fla.
AN INVESTIGATION OF UNPREDICTED DIFFERENCES IN ATTRITION RATES AMONG STUDENTS FROM DIFFERENT PROCUREMENT SOURCES
Robert J. Wherry, Jr. and Charles W. Hutchins, Jr. 9 Oct. 1964 17 p refs
(BUMED-40; AD-609668)

An investigation of unpredicted differences in attrition rates among men from different procurement sources is described. Those differences found were analyzed for contributing factors. Suggestions are made as to the application of these factors in improving those procurement sources showing the higher attrition rates. Author

N65-17289*# Oak Ridge National Lab., Tenn. Biology Div.
THE ORNL SPACE BIOLOGY PROGRAM Annual Report, Period Ending Jun. 30, 1963
G. E. Stapleton and M. A. Bender 8 Nov. 1963 39 p
(NASA Order R-60; NASA Order R-77)
(NASA-CR-52679; ORNL-TM-720) OTS: HC $2.00/MF $0.50

The investigations are divided into two chief categories: (1) a basic supporting program, which includes the ground-based laboratory research chiefly concerned with the relative biological effectiveness (RBE) of high-energy protons on a variety of biological materials ranging from bacteria to human blood cells, and (2) a biosatellite program, which involves the development of testing methods and base-line radiation effects data on a number of biological materials for experiments in space vehicles in flight. To date, the necessary equipment and instrumentation have been developed for proton irradiations, and experiments have been done with 22-Mev and 130-Mev protons. The results of these experiments are reported here. The biological experiments flown in the BIOS I space probe and the 1962 Goose Bay high-altitude balloon flights, and the experience gained from participation in the flights, are discussed. Author

N65-17290*# Army Chemical Corps., Fort Detrick, Md. Physical Defense Div.
STERILIZATION OF NATURALLY CONTAMINATED METAL SURFACES WITH DRY HEAT Protection Branch Report of Test No. 8-64

Dorothy M. Portner 16 Oct. 1963 6 p refs
(NASA Order-35)
(NASA-CR-52899) OTS: HC $1.00/MF $0.50

Investigations into the dry heat sterilization of naturally contaminated metal surfaces were conducted. Results indicate: (1) Almost 1000 microorganisms were recovered from a stainless steel strip (approximately 500/in.^{2}) after exposure to air for 33 days. (2) None of these stainless steel strips exposed to 135° C for 12 hours or 24 hours contained any viable microorganisms as evidenced by the lack of microbial growth after 7 days' incubation in a fluid thioglycollate medium. After 7 days' incubation period, broth samples in which the strips had been placed all supported bacterial growth when about 100 spores of *Bacillus subtilis* var. *niger* were deliberately introduced. (3) The number and type of viable organisms on a surface, at any specific time, vary considerably. (4) Almost all of the microorganisms recovered were aerobes, with spore-forming bacteria the most predominant type. (5) Data support the choice of the time-temperature combination of 135° C for 24 hours for sterilizing a spacecraft provided that particular care is taken to keep the spacecraft clean during assembly.
I.v.L.

N65-17303# Joint Publications Research Service, Washington, D. C.
GAS EXCHANGE THROUGH THE SKIN AND ITS IMPORTANCE FOR THE HUMAN BODY
N. M. Petrun' 26 Feb. 1965 66 p Transl. into ENGLISH from the book "Gazoobmen Cherez Kozhu i Yego Zhacheniye Dlya Organizma Cheloveka" Moscow, Medgiz, 1960 p 2, 18–34, 99–133, 152–161
(JPRS-28923; TT-65-30402) OTS: $3.00

The question of gas exchange (oxygen, carbon dioxide and, in part, nitrogen) through the human skin, and its significance for the body under normal and pathological conditions, is explored. It is shown conclusively that gas exchange through the skin increases sharply in difficult situations (physical stress, overheating, etc.), acquiring practical significance in making up for inadequacy of pulmonary gas exchange. It should be assumed that such a compensatory role of cutaneous gas exchange acquires still greater importance during illness of the body. Author

N65-17304# Joint Publications Research Service, Washington, D. C.
COPING WITH SILENCE IN OUTER SPACE
V. Lebedev and O. Kuznetsov 26 Feb. 1965 9 p Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), Oct. 1964 p 59–64
(JPRS-28929; TT-65-30405) OTS: $1.00

Isolation chamber experiments on humans with restricted stimuli were conducted and showed that healthy individuals with high motivation can remain in isolation for a long time without any psychic changes that endanger their health. The uniformity and monotony of impressions in the absence of external stimuli reduce the energy level of the cerebral cortex and lead to illusions of recognition of eidetic sensations, but not hallucinations. This intensification of brightness of imagery under isolation conditions is due to the reduced flow of stimuli impinging on the human sensory organs. An understanding of the fundamentals of space and aviation psychology, planned purposeful activity during space flight, as well as good health and high motivation are recommended measures to combat sensory confusion and other isolation psychological phenomena.
G.G.

N65-17306# Mayo Clinic, Rochester, Minn.
PLEURAL PRESSURES IN DOGS IN SUPINE AND PRONE BODY POSITIONS STUDIED WITHOUT THORACOTOMY
W. J. Rutishauser, N. Banchero, A. G. Tsarkiris, R. E. Sturm, and E. H. Wood [1965] 14 p

Pleural pressures were measured with saline-filled catheters. This avoided air around the catheter tip and hence all air-fluid or air-balloon-fluid interfaces, and the associated complicating surface tension effects on the pressure transducer system. These studies indicated that intrapleural pressures recorded at the superior surface of the lungs are uniformly more negative than pressures recorded simultaneously from the dependent surface. These differences in pressure, when expressed as a mean gradient per centimeter of vertical distance separating the two lung surfaces, are greater when the animal is in the prone position than when in the supine position. E.E.B.

N65-17310# Joint Publications Research Service, Washington, D. C.
CYBERNETICS—PHILOSOPHICAL AND SOCIOLOGICAL PROBLEMS
I. Novik 20 Jan. 1964 217 p refs Transl. into ENGLISH of the book "Kibernetika—Filosofskiye i Sotsiologicheskiye Problemy" Moscow, State Political Lit. Publishing House, 1963 p 1–207
(JPRS-22814; OTS-64-21340) OTS: $3.50

Social, scientific-technical, and theoretical conditions led to the emergence of the new science of cybernetics. This new science is characterized by a generic and abstract approach to control with the aid of a signaling action. This distinguishes it from automatic control, effected in the past, to presuppose direct mechanical communications, nexus and contact. Cybernetics is directly bound to optimization. An analysis of the interrelationship of man and machine led to the conclusion that the use of cybernetic machines will contribute to raising the cultural-technical level of mankind. G.G.

N65-17326*# Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A THEORY FOR THE OPTIMAL DETERMINISTIC CHARACTERIZATION OF THE TIME-VARYING DYNAMICS OF THE HUMAN OPERATOR
Walter W. Wierwille and Gilbert A. Gagne Washington, NASA, Feb. 1965 68 p refs
(Contract NAS1-3485)
(NASA-CR-170) OTS: HC $3.00/MF $0.75

A deterministic theory of characterization is presented which can be used to determine the time-varying dynamics of the human operator engaged in a tracking task. With this theory, it is possible to obtain a time-varying impulse response and a time-varying transfer function which represent the action of a human operator in an open- or closed-loop control system. No special form of input is required. The characterization, which may be developed for either real-time or nonreal-time computation, is based upon an exact theory of fixed-form optimization. A strongly convergent, definitely stable, iteration technique can be used to realize the optimal characterization filter. The theory takes the time variation of the impulse response or transfer function into account, so that it is unnecessary to make the assumption of slowly varying dynamics.
Author

N65-17329*# Massachusetts Inst. of Tech., Cambridge.
REMOTE MANIPULATION WITH TRANSMISSION DELAY

William R. Ferrell Washington, NASA, Feb. 1965 120 p refs (Grant NsG-107-61)
(NASA-TN-D-2665) OTS: HC $4.00/MF $0.75

If a remote manipulator is located at a great distance from a person using it and monitoring its activity, limited signaling speed will result in a time discrepancy between the operator's control activity and the feedback he gets concerning the response of the distant equipment. The work reported represents the results of a program of exploratory research into the effects of such a delay on an operator's ability to perform self-paced manipulation tasks with a manipulator which duplicates his hand motions. It was found that even complex tasks could be accomplished by adopting a simple strategy of performing the task by a series of discrete, open-loop movements. No evidence of unstable motions or of delay-induced emotional stress was observed. Since this strategy was consistently used, it was found possible to predict task completion time in the delay case from measures of operator-manipulator performance when there was no delay. The ability to perform without visual feedback, open-loop, was separately investigated. Author

N65-17365# Harvard Univ., Cambridge, Mass. Lab. of Psychophysics
[HUMAN ENGINEERING AND SENSUAL PERCEPTIONS] Progress Report No. 42, 1 Jan.–30 Jun. 1964
S. S. Stevens et al 30 Jun. 1964 20 p refs
(Grants NSF G-10716; NIH B-2974)
(PPM-106; AD-602964).

Six descriptive abstracts are presented. The projects are concerned with theoretical and experimental investigation of psychophysical aspects of auditory perception, and analogous phenomena of other phases of sensory perception. E.P.V.

N65-17438# School of Aerospace Medicine, Brooks AFB, Tex.
HUMAN FACTORS ASPECTS OF A 30-DAY EXTENDED SURVIVABILITY TEST OF THE MINUTEMAN MISSILE
Bryce O. Hartman, Don E. Flinn, A. B. Edmunds, F. D. Brown, and J. E. Schubert (Boeing Co., Seattle) Oct. 1964 25 p refs
(SAM-TDR-64-62; AD-456174)

Two civilian subjects successfully completed 30 days of unbroken confinement in an underground Minuteman launch control center with an open-loop air supply. Logistic supplies were self-contained. During the test, they ate, slept, and performed duties similar to those that would be required of an operational crew in a postnuclear attack environment. Their performance score was high (99.75% level) with no critical errors. Morale throughout the test was excellent, with minimum of interpersonal friction. No physiologic or psychologic changes were observed which would compromise the integrity of the weapon system. Alterations in sleep patterns obtained were consistent with predictions based on work levels. Author

N65-17465*# National Aeronautics and Space Administration, Washington, D. C.
SPACE PHYSIOLOGY, SOME RESULTS AND PROSPECTS OF EXPERIMENTAL INVESTIGATIONS [KOSMICHESKAYA FIZIOLOGIYA, NEKOTORYYE ITOGI I PERSPEKTIVY EKSPERIMENTAL'NYKH ISSLEDOVANIYA]
O. G. Gazenko, V. V. Parin, V. N. Chernigovskiy, and V. I. Yazdovskiy Mar. 1965 19 p Transl. into ENGLISH from a paper presented at 10th Congr. of the I. P. Pavlov All-Union Physiol. Soc., Yerevan, USSR, 22-28 Oct. 1964
(NASA-TT-F-305) OTS: HC $1.00/MF $0.50

The results of telemetric investigations carried out during suborbital and orbital flights in space are described. Studies of animals during suborbital flights in 1957 to 1959 showed that excess gravity in dogs was associated with changes in the cardiovascular and respiratory systems. An active or passive defense reaction developed. Later, under conditions of weightlessness, these indices approximated prelaunch levels. Experiments in 1960–1961 which involved the study of various specimens, including animals, plants, microorganisms and biochemical substrates, during flight and after their return to earth confirmed the results of earlier tests. Stability of these physiological parameters developed after some time under conditions of weightlessness, although the cardiovascular and respiratory systems showed some retardation in centrifuge studies. There was some instability in the cardiac rhythm. Animals functioned with little energy and some disruption of physiological and biochemical parameters occurred. It was concluded, however, that space flight does not have any unfavorable biological effects on man or animals. Effects of long-term weightlessness and the environmental requirements of extended space flight were studied. Although there were some irregularities in heart action and some fatigue and irritation after the flight, no pathological indications were found. The last flight compared the reactions of the female and male organism. The results again indicated a gradual adaptation to the conditions of flight, although some symptoms of general fatigue were observed. Author

N65-17468# George Washington Univ., Washington, D. C. Human Resources Research Office
PROGRAMED INSTRUCTION AND LOW ALTITUDE AERIAL OBSERVATION
Peter B. Dawkins Dec. 1964 56 p refs
(Contract DA-44-188-ARO-2)
(HUMRRO-RR-14; AD-456738)

An Army training course on low altitude aerial observation was converted into programed format. The programed content consisted of both verbal and visual (i.e., photographs and maps) material on four basic aerial observer skills. Criterion testing on target location indicated that the group of students receiving the experimental training made reliable learning gains, in comparison with a control group which did not receive the training. A reduction in time required to locate targets accompanied the increase in accuracy. On the average, study time for the self-paced programed courses was less than that required for the classroom version of the course (15 hours vs 16 hours). Author

N65-17492# Joint Publications Research Service, Washington, D. C.
REVIEW OF SOME WORKS NOMINATED FOR 1965 LENIN PRIZES: MORPHOLOGICAL STUDIES OF FISH AID AIRCRAFT AND SHIP DESIGNERS
26 Feb. 1965 7 p refs Transl. into ENGLISH from Izv. (Moscow), 16 Jan. 1965 p 3
(JPRS-28910; TT-65-30393) OTS: $1.00

The role of the study of the functional morphology of fish in the design of underwater craft of diverse types is discussed. Relationships are noted between external structures of fish and recent designs for naval and air craft, including fins to control vertical direction, and lifting configurations of the fish body or the airplane fuselage. The importance of these to the progress of technology is cited as a reason for awarding the Lenin Prize. D.E.W.

N65-17509*# Northrop Space Labs., Hawthorne, Calif. Bioastronautics Lab.
STERILIZATION OF SPACE PROBES
R. W. Eppley Feb. 1962 30 p refs Prepared for JPL
(Contract NAS7-100)
(NASA-CR-60875; NSL-62-26) OTS: HC $2.00/MF $0.50

For sterilizing space vehicles with any probability of impacting the moon or planets, the use of dry heat, ethylene oxide gas, and gamma radiation is advised. Other methods of sterilization discussed are moist heat, β-propiolactone, other disinfectants, bacterial filters, and preventive measures. Recommendations are made for sterilizing particular materials. Methods are suggested for packaging and handling sterile materials, for quality control procedures, and for the sterilization of return vehicles. The restraints upon design imposed by sterilization are summarized. R.L.K.

N65-17511*# Douglas Aircraft Co., Inc., Huntington Beach, Calif. Space Systems Center
HUMAN ENGINEERING DESIGN CRITERIA STUDY Quarterly Progress Report No. 2, 1 Oct.–31 Dec. 1964
W. R. Harmer 7 Jan. 1965 57 p refs
(Contract NAS8-11256)
(NASA-CR-60855; A3-860-K447-M-2) OTS: HC $3.00/MF $0.50

Interim results are reported of literature searches in the areas of operational environment, safety, man's capability for weight lifting, control and display, decision making, anthropometry, clothing, and maintainability. Working bibliographies, lists of materials on order, and draft introductions to various chapters of the design criteria study are included. R.L.K.

N65-17603*# AiResearch Mfg. Co., Los Angeles, Calif.
HUMAN FACTORS AND ENVIRONMENTAL CONTROL/LIFE SUPPORT SYSTEMS STUDY PROGRAM: LUNAR EXPLORATION SYSTEMS FOR APOLLO Midterm Status Report
16 Dec. 1964 142 p
(Contract NAS8-11447)
(NASA-CR-60909; SS-3242) OTS: HC $4.00/MF $1.00

The formulation of human factors criteria involved operating procedure studies, task analyses, and investigations to determine the most suitable shelter interior design with emphasis on the problems of long-term habitability and emergency conditions initiated through solar flares or loss of pressurization in one compartment. A full-scale mockup of the shelter has been constructed for investigation of space requirements and equipment placing. Analyses and evaluation of subsystems for the environmental control and life support systems were done with attention focused on the manned shelter module used in the LESA bases. The selected processes for various essential life-support functions, for fuel-cell and solar-cell power systems, as well as for nuclear power systems are presented in tables. G.G.

N65-17618# George Washington Univ., Washington, D. C. Human Resources Research Office
IDENTIFICATION OF ELECTRONICS MAINTENANCE TRAINING REQUIREMENTS: DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL ORDNANCE RADAR REPAIR COURSE
A. James Mc Knight and Patrick J. Butler Dec. 1964 60 p refs
(Contract DA-44-188-ARO-2)
(HumRRO-RR-15; AD-457167)

To identify the requirements most appropriate for ordnance electronics maintenance training, methods of analyzing electronics maintenance tasks were developed. The process included system, task, and knowledges and skills analyses, and determination of training objectives. A representative MOS, Nike Track Radar Repairman, was analyzed by these methods, and the results were reflected in a 22-week experimental course; emphasis was placed more on practical maintenance procedures and certain technical aspects than on circuit operation theory. Graduates of the experimental course surpassed graduates of the 39-week standard course on an overall job-sample measure, and on troubleshooting the radar system and components. They ranked almost as well as field-experienced repairmen in troubleshooting radar components, but somewhat below them in other areas tested. Author

N65-17645 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ADAPTIVE OPTIMIZATION OF DYNAMIC SYSTEMS WITH HUMAN OPERATOR
Roman Kulikowski *In its* Records of Automation and Telemechanics 15 Jan. 1965 p 1–32 refs (See N65-17644 08-34)

Discussed are problems of optimizing dynamic systems with human operator. It was pointed out that maximalization of the physical or psychic effort of the human operator (or also the minimalization of his fatigue), can be considered with the aid of optimization adaptation methods of extremal regulators. As a concrete example a cyclist riding a bicycle was discussed. The best strategy corresponds to a speed of travel that assures maximum speed at finish, provided the path covered by the operator is constant. It was pointed out that the best strategy can be described experimentally on the basis of a certain iteration process. The proven statement allows the solution of a series of analogous problems, in which the dynamic arrangement includes a human being. It was pointed out in particular, that a series of problems connected with maximalization of dynamic accuracy, can be solved with the aid of similar methods. Author

N65-17704# Queens Univ., Kingston (Ontario). Dept. of Mathematics
A GENERAL ANALYSIS OF POST-DETECTION CORRELATION
L. L. Campbell Oct. 1964 30 p refs
(Contract DRB-413000; Grant NRC A-2151)
(RR-64-4)

For a system of two receivers, each containing a nonlinear device and a zonal filter, a general method is developed for calculating the cross-correlation function of the outputs when the inputs are two related Gaussian processes. In the course of the development some new results are obtained concerning the cross-correlation function of two pre-envelopes. Author

N65-17722*# Joint Publications Research Service, Washington, D. C.
TRANSLATIONS FROM BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY (BULLETIN OF EXPERIMENTAL BIOLOGY AND MEDICINE), VOLUME 58, NO. 10, 1964
L. A. Lugovoy et al 29 Jan. 1965 30 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 58, no. 10, 1964
(JPRS-28549; TT-65-30235) OTS: $2.00

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1. BLOOD CIRCULATION IN INDIVIDUAL PARTS OF THE CEREBRAL CORTEX DURING PHOTIC AND OLFACTORY STIMULATIONS L. A. Lugovoy p 1–6 refs

2. EFFECT OF THE TETANUS TOXIN ON NEUROMUSCULAR TRANSMISSION G. N. Kryzhanovskiy and A. Kh. Kasymov p 7–14 refs

3. BIOCHEMICAL INDICES OF SKIN TRANSPLANTS FROM HUMAN EMBRYOS AND ADULT MAN USED FOR REPLACEMENTS OF SKIN DEFECTS B. Z. Rudoy, V. N.

Afonova, A. A. Baranov, A. I. Rotsel', and S. S. Promakhova p 15–20 refs

4. RECORDING VIA RADIO OF THE SPEED OF DIFFUSION OF THE PULSE WAVE IN A FREELY MOVING INDIVIDUAL B. M. Stolbun and V. M. Forshtadt p 21–27 refs

N65-17744# Joint Publications Research Service, Washington, D. C.

TRANSLATIONS FROM PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYATERAPIYA (PATHOLOGICAL PHYSIOLOGY AND EXPERIMENTAL THERAPY), VOLUME VIII, NO. 5, 1964

11 Feb. 1965 57 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 8, No. 5, 1964 p 12–20, 31–44, 73–78, 81–82

(JPRS-28724; TT-65-30313) OTS: $3.00

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2. THE INFLUENCE OF STRYCHNINE ON THE RESISTANCE OF ANIMALS TO THE EFFECT OF ACCELERATIONS V. Ye. Belay, P. V. Vasil'yev, S. P. Kolchin, and S. V. Maslyanenko p 9–17 refs (See N65-17746 08-04)

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4. ELECTROCARDIOGRAPHIC AND MORPHOLOGICAL CHARACTERISTICS OF ACUTE EXPERIMENTAL CARDIAC INSUFFICIENCY DURING THE ACTION OF HYDRAZINE DERIVATIVES Ye. A. Shuk, N. K. Popova, P. Yu. Il'yuchenok, M. D. Shmerling, and V. S. Sergiyevskiy p 25–35 refs (See N65-17747 08-04)

5. CHANGES IN THE HEMOPOETIN CONTENT OF THE BLOOD SERUM OF DOGS FOLLOWING REPEATED BLOOD-LETTINGS L. I. Timoshenko p 36–41 refs

6. TOXIC AND ANTITOXIC PROPERTIES OF THE SERUM OF BURNED ANIMALS I. K. Koryakina p 42–51 refs

7. HYPOTHERMIA TOLERANCE OF ANIMALS AT THE EARLY STAGES OF POSTEMBRYONAL ONTOGENESIS Ye. M. Prokop'yeva p 52–54 refs

N65-17745 Joint Publications Research Service, Washington, D. C.

ADAPTATION TO HYPOXIA AND HIGH ALTITUDE ACCLIMATIZATION AS FACTORS CONTRIBUTING TO ANIMALS' RESISTANCE TO SOME EXTREME CONDITIONS

N. N. Sirotinin *In its* Transl. from Patol. Fiziol. i Eksperim. Terapiya (Pathological Physiol. and Exptl. Therapy), Vol. VIII, No. 5, 1964 11 Feb. 1965 p 1–8 refs (See N65-17744 08-04) OTS: $3.00

Acclimatization to a high-altitude climate increases the resistance of the organism to hypoxia under pressure chamber conditions. Adaptation to hypoxia under pressure chamber conditions and acclimatization to a high-altitude climate increase the resistance of the organism to radial acceleration. Author

N65-17746 Joint Publications Research Service, Washington, D. C.

THE INFLUENCE OF STRYCHNINE ON THE RESISTANCE OF ANIMALS TO THE EFFECT OF ACCELERATIONS

V. Ye. Belay, P. V. Vasil'yev, S. P. Kolchin, and S. V. Maslyanenko *In its* Transl. from Patol. Fiziol. i Eksperim. Terapiya (Pathological Physiol. and Exptl. Therapy), Vol. VIII, No. 5, 1964 11 Feb. 1965 p 9–17 refs (See N65-17744 08-04) OTS: $3.00

At the early stages of development of experimental diphtheria myocarditis in rabbits, an increased excitability of the hypothalamus is observed, as well as the presence of a prolonged EEG activation reaction; during the later periods of the disease, there is a reduction of hypothalamic excitability, and the prevalence of slow rhythms of electric potentials in the cortical EEG. Death of the animals is preceded by a complete drop in the electric activity of the cerebral cortex. Author

N65-17747 Joint Publications Research Service, Washington, D. C.

ELECTROCARDIOGRAPHIC AND MORPHOLOGICAL CHARACTERISTICS OF ACUTE EXPERIMENTAL CARDIAC INSUFFICIENCY DURING THE ACTION OF HYDRAZINE DERIVATIVES

Ye. A. Zhuk, N. K. Popova, P. Yu. Il'yuchenok, M. D. Shmerling, and V. S. Sergiyevskiy *In its* Transl. from Patol. Fiziol. i Eksperim. Terapiya (Pathological Physiol. and Exptl. Therapy), Vol. VIII, No. 5, 1964 11 Feb. 1965 p 25–35 refs (See N65-17744 08-04) OTS: $3.00

In dogs treated with iprazide, catron, and isoniazide, as well as in controls, following ligation of the coronary artery, electrocardiographic changes were observed which were characteristic of an extensive ischemic affection of the myocardium—an increased amplitude of R-wave and a rise in the S-T segment. Upon moving the local monopolar electrode, all experimental animals manifested a gradual change from a rise in S-T segment to its decrease at the visual border of the affected and intact myocardium, as compared to control dogs in which a marked transition was observed. An X-ray vasographic study of the arterial system of the heart showed the absence of a sharp border between the ischemized zone and the myocardial area with intact blood supply in tests where hydrazine derivatives prevented fibrillation, as contrasted with a sharply delineated ischemic zone in the majority of control dogs. Author

N65-17750# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

BEHAVIORAL RESEARCH WITH ANIMALS IN A MANNED SPACE LABORATORY

Herbert H. Reynolds and Frederick H. Rohles Nov. 1964 10 p (ARL-TR-64-17; AD-608807)

This paper suggests animal behavioral research during prolonged weightlessness. The research suggested is justified on the basis of the short gestation period and rapid maturation of small animals, the number of subjects which may be studied, the controls which can be achieved, and the resultant increase in reliability of findings. Author

N65-17751# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN INSUFFICIENCY

24 Nov. 1964 779 p refs Transl. into ENGLISH of the Publ. "Kislorodnaya Nedostatochnost" Kiev, Izd. AN UKR' SSR, 1963 p 3–610

(FTD-TT-64-878/1+2; AD-608459) OTS: $10.85

Collection of papers on comparative physiology of adaptation and acclimatization of the organism to high-mountain climate, contemporary concepts of cell chemical mechanism in the process of adaptation to hypoxia, and other related laboratory research. For individual titles see N65-17752–N65-17845.

N65-17752 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMPARATIVE PHYSIOLOGY OF ACCLIMATIZATION TO THE CLIMATE OF THE HIGH MOUNTAINS

N. N. Sirotinin *In its* Oxygen Insufficiency 24 Nov. 1964 p 1-16 refs (See N65-17751 08-04) OTS: $10.85

The human organism is sensitive to atmospheric oxygen deficiency, but possesses a mechanism of adaptation which begins to function at the early stages of hypoxia. Early compensation for oxygen deficiency brings about an increase in pulmonary ventilation and blood circulation. The erythrocytes discharged from the reservoirs into the active circulation have a tendency to degenerate faster than the normal cells. Products of their disintegration act as stimuli for an increase in the hemotopoiesis. The red cell count and the hemoglobin concentration rise gradually with a simultaneous normalization of pulmonary ventilation and blood flow rate. The increase in the total erythrocyte oxygenating surface area results in a certain shift of tissue mechanisms. Author

N65-17753 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ADAPTATION OF LOWER VERTEBRATES TO HYPOXIA

L. V. Bogdanova *In its* Oxygen Insufficiency 24 Nov. 1964 p 17-24 (See N65-17751 08-04) OTS: $10.85

In order to study the adaptation of lower vertebrates to hypoxia, experiments were conducted at altitudes of 2000, 3000, 4000, and 5000 meters on frogs, turtles, and racers. Of 12 turtles, 4 showed a certain speedup in the respiratory movements, while 2 showed slower, and another showed very slight respiration. In the racers (*Zamenis gemonensis*), residence at an altitude of 2100 m produced no change in their respiration. When the altitude was increased to 3000 meters, an increase in the oxygen capacity of the blood nor a respiratory reaction was observed at altitudes of 2150 and 3000 m. E.E.B.

N65-17754 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF HYPOXIA ON THE CONDITIONED REFLEXES OF FISH

T. A. Aref'yeva *In its* Oxygen Insufficiency 24 Nov. 1964 p 25-31 (See N65-17751 08-04) OTS: $10.85

In goldfish, conditioned reflexes (food searching after a light or sound signal) were affected to a higher degree by changes in the hydrostatic pressure than by oxygen insufficiency. With a sufficient oxygen concentration (1.7 ml/cm^3) the change in hydrostatic pressure (200- to 300-meter water depth) led to impairment of the conditioned reflexes, which resulted in a decrease of the number of positive reactions. A complete suppression of conditioned reflexes occurred when the oxygen concentration reached 0.3 to 0.22 cm^3/l. This concentration represents a lethal threshold. At this state the fish exhibits a severe condition of asphyxia. Author

N65-17755 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE ELECTROCARDIOGRAM OF THE RACER UNDER NORMAL CONDITIONS AND IN HYPOXIA

V. I. Danilenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 32-36 (See N65-17751 08-04) OTS: $10.85

In snakes, a fall of barometric pressure produced no effect on the function of the cardiovascular system. The reptiles exhibited a remarkable ability to adapt to the low oxygen partial pressure of the inhaled air. Their electrocardiograms showed a slight effect at an altitude of 3000 meters. The Q-T and R-R intervals and the amplitude of the T wave were slightly decreased. The physical stress induced by placing the animals in the vertical position resulted in a more pronounced deviation from the normal electrocardiogram. Author

N65-17756 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMPARATIVE-PHYSIOLOGICAL FEATURES OF HEMATOGENETIC FUNCTION IN ANIMALS UNDER THE CONDITIONS OF THE HIGH MOUNTAIN CLIMATE

N. M. Shumitskaya *In its* Oxygen Insufficiency 24 Nov. 1964 p 37-44 (See N65-17751 08-04) OTS: $10.85

Animals on different levels of evolution showed varying degrees of adaptation to high altitudes. Under conditions of oxygen deficiency, man exhibited greater deviations from normal values in blood composition, and particularly in red blood count. At 4200-meter altitude, the number of erythrocytes in young adults increased by 4%. A definite shift to the left was noted. The presence of reticulocytes in the peripheral blood indicated an increase in hematopoietic activity. Author

N65-17757 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ROLE OF THE AGE FACTOR IN THE ORGANISM'S REACTION TO HYPOXIA

N. V. Lauer *In its* Oxygen Insufficiency 24 Nov. 1964 p 45-57 (See N65-17751 08-04) OTS: $10.85

Investigations showed that in young adults the mechanism of adaptibility to oxygen deficiency in the ambient air was more effective than in immature or elderly persons. At this age, the reflexes of respiratory activity, the cardiovascular system, and the blood components are developed to full capacity; the special hypoxia reflexes are well established; and the nervous and humoral systems are in a state of great stability. All these factors enable the organism to maintain a high degree of homeostasis. Author

N65-17758 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ROLE OF THE AGE FACTOR IN ADAPTATION OF THE HUMAN ORGANISM TO OXYGEN INSUFFICIENCY

A. Z. Kolchinskaya *In its* Oxygen Insufficiency 24 Nov. 1964 p 58-72 (See N65-17751 08-04) OTS: $10.85

Comparative studies of the response of the human organism to the effects of atmospheric oxygen deficiency indicate that man, between the ages of 20 and 50, possesses a more effective and economical adaptation mechanism to hypoxia than very young or very old individuals. With a decrease in ambient oxygen concentration, an increase in pulmonary ventilation and blood flow rate enable the organism to maintain homeostatis, and assures normal body functions. The adaptive mechanism may vary in each case. The increase in minute volume depends upon (1) degree of hypoxia; (2) external temperature; (3) individual characteristics; (4) degree of training; and (5) functional state of the nervous system. Author

N65-17759 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CERTAIN DATA ON THE ANATOMICAL-PHYSIOLOGICAL CHARACTERISTICS OF THE ORGANISM OF CHILDREN BORN AND RAISED IN THE HIGH MOUNTAINS

L. A. Bryantseva *In its* Oxygen Insufficiency 24 Nov. 1964 p 73-80 refs (See N65-17751 08-04) OTS: $10.85

A survey of children, between the ages of 7 and 16, who were born at an altitude of 2050 m and remained permanent residents of the location, disclosed certain deviations from the normal physiological and morphological characteristics. The average height was less than normal, but the weight was within the normal limits. The thoracic girth was increased. The vital capacity was increased. The respiration rate was normal; however, the minute respiratory volume was increased. The pulse rate was lower than normal, and a small group developed a slight bradycardia. The electrocardiogram showed, in general, low amplitudes, with the exception of the T wave which in many instances was of greater amplitude than normal. The blood flow rate was low. In 40% of the cases the capillary resistance was low. The high pulmonary ventilation and the low blood flow rate may provide better oxygen saturation of the blood in the pulmonary circulation. However, it is possible that the tissue requirements for oxygen are lower at high altitudes.
Author

N65-17760 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL INVESTIGATION OF CARDIAC-ACTIVITY DISTURBANCES IN HYPOXIA IN YOUNG PUPPIES
N. V. Lauer, M. M. Koganovskaya, O. P. Kostenko, and M. S. Bondarevskiy *In its* Oxygen Insufficiency 24 Nov. 1964 p 81-89 (See N65-17751 08-04) OTS: $10.85

The effect of hypoxia was studied in young and mature dogs. The animals were placed in a decompression chamber, in which the simulated altitude was varied from sea level to 15000 m. Electrocardiograms were taken at every 1000 m. During the first few days after birth, the animals subjected to hypoxia did not show any deviations from the normal electrocardiogram. As the animals matured, cardiac effects were registered in certain electrocardiographic variations; (1) The T-wave amplitude was low. (2) The S-T segment and the T-wave were increased. These deviations do not indicate a disturbance in the cardiac function; but rather, suggest a different cardiac structure during growth and development of the body, and a specific type of tissue metabolism during this period.
Author

N65-17761 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE INFLUENCE OF ACUTE HYPOXIA IN CHANGING THE ACID RESISTANCE OF ERYTHROCYTES OF THE GROWING ORGANISM
Yu. V. Semenov *In its* Oxygen Insufficiency 24 Nov. 1964 p 90-99 ref (See N65-17751 08-04) OTS: $10.85

Moderate or acute hypoxia was induced in young and mature dogs either by placing them in a pressure chamber in which the amount of ambient oxygen was regulated, or by a stricture of the trachea. Erythrograms were determined by the optical density of a blood sample hemolyzed in a 0.004 N HCl solution. In mature dogs hypoxia caused an increase in the number of erythrocytes in the circulating blood, with a consistent increase in their fragility. In young dogs hypoxia had no effect on the total number and the degree of fragility of the red blood cells.
Author

N65-17762 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SIGNIFICANCE OF HYPOXEMIA IN THE PATHOLOGY OF CHILDHOOD
Yu. F. Dombrovskaya, A. S. Chechulin, A. N. Dombrovskiy, and A. A. Rogov *In its* Oxygen Insufficiency 24 Nov. 1964 p 100-109 ref (See N65-17751 08-04) OTS: $10.85

Hypoxemia and respiratory insufficiency lie at the roots of childhood pathology in a number of illnesses. Through clinical study of young children with pneumonia, and experimental studies on rats, it was established that asphyxia sets up a premorbid state for the development of pneumonia. Also, under conditions of oxygen starvation, changes typical of chronic interstitial pneumonia were observed. Further, in children attending rural schools, data indicated that disturbances to external respiration and gas composition of the blood were considerably less severe. Particular attention should therefore be given in cases of pathogenetic treatment to latent or manifest hypercapnia and hypoxia occurring in childhood illnesses. The aerotherapy widely employed in children's clinics bears witness to the expediency and effectiveness of fresh air therapy.
E.E.B.

N65-17763 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON CERTAIN PECULIARITIES OF THE REACTION OF THE AGED ORGANISM TO ACUTE HYPOXIA
M. M. Seredenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 110-118 (See N65-17751 08-04) OTS: $10.85

In aged albino rats and dogs subjected to oxygen deficiency in a low-pressure chamber at various altitudes, the degree of adaptation to hypoxia was lower than in mature animals. Ataxia, involuntary micturition, and defecation were noted at lower altitudes in the aged animals than in mature animals. The recovery time of respiratory rate and volume and of the pulse rate was increased. The character of the electrocardiogram was changed. In the aged animals the physiological compensation of hypoxia, which consisted of an increase in pulmonary ventilation and oxygen uptake, did not produce an adequate oxygen saturation in the circulating blood sufficient for a rapid elimination of the oxygen debt.
Author

N65-17764 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE AGE-CONNECTED PECULIARITIES OF THE REACTION OF THE HEART TO HYPOXIA
L. N. Bogatskaya, N. S. Verkhratskiy, L. V. Costyuk, and V. V Frol'kis *In its* Oxygen Insufficiency 24 Nov. 1964 p 119-129 (See N65-17751 08-04) OTS: $10.85

Myocardial hypoxia is one of the most commonly encountered pathogenic mechanisms that disturb the function of the heart. In experiments with rabbits it was observed that as the organism aged, there was a change in the proportions between anaerobic and aerobic phases of respiration. Further, the heart of the aged is more sensitive to pathological processes that result in hypoxia of the myocardium. The age-connected peculiarities of the heart to hypoxia were shown by experiments with aged and young rabbits in which the development of myocardial infarct was observed by tying off the circumflex branch of the left coronary artery. A large number of fibrillation of the heart was noted for the aged.
E.E.B.

N65-17765 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN EARLY INDICATOR OF THE ADAPTIVE REACTION OF MUSCLE TISSUE TO DEVELOP SENESCENT HYPOXIA
S. I. Fudel'-osipova, and F. I. Grishko *In its* Oxygen Insufficiency 24 Nov. 1964 p 130-138 (See N65-17751 08-04) OTS: $10.85

Experiments with rats of different ages from 1 day to 37 months showed that 15 month old rats have the highest rate of tissue respiration. At 37 months the respiration had dropped

by almost 50%. The decline in tissue respiration in older animals may depend upon a decrease in active substrate and a decrease in enzyme activity. Microscopic examination of muscle fibers showed that fiber thickness was smaller in the older animals. Also, it was observed that while the majority of cells in the aged have lost their ability to divide, the nuclei begin to divide at a higher rate. It was concluded that the appearance of a large number of nuclei indicates oxygen starvation and that oxygen consumption by the tissue diminishes with age. The appearance of a large number of nuclei serves as an early criteria of aging and the onset of tissue hypoxia. E.E.B.

N65-17766 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF HYPOXIA ON PROPAGATION OF STIMULI IN THE RESPIRATORY FORMATIONS OF THE BRAIN

S. A. Dolina and G. P. Konradi *In its* Oxygen Insufficiency 24 Nov. 1964 p 139–143 (See N65-17751 08-04) OTS: $10.85

Rats with electrodes permanently implanted into the motor projection center of the frontal lobe of the cerebral cortex were subjected to hypoxia in a pressure chamber, in which various altitudes were simulated sudden drops in pressure. Animals that exhibited convulsions upon electrical stimulation of the motor area showed an increase stimulate threshold at lower pressures. Their sensitivity to the effects of the central nervous system stimulants was increased with a slight decrease to ambient pressure. The results showed that moderate hypoxia, which does not lower the oxyhemoglobin concentration of the blood, increases the response threshold at the motor loci and helps to maintain the normal relationship of the activity of the cortical center. Author

N65-17767 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN INVESTIGATION OF THE BIOELECTRIC ACTIVITY OF THE CEREBRAL CORTEX AND CERTAIN SUBCORTICAL FORMATIONS IN ACUTE HYPOXIA

V. B. Malkin, A. N. Razumeyev, and G. V. Izosimov *In its* Oxygen Insufficiency 24 Nov. 1964 p 144–154 (See N65-17751 08-04) OTS: $10.85

Acute hypoxia was induced in rabbits placed in a low-pressure chamber, in which various altitudes were simulated. The animals had permanent electrodes implanted into the sensory-motor areas of the brain. Three phases in the change of the brain potentials under conditions of the increasing hypoxic hypoxia were observed; (1) stimulation of the high-frequency impulses; (2) predominance of slow waves of large amplitude; and (3) depression of potentials. These phases were evident in the electroencephalograms of the sensory-motor areas of the cortex, the reticular formation, and the hypothalamus; no changes were noted in the potentials of the hippocampus. The conclusion may be reached, that the effect of acute hypoxia of short duration, which causes a complete depression of potentials through the well defined phases, cannot be reduced to a simple mechanism of radiation of impulses. Author

N65-17768 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

POLAROGRAPHIC METHOD IN STUDY OF TISSUE HYPOXIA IN THE LIVING ORGANISM

Ye. A. Kovalenko, V. L. Popkov, and I. N. Chernyakov *In its* Oxygen Insufficiency 24 Nov. 1964 p 155–163 ref (See N65-17751 08-04) OTS: $10.85

A polarographic method for the study of tissue hypoxia in living organisms was utilized in dogs. As a cathode, a plexiglass electrode with a platinum needle was implanted into the brain tissue. An ebonite rectangular electrode with a silver chloride tip, or an ear clip with a silver chloride plate, served as an anode. The system permits a study of oxygen partial pressure in the brain tissue under conditions of (1) low ambient pressure; (2) acceleration stress; (3) inhalation of pure oxygen under high tension, or of various gas mixtures; and (4) introduction of various pharmaceutical agents into the organism. Author

N65-17769 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN PRESSURE IN TISSUES OF DOG BRAIN DURING RESPIRATION OF GAS MIXTURES

Ye. A. Kovalenko, V. L. Popkov, and I. N. Chernyakov *In its* Oxygen Insufficiency 24 Nov. 1964 p 164–173 ref (See N65-17751 08-04) OTS: $1.00

Oxygen tension was determined by the polarographic method in the brain tissues in dogs inhaling various gaseous mixtures. The following results were obtained: (1) Pure oxygen increased the oxygen saturation of the brain tissues by 50%. (2) A 5% to 10% oxygen concentration in the atmospheric air caused a decrease by 38% in the cortex, and by 53% in the subcortical areas. (3) A mixture of atmospheric air and 10% CO_2 showed an increase by 42%. (4) A 92.5% O_2 and 7.5% CO_2 mixture produced an increase of 325%. (5) Atmospheric air containing 7.5% O_2 and 7.5% CO_2 resulted in a normal or slightly increased oxygen saturation. Author

N65-17770 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ENERGY INDICES TO STATE OF CENTRAL NERVOUS SYSTEM IN HYPOXIA

V. A. Berezovskiy *In its* Oxygen Insufficiency 24 Nov. 1964 p 174–181 (See N65-17751 08-04) OTS: $10.85

Determination of the oxygen saturation of the brain tissues in dogs by a polarographic method produced the following results: (1) A temporary occlusion of one of the four major cervical arteries in dogs caused a decrease in the oxygen tension, and an increase in the temperature of the brain tissues. (2) The radiation of impulses through the cerebral tissues, as a result of the hypoxic state of the central nervous system, produced an increase in the thermal conductivity of the brain tissues. Author

N65-17771 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF ASPHYXIA ON THE ELECTROCORTICAL EFFECTS OF ACETYLCHOLINE

Ye. A. Markova *In its* Oxygen Insufficiency 24 Nov. 1964 p 182–187 (See N65-17751 08-04) OTS: $10.85

From experimentation with rabbits, it was shown that the development of asphyxia causes a progressive reversible disappearance of the electrocortical effects of acetylcholine. During the process of restoration of the functions, these effects return to the initial values. Against the background of cortical-activity desynchronization during asphyxia and subsequent restoration of functions, an outburst of synchronized potentials of considerable amplitude and slow rhythm was observed during intracarotid injection of acetylcholine. E.E.B.

N65-17772 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF ANOXIA ON THE PHYSICAL ELECTROTONUS OF SMOOTH MUSCLE

M. F. Shuba *In its* Oxygen Insufficiency 24 Nov. 1964 p 188-193 (See N65-17751 08-04) OTS: $10.85

The smooth sphincter muscle of the frog's stomach, with polarizing and lead electrodes applied, was mounted in a humid, hermetically sealed chamber. Anoxic conditions were established by passing pure nitrogen through the chamber. Potassium cyanide was used as a cell respiration inhibitor. The tissue therefore lost its ability to reduce oxygen and oxygen starvation set in. At the end of the 10th minute of cyanide treatment of the muscle, the amplitude of the negative local potential had diminished markedly. The potential gradually decreased to zero value. This was found to be a reversible reaction and the amplitude could be restored to original value. It was concluded that the amplitude of the electronic potential depends upon the permeability of the protoplasmic membrane. E.E.B.

N65-17773 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE POTENTIAL ADAPTIVE-COMPENSATORY FUNCTIONS OF THE ORGANISM IN HYPOXIA

I. M. Kyazen *In its* Oxygen Insufficiency 24 Nov. 1964 p 194-202 (See N65-17751 08-04) OTS: $10.85

Pilots of supersonic craft are under physical and emotional strain that affects their respiratory rate (often resulting in hypoxia), cardiac rate, and other physiological parameters. The strain leads to a decrease of the subjects' performance capacity. A study of the neural and glandular systems of the intestinal tract indicates that a prophylactic approach is necessary to prevent exhaustion of the mechanisms of the central nervous and humoral systems. Normalization of the metabolic processes can be achieved by the use of an adequate diet supplemented by vitamins, such as thiamine, citrin, and ascorbic and para-aminobenzoic acids. In certain cases, the use of pharmaceutical agents is advisable. Author

N65-17774 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ADAPTATION OF THE MATURE ORGANISM TO OXYGEN INSUFFICIENCY AND THE IMPORTANCE OF THE HIGHER DIVISIONS OF THE BRAIN IN THIS PROCESS

N. V. Lauer, A. Z. Kolchinskaya, and V. V. Turanov *In its* Oxygen Insufficiency 24 Nov. 1964 p 203-218 ref (See N65-17751 08-04) OTS: $10.85

The effect of hypoxia was studied in normal dogs in the low-pressure chamber, by the use of a spirometer with various gas mixtures, and under natural conditions of high altitude. The same effect was also investigated on anesthetized animals, and in animals with cerebral decortication. In normal animals, moderate hypoxia resulted in an increase of the respiratory volume and respiratory rate. Severe hypoxia caused an increase in respiratory rate, a decrease in alveolar ventilation, and an increase in heart rate. An ambient oxygen concentration drop to 7% produced a sudden increase in blood pressure with a simultaneous decrease in cardiac rate. At this concentration the oxygen saturation of the blood remained normal, but an increase in the red count was noted. Dogs under anesthesia, or with decortication, did not show the same degree of response. The conclusion may be drawn that a disturbance of the body function by the control of the nervous system, by the exclusion of cerebral cortex, decreased the reflex action which plays the basic role in the adaptive mechanism to hypoxia. Author

N65-17775 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE PROBLEM OF ADAPTATION OF ADULT HUMAN ORGANISM TO OXYGEN INSUFFICIENCY

V. V. Turanov *In its* Oxygen Insufficiency 24 Nov. 1964 p 219-229 (See N65-17751 08-04) OTS: $10.85

Experiments were conducted on the same individuals, both in the decompression chamber and at high altitude. At moderate elevation (below 3000 m), the first response to hypoxia was that of the respiratory system. The minute respiratory volume was increased by the increase in the tidal volume; respiratory rate and cardiac rate remained normal at higher elevations (above 3000 m); the pulse rate increased; the red blood count and hemoglobin concentration showed higher values than normal. At the 3000-m altitude the response was due to the activity of the cerebral cortex. The electrocardiogram showed a decrease in the T-P interval, and an increase in the R-wave magnitude. The drop in the oxygen tension of the peripheral blood cannot be sufficiently compensated by the increase of the red count and hemoglobin content. As a result, the subject experiences discomfort. During sleep or under anesthesia, the activity of the adaptive mechanisms is retarded. Author

N65-17776 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SIGNIFICANCE OF THE FUNCTIONAL STATE OF THE CENTRAL NERVOUS SYSTEM IN THE INTERACTION MECHANISMS OF THE RESPIRATORY AND VASOMOTOR CENTERS IN VARIOUS FORMS OF HYPOXIA

Ya. M. Britvan *In its* Oxygen Insufficency 24 Nov. 1964 p 230-240 (See N65 17751 08-04) OTS: $10.85

Experiments were conducted on rabbits in a state of shock after intravenous injections of normal horse blood serum, and on cats that were denied inhalation of air. The relationship between the respiratory and cardiovascular brain center activity varied under various kinds of hypoxia (anaphylactic shock, asphyxia, or an increase in intracranial pressure). This interdependence varied with the intensity and duration of hypoxia and the initial state of the central nervous system. In these types of hypoxia, in contrast to hypoxemia, the primary response is an increase in blood pressure. However, in all cases of hypoxia the brain cortex exhibits high sensitivity. Author

N65-17777 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DECREASE IN THE ORGANISM'S RESISTANCE TO OXYGEN STARVATION UNDER THE INFLUENCE OF NARCOTICS

A. I. Ulovich *In its* Oxygen Insufficiency 24 Nov. 1964 p 241-250 ref (See N65-17751 08-04) OTS: $10.85

The resistance of narcotized animals to moderate degrees of oxygen starvation was investigated and led to the observation that the survival rate of narcotized animals decreased in both anemic and hypoxic hypoxia. Respiration, blood pressure, and oxygen contents in arterial blood of cats and rabbits indicated sharper deviations from the initial physiological level in narcotized animals as compared with those that were not drugged. The rhythm of respiration was also disturbed in animals narcotized with sodium amytal and chloralose. However, data taken during this experimentation were not conclusive and the general conclusion that narcotics have a positive effect in oxygen starvation is not warranted. E.E.B.

N65-17778 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

THE REFLEX MECHANISM OF PERIODIC RESPIRATION IN HYPOXIA

A. I. Khomazyak *In its* Oxygen Insufficiency 24 Nov. 1964 p 251-257 (See N65-17751 08-04) OTS: $10.85

Periodic breathing may be a result of the relative CO_2 and O_2 tensions in the circulating blood. Dogs, under light anesthesia, inhaled a 10% oxygen and 90% nitrogen mixture. The simultaneous values of the oxygen tension of blood in the carotid arteries, the arterial and venous blood pressure, and the pressure in the heart and the pulmonary arteries were also recorded. The experiments were repeated with periodic breathing induced by injections of sodium amytal solution. The ensuing hypoxia was registered by the lowering of oxygen tension in the carotid arteries, which led to an increase in respiration, pulse, cardiac stroke, and blood pressure of the systemic circulation. The systolic pressure in the carotid arteries was increased, but the diastolic pressure was lowered. Upon return to normal air inhalation, the first breath caused apnea, which was the result of the sudden increase in oxygen tension of the blood in the carotid arteries, which however, did not reach the normal level. In the period of recovery from hypoxia, periodic respiration ensued during the organism's normalization of the carotid chemoreceptors threshold of sensitivity. Author

N65-17779 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE REGULATION OF GAS EXCHANGE IN HYPOXEMIA

A. D. Slonim *In its* Oxygen Insufficiency 24 Nov. 1964 p 258-267 ref (See N65-17751 08-04) OTS: $10.85

Experimental results and observations on animals and man during the period of adaptation to atmospheric oxygen deficiency could not reveal a definite mechanism of the process of adaptation. The tissue gas exchange was either affected or remained unchanged. As a rule, hypoxia of short duration either increased or decreased the gas exchange. However, prolonged exposure to hypoxia resulted in normal oxygen uptake. Low temperatures associated with high altitudes could play a role in the hypoxic effect. A depression of the thermoregulatory tonus of the skeletal muscles was usually observed during hypoxia and may be considered as one of the factors. Author

N65-17780 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE PROBLEM OF DECOMPENSATION AND COMPENSATION OF THE HUMAN RESPIRATORY FUNCTION

Ye. N. Domontovich *In its* Oxygen Insufficiency 24 Nov. 1964 p 268-280 ref (See N65-17751 08-04) OTS: $10.85

Injury to the lungs is followed by increase in resistance to respiration. The rate of expiration, the composition of alveolar air, and other indicators were determined simultaneously with the respiration and dynamics of the arterial blood. It was noted that there is an absence of a direct and consistent relationship between the presence of hypoxemia and the capacity of patients to do physical work. It was found that this capacity is lowered when the hypoxemia is due to alveolar hypoventilation. Further, it was concluded that hypoxemia cannot be an unfailing indication of oxygen starvation. E.E.B.

N65-17781 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE ROLE OF RESPIRATION THROUGH THE SKIN IN COMPENSATING DIFFICULT OR DISTURBED PULMONARY GAS EXCHANGE IN MAN

N. M. Petrun' *In its* Oxygen Insufficiency 24 Nov. 1964 p 281-287 (See N65-17751 08-04) OTS: $10.85

In order to investigate the influence of elevated oxygen concentrations, in the air surrounding the skin, on the rate at which it penetrates the skin and on the extent of pulmonary gas exchange, the entire body of each test subject, except the head, was enclosed in a lightweight diving suit. Results showed that absorption of oxygen through the surface of the skin increased by 33 times, while the amount of carbon dioxide excreted was 45% smaller. Also, there was a marked decline in absorption of oxygen by the lungs of test subjects. This was 25% smaller after 30 minutes of the experiment, and had dropped to 31% after an hour. Cutaneous respiration, it was concluded, is capable of compensating for inadequacies of pulmonary gas exchange. E.E.B.

N65-17782 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE EFFECT OF NORMAL BAROMETRIC PRESSURE ON THE GAS COMPOSITION OF THE BLOOD OF ANIMALS THAT HAVE UNDERGONE REMOVAL OF A LUNG

V. A. Losev *In its* Oxygen Insufficiency 24 Nov. 1964 p 288-293 (See N65-17751 08-04) OTS: $10.85

Rabbits that had undergone pneumonectomy 1 to 1 1/2 years previously, and control rabbits were placed in a chamber in which the atmosphere was rarefied to a conventional altitude of 6000 to 10000 meters. After 30 to 50 minutes the chamber atmosphere was brought back to normal, the rabbits were immediately taken out, and blood samples were taken. It was found that the normal animals had greater compensatory abilities than those that had undergone surgery. The capacity of animals with one lung to adapt to marked levels of hypoxia was lower than in normal animals. E.E.B.

N65-17783 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE INFLUENCE OF HYPOXIA CAUSED BY DECREASE IN ATMOSPHERIC PRESSURE ON CARDIAC ACTIVITY OF ANIMALS THAT HAVE UNDERGONE PNEUMONECTOMY

L. P. Cherkasskiy *In its* Oxygen Insufficiency 24 Nov. 1964 p 294-303 (See N65-17751 08-04) OTS: $10.85

Experimentation on the influence of hypoxia on rabbits in an altitude chamber at various points in time after removal of a lung is reported. Removal of a lung reduces the organism's reserve capabilities for adaptation to hypoxia conditions. Nevertheless, it was found that the disturbed functions were compensated to a degree after the operation so that experimental animals with one lung were, in many cases, capable of resisting rather considerable degrees of artifically induced hypoxia. E.E.B.

N65-17784 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

REGIONAL OXYGEN INSUFFICIENCY

M. Ye. Marshak *In its* Oxygen Insufficiency 24 Nov. 1964 p 304-309 (See N65-17751 08-04) OTS: $10.85

When the oxygen content in the imspired air is lowered considerably, as in cases of hypoxia, the amount of oxygen used by the organism is smaller than its requirement, so that an oxygen deficiency develops and is aggravated as the hypoxia continues. By experimentation it was shown that during the first few minutes after application of a tourniquet in the second phase of ischemia in the extremity, the muscle temperature dropped not only as a result of blood supply stoppage but also as a result of a conditioned reflex increase in the tone of the muscle and contraction of the vessels. Further, it was shown

that after ligature of a branch of the coronary artery, the oxygen *partial pressure* drops very sharply in the ischemized zone of the myocardium. This suggests that oxygen therapy in myocardial infarct consists chiefly in elimination of the myocardial oxygen insufficiency in the zone bordering the zone of total ischemia. E.E.B.

N65-17785 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON TWO CHEMORECEPTOR MECHANISMS OF THE CAROTID SINUSES
S. S. Krylov *In its* Oxygen Insufficiency 24 Nov. 1964 p 310-319 (See N65-17751 08-04) OTS: $10.85

Experimentation to resolve the mechanism of the carotid *sinuses is reported. Three* hypothesis were previously proposed. According to the acetylcholine hypothesis, excitation of the sensitive terminals of the sinus nerve takes place solely by way of acetylcholine secreted by the chemoreceptor cells on any disturbance to glomera capable of producing excitation in it. The oxygen hypothesis is that the cause of excitation is an increase in hydrogen ion concentration arising from carbonic acid formation. *The third hypothesis is that* the cause of excitation in the sinus is a disturbance in the metabolism of the cells. From the data presented, it was concluded that the evidence can be best explained in terms of two independent chemoreceptor mechanisms in the carotid sinuses, and represents an apprisal of the central nervous system of a threat to the energy metabolism of the tissues. E.E.B.

N65-17786 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFLUENCE OF OXYGEN STARVATION ON INTERCEPTIVE REFLEXES (FEMORAL-ARTERY CHEMORECEPTORS)
R. Z. *Pozdnyakova In its* Oxygen Insufficiency 24 Nov. 1964 p 320-327 (See N65-17751 08-04) OTS: $10.85

The excitability of the femoral-artery chemoreceptor under conditions of oxygen deficiency by the change, during hypoxia, in the interoceptive reflexes was investigated. Indicators observed were oxygen and carbon dioxide contents of the arterial blood and the pH. Experiments were made with dogs that had been anesthetized by intravenous injection of *sodium thiopental*. It was concluded that under the conditions of mild hypoxia and circulatory hypoxia, the interoceptive reflexes from the chemoreceptors of the peripheral vessels are intensified, and that an increase in the excitability of the peripheral end of the interoceptive analyzer is responsible for this. E.E.B.

N65-17787 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEVELOPMENT OF EXPERIMENTAL MYOCARDIAL INFARCT IN ARTERIAL HYPOTONIA
M. I. Gurevich, M. Ye. Kvilnitskiy, N. G. Kochemasova, Yu. S. Kozachuk, and M. N. Levchenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 328-333 (See N65-17751 08-04) OTS: $10.85

Investigations were performed on rabbits in which arterial hypertonia was induced by removal of the adrenal glands. The animals showed characteristic changes in the electrocardiogram and shifts in the electrolytic composition of the blood. *The electrocardiographic data indicated* that focal ischemia induced against a background of chronic arterial hypertonia caused a development of more extensive necrotic focus and a broader zone of injury and hypoxia in the myocardium. This was confirmed by morphological examinations of the hearts of these animals. It was concluded that these investigations have produced new proofs of the importance of deviations in vascular permeability and electrolyte exchange in the development and outcome of ischemic necroses of the myocardium during arterial hypotonia. E.E.B.

N65-17788 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL INVESTIGATIONS OF HEMODYNAMICS IN MYOCARDIAL INFARCT
M. M. Povzhitkov *In its* Oxygen Insufficiency 24 Nov. 1964 p 334-342 (See N65-17751 08-04) OTS: $10.85

Hemodynamic indicators of experimental myocardial infarct in experiments on 15 dogs were investigated. It was concluded that an increase in the minute and stroke volumes of the heart and in the blood flow and circulation times, together with changes *in the ballistocardiogram, indicate early* disturbance to the myocardium contractile function. A considerable drop in the vascular tone of the internal organs may cause a drop in general peripheral resistance, and this appears to be one of the important factors in postinfarct shock. Further, a rise in general peripheral resistance may be regarded as a compensatory reaction of the organism to improve blood supply to vitally important organs. E.E.B.

N65-17789 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OXYGEN STARVATION AND THE MECHANISMS COMPENSATING IT IN CONGENITAL HEART DEFECTS OF THE BLUE AND PALLID TYPES
L. L. Shik *In its* Oxygen Insufficiency 24 Nov. 1964 p 343-351 (See N65-17751 08-04) OTS: $10.85

Results obtained in a study of patients with blue-type defects are compared with the studied changes that take place in the physiological functions in hypoxic hypoxia, particularly during prolonged residence in the mountains. *In patients with* blue defects and in healthy individuals in the mountains, hyperventilation is caused by lowered O_2 partial pressure *in the alveolar air* and is governed by reflex intensification of breathing, produced by stimulation of chemoreceptors in the sinocarotic regions. In the mountains, hyperventilation represents an adaptive reaction to lower the extent of arterial hypoxemia. In patients with defects, the compensatory significance of hyperventilation consists in prevention of hypercapnia but does not lessen the extent of hypoxemia. In pallid cardiac defects, the basic compensatory *reactions are directed* toward preservation of an adequate blood supply to organs and tissues. E.E.B.

N65-17790 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HYPOXIA, HYPOXIDOSES AND AUTOALLERGY: THEIR IMPORTANCE IN INTERNAL PATHOLOGY
F. Ya. Primak *In its* Oxygen Insufficiency 24 Nov. 1964 p 352-357 ref (See N65-17751 08-04) OTS: $10.85

Investigation of the gas composition of the blood in persons suffering from severe forms of endocarditis enables the identification of patients in whom the *mounting manifestations* of arterial hypoxemia are combined with signs of tissue hypoxia. Disturbances to the vascular structure function should *be regarded as one* of the essential signs of hypoxidosis and the autoallergia that accompanies it. Study of vascular tissue permeability in persons with manifest hypoxia and vascular dystonia indicated a considerable increase in the amount of fluid escaping from the vascular stream, as well as an increase in the amount of albumin in it. This circumstance is of essential importance both in the exacerbation of the manifestations

of hypoxidosis, and in the development of subsequent autosensitization due to native proteins sweated out of the vascular stream. E.E.B.

N65-17791 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE BASIC MECHANISMS COMPENSATING HYPOXIA IN CHRONIC CIRCULATORY INSUFFICIENCY

A. A. Ayzenberg, Ya. S. Leshchinskaya, and G. M. Robolotskaya *In its* Oxygen Insufficiency 24 Nov. 1964 p 358-371 (See N65-17751 08-04) OTS: $10.85

Certain consistent relationships in the compensation of hypoxia in chronic circulatory insufficiency are reported. In the initial stages of decompensation, the utilization of oxygen rises in response to the decrease in blood arriving at the tissue. In a later stage, hypoxia is compensated at the expense of reduced affinity of hemoglobin for oxygen, and the adjustment of metabolism with intensification of anaerobic processes. In patients suffering from heart defects with latent circulation insufficiency, the amount of circulating blood is lower than normal; it increases as decompensation develops. In the third stage of decompensation, the ability of the tissues to consume oxygen is lowered, histotoxic hypoxia develops, and resynthesis of lactic acid in the liver is suppressed. E.E.B.

N65-17792 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CONCERNING HYPOXIA IN ATHEROSCLEROTIC HEART DAMAGE

A. L. Mikhnev and N. S. Zanozdra *In its* Oxygen Insufficiency 24 Nov. 1964 p 372-377 (See N65-17751 08-04) OTS: $10.85

Patients suffering from atherosclerotic myocardiosclerosis were studied, and their external respiration indices, gas content of the arterial and venous blood, and oxyhemoglobin dissociation and carbonic acid fixation determined. Increase in respiratory frequency indicated that the external respiratory apparatus was operating under stress, and decrease in depth and reserve of respiration and the respiratory coefficient indicated its relative inadequacy. Carbon dioxide in the venous and arterial blood increased when pneumosclerosis was present. A decrease was noted in persons with circulatory insufficiency and myocardiosclerosis. An upward and left shift of the oxyhemoglobin dissociation curve was noted for a patient suffering from manifest pneumosclerosis, pulmonary emphysema, and pulmonary cardiac insufficiency. A shift right and downward indicated, in some cases, circulatory insufficiency. E.E.B.

N65-17793# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PATHOGENESIS OF ARTERIAL HYPOXEMIA IN RHEUMATIC HEART DISEASE

B. P. Prevarskiy *In its* Oxygen Insufficiency 24 Nov. 1964 p 378-384 (See N65-17751 08-04) OTS: $10.85

Determination of the blood gases, air distribution in the lungs, spirometry, pulmonary gas exchange, oxyhemography, pneumography for patients with rheumatic heart disease in various stages of circulatory insufficiency is reported. It was concluded that the oxygen saturation of the arterial blood began to fall in the early stages of rheumatic development. It had decreased markedly when the cardiac defects became manifest with increasing circulatory insufficiency. Drop in oxygen saturation of the arterial blood results from distribution of air in lung disturbances, impaired diffusion of oxygen through the hemorespiratory barrier, admixture of venous blood into the arterial stream, and respiratory arrhythmia. E.E.B.

N65-17794 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BASAL METABOLISM AND EXTERNAL RESPIRATION IN CHRONIC ARTERIAL HYPOXEMIA CAUSED BY CONGENITAL HEART DEFECTS

R. S. Vinitskaya, L. S. Romanqua, and K. Yu. Akhmedov *In its* Oxygen Insufficiency 24 Nov. 1964 p 385-394 (See N65-17751 08-04) OTS: $10.85

Basal metabolism tests on patients with congenital heart defects and arterial hypoxemia are reported. Deviations of the basal metabolism from the norm were computed, and the oxygen utilization and respiratory coefficient were determined. The vital capacity was measured with the patient in the standing position. Oxygen saturation of the arterial blood was determined in a cuvette oximeter. Pulmonary ventilation increased and may be related to the constant stimulation of the chemoreceptors in the sinocarotic and cardioaortic zones by the subnormal oxygen in the arterial blood. For chronic arterial hypoxemia, persistent hyperventilation was characteristic. Although oxygen consumption corresponded in most cases to the basal metabolism norms, the requirements of all organs and tissues were not fully satisfied. Constant oxygen starvation and limitation of muscular activity have severe effects on growth. E.E.B.

N65-17795 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CERTAIN ADAPTIVE REACTIONS OF THE ORGANISM IN HYPOXIC STATES IN HYPERTONIA PATIENTS

T. I. Mazurenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 395-401 (See N65-17751 08-04) OTS: $10.85

Observations of hypertonia patients are reported. Gas composition of the blood; hemoglobin content; erythrocyte count; diameter, volume, and thickness of erythrocyte; and number of reticulocytes were measured. The oxygen index to hemoglobin capacity was calculated. It was observed that a drop in the oxygen capacity of the hemoglobin accompanied the increase in its amount, and that a subsequent drop in the amount of hemoglobin was accompanied by a rise in its oxygen capacity. Variability observed in the indices of hemoglobin-oxygen capacity, and the variation of the erythrocyte composition of the blood represent compensatory mechanisms of the organism. E.E.B.

N65-17796 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHARACTERISTICS OF HYPOXIC-DYSTONIC SHIFTS IN THE DIAGNOSIS OF ENDOCARDITIS AND THEIR IMPORTANCE FOR THERAPEUTIC PRACTICE

G. Ya. Danish *In its* Oxygen Insufficiency 24 Nov. 1964 p 402-410 (See N65-17751 08-04) OTS: $10.85

Patients with different forms of endocarditis were examined, and the data are presented. Changes in the gas composition of the blood were found in the majority of cases examined. The observed cases of arterial hyperoxia may be regarded as compensation amplification of the blood's respiratory function, and the low arteriovenous oxygen difference may be taken as evidence of the presence of a kind of anaerobic type of metabolism. This was also suggested by the high oxygen content in the venous blood. The hypoxemia manifestation variability and the aggravated symptoms bring up the question of exacerbation of a focal infection delivering bacteria and toxic products into the bloodstream. E.E.B.

N65-17797 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN DEFICIENCY IN MITRAL DISEASE

B. A. Manyako *In its* Oxygen Insufficiency 24 Nov. 1964 p 411-416 (See N65-17751 08-04) OTS: $10.85

The elimination of oxygen deficiency in patients suffering from mitral disease with stenosis predominating during the performance of physical work is reported. Oxygen deficiency was determined by three tests: the oxygen-deficit index, recovery period, and half-value time. Data obtained were compared with hemodynamic indices, the venous pressure, and flow rate. Tables are presented which show the dynamics of these indices as a function of the stage of the disease. It was concluded that oxygen deficit by spirographic study of gaseous interchange under physical stress may be used for differential diagnosis of cardiac failure. Also, the oxygen-deficit index decreases markedly, and the recovery period and half-time value increase steadily after the development of circulatory insufficiency in mitral disease. E.E.B.

N65-17798 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN DEFICIENCY AS AN INDEX OF HYPOXIA DURING THE EARLY STAGES OF HYPERTONIA

D. A. Nuzhnyy *In its* Oxygen Insufficiency 24 Nov. 1964 p 417-422 ref (See N65-17751 08-04) OTS: $10.85

Extent of oxygen deficiency was evaluated from the following measured values: time required to eliminate oxygen deficiency, recovery coefficient, adaptation half-time, onset time of maximum oxygen consumption, and onset time of the decrease in maximum oxygen consumption during the recovery period. Data are presented to show that adaptations of the cardiovascular and pulmonary systems react less completely in first-stage hypertonia patients than in healthy persons. Thus, oxygen deficiency and the late elimination of this deficiency exhibited by patients in the early stages of hypertonia may indicate the existence of hypoxia. E.E.B

N65-17799 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MECHANISMS OF THE DEVELOPMENT OF HYPOXIA IN CARDIOVASCULAR DISEASES

V. D. Mel'nichenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 423-431 (See N65-17751 08-04) OTS: $10.85

Three processes are identified in the changes in the lungs in cardiovascular diseases: (1) Alveolar capillaries are dilated and multiplied. In this case the fact that not all of the alveolar capillaries are exposed under normal conditions of gaseous interchange must be taken into account. The compensatory reserves of the alveolar capillaries are so great that if all the capillary loops of the alveolar septum are exposed they can dilatate to four to five times their ordinary size and reach the width of the alveolar lumen. (2) The development of connective tissue in the septal tissue must in all probability be attributed to an allergic inflammatory process. (3) Hyperplasia of the capillary network is compensated at the surface of the fibrous filaments where the septal tissue comes into contact with the alveolar air. E.E.B.

N65-17800 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE DISRUPTION OF CARBON DIOXIDE INTERCHANGE IN CHRONIC HYPOXIA, ITS PATHOGENESIS AND MODES OF TREATMENT

S. N. Sorinson *In its* Oxygen Insufficiency 24 Nov. 1964 p 432-439 ref (See N65-17751 08-04) OTS: $10.85

Analysis of the disruptions of carbon dioxide interchange which occur in chronic hypoxia of pulmonary etiology, based on the results of examination of patients with pneumosclerosis involving 2d- and 3rd-degree respiratory insufficiency, is reported. It was observed that carbon dioxide content of the arterial blood exceeded 48% by volume in half of the patients with second-stage respiratory insufficiency. Oxygen therapy in chronic hypoxia presents special difficulties since it entails a considerable disruption of carbon dioxide interchange. Additional CO_2 accumulation prevents development of the protective reactions which act to prevent hyperoxia. Material presented confirms that there are considerable disturbances of CO_2 interchange in chronic hypoxia. Elimination of these disturbances should be an important aspect in treating this group of patients. E.E.B.

N65-17801 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGE IN EXTERNAL RESPIRATION AND BLOOD ALKALI RESERVES AS AN INDEX OF HYPOXIA IN BRONCHIAL ASTHMA PATIENTS

A. I. Dayuba *In its* Oxygen Insufficiency 24 Nov. 1964 p 440-447 (See N65-17751 08-04) OTS: $10.85

Examination of bronchial asthma patients with altered external respiratory functioning to determine the extent to which functional disruption of the external respiratory apparatus influences qualitative oxygen utilization by the tissues is reported. Minute respiratory volume, pulmonary vital capacity, maximum ventilation, forced pulmonary vital capacity, gas-transport function of the blood, lactic and pyruvic acid content of the blood, and blood alkali reserves were studied. It was concluded: (1) Disruption of pulmonary ventilation and acid alkali equilibrium of the blood must be considered a symptom of hypoxia. (2) Organic damage to the respiratory system promotes hypoxia. (3) External respiratory system has a high adaptive capacity. (4) Changes in the oxygen-alkali equilibrium may be corrected by drug therapy. E.E.B.

N65-17802 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN STARVATION IN PATHOLOGICAL CONDITIONS OF THE LIVER

V. P. Bezuglyy *In its* Oxygen Insufficiency 24 Nov. 1965 p 448-457 (See N65-17751 08-04) OTS: $10.85

Gas composition of arterial and venous blood, oxyhemoglobin dissociation, and carbonic acid fixation is reported for Botkin's disease patients. It was found: (1) Changes in the gas composition of the blood, oxyhemoglobin dissociation, and carbon dioxide fixation occur in acute virus hepatitis. (2) Oxygen saturation of the arterial blood decreased, oxygen content of the venous blood decreased, oxygen difference in the arterial-venous relation increased, and oxygen utilization in the arterial venous blood increased. (3) Hemoglobin affinity for oxygen decreased. (4) In addition to an increase in the percentage oxygen saturation of the arterial blood, the oxyhemoglobin dissociation tended to normalize during recovery. (5) Carbon dioxide transport was also disrupted and an accumulation of this gas formed in the tissues. (6) The presence of tissue oxygen starvation during the disease makes it necessary to take special measures to prevent hypoxia. E.E.B.

N65-17803 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE HORMONAL FACTOR AND ADAPTATION TO HYPOXIA IN TERMINAL CONDITIONS

G. L. Lyuban *In its* Oxygen Insufficiency 24 Nov. 1964 p 458-464 ref (See N65-17751 08-04) OTS: $10.85

Hypoxia always appears as a component in terminal conditions, especially at the onset of clinical death. Injection of

corticoids and antihistamines had a favorable influence on hypoxia adaptation in terminal conditions. It was found that adaptation to hypoxia is governed primarily by the hormonal effect of insulin. Experimental administration of hormonal preparations proved to have a marked positive influence on the dynamics of restoration of vital functions. In experiments with white mice resistance to hypoxia increased as the torrid stage of burn or electric shock became more severe. Adaptation to hypoxia is one of the components of the pathological process which occurs in terminal conditions of various types. E.E.B.

N65-17804 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE DURATION OF CLINICAL DEATH

A. A. Sarkisyan, S. A. Khachatryan, and A. B. Zakharyan *In its* Oxygen Insufficiency 24 Nov. 1964 p 465-470 (See N65-17751 08-04) OTS: $10.85

In order to determine the duration of clinical death, experiments were conducted on mature dogs kept at high altitude for 1 to 3 years. Clinical death was induced by exsanguination from the femoral artery, and revival was carried out by the complex method developed by V. A. Negovskiy. The dogs' general behavior and body temperature were monitored before and after revival. The animals' respiration, blood pressure, and cardiac activity were monitored. Results showed that dogs kept at an altitude of 920 to 950 meters above sea level can be revived after clinical death lasting 6 minutes. Dogs kept at an altitude of 3200 to 3500 meters can be completely revived after clinical death lasting 10 to 12 minutes. This observation confirms the part that hypoxia plays in revival after clinical death. Hypoxia-adapted dogs withstand clinical death lasting 10 to 12 minutes. E.E.B.

N65-17805 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN DEFICIENCY IN BURN INTOXICATION

Ye. V. Gubler *In its* Oxygen Insufficiency 24 Nov. 1964 p 471-477 (See N65-17751 08-04) OTS: $10.85

Oxygen therapy administered during the first few hours after inflicting extremely severe burns on rats, using pure oxygen under a pressure of 2.3 to 2.7 atmospheres for three hours, did not cause the animals to survive any longer than the controls. The majority died during the therapy. Effects of oxygen deficiency and oxygen therapy in burn intoxication may be explained by the fact that the detrimental action of hypoxia and the positive effect of burn therapy are somehow masked by the simultaneously developing toxic effect of oxygen and the correspondingly favorable action of hypoxia. E.E.B.

N65-17806 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INCREASING THE RESISTANCE OF ANIMALS TO THE TOXIC ACTION OF EXCESS OXYGEN BY ACCLIMATIZATION TO HYPOXIA

A. G. Zhironkin *In its* Oxygen Insufficiency 24 Nov. 1964 p 478-485 (See N65-17751 08-04) OTS: $10.85

Increased tolerance to the toxic effects of excess oxygen in the ambient air was successfully accomplished on small animals by subjecting them to simulated low barometric pressure equivalent to 6000-m altitude in a low-pressure chamber for 4 to 5 hours during 3 or 4 consecutive days. At the end of this period, the animals were subjected to a sudden change to pure oxygen under 4.5 to 6 atmospheres pressure. These animals could withstand higher concentrations of atmospheric oxygen without toxic effects. Tissue adaptation and changes in basal metabolism could be considered the basic factors for the adaptive mechanism. The same type of training could be used in cases of hypoxia. Author

N65-17807 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ROLE OF OXYGEN IN REDUCING THE UNFAVORABLE EFFECT OF ELEVATED CARBON DIOXIDE CONCENTRATIONS OF THE ORGANISM

T. N. Zheludkova, V. P. Zagryadskiy, O. Yu. Sidorov, and Z. K. Sulimo-Samuylio *In its* Oxygen Insufficiency 24 Nov. 1964 p 486-49 (See N65-17751 08-04) OTS: $10.85

Rabbits kept in an airtight chamber, in which the O_2 and CO_2 concentrations could be regulated, showed a favorable effect of high O_2 concentration on the state of hypercapnia. A prolonged exposure to an atmosphere containing 3% to 5% CO_2 and 35% O_2 resulted in less pronounced physiological effects, faster recovery, and greater tolerance to transverse radial acceleration stress than under conditions of 3% to 5% CO_2 and 21% O_2. Author

N65-17808 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN CONSUMPTION AND CARBON DIOXIDE ELIMINATION IN RESPIRATION UNDER EXCESS PRESSURE

P. K. Vokhmyanin *In its* Oxygen Insufficiency 24 Nov. 1964 p 492-496 (See N65-17751 08-04) OTS: $10.85

Under pressure-breathing conditions, dogs wearing masks showed that the O_2 pressure equivalent of a 300-mm water column caused a lowering of oxygen consumption by the tissues and interfered with carbon dioxide removal. Hypoxia ensued even at normal altitude, when pure oxygen was given, regardless of changes in pulmonary ventilation. It was caused by an increase in interpulmonary pressure, resulting in a decrease in volume of the circulating blood and in the blood flow rate. These conditions created a lack of venous return. Hyperventilation could increase the state of hypercapnia. However, oxygen and carbon dioxide concentration in the alveolar air did not coincide with O_2 and CO_2 concentration in the peripheral blood. Upon removal of the mask, normalization of the physiological processes was retarded because of hyperemia and pulmonary edema due to recovery from venous stasis. Author

N65-17809 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

IONIC SHIFTS IN THE ORGANISM OF THE HUMAN AND ANIMALS DURING HYPOXIC PHENOMENA OF VARIOUS ORIGINS (SUBNORMAL BAROMETRIC PRESSURE, ACCELERATION, VIBRATION)

A. S. Barer *In its* Oxygen Insufficiency 24 Nov. 1964 p 497-504 (See N65-17751 08-04) OTS: $10.85

Ion migration in the tissues of the human and animal organism was determined on the basis of potassium and sodium concentration in urine, saliva, and blood. The common response of the organism to various stresses (low pressure, acceleration, and vibrations) was tissue hypoxia, primarily in the brain. At low altitudes, hypoxic hypoxia was noted. Acceleration caused circulatory hypoxia. Vibrations produced a combination of hemodynamic disturbances and tissue hypoxia. Migration of sodium and potassium ions in the interstitial fluid evidently depends upon the degree of permeability of the cell membranes in regard to these ions. Author

N65-17810 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RESISTANCE OF RATS TO HYPOXIA IN ACUTE RADIATION SICKNESS
S. V. Gasteva, K. P. Ivanov, and D. A. Chetvernikov *In its* Oxygen Insufficiency 24 Nov. 1964 p 505-512 (See N65-17751 08-04) OTS: $10.85

Albino rats were subjected to whole-body irradiation of 750 R. The animals were elevated to a simulated altitude of 12 000 m, at various periods after irradiation. Animals tested for hypoxic effects, 48 to 72 hours after exposure, showed greater tolerance to hypoxia. This was evidently due to the lowering of metabolism concurrent with slight hyperemia, due, in all probability, to starvation and other effects. Gas exchange following irradiation dropped considerably below that observed in controls. Animals subjected to hypoxia 96 hours after the irradiation, showed the same response as the controls. Although, at this stage the metabolism remained low, the lethal effect of hypoxia could be due to the terminal phase of radiation sickness. Tolerance noted 6 to 24 hours after exposure could not be related to metabolic changes, but depended on other factors, which will require further study. Author

N65-17811 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CURRENT CONCEPTS OF THE REORGANIZATION OF CELL CHEMISM DURING ACCLIMATIZATION TO HYPOXIA
Z. I. Barbashova *In its* Oxygen Insufficiency 24 Nov. 1964 p 513-521 (See N65-17751 08-04) OTS: $10.85

A study of the physical properties of muscle protein involved in contractile action was performed on the muscular tissue of rats. The viscosity of actomyosin changed, upon dilution at the same degree, whether the protein was isolated from normal animals or from those adapted to hypoxic conditions. This indicates that adaptation did not change the size or structure of the protein molecule. However, adenosine triphosphate (ATP) action reduced actomyosin viscosity because of the dissociation of protein into actin and myosin. Upon recovery, the actin and myosin molecules combinec to form a molecule of actomyosin, which possessed a normal degree of viscosity. However, the recovery time was reduced after a hypoxic experience. Author

N65-17812 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PHYSIOLOGICAL AND BIOCHEMICAL MECHANISMS OF ADAPTATION TO HIGH MOUNTAIN CONDITIONS
P. A. Korzhuyev *In its* Oxygen Insufficiency 24 Nov. 1964 p 522-527 (See N65-17751 08-04) OTS: $10.85

Mountain sheep and goats showed higher hemoglobin and myoglobin concentrations and an increase in the erythrocyte number and the hematocrit, as compared with domesticated species. Author

N65-17813 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF OXIDATIVE METABOLISM ENZYMES (SUCCINOXIDASE AND CYTOCHROME) IN THE CEREBRAL CORTEX AND MYELENCEPHALON IN HYPOXIA-ACCLIMATED RATS
Ye. Yu. Chenykayeva *In its* Oxygen Insufficiency 24 Nov. 1964 p 528-535 (See N65-17751 08-04) OTS: $10.85

Determinations of succino-oxidase and cytochrome oxidase levels in the cardiac muscle, the brain cortex, and medulla were conducted in albino rats subject to hypoxia during several generations. Each new generation showed a tendency toward an increase in anaerobic glycolysis and changes in the cytochrome system, characteristic of a higher tolerance to hypoxia. The hemoglobin content and the number of erythrocytes, as well as the level of carbon-hydrase activity, remained elevated. A combination of these factors led to greater tolerance to hypoxia. However, after the seventeenth generation, the hemoglobin content normalized. The hypoxia adaptation mechanism was transferred to the tissue system, that is, the cytochrome system, primarily in the medulla. Author

N65-17814 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RATE OF LIPID AND CARBOHYDRATE RENEWAL IN THE BRAIN AND LIVER IN HYPOXIA
M. I. Prokhorova, L. S. Romanova, and G. P. Sokolova *In its* Oxygen Insufficiency 24 Nov. 1964 p 536-542 (See N65-17751 08-04) OTS: $10.85

Hypoxia was induced in white rats by injection of sodium nitrite as the methemoglobin-forming agent. Content and rate of renewal of cerebral lipids and rate of cerebroside renewal were unchanged in hypoxia. The rate of ganglioside renewal from glucose was almost halved. Total lipid and cholesterol contents of the liver decreased. The glycogen content of the brain decreased by 25% to 30%, and by a factor of 4 in the liver. The rate of glycogen renewal was also sharply altered. The specific activity of the cerebral glycogen was reduced by a factor of 1.8 and hepatic glycogen, by 2.6. The radioactivity of the cerebral glycogen per gram of tissue decreased by a factor of 2.6, and that of the hepatic glycogen, by a factor of almost 11. E.E.B.

N65-17815 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OXYGEN-FIXING PROPERTIES OF BLOOD HEMOGLOBIN DURING ACCLIMATIZATION OF THE ORGANISM TO CHRONIC HYPOXIA
V. I. Voytkevich *In its* Oxygen Insufficiency 24 Nov. 1964 p 543-549 (See N65-17751 08-04) OTS: $10.85

The oxyhemoglobin dissociation curve was studied in several generations of rats kept in environmental chambers and subjected to hypoxia by maintaining the ambient air at a constant composition of 89.5% N^2 and 10.5% O^2 at normal pressure. Hypoxic animals of the eleventh to thirteenth generation showed a shift in the oxyhemoglobin dissociation curve in 55% to 57% of the cases. In the majority of cases, the shift was to the left in the area of the upper inflexion. In 30% of the cases, it was to the right in the area of the lower inflexion. In some cases, the shift was noted simultaneously to the left in the upper inflexion, and to the right in the area of the lower inflexion. The oxyhemoglobin dissociation curves indicate the respiratory function of blood and the hemoglobin affinity to oxygen, and may serve as indices of the greatest degree of adaptation to hypoxia. Author

N65-17816 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COUPLED ION EXCHANGE OF POTASSIUM AND SODIUM SALTS BETWEEN HUMAN ERYTHROCYTES AND BLOOD PLASMA AT VARIOUS PARTIAL OXYGEN PRESSURES
I. M. Dedyulin *In its* Oxygen Insufficiency 24 Nov. 1964 p 550-55[illegible] (See N65-17751 08-04) OTS: $10.85

The potassium concentration of blood plasma in man is higher at high altitudes than at near sea level. The reduction of carbonic acid in the pulmonary circulation, and the ensuing alkalosis, lead to an increase in potassium concentration in the peripheral blood. This fact indicates an adsorption mechanism of the cell membrane permeability, and suggests hemoglobin and oxyhemoglobin as the basic

buffer system of the sodium potassium shift between the erythrocytes and plasma. Author

N65-17817 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DATA ON HYPOXIA AND ACCLIMATIZATION

L. G. Filatova *In its* Oxygen Insufficiency 24 Nov. 1964 p 552–556 (See N65-17751 08-04) OTS: $10.85

A study of the effects of hypoxia on human and animal organisms in the Kirgizia region, at 760- to 2500-meter altitude, did not disclose a basic mechanism of adaptation. Both animals and men showed a lowering of the energy expenditure level. The thyroid gland may play a role in this mechanism. The extero-receptors (vision, hearing, and smell) may also take part in adaptation. The exclusion of these receptors resulted in an increase of hypoxia tolerance. Author

N65-17818 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MECHANISMS EMPLOYED BY THE ORGANISM TO ADAPT TO HIGH-ALTITUDE CONDITIONS

B. T. Tupusbekov *In its* Oxygen Insufficiency 24 Nov. 1964 p557–565 (See N65-17751 08-04) OTS: $10.85

The first phase of adaptation to hypoxia is nervous stimulation of hemodynamics and respiration. During the second phase, the specific (oxygen deficiency) and nonspecific (pressure, temperature, humidity, and illumination) stimuli are differentiated, resulting in the adjustment of organic functions. The third phase combines the further development and improvement of functions, with structural changes, which could be passed on to the next generation. Unlike experimental conditions of simulated constant pressures, the natural conditions vary from day to day. Therefore, the natural process of adaptation to high altitudes proceeds unevenly under the effect of specific and nonspecific factors. Author

N65-17819 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DATA ON ACCLIMATIZATION TO THE MOUNTAIN COUNTRY OF KIRGIZ

M. M. Mirrakhimov *In its* Oxygen Insufficency 24 Nov. 1964 p 566–577 (See N65-17751 08-04) OTS: $10.85

Adaptation to high altitudes (1500 to 1800 m) in the Kirgizia region for a long period of time led to changes in certain functions of the organism, such as those of the cardiovascular system, which became adjusted to more efficient utilization of oxygen. The gas exchange level became lower. The hemoglobin concentration was higher, although the red blood count remained normal. Pulse rate, arterial pressure, and blood flow rate decreased. Venous pressure, capillary permeability, and pulmonary circulation showed an increase. A general depression in body function level was evident. Under such circumstances the minute cardiac volume, an indicator of hemodynamic activity, remained normal. Author

N65-17820 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN THE NERVOUS SYSTEM AT AN ALTITUDE OF 2000 m

L. M. Telcharov, N. Nikolov, and St. Chernayev *In its* Oxygen Insufficiency 24 Nov. 1964 p 578–583 (See N65-17751 08-04) OTS: $10.85

At an altitude of 2000 meters, changes in the functional state of the human organism were observed in subjects not accustomed to it. The brain cortex activity was stimulated, and the impulses were radiated to the centers of the autonomic nervous system, which caused an increase in neurovascular activity. The respiratory stem was not affected to a significant degree, because the nervous system had sufficient power to maintain the necessary adjustment. However, a prolonged stay at high altitude could produce a permanent stress on the nervous system assuming pathological dimensions. Author

N65-17821 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

VALUE OF OXYHEMOMETRIC DETERMINATION OF BLOOD-FLOW RATE AND OXIDATION LEVEL IN APPRAISING ACCLIMATIZATION TO HIGH-MOUNTAIN CONDITIONS

A. M. Tyurin *In its* Oxygen Insufficiency 24 Nov. 1964 p 584–590 (See N65-17751 08-04) OTS: $10.85

Clinical examinations of a group of Soviet skiers training for the Olympic games at an altitude of 1500 to 2000 m disclosed the following physiological changes: (1) Pulse rate was decreased. (2) Blood pressure was lowered. (3) Hemoglobin content values were lower than normal. (4) Blood flow rate was increased. (5) Oxygenating process was more intensive. (6) Fatigue-recovery time was shortened. Author

N65-17822 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF HIGH-MOUNTAIN FACTORS ON THE REFLEX RELATIONSHIPS BETWEEN RENAL AND SALIVARY ACTIVITY

B. Ye. Esipenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 591–597 (See N65-17751 08-04) OTS: $10.85

Dogs with permanent parotid gland and stomach fistulas and with their ureters excluded to the skin surface, were studied at an altitude of 2000 to 3200 m to establish the possible effect of high altitude on the relationship between salivary gland activity and kidney function. The animals were given 500 ml of water at 36° to 38° C through the stomach fistula. Urine was collected every 15 min; saliva specimens were taken every two min. The kidney–salivary gland function was found to be different at high altitude from that at near sea level. This effect could be explained by the effect of hypoxia on the central nervous system. Oxygen deficiency led to a disturbance in reflex coordination between digestive functions and others, such as cardiac activity and respiration. As a result, saliva secretion was depressed and urine output increased. Prolonged stay at high altitude led to normalization of these functions. Author

N65-17823 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE UROPOIETIC FUNCTION OF THE KIDNEYS UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

B. Ye. Yesipenko and A. P. Kostromina *In its* Oxygen Insufficiency 24 Nov. 1964 p 598–606 (See N65-17751 08-04) OTS: $10.85

Kidney function was studied at near sea level and at altitudes of 2000 and 3200 m in dogs that were provided with a stomach fistula and had their ureters excluded to the skin surface. The following conclusions were reached: (1) Urine volume increased with an increase in altitude. (2) An increase in water intake resulted in an increase in urinary volume at 2000 meters; but at higher altitudes, normalization or even a fall below normal was noted. (3) The amount of solids increased with altitude; however, without forced water intake, values were lower than at near sea level. (4) Changes in the

urine formation process are the result of water equilibrium dynamics under conditions of high altitude, and are directed toward aqueous homeostasis of the organism. Author

N65-17824 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NEUROHUMORAL SHIFTS IN THE BLOOD OF ANIMALS UNDER MOUNTAIN CONDITIONS
G. I. Kulik *In its* Oxygen Insufficiency 24 Nov. 1964 p 607-611 (See N65-17751 08-04) OTS: $10.85

Neurohumoral changes were studied in dogs and domestic fowl under conditions of high altitudes. The inotropic and cholinesterase activity of the blood serum increased at 2000 meters. However, at higher altitudes, values began to return to normal. Author

N65-17825 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHANGES IN ARTERIAL PRESSURE, CARDIAC RHYTHM AND RESPIRATION WITH NORMAL AND DEPRESSED FUNCTIONING OF THE THYROID GLAND UNDER MOUNTAIN CONDITIONS
M. I. Imanaliev *In its* Oxygen Insufficiency 24 Nov. 1964 p 612-618 (See N65-17751 08-04) OTS: $10.85

The effects of the hypothyroid state on adaptation to hypoxia at 3200 m altitude were studied on dogs with hypothyroidism induced by oral intake of 6-methylthiourocil (50 mg per 1 kg of body weight) for 11 to 12 days. At near sea level, blocking of thyroid gland function resulted in (1) depression of blood pressure without significant changes in cardiac activity; (2) slight increase in respiratory rate; and (3) a decrease in amplitude of thoracic movements. In hypothyroid animals exposed to an altitude of 3200 m, blood pressure was lowered, with a simultaneous increase in pulse and respiration rates. It is known that hypothyroidism depresses metabolism of the body. Therefore, animals with hypothyroidism could tolerate high altitude better than the normal control. Author

N65-17826 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFLUENCE OF VITAMINS ON THE FUNCTIONAL STATE OF THE ADRENAL CORTEX IN LOCAL INHABITANTS OF THE EASTERN PAMIR (ALTITUDE 3700 m ABOVE SEA LEVEL)
V. M. Braginskiy and M. M. Mirzoyev *In its* Oxygen Insufficiency 24 Nov. 1964 p 619-624 (See N65-17751 08-04) OTS: $10.85

A determination of the 24-hour output of 17 ketosteroids was conducted on a group of residents of the Pamir, at an altitude of 3700 m, as an indicator of the functional state of the adrenal cortex. Large doses of vitamins (50 mg riboflavin, 100 mg vitamin E, and 500 micrograms biotin) given daily, increased the functional state of the adrenal cortex. However, daily doses of 30 mg folic acid reduced adrenal cortex activity Author

N65-17827 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFLUENCE OF HYPOXIA UNDER MOUNTAIN CONDITIONS ON DOGS WITH ECK-PAVLOV FISTULA
Ye. V. Kolpakov and N. M. Shumitskaya *In its* Oxygen Insufficiency 24 Nov. 1964 p 625-633 (See N65-17751 08-04) OTS: $10.85

The Eck-Pavlov fistula was selected as the model for reproduction of liver insufficiency. Behavior and peripheral blood-picture changes in dogs with liver insufficiency of long standing were compared with those experienced by dogs with Eck-Pavlov fistula, and with control animals to determine the nature and qualitative features of hypoxia adaptation. The postsurgical and control dogs showed differing response reactions under the conditions of hypoxia. The experimental animals suffered more severely than the control animals. In dogs with liver insufficiency, the mechanism of acclimatization to mountain climate went into action more slowly than that of the control animals. The investigations made on dogs with direct Eck-Pavlov fistula under conditions of hypoxia indicate significant participation of the liver in the hematogenetic processes and in the formation of hemoglobin. E.E.B.

N65-17828 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHANGE IN THE NUMBER OF EOSINOPHILS UNDER CONDITIONS OF HIGH ALTITUDE
P. V. Beloshitskiy and Lo Sin'-mao *In its* Oxygen Insufficiency 24 Nov. 1964 p 634-639 (See N65-17751 08-04) OTS: $10.85

Experiments on guinea pigs in pressure chambers, and studies conducted on guinea pigs, mice, and human subjects at altitudes of 2000 and 3500 m produced the following results: (1) Low barometric pressure stimulated the activity of the hypophysis-adrenal system, as was indicated by the lowered eosinophil count of the peripheral blood. (2) Injections of adrenocorticotrophic hormone under the same conditions led to a further drop in the eosinophil count, which was beginning to normalize. Author

N65-17829 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHANGES IN THE ERYTHROCYTE COUNT, PULSE RATE AND BLOOD PRESSURE UPON AN ASCENT TO HIGHER ALTITUDE AFTER PRIOR ACCLIMATIZATION TO HIGH ALTITUDE CONDITIONS
A. B. Zakharyan *In its* Oxygen Insufficiency 24 Nov. 1964 p 640-643 (See N65-17751 08-04) OTS: $10.85

Clinical and laboratory examinations were performed on young men between 20 and 26, before and after an ascent from an altitude of 3250 to 3900 meters. The subjects formed four groups that lived at the 3250-meter altitude for the following different periods of time prior to the study: (1) 1 month; (2) 1 to 6 months; (3) 6 to 12 months; and (4) over 12 months. The increase in blood pressure, pulse rate, hemoglobin content, and red blood cell count was more pronounced in the individuals who were less adapted to high altitude. Author

N65-17830 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFLUENCE OF THE MOUNTAIN CLIMATE OF THE EL'BRUS REGION ON THE EXTERNAL (PULMONARY) RESPIRATORY FUNCTION IN BRONCHIAL ASTHMA PATIENTS
S. P. Mel'nichuk *In its* Oxygen Insufficiency 24 Nov. 1964 p 644-651 (See N65-17751 08-04) OTS: $10.85

Men and women ranging in age from 20 to 49 years with histories of bronchial asthma varying in length and gravity, but without concomitant disorders of the cardiovascular system, were taken into the mountains to determine the influence

of the mountain climate on the external respiratory function. Improvement in the regulation of the external respiratory function was shown by these experimental observations. Conditions of mountain climate may be considered not simply as a symptomatic and temporary method of treatment and prophylaxis for bronchial asthma, but as a long-lasting one with a pathogenetic basis. Previous data on the therapeutic and prophylactic utilization of mountain climate were confirmed. E.E.B.

N65-17831 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF THE MOUNTAIN CLIMATE ON THE COURSE OF BRONCHIAL ASTHMA

A. A. Kochum'yan *In its* Oxygen Insufficiency 24 Nov. 1964 p 652-659 (See N65-17751 08-04) OTS: $10.85

The course of the illness, electrocardiographic study, fluoroscopy, clinical analyses, and measurements of arterial pressure, respiratory frequency, and pulse were made at three different altitudes. It was observed that mountain climate (altitude of 2000 meters) had a favorable influence on patients suffering from bronchial asthma. Sojourn at higher altitude (3000 m) caused a worsening of the course taken by the asthma as compared with the 2000-meter altitude. This may have been due to the unfavorable weather at the higher altitude. E.E.B.

N65-17832 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIENCE IN THE TREATMENT OF BRONCHIAL ASTHMA PATIENTS BY STEPWISE ACCLIMATIZATION TO THE MOUNTAIN CLIMATE

S. A. Ul'yanova and N. M. Shumitskaya *In its* Oxygen Insufficiency 24 Nov. 1964 p 660-667 (See N65-17751 08-04) OTS: $10.85

Bronchial asthma patients, some suffering from concomitant disorders such as emphysema of the lungs, chronic bronchitis, stenocardia, hypertonia, and atherosclerosis, were taken in steps to higher and higher altitudes. It was established that prolonged stays (30 days) in a mountainous locality at altitudes of 2000 to 3500 meters above sea level had a favorable influence on the course of the disease. The asthma attacks became considerably less frequent and were of a milder nature. This improvement is accounted for by acclimatization of the body to hypoxic conditions. Also, a decrease in the allergic sensitization of the bronchial asthma patient was established. E.E.B.

N65-17833 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE THERAPEUTIC PROPERTIES OF THE MOUNTAIN CLIMATE IN HYPERTONIA

M. A. Aliev *In its* Oxygen Insufficiency 24 Nov. 1964 p 668-674 (See N65-17751 08-04) OTS: $10.85

Renal form of hypertonia was produced in dogs by collapsing one or both kidneys with a rubber capsule. Under conditions of high altitude (1800 m), hypertonia was retarded in the dogs in which unilateral renal ischemia had been produced. At altitudes of 2700 meters above sea level, a delaying effect was also observed. This retarding influence was verified at 3200 meters. Hypertonia did not develop in any of the dogs with one kidney collapsed. Collapsing both kidneys resulted in an increase in arterial pressure. Thus, the climate of high mountains, which constitutes a complex of atmospheric factors (subnormal barometric pressure, intense sunlight, negative air ionization, moderate temperature) had a therapeutic effect on induced hypertonia. It was noted that the favorable therapy was not experienced during the cooler weather in the mountains (September to October). E.E.B.

N65-17834 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DISTINCTIVE CHARACTERISTICS OF OXYGEN SUPPLY TO THE ORGANISM IN PATIENTS WITH CARDIAC VALVE DEFECTS UNDER THE CONDITIONS OF THE MOUNTAIN CLIMATE

A. Yu. Tilis, M. M. Mirrakhimov, and A. D. Dzhaylobayev *In its* Oxygen Insufficiency 24 Nov. 1964 p 675-684 (See N65-17751 08-04) OTS: $10.85

An investigation to determine the nature of the oxygen supply in patients with cardiac valve defects who had lived since birth in the mountains is reported. With increasing altitude, a slowdown in the cardiac patients' bloodstream rate was observed, even in incipient forms of circulatory insufficiency. A significant decrease in the oxygen utilization coefficient in cardiac patients was observed in the mountains. This was accomplished with an increase in the respiratory minute volume by 55% to 80%. At an altitude of 1650 meters, heart valve patients with complete compensation, and those in the initial forms of circulatory insufficiency show good adaptation to the environmental conditions. E.E.B.

N65-17835 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ARTERIAL PRESSURE NORMS FOR NATIVE INHABITANTS OF THE MOUNTAINOUS REGIONS OF KIRGIZIA

A. T. Tynybekov *In its* Oxygen Insufficiency 24 Nov. 1964 p 685-688 (See N65-17751 08-04) OTS: $10.85

Comparative studies of blood pressure values of inhabitants of the lowlands and of the Kirgizia Mountains disclosed that blood pressure levels were lower in the residents of the Kirgizia highlands than in the inhabitants of Leningrad or Moscow, as far as individuals under 29 were concerned. However, older persons did not show such variations. Author

N65-17836 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL DATA ON THE EFFECT OF THE MOUNTAIN CLIMATE ON THE COURSE OF ARTERIAL HYPERTONIA AND MYOCARDIAL INFARCT

N. V. Il'chevich, M. Ye. Kvitnitskiy, and M. A. Kondratovich *In its* Oxygen Insufficiency 24 Nov. 1964 p 689-694 (See N65-17751 08-04) OTS: $10.85

The effect of mountain climate on the dynamics of a number of indices to the functional state of the cardiovascular system in dogs with experimental renal hypertonia and myocardial infarct is reported. Renal hypertonia was induced by application of split silver rings to the renal arteries, and myocardial infarct by application of a ligature to the middle third of the descending branch of the left coronary artery. Acceleration of cardiac rhythm with smoothing of the sinus arrhythmia was noted in the dogs with experimental hypertonia. They showed distinct tachycardia before arrival in the mountains and its degree increased with ascent. In dogs with myocardial infarct, the arterial pressure showed little change with ascent into the mountains. The mountain climate had distinct and variegated effects on the functional state of the cardiovascular system. E.E.B.

N65-17837 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN CERTAIN INDICES OF THE CARDIOVASCULAR SYSTEM AND RESPIRATION UNDER MOUNTAIN CONDITIONS (A COMPARATIVE STUDY IN SCHIZOPHRENIA PATIENTS AND HEALTHY PERSONS)

S. N. Sorinson and A. P. Morozov *In its* Oxygen Insufficiency 24 Nov. 1964 p 695-703 (See N65-17751 08-04) OTS: $10.85

Changes in the cardiovascular and respiratory system indices of schizophrenics and healthy individuals at various altitudes is reported. Pulse acceleration was observed in all subjects. The schizophrenics had the most rapid pulses, as well as lower blood pressures, at all altitudes. Signs of myocardial ischemia were detected in the electrocardiographic examination, with no particular differences after physical exertion, being noted, between the two groups of subjects. Frequency and extent of the EKG shifts increased with altitude. It was concluded that a sojourn in the mountains causes less readjustment for schizophrenics than for healthy individuals. E.E.B.

N65-17838 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THERAPEUTIC VALUE OF THE HIGH MOUNTAIN SOJOURN IN CERTAIN PSYCHIC DISORDERS

N. V. Kantorovich *In its* Oxygen Insufficiency 24 Nov. 1964 p 704-708 (See N65-17751 08-04) OTS: $10.85

Patients with various degrees of psychic disturbances were observed at various altitudes to determine the therapeutic value of high mountain environments. Residence in the high mountains produced its most striking effect in the manic phase of manic-depressive psychosis and in psychomotor excitation in general. Of the schizophrenic patients, the best results were obtained with hallucinatory paranoids. Excellent results were observed for the catatonics. The therapeutic effect on the simple form was not as good. This experimentation confirmed the basic factor of hypoxia in influencing the course of psychic disorders. Hypoxia was not considered the sole cause of the improvement in the mental condition of the patients. Secondary factors such as physical exertion, climatic and geographical factors, and the effect of radiation contribute. E.E.B.

N65-17839 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE RESULTS OF TREATING SCHIZOPHRENIA PATIENTS BY RESIDENCE IN THE HIGH MOUNTAINS DURING 1961

A. I. Durandina *In its* Oxygen Insufficiency 24 Nov. 1964 p 709-717 (See N65-17751 08-04) OTS: $10.85

Conditions of the high Tien-Shan mountains had a favorable effect on the course of all forms of schizophrenia. The mountain climate had its most striking effect on the hallucinatory-paranoid form of schizophrenia. Poorer results were obtained with the simple, hebephrenic, and catatonic forms. Psychotic symptoms vanished completely or diminished conspicuously during the period from 2 to several weeks. These observations confirmed the therapeutic value of mountain environment for the treatment of schizophrenia. E.E.B.

N65-17840 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COURSE OF PSYCHOMOTOR EXCITATION AND MANIC DEPRESSIVE PSYCHOSIS UNDER THE CONDITIONS OF THE HIGH MOUNTAINS

V. A. Rozhnov *In its* Oxygen Insufficiency 24 Nov. 1964 p 718-723 (See N65-17751 08-04) OTS: $10.85

Psychomotor disturbance vanished in patients with manic-depressive psychosis on the first to third day in the mountains. In those cases in which the manic patients still retained their psychomotor disturbance during the first 2 days at 3540 meters, the motor and speech disturbances vanished immediately when they were taken to an altitude of 4200 to 4500 meters and then brought back down. In schizophrenic patients, the psychomotor disturbance had disappeared by the third to thirteenth day of the mountain stay. Thus, a sojourn in the high mountains had excellent therapeutic results in treating the manic phase of manic-depressive psychosis, as it did in the other types of mental disorders studied. E.E.B.

N65-17841 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ROLE OF THE HYPOXIC FACTOR IN THE DEVELOPMENT AND COURSE OF EXPERIMENTAL EPILEPTIC SEIZURES

A. I. Nazarenko *In its* Oxygen Insufficiency 24 Nov. 1964 p 724-730 (See N65-17751 08-04) OTS: $10.85

The functional state of the respiratory and circulatory systems of dogs was studied to determine the role of hypoxia in the genesis of convulsive seizures. It was observed that respiration and blood pressure vary considerably during convulsive seizures. In the tonic phase, a sharp increase takes place in blood pressure, and respiration stops. At the peak of the seizure, the oxygen content in the arterial blood is down, and that in the venous blood is up. The arterial-venous oxygen difference is sharply reduced. During the tonic phase, the rate of oxygen uptake by the tissues of the cerebral hemispheres is depressed. Oxygen tension in the brain drops at the height of the seizure. Adaptation and acclimatization to hypoxia result in increased tolerance to an epileptogenic factor. E.E.B.

N65-17842 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE SIGNIFICANCE OF HYPOXIA IN THE MECHANISM OF INSULIN THERAPY AS APPLIED TO SCHIZOPHRENIA PATIENTS

Ya. M. Britvan and I. A. Mizrukhin *In its* Oxygen Insufficiency 24 Nov. 1964 p 731-740 (See N65-17751 08-04) OTS: $10.85

Patients with paranoid and catatonic forms of schizophrenia were observed to experience a considerable drop in the oxygen saturation of the arterial blood as insulin hypoglycemia became more acute and the comatose state developed. A slight lowering of the oxygen saturation of the blood was noted as soon as 20 to 30 minutes after administration of insulin. Together with oxygen starvation of the brain, arterial hypoxemia is also a factor in the mechanism of insulin-coma therapy. It may be assumed that general tissue hypoxia also arises during insulin intoxication. It was concluded that the adoption of the continuous oxyhemometry technique on a broader scale in psychiatric practice is a necessity. E.E.B.

N65-17843 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DYSOXIA AS A CONDITION DISTINCT FROM HYPOXIA

G. B. Derviz *In its* Oxygen Insufficiency 24 Nov. 1964 p 741-748 (See N65-17751 08-04) OTS: $10.85

Attention is directed to the difference in meaning of hypoxia (oxygen starvation, oxygen deficiency, or oxygen insufficiency), and the term dysoxia (oxidative metabolism processes). To emphasize the area in which the term dysoxia is more appropriate than the term hypoxia, the case of leukemia patients is reviewed where fats are formed in the leucocytes at the expense of carbohydrates, while at the same time organic acids accumulate as a result of some process yet unidentified. This may be called dysoxia. E.E.B.

N65-17844 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE PROBLEM OF CLASSIFYING DEGREES OF HYPOXIC STATES

A. Z. Kolchinskaya *In its* Oxygen Insufficiency 24 Nov. 1964 p 749-758 (See N65-17751 08-04) OTS: $10.85

A literature review and an analysis are given for the classification of the states of hypoxia. Taking into account changes in the functions of the central nervous system, respiration, cardiac activity, and humoral shifts in hypoxia, the following stages were proposed: latent hypoxia, compensated hypoxia, manifest hypoxia, uncompensated hypoxia, and terminal. E.E.B.

N65-17845 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FUNDAMENTALS FOR AUTOMATIC DIAGNOSIS OF THE HYPOXIC STATE

V. B. Malkin *In its* Oxygen Insufficiency 24 Nov. 1964 p 759-769 (See N65-17751 08-04) OTS: $10.85

A polygraphic method for registering various physiological functions simultaneously, in order to detect the most important deviations from normal, would be a valuable tool for an automatic diagnosis of the hypoxic state. It should provide for (1) photometric determination of oxygen saturation of the arterial blood; (2) determination of changes in rhythm, rate, and volume of respiration; (3) electrocardiography; (4) blood pressure reading; and (5) electroencephalography. Author

N65-17867*# Connecticut Agricultural Experiment Station, New Haven.

PLANT LEAVES FOR THE PRODUCTION OF OXYGEN IN A CLOSED SYSTEM Quarterly Status Report

[1962] 8 p

(Contract NASr-129)

(NASA-CR-60892) OTS: HC $1.00/MF $0.50

Experiments are conducted on plants to ascertain the effects of continuous light on their growth. A tomato plant and a sugarcane plant are subjected to an illumination of approximately 1500 foot candles and a high intensity of 10 000 foot candles, respectively. At 1500 foot candles, after 3 days, the lower leaves of the tomato plant became chlorotic because the light was continuous. This chlorosis continued to develop until, after two weeks, the tomato plant was nearly all yellow. At the end of one month this plant was nearly white and died during the following week. In contrast, the cane grew normally except where leaves touched the lamp surface and were killed by the heat. No ill effects of the continuous light were apparent in the cane after 6 months. Since cane showed no ill effects of continuous light at 1500 ft-c, its carbon dioxide absorption and water loss were examined in continuous illumination of 10 000 ft-c. The plant began to show slight chlorosis after 48 hours of illumination and the rate of carbon dioxide absorption began to decline. The rate of water loss increased steadily during the experiment as the plant grew and more tissue was present to lose water. J.R.C.

N65-17876*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART I: REVIEW OF THE LITERATURE ON THE PHYSIOLOGICAL EFFECTS OF IMMOBILIZATION

C. Vallbona, F. B. Vogt, D. Cardus, W. A. Spencer, and M. Walters Washington, NASA, Mar. 1965 18 p refs

(Contract NAS9-1461)

(NASA-CR-171) OTS: HC $1.00/MF $0.50

A review of literature (up to 1963) on the effects of immobilization reveals that bed rest was evaluated in 83 subjects (30 of whom were allowed to sit up) and water immersion in 33 subjects. There is a wide variety of experimental conditions in each study. This precludes pooling of data to evaluate the significance of the findings. It is concluded that bed rest deserves further study with special attention to include wider variety of subjects in regard to age, training habits, and physical condition; identification of physiological rhythms during bed rest; definition of changes in body composition; study of the mechanism of orthostatic hypotension following bed rest. Author

N65-17877*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

LABORATORY TESTS OF SUBJECTIVE REACTIONS TO SONIC BOOM

K. S. Pearsons and K. D. Kryter Washington, NASA, Mar. 1965 38 p refs

(Contract NASr-58)

(NASA-CR-187) OTS: HC $2.00/MF $0.50

In a special laboratory chamber, subjects compared the subjective acceptability of sonic booms (simulated) that would be heard outdoors and indoors, with the sound of subsonic jet aircraft and bands of filtered white noise. The subjective acceptability of the booms was expressed in terms of equivalent perceived noise level in PNdB. (The PNdB values used refer to the calculated peak perceived noise level of the flyover sound of a subsonic jet aircraft that is subjectively as acceptable as a given sonic boom.) When heard indoors, a sonic boom having an outdoor overpressure of 2.3 lb/ft^2 was judged as acceptable as the sound of a subsonic jet heard indoors and having an outdoor level of 113 PNdB; the same boom heard outdoors was judged to be less noisy by an equivalent of 17 PNdB than the sound of subsonic jet at 113 PNdB. Some factors involved in estimating community response to aircraft noise are discussed. Author

N65-17879*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY — A CONTINUING BIBLIOGRAPHY

Jan. 1965 182 p refs

(NASA-SP-7011(06)) OTS: HC $1.00/MF $1.25

Subjects covered are 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. In addition, similar effects on biological organisms of lower order are included. Related topics such as sanitary problems, pharmacology, toxicology, safety, and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Three organizations contribute to the publications—NASA, the American Institute of Aeronautics and Astronautics, and the Library of Congress. R.W.H.

N65-17890# Joint Publications Research Service, Washington, D. C.

POSSIBILITY OF USING TISSUE HEMOLYSINS TO INDICATE THE EFFICACY OF RADIOPROTECTIVE PREPARATIONS CONTRAINDICATED

V. V. Antipov 3 Mar. 1965 13 p refs Transl. into ENGLISH from Radiobiologiya (Moscow), v. 1, no. 1, 1961 p 86-92 (JPRS-28981; TT-65-30434) OTS: $1.00

Investigated was the possibility of the utilization of accumulation dynamics of the hemolytic factor for the evaluation of the protective efficacy of some of the preparations in X-ray radiation of rats. An attempt was made to determine the role which the hemolytic factor plays in the pathogenesis of radiation sickness. Conclusions were: (1) Tissue hemolysins discovered in the liver extracts of irradiated rats are formed in vitro in the process of incubation and the subsequent cold storage of the extracts. (2) No correlation exists between the efficacy of the prophylactic action of radioprotective substances and their ability to inhibit the formation of hemolysins. (3) No basis exists for ascribing the role of cytotoxins in the pathogenesis of radiation sickness to hemolytically active substances. Author

N65-17906# Rome Air Development Center, Griffiss AFB, N. Y.

MISREGISTRATION IN COLOR ADDITIVE DISPLAYS

Alvin M. Snadowsky Dec. 1964 33 p refs

(RADC-TDR-64-488; AD-610528)

The relationship between misregistration in color additive displays and viewer performance was studied. In the first experiment simple geometric forms were presented, one at a time, and the subject's response times were recorded. A progressive increase in reaction time was found from 65% to 100% misregistration. The second experiment was more generalized to operational displays. Thirty-six alphanumeric symbols were presented simultaneously in seven colors with an additive color projector similar to those used in command and control systems. Using an accuracy-speed composite score as a performance measure, results similar to the first experiment were obtained. The results indicate that for ideal conditions misregistration should not exceed 65% of stroke width. This is not to say, however, that misregistration up to 65% can be tolerated without additional considerations. It is quite likely that for operational conditions, involving prolonged observation and stress, a more stringent criterion should be employed. Author

N65-17909# Oregon State Univ., Corvallis. Science Research Inst.

FATE OF PENTABORANE-9-H^3 IN SMALL ANIMALS AND EFFECTS OF PENTABORANE-9 UPON GLUCOSE CATABOLISM BY RATS Final Report, 1 Jun. 1963-30 Jun. 1964

D. J. Reed, F. N. Dost, and C. H. Wang Wright-Patterson AFB, Aerospace Med. Res. Labs., Dec. 1964 36 p refs

(Contract AF 33(657)-11757)

(AMRL-TR-64-112; AD-610571)

Rats given liquid $B_5H_9^3$ by intraperitoneal injection evolved 36% to 37% of the tritium label as molecular hydrogen over a 2 3-hour period. A nonvolatile hydrolysis intermediate rapidly formed in the bloodstream concurrently as molecular hydrogen was evolved by treated animals. Tritium in the hydrolysis intermediate was found to be nonexchangeable into water. However, the hydrolysis intermediate slowly disappeared, and approximately an equivalent amount of tritium could be detected in the body water of treated animals. The effect of pentaborane-9 intoxication upon glucose catabolism by rats was examined. Total respiratory CO_2 production by intoxicated rats was slightly greater than that of normal rats. Catabolism of glucose via the glycolytic pathway appeared to be inhibited during the initial 4 hours after B_5H_9 administration by intraperitoneal injection. Pentaborane-9 intoxication appears to affect glucose catabolism for only a 6-8-hour period. Author

N65-17910# American Foundation for Biological Research, Madison, Wis.

THE TIME FACTOR IN INITIATION OF FREEZING AND IN PENETRATION AND PROPAGATION OF ICE IN TISSUES OF MOUSE LIMBS

R. J. Williams and B. J. Luyet Ft. Wainwright, Alaska, Arctic Aeromed Lab., Sep. 1964 16 p refs

(Contract AF 41(657)-343)

(AAL-TDR-63-27; AD-610610)

In studying the course of ice invasion of mouse limbs exposed to various ambient temperatures three stages were considered: the initiation of freezing, the passage of ice through the skin and the propagation of the ice within the limb. At an air temperature of $-25°$ C excised limbs froze within 4 minutes; at $-20°$ C they froze within 7 minutes; at $-15°$ C the proportion of limbs remaining unfrozen after a 40-minute test period varied from 7% to 40%. The time required for the passage of the ice front through the skin (using a model system in which the skin separated ice crystals from a layer of physiological saline) was less than 2 seconds at $-9°$ C; it was 8 seconds at $-4°$ C, 160 seconds at $-1.8°$ C; above $-1.8°$ C penetration could not be induced. Within the foot (attached to the body), ice traveled from the toes to the heel at rates of the order of 2 cm per second at $-8°$ C, 1 cm at $-6°$ C, 5 mm at $-4°$ C and 1 mm at $-2°$ C. Author

N65-17916# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE IMPORTANCE OF QUANTITATIVE CHANGES IN THE EXTRACELLULAR FLUID SPACE IN DISTURBANCES TO WATER BALANCE IN EXPERIMENTAL "INTESTINAL RADIATION DEATH"

Z. Zsebok and G. Petranyi 29 Jan. 1965 16 p refs Transl. into ENGLISH from Magy. Radiol. (Hung.), no. 1, 1964 p 1-18

(FTD-TT-64-912/1+2+3+4; AD-456918)

The form of radiation sickness culminating in "intestinal death" is manifested in the phenomena of the gastrointestinal syndrome. Death occurs from whole-body radiation ranging from 1000 to 12 000 roentgens in animals, with survival time from 3 to 5 days. The following problems were also investigated: (1) the degree to which the various vital organs participate in the changes of inulin clearance observed in the gastrointestinal radiation syndrome; (2) the importance of the inulin clearances of the individual organs in the period of unstable inulin clearance observed in the 24th hour after exposure to radiation; and (3) the extent of variation in the inulin permeability of the intestinal mucosa, which sustained a radiation injury. E.E.B.

N65-17947*# General Electric Co., Philadelphia, Pa. Space Sciences Lab.

RESEARCH STUDY OF THE UTILIZATION OF BIOELECTRIC POTENTIALS Final Report

J. J. Konikoff 31 Oct. 1964 55 p refs

(Contract NAS2-1420)

(NASA-CR-60955) OTS: HC $3.00/MF $0.50

Biological potential studies on electrode materials and on anatomical sites conducted on rats and other animals have shown the feasibility of using bioelectric potentials as a primary energy source. Several combinations of materials have

proved to be benign with respect to interacting with the animal tissues. The optimum electrode system is that of high speed steel and platinum-platinum black. The capability of this system operating under a 10000-ohm load in an unrestrained animal at an output of 0.49 ±0.01 volts for 128 days was reported. Higher output can be obtained by increasing the area of the platinum-platinum black electrode. The peritoneum cavity appears to be the optimum locus for the electrodes to be placed. This system of implanted electrodes also has the capability of powering specially designed transmitters. E.E.B.

N65-17977# Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
SPACE CABIN LIFE SUPPORT SYSTEMS ENGINEERING AND DEVELOPMENT PLAN
K. H. Houghton 17 Aug. 1964 33 p refs
(SM-47691)

Space laboratory-type life support subsystems are to be installed in a space cabin simulator and manned for long duration mission tests of up to 60 days. The hardware to be used will be flight-type, but not necessarily of flight-weight. Initially, three separate testing phases are planned, each progressively increasing the degree of closure of the oxygen and water cycles. Upon completion of the initial manned tests, the facility will be used to continuously test, compare, and upgrade different types of equipment on an integrated basis. The crew is integrated into the total system to obtain realistic subsystem design performance data, and to evaluate the maintenance and other man-machine interface problems associated with the life support subsystems. The results of tests conducted in conjunction with the manned cabin simulator will be used to upgrade both the equipment performance and the generalized life support and environmental control system Fortran program (G-189). Author

N65-17978# Joint Publications Research Service, Washington, D. C.
BIOLOGY AND INFORMATION: ELEMENTS OF BIOLOGICAL THERMODYNAMICS
Karl Sigmundovich Trincher 2 Mar. 1965 104 p refs Transl. into ENGLISH of the book "Biologiya i Informatsiya: Elementy Biologicheskoy Termodinamiki" Moscow, 1964 p 1-100
(JPRS-28949; TT-65-30415) OTS: $4.00

Thermodynamic principles that govern the distance and development of living organism are formulated, and a history of the application of thermodynamics in biology is given. The main principles of biological thermodynamics were expressed in equations for (1) the thermodynamic theorem of biological evolution; (2) the law of biological adaptation; (3) the thermodynamic equation of metabolism; and (4) the law of accumulation of information. It was concluded that the basic property of life is the presence of an information content which emerges and is preserved in the nonaqueous structures of the living system during the course of the adaption and evolution of living organisms. G.G.

N65-17986# Joint Publications Research Service, Washington, D. C.
THE CELL AS A CYBERNETIC SYSTEM
H. David 3 Mar. 1965 36 p refs Transl. into ENGLISH from Das Deut. Gesundheitswesen (Berlin), v. 20, no. 2, 14 Jan. 1965 p 53-62, and no. 3, 21 Jan. 1965 p 101-107
(JPRS-28974; TT-65-30430) OTS: $2.00

A concept of intracellular relationship is discussed that is based on submicroscopic as well as biochemical findings. A great number of individual data on the morphological and biochemical composition of the individual cellular components are presented, and the informative, regulatory, and recoupling processes are regarded as the foundation of all life processes. It was concluded that the cell forms a model cybernetic system, the disturbance of which means disease, and the destruction of which means death. G.G.

N65-17997# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology
LABORATORY OF NUCLEAR MEDICINE AND RADIATION BIOLOGY SEMIANNUAL PROGRESS REPORT FOR THE PERIOD ENDING 31 DECEMBER 1964
[1964] 132 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-541)

Publications and reports issued in the second half of 1964 are listed. Brief resumes of interim work are presented in the fields of biochemistry, radiobiology, pharmacology and toxicology, nuclear medicine, biophysics, and environmental radiation. R.L.K.

N65-18000# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
CORTICAL CONTROL OF EYE MOVEMENTS AND VISUAL THRESHOLD Final Report, 1 Jun. 1963-1 Jun. 1964
M. A. Bouman [1964] 26 p refs
(Contract DA-91-591-EUC-2946)
(AD-453155)

This report is concerned mainly with the cortical control of the eye and its movements. More specifically, the report describes experimental investigations on the increase in the threshold for visual perception which occurs just prior to, and during, eye movements. To measure the visual threshold in the vicinity of eye movement, an apparatus was constructed having alternately burning lights. Some time after switching, a flash of short duration of controlled intensity was presented which fell in the vicinity of the subject's eye movement. Eye movements were measured by reflection of light from the surface of the eye. The reflection data are fed to a pattern recognizer which records the onset of eye movement. The subject records whether or not he saw the flash. Controlled general illumination is also provided. The threshold for perception as a function of eye movement was measured. The influence of cortical activity is under investigation. Author

N65-18001# Army Personnel Research Office, Washington, D. C. Combat Systems Research Lab.
RESEARCH ACTIVITIES ON PERFORMANCE IN ARMY MONITOR SYSTEMS Technical Research Report No. 1139
J. G. Tiedemann Oct. 1964 21 p refs
(AD-609112)

The objective was to improve performance in U.S. Army monitor jobs, with emphasis on developing and testing new work methods for operational systems. Through FY 1964, activities were designed (1) to develop general principles and techniques leading to work methods through which to improve the performance of monitoring functions; and (2) to improve performance of information monitoring personnel within the U.S. Army Security Agency. The current program is one of applied research based on simulation of relevant aspects of monitor jobs in a laboratory setting and is organized around the nature of monitoring behavior, determinants and correlates of monitor performance. Laboratory experimentation is conducted in which the effects on performance of factors associated with signal, task, environment, and the individual are

studied in various combinations. The vigilance laboratory houses an electronic simulator through which the relevant features of monitor jobs can be systematically varied. The present report reviews the highlights of five studies. Author

N65-18027# Joint Publications Research Service, Washington, D. C.
INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES Selected Articles
2 Mar. 1965 68 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), v. 8, no. 10, 1964 (JPRS-28951; TT-65-30417) OTS: $3.00

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2. THE HYGIENIC EVALUATION OF THE EXPERIMENTAL PRODUCTION OF POLYETHYLENE BY THE LOW PRESSURE METHOD M. M. Levian p 6-10 refs

3. THE SUBSTANTIATION OF THE MAXIMUM PERMISSIBLE CONCENTRATION OF ANTIMONOUS HYDRIDE Ye. V. Levin p 11-15 refs

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7. PROBLEMS OF THE FUNCTIONAL DIAGNOSIS AND TREATMENT OF TOXIC LIVER INJURIES CAUSED BY BENZENE NITRO-COMPOUNDS L. N. Kazinskaya p 38 44

8. ON CERTAIN CHARACTERISTICS OF THE INDUSTRIAL MICROCLIMATE IN HOT WORKSHOPS F. M. Shleyfman p 45-47

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10. BATYL ALCOHOL TREATMENT OF LEUCOPENIA IN PATIENTS SUFFERING FROM CHRONIC RADIATION ILLNESS V. S. Klimov, Ye. A. Denisova, and N. I. Gorbarenko p 51-53

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13. HEMOPOIETIC SHIFTS UNDER THE EFFECT OF THE GAMMAISOMER HEXACHLOROCYCLOHEXANE V. Ye. Balashov p 62-64 refs

N65-18031# Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
METHODS OF SANITIZING AND DEODORIZING RUBBERIZED FABRIC AND PRODUCING TEMPORARY ANTISTATIC FILMS ON SYNTHETIC MATERIALS
W. E. MacKenzie 2 Oct. 1964 10 p
(NAEC-AML-2050; AD-609164)

An investigation of sanitizing, deodorizing, and antistatic agents is described. Recommendations are made for the use of quaternary ammonium compounds for sanitizing and deodorizing rubberized flight clothing, and for the use of nonionic detergents for rendering synthetic materials antistatic. Author

N65-18041# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
RADIOELECTRONICS IN SPACE MEDICINE
I. T. Akulinichev, R. M. Bayevskiy et al 23 Nov. 1964 68 p refs Transl. into ENGLISH of the book "Radioelektronika v Kosmicheskoy Meditsine" Moscow, Izd. Energ., 1964 p 3-45 (FTD-TT-64-836/1+2; AD-609140)

Sensors, electrodes, and the registration of biopotentials are discussed in a chapter on collecting and converting medicobiological information. The medical radioelectronic apparatus which was used on Soviet animal-carrying satellites and on the manned Vostok spacecraft is described. Ground testing and monitoring apparatus is also explained. Other chapters cover data transmission and registration systems, and the use of radio and television for medical monitoring. Prospective applications for radioelectronics in space medicine are discussed, such as systems for intracabin retransmission of physiological data from the cosmonaut when he is moving about freely, electroplethysmography for indirect evaluation of the intracranial blood circulation, study of pulmonary ventilation during space flight, and the development of automatic medical monitoring systems. R.L.K.

N65-18074# Naval Training Device Center, Port Washington, N. Y. Human Factors Lab.
PERCEIVED BRIGHTNESS OF LIGHT FLASHES
Milton S. Katz 3 Aug. 1964 62 p refs
(NAVTRADEVCEN-IH-16; AD-609358)

Some aspects of the Broca-Sulzer effect were investigated by an optical system which provided contiguous uniocular or separate binocular brightness comparisons of brief flashes superimposed on a constant luminance adapting field. The briefer of two equal-luminance flashes appears brighter provided luminance is sufficiently high, but may diminish or vanish if luminance is very high. Presentation of stimuli in separate binocular vision produces no essential change, but increases the effect as compared with that obtained in uniocular vision. Stimulus size exerts no marked influence in uniocular or binocular view, but results in increased observer variability at the smallest size. Whatever the luminance level the relative brightness of very brief flashes is approximately proportional to their duration. When the background adapting luminance level increases, the luminance level of flashes giving enhancement increases approximately proportionally. Flash duration giving the greatest brightness is long at low luminance, progressively briefer as luminance increases, and longer as luminance increases to very high levels. Author

N65-18082 Argonne National Lab., Ill.
RECOVERY FROM DIVISION DELAY IN IRRADIATED GAMETES OF *ARBACIA PUNCTULATA*
Patricia Mc Clement Failla *In its* Radiol. Phys. Div. Ann. Rept., Jul. 1963-Jun. 1964 [1964] p 49 56 refs (See N65-18078 08-34) OTS: $6.00

Gamete recovery from the effects of gamma irradiation was improved by inducing anoxia. The experimental work was done on *Arbacia punctulata* postfertilization sperms and eggs suspended in cold deuterated sea water. Anoxia was achieved by bubbling nitrogen through the bath. This oxygen-deprivation process resulted in prolonging the first cell division cycle. J.M.D.

N65-18086 Argonne National Lab., Ill. Radiological Physics Div.

GENERAL TECHNICAL PROBLEMS IN RADIOLOGICAL PHYSICS

Leonidas D. Marinelli *In its* Radiol. Phys. Div. Ann. Rept., Jul. 1963-Jun. 1964 [1964] p 97-119 refs Presented at the Colloq. Sui Rappt. Tra Fis. E. Med., Levico-Roncegno, Italy, 14-20 Sep. 1964 (See N65-18078-08-34) OTS: $6.00

Problems in radiological physics applications in medicine are discussed. Specific areas include (1) measurement of radiation exposure, and methods of radiation shielding, in X-ray diagnosis, (2) methods of determining accurate radiotherapeutic dose, and (3) the use of scanning devices and radioisotopes as internal tracers. J.M.D.

N65-18087 Argonne National Lab., Ill. Radiological Physics Div.

THE RELATIVE ACTIVITIES OF THORIUM DAUGHTER ISOTOPES IN THE TISSUES OF THOROTRAST PATIENTS Progress Report

Robert M. Parr *In its* Radiol. Phys. Div. Ann. Rept., Jul. 1963-Jun. 1964 [1964] p 127-139 refs (See N65-18078 08-34) OTS: $6.00

Residual thorium daughter isotopes were studied in tissues of patients injected with thorotrast. Gamma-ray spectrometry was used in an attempt to identify the decay elements in the in vivo samples, but good discrimination among the daughters was not achieved. The data implied that most products form in the liver and spleen and escape into the skeleton. J.M.D.

N65-18088 Argonne National Lab., Ill. Radiological Physics Div.

AN EXPERIMENTAL COMPARISON BETWEEN THE RESULTS OF Ca^{45} KINETIC ANALYSIS AND TETRACYCLINE LABELING

W. R. Lee (Inst. of Orthopaed., London), J. H. Marshall, and H. A. Sissons (Inst. of Orthopaed., London) *In its* Radiol. Phys. Div. Ann. Rept., Jul. 1963-Jun. 1964 [1964] p 141-161 refs (See N65-18078 08-34) OTS: $6.00

Calcium 45 tracer analysis and tetracycline labeling were compared as indicators of bone formation. Metabolic data were gathered on a puppy and a grown dog injected with tracer and tetracycline. They were sacrificed after 12 days of study, and radiochemical and histological analyses were made on the bone and excretory samples. The analysis showed a good correlation between calcium tracer accretion and tetracycline deposit. J.M.D.

N65-18089 Argonne National Lab., Ill. Radiological Physics Div.

OSTEOLATHYRISM IN MICE AND INHIBITION OF THE ENDOSTEAL BONE REACTION IN ESTROGEN-TREATED MICE BY AMINOACETONITRILE

D. J. Simmons, A. M. Pankovich, and A. M. Budy (Chicago Univ.) *In its* Radiol. Phys. Div. Ann. Rept., Jul. 1963-Jun. 1964 [1964] p 162-178 refs (See N65-18078 08-34) OTS: $6.00

(Contract AT(11-1)-787; Grant PHS-A-4225)

The effect of aminoacetonitrile (AAN) on the skeletons of young mice injected with estrogen was studied histologically and microradiographically. The bone reaction leading to ossification of the marrow cavities as a consequence of estrogen treatment was diminished by 5- to 20-mg AAN, and the effect was roughly proportional to the dose of the nitrile. The metaphyseal trabeculae (distal femur) of the AAN-treated mice developed a mosaic appearance. While administration of the nitrile alone induced the formation of periosteal hyperostotic and osteocartilaginous hyperostotic fibrous bone tissue over the femoral shafts late in the posttreatment recovery period; combined treatment with estrogen potentiated these changes during the treatment period itself. The cortical bone tissue was also demineralized by combined treatment, and fused osteocyte lacunae regularly appeared as an apparent sequela of both cell enlargement and degradation of perilacunar matrix. Conversely, estrogen completely protected the epiphyseal cartilages against degenerative changes (abnormal vascular invasion, rents, etc.) after low doses of AAN (0.5-2.5 mg) during the treatment period, but the hormone was only partially effective after higher doses of AAN. It was suggested that aminoacetonitrile disrupts both the formation of new bone collagen and the integrity of collagenous structures deposited prior to the treatment. Author

N65-18090 Argonne National Lab., Ill. Radiological Physics Div.

DIURNAL VARIATIONS IN THE METABOLIC ACTIVITY OF BONE AND CARTILAGE

David J. Simmons and George Nichols, Jr. (Harvard Univ.) *In its* Radiol. Phys. Div. Ann. Rept., Jul. 1963-Jun. 1964 [1964] p 179-193 refs (See N65-18078 08-34) OTS: $6.00 (Grant PHS-AM-00854-(C9))

Glycine-2-C^{14}, labeled in the carboxyl carbon, was studied experimentally to discriminate diurnal pattern of collagen formation from cycles in other forms of bone metabolism. Albino rats were maintained in laboratory-controlled light and darkness, and either fed or fasted. Analysis of in vivo and in vitro data on metabolism of bone cells in the metaphyses of the rat femur and tibia showed that collagen synthesis and bone formation are both diurnally regulated. It was also concluded that the daily periods of most active metaphyseal bone formation and resorption are coincident, and that tissue remodeling is most intense in the early day period. J.M.D.

N65-18132*# Philco Corp., Palo Alto, Calif. WDL Div.

COMET AND CLOSE-APPROACH ASTEROID MISSION STUDY. VOLUME 4: SPACECRAFT SYSTEM EVALUATION Final Report, 2 Jul. 1964-2 Jan. 1965

Albert Giddis 2 Jan. 1965 24 p refs Prepared for JPL (Contracts NAS7-100; JPL-950870)

(NASA-CR-57096; WDL-TR-2366, Vol. 4) OTS: HC $1.00/MF $0.50

Data based on environmental specifications for the Centaur stage boosted by the Atlas launch vehicle are presented. Mission constraints for the design of conceptual spacecraft to accomplish the Comet Mission objectives, and the sequence of events for the photovoltaic configuration are also tabulated. The criteria established for evaluating system capability are based on the following key parameters: (1) weight of science, (2) aiming error, and (3) bit rate. R.W.H.

N65-18167# Louisville Univ., Ky.

VIGILANCE FOR AUDITORY INTENSITY CHANGES AS A FUNCTION OF PRELIMINARY FEEDBACK AND CONFIDENCE LEVEL

Michael Loeb (Army Med. Res. Lab.) and John R. Binford Dec. 1964 34 p refs Submitted for Publication

(Contract DA 49-193-MD-2197)

(AD-609282)

Forty-eight subjects were asked to respond to occasional increments in a pulse train with ratings of certainty of signal occurrence for 20 minutes. Half (F) subjects were given feedback; half (NF) were not. In a second session all responded

during an 80-minute period with a simple response. In another, half responded with certainty ratings; half responded with a simple response. Finally, those who had responded with ratings responded simply, and those who had employed a simple response made ratings. It was found that F subjects made fewer false responses and tended to make fewer detections in earlier sessions. In later sessions false responses were reduced for all. The usual progressive false response and detection reductions and latency increases were noted; when subjects employed ratings, reductions in certainty were noted within sessions. It was concluded that the data support the detection theory model for vigilance for this type of task. Author

N65-18178*# National Aeronautics and Space Administration, Washington, D. C.

EMBOLISM AND PAROXYSMAL AURICULAR FIBRILLATION [EMBOLI OG PAROKSYSTISK FLIMMERARYTMI]

E. Wolff Sorensen Jan. 1964 7 p refs Transl. into ENGLISH from Nord. Med. (Stockholm), v. 64, 13 Oct. 1960 p 1288-1290

(NASA-TT-F-8552) OTS: HC $1.00/MF $0.50

Problems concerning paroxysmal auricular fibrillation (PAF) are discussed. Among about 7000 admitted patients, 1% had PAF, and in this group one-third developed embolism. Of the patients with PAF, 83% were over 60 years of age, and all the patients with PAF and embolism were over 59 years. Recognized organic heart disease did not seem to predispose to PAF. Out of 19 patients with PAF and embolism 9 developed cerebral embolism. None of these 9 patients had earlier recognized heart disease. The relative dangers of paroxysmal and permanent auricular fibrillation are considered, and recommended therapy is discussed. D.E.W.

N65-18180*# National Aeronautics and Space Administration, Washington, D. C.

PRESSURE SUIT FOR HIGH-ALTITUDE AND SPACE FLIGHT [L'EQUIPAGGIAMENTO A PRESSIONE PER IL VOLO ATMOSFERICO E SPAZIALE]

A. Scano Mar. 1965 33 p refs Transl. into ENGLISH from Riv. Med. Aeron. e Spaziale (Rome), v. 26, 1963 p 478-508

(NASA-TT-F-9257) OTS: HC $2.00/MF $0.50

The physiological principles which led to the development of a pressure suit for high-altitude and space pilots are briefly outlined. This equipment, designed especially to protect man against sudden exposure to low barometric pressure from 15 000 m up, also insures survival and moderate activity. The major biological characteristics are reviewed, such as the maintenance of physiologic O_2 pressure in the breathing equipment and of equivalent pressure on the body surface, the disposal of CO_2 and other substances exhaled or discharged through the skin, heat regulation capability, and head and limb movements. Author

N65-18205*# Wilmot Castle Co., Rochester, N. Y.

STUDIES FOR STERILIZATION OF SPACE PROBE COMPONENTS Final Report

Martin G. Koesterer Washington, NASA, Mar. 1965 59 p refs (Contract NASw-879)

(NASA-CR-191) OTS: HC $3.00/MF $0.50

The effects of dry heat between 80° to 160° C on microbial spores found on dirty industrial materials and also on off-the-shelf electronic components were investigated, with emphasis on temperatures in the 125° to 135° C temperature range. Dry heat treatment at 135° C for 24 hours killed large concentrations of microbial spores in or on most carriers or substrates tested, but was not effective against microbial soil flora. The relatively low concentration of airborne microbial surface contamination of objects can be safely eliminated by sterilization at 135° C or less within a few hours. Data on the microbial contamination of electrical components indicated only a small percentage of entrapped viable microorganisms, and their level of contamination seems to be of a low order. Dry heat treatment of bacterial spore populations under closed or open gaseous environments indicated little difference in resistance up to a temperature of 125° C. The thermal death time data and curves for the relatively heat resistant microbial spores are presented over a temperature range of 80° to 160° C. G.G.

N65-18214*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

EFFECT OF COMBINED LINEAR AND OSCILLATORY ACCELERATION ON PILOT ATTITUDE-CONTROL CAPABILITIES

Constantine B. Dolkas and John D. Stewart Washington, NASA, Mar. 1965 42 p refs

(NASA-TN-D-2710) OTS: HC $2.00/MF $0.50

Data are presented to show the effects of superimposing vibration at 11 cycles per second on steady linear acceleration on the tracking ability of a human pilot in a stability- and rate-augmented vehicle with dynamics typical of a large high-thrust rocket. The linear accelerations ranged from 1 to 3.5 g, and the oscillatory stresses varied from 0 to ±3.0 g at 11 cps. A random-appearing compensatory tracking problem was presented to the pilot in the pitch plane, although the pilot controlled both pitch and yaw. No attempt was made in this study to simulate additional pilot tasks, such as monitoring of critical launch vehicle and spacecraft performance and status displays which would be required in the real situation. Various damper-failure situations were investigated, and certain characteristics due to autopilot nonlinearities were studied. Effects on the tracking efficiency of dividing the pilot's attention between pitch and yaw channels were also examined. Author

N65-18227# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AUTOMATIC CONTROL OF ALGAE CULTURE

Ye. A. Ivanov and I. V. Aleksandrova 20 Nov. 1964 15 p refs Transl. into ENGLISH from Usp. Sovrem. Biol. (Moscow), v. 56, no. 1, 1963 p 90-97

(FTD-TT-64-247/1+2; AD-609141)

The intensity, I, of photosynthesis is dependent on a complex set of time varying parameters of the algae culture and its environment. A self-adjusting system is required to maintain I at a maximum value as the parameters change value. The components of the time gradient of the function I are determined by synchronous detection, and a continuous supply of signals is fed to the object with direct distribution to the channels. The control is dependent on the determination and differentiability of I, and is not solvable for the general case. A specific partial case is considered, wherein a chlorella culture is grown in flat transparent trays illuminated from two sides by light sources with near-optimum spectral composition. The suspension is constantly agitated and fed with mineral components in normal concentration. The cell density and pH are maintained at constant levels. The intensity is dependent on illumination and temperature which are measurable and known. Equations are derived for the required differential values of parameters with respect to time for the maximization of photosynthetic intensity. E.P.V.

N65-18279# Louisiana State Univ., Baton Rouge, La. Dept. of Bacteriology

MICROBIAL OXIDATION OF HYDROCARBON GASES Terminal Report

C. S. Mc Cleskey [1964] 5 p refs
(Contract Nonr-1575(01))
(AD-609207)

Microorganisms capable of oxidizing methane as the sole carbon source were not capable of growth with ethane, propane, or butane in the absence of methane. Bacteria isolates capable of oxidizing ethane, propane, or butane as sole carbon sources were not able to grow with methane alone. Methane oxidation proceeds as follows: Ch_4 CH_3OH HCHO CO_2 The optimum temperature was about 32°C, and optimum pH 6. Pink pigmented bacteria were shown to be methanol oxidizers incapable of growth with methane as the sole carbon source. References are given to publications detailing the morphology and physiology of the bacteria species isolated and studied: *Methanomonas methanooxidans*, and *Vibrio extorquens*. R.L.K.

N65-18283# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BIOLOGICAL RADIO COMMUNICATIONS
B. B. Kazhinskiy 1 Apr. 1963 176 p refs Trans. into ENGLISH of the book "Biologicheskaya Radiosvyaz" Kiev, Izd. Akad. Nauk Ukr. SSR, 1962 p 1-168
(FTD-TT-62-1923/1+2; AD-415676)

CONTENTS:

1. A CLEAR CASE OF BIOLOGICAL RADIO COMMUNICATION p 16-42 refs
2. AMONG THE QUADRUPED AND FEATHERED FRIENDS OF V. L. DUROV p 43-68 refs
3. "RAYS OF VISION" p 69-91
4. THE EAR: AN ANALYZER OF BIO-ELECTROMAGNETIC WAVES OF AUDITORY FREQUENCY p 92-106 refs
5. HOW MATTER (BRAIN) THINKS p 107-120
6. K. E. TSIOLKOVSKIY ON TELEPATHY p 121-145 refs
7. THE FRIENDS AND ENEMIES ABROAD p 146-164 refs

N65-18294# Stanford Research Inst., Menlo Park, Calif.
APPLICATIONS OF THE BEHAVIORAL SCIENCES TO RESEARCH MANAGEMENT: AN INITIAL STUDY IN THE OFFICE OF AEROSPACE RESEARCH
Howard M. Vollmer Washington, AFOAR, Nov. 1964 94 p refs
(Contract AF 49(638)-1028)
(IMU-3580; AFOSR-64-2555; AD-609356)

The method of study included collection of data by use of personal interviews, a standard written questionnaire, and review of management records. It also included inputs of information from the behavioral sciences to management during the 12-month period covered by the study. Findings on research organization substantiate the importance of protecting the integrity of research activities and of differentiating them from development, to maintain a participatory style of leadership, to support methods to translate research findings into rapid utilization, and to assure a sense of continuity in laboratory structure and research programs. Findings on the evaluation of research productivity point out methods to measure the quality of research products, as well as quantity, through examining subsequent citations of publications and the source of original publication. Findings on the recruitment, retention, and utilization of scientists suggest the importance of freedom in the conduct of research as a general incentive, and also indicate the importance of further research to analyze effectiveness of different incentives for different types of civilian and military scientists identified in this study. Author

N65-18321# Atomic Energy Commission, Washington, D. C.
RADIATION PASTEURIZATION OF FOODS Summaries of Accomplishment
[1964] 208 p refs Presented at the 4th Ann. Contractors Meeting, 21-22 Oct. 1964
(CONF-641002) OTS: $6.00

Efforts to extend the usable shelf life of both fresh and cooked food products through the use of ionizing radiation are discussed. Topics include (1) product development—division of isotopes development; wholesomeness and public health safety—division of biology and medicine; (2) summaries of five general sessions pertaining to commercialization of irradiated foods, economic studies, marine and fishery technology, fruit and vegetable technology, microbiology, toxicity studies, and biochemistry; and (3) the overall status of the AEC program in product development, wholesomeness, and irradiation facility development. G.G.

N65-18336*# National Aeronautics and Space Administration, Washington, D. C.
TRITONS (NEWTS) IN PERMAFROST [TRITONY V VECHNOY MERZLOTE]
A. G. Bannikov Oct. 1964 4 p Transl. into ENGLISH from Priroda (Moscow), v. 52, no. 6, 1963 p 115-116
(NASA-TT-F-9162) OTS: HC $1.00/MF $0.50

Its great resistance to low temperatures enables the Siberian triton to live in the permafrost zone. It can withstand a gradual cooling down to -6° and remains active and able to move at temperatures ranging from 2° to 4° above zero in contrast to other newt species. It is assumed that the triton can survive, in a numbed state, continuous permafrost periods of 20 to 30 years because of the seasonal rhythm it has built up during the process of evolution G.G.

N65-18337*# National Aeronautics and Space Administration, Washington, D. C.
RADIATION PROTECTING ACTION OF CYANOGEN COMPOUNDS (AMYGDALIN)
V. V. Rogozkin, B. P. Belousov, and N. K. Yevseyev Mar. 1965 82 p refs Transl. into ENGLISH from the book "Radiozashchitnoye Deystviye Tsianistykh Soyedineniy (Amigdalin)" Moscow, Gos. Izd. Med. Lit., 1963 p 24-65, 118-132
(NASA-TT-F-9259) OTS: HC $3.00/MF $0.75

Amygdalin is a natural glucoside, corresponding structurally to nitrile β-gentibioside of α-bitter almond. It is highly toxic, converting to d-glucose, benzaldehyde, and prussic acid. Its preparation, chemical, and physical properties are presented. Experiments on rats, mice, and dogs are described and analyzed. Administered in protective doses, amygdalin does not affect the behavior and general condition of the animals, does not change their physical endurance, and does not produce any sharp changes in the cardiovascular and respiratory systems, or in other important functions. In optimal protective doses, amygdalin is capable of improving the animals' resistance to oxygen deficiency. A pronounced radioprotective effect was observed for rats and mice. E.P.V.

N65-18365# Joint Publications Research Service, Washington, D. C.
PHILOSOPHICAL QUESTIONS OF CYBERNETIC MODELING
I. B. Novik 10 Mar. 1965 47 p refs Transl. into ENGLISH of the booklet "O Filosofskikh Voprosakh Kiberneticheskogo Modelirovaniya" Moscow, Znaniye Publishing House, 1964 p 1-40
(JPRS-29053; TT-65-30471) OTS: $2.00

CONTENTS:

N65-18377 School of Aerospace Medicine, Brooks AFB, Tex. Clinical Sciences Div.

CARDIOVASCULAR RESPONSES TO GRAVITATIONAL CHANGES AFTER PROLONGED BED REST

Perry B. Miller, Robert L. Johnson, and Lawrence E. Lamb *In* AFSC 11th Ann. AF Sci. and Eng. Symp. [1964] 22 p refs (See N65-18373 08-34)

Various effects of 4 weeks of absolute bed rest on the circulatory system were studied in 12 healthy male volunteers. The experimental conditions were considered analogous to extended space flight. Tilt-table tests were performed, with and without antigravity garments. Substantial loss in blood and plasma volume, and in red cell mass, was noted by the end of the study. Postural syncope was frequent on the tilt table, except when the subject wore an antigravity suit. The antigravity suit also promoted stability in orthostatic heart rates. Transverse acceleration on the tilt table appeared to cause no cardiac or vision irregularities. J.M.D.

N65-18378 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

INTERDISCIPLINARY MEASUREMENT OF HUMAN PERFORMANCE UNDER LOW AND ZERO GRAVITY CONDITIONS

Duane Frank Kasten *In* AFSC 11th Ann. AF Sci. and Eng. Symp. [1964] 13 p (See N65-18373 08-34)

Interdisciplinary studies of human locomotion under conditions of weightlessness are described. Laboratory studies have been done on human self-rotation under zero gravity, eye counter roll, and ability to control motion with use of propelling devices. These were cooperative projects involving physiologists, psychologists, anthropologists, and engineers. The use of an analog computer in these studies is explained. J.M.D.

N65-18379 School of Aerospace Medicine, Brooks AFB, Tex. Neuropsychiatry Dept.

THE EFFECTS OF SECOBARBITAL AND D-AMPHETAMINE ON PERFORMANCE DURING A SIMULATED TACTICAL AIR MISSION

Richard E. Mc Kenzie and Lois L. Elliott *In* AFSC 11th Ann. AF Sci. and Eng. Symp. [1964] 30 p refs (See N65-18373 08-34)

The effects of secobarbital and d-amphetamine on pilot performance during simulated tactical air mission are reported. Secobarbital was used as a relaxant for sleep before flight, and d-amphetamine served as a stimulant to combat fatigue during flight. Air Force flight candidates were randomly assigned to treatments involving the drugs, a placebo, and control. Their ability under treatment to keep an aircraft on course was measured in a cockpit-console flight simulator. The residual effect of secobarbital alone, or in combination with d-amphetamine, harmed performance. Performance was enhanced by the use of d-amphetamine alone. J.M.D.

N65-18381 Air Force Systems Command, Wright-Patterson AFB, Ohio. AF Flight Dynamics Lab.

ZERO GRAVITY ELECTROLYSIS CELL

Michael D. Rutkowski and Michael A. Maxwell 26 Jun. 1964 *In* AFSC 11th Ann. AF Sci. and Eng. Symp. [1964] 25 p (See N65-18373 08-34)

The program consisted of the fabrication and testing of a single cell, the results of which led to the design of a six-cell unit. After reviewing the available literature, the reverse fuel cell type of electrolysis cell was selected because of its relative simplicity and because of extensive research done on fuel cells. A design utilizing nickel screen electrodes and an asbestos cloth-filter paper matrix was finalized utilizing a special method of feeding water to the cell in zerogravity. The electrolyte selected was potassium hydroxide because of its high ionic mobility. The six-cell unit operates at 14 volts and 12 amperes with a nominal electrode area of 0.230 square foot. Problems encountered included slight hydrogen-oxygen mixing, electrolyte leakage, and foaming at the electrolyte-electrode interface. Author

N65-18387 School of Aerospace Medicine, Brooks AFB, Tex.

MODIFICATION OF THE EFFECTS OF ACUTE LETHAL DOSES OF IONIZING RADIATION IN THE RHESUS PRIMATE

George S. Melville, Jr., George W. Harrison, Jr., and Robert J. Young *In* AFSC 11th Ann. AF Sci. and Eng. Symp. [1964] 40 p refs Prepared in cooperation with Texas Univ. (See N65-18373 08-34)

(Contracts AF 41(657)-382; AF 41(609)-2005)

A drug and transplant experiment was performed on rhesus monkeys to reduce toxic effects of an acute lethal dose of ionizing radiation. A thiol mixture was given to some subjects before radiation and was found to protect the intestinal tract, lymphoid and bone marrow tissues. Radiation-damaged bone marrow sites were treated with transplants of autologous marrow, which enabled tissue to regenerate, and which promoted survival. J.M.D.

N65-18408# Joint Publications Research Service, Washington, D. C.

A NEW BRANCH OF SCIENCE—BIONICS

L. Pyl'kevych 11 Mar. 1965 12 p Transl. into ENGLISH from Communist Ukrainy (Kiev), no. 11, Nov. 1964 p 47-54

(JPRS-29090; TT-65-30496) OTS: $1.00

Bionics is a science still in its rudimentary stage of development, arising at the boundary between biology, cybernetics, and electronics, which applies the principles of biological processes in solving engineering problems. Its main purpose is to develop technical devices with characteristics modeled on those of living organisms, utilizing the laws of living nature in developing technology, particularly in cybernetics. Bionics can be applied in the solution of engineering problems in mechanics, hydrodynamics, aerodynamics, energetics, cybernetics, computer engineering, shipbuilding, communications, chemistry, astronautics, etc., and is of enormous significance in furthering technical progress. R.W.H.

N65-18409# Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.

HUMAN FACTORS OF EMERGENCY EVACUATION

Stanley R. Mohler, John J. Swearingen, Ernest B. McFadden, and J. D. Garner Sep. 1964 20 p refs

(AM-65-7)

A summary of the evacuation experience since World War II in civil tests and actual civilian airliner accidents is presented. The results of recently conducted aeromedical research into means of affording the more rapid evacuation of high-density piston and jet passenger aircraft are given. Recommendations are made relative to aircrew training programs and future aircraft design considerations. Author

N65-18427# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div

LIFE AND SPACE

V. Borisov and O. Gorlov 31 Aug. 1964 286 p Transl. into ENGLISH of the book "Zhizn i Kosmos" Moscow, Izd. Sov. Rossiya, 1963 p 1-200

(FTD-MT-63-200; AD-608650)

The problems and achievements of space biology and medicine as related to the following subjects are discussed: *Biosphere; Life in Weightlessness; Speed and Acceleration; Life in a Vacuum; Food Supply of Astronauts; Rays from World Depths; Space Explorers; Man and the Cosmos; and Star-Flights of the Future.* G.G.

N65-18468# Naval Applied Science Lab., Brooklyn, N.Y. Physical Sciences Div.

THERMAL RADIATION PROTECTION OFFERED BY AIR CREW FLIGHT UNIFORMS Final Report

John Bracciaventi 22 Dec. 1964 23 p refs

(AD-453922)

Seven flight crew uniforms were exposed to thermal radiation simulating that from a 1-megaton nuclear detonation. The radiant exposures for significant damage to the uniform, and the exposures required to produce second degree burns on skin behind the uniforms were determined. The results were compared to those obtained by exposing the uniforms to square wave pulses of constant irradiance. There was no general correlation between the square-wave and nuclear-weapon pulse radiant exposures for similar effects. The weapons pulse exposures ranged from less than, to at least twice, those for square-wave exposures, depending on the material and the effect. Author

N65-18474# Atomic Energy Commission Research Establishment, Riso (Denmark). Health Physics Dept.

ENVIRONMENTAL RADIOACTIVITY IN GREENLAND IN 1963

A. Aakrog and J. Lippert Jul. 1964 23 p refs

(RISO-87; AD-453310)

The present report deals with the measurement of fallout radioactivity in Greenland in 1963. Strontium 90, and strontium 89 and cesium 137 in most instances, were determined in samples of precipitation, soil, sea water, vegetation, animals, and drinking water. Estimates of the mean content of strontium 90 and cesium 137 in the human diet in Greenland in 1963 are given. Author

N65-18490*# Cedars of Lebanon Hospital, Los Angeles, Calif. Inst. for Medical Research

A TECHNIQUE FOR TESTING HEART FUNCTION BY ANALYSIS OF ITS VIBRATION SPECTRUM Progress Report

Clarence M. Agress and Stanley Wegner 31 Jan. 1965 156 p refs

(Grant NsG-289)

(NASA-CR-57145) OTS: HC $5.00/MF $1.00

A study on the usefulness of certain physiological and myocardiological factors in reflecting heart function in dogs and man is reported. Evaluation of factors is based on experimental data from animal and human experiments; the analytical principle is comparison of normal subjects with myocardial-damaged subjects. There is special interest in selecting parameters which detect early decompensation of the heart. Both animal and human data suggest four tentative conclusions: (1) Heart function can be estimated from comparison of initial ventrical tension to resulting stroke work. (2) Vibrocardiographic wave intervals can identify hypoxia. (3) Ejection time alone and vibrocardiogram alone are not useful in discriminating between normal and abnormal subjects. J.M.D

N65-18500*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART II: EXPERIMENTAL DESIGN

C. Vallbona, F. B. Vogt, D. Cardus, and W. A. Spencer (Baylor Univ.) Washington, NASA, Mar. 1965 116 p refs

(Contract NAS9-1461)

(NASA-CR-172) OTS: HC $4.00/MF $1.00

An immobilization study unit was organized to study the consequences of immobilization and its mechanisms. A pilot experiment and two studies aimed at (1) quantifying cardiovascular deconditioning resulting from 3 days and 14 days of bed rest; (2) investigating the mechanisms of orthostatic hypotension; (3) evaluating indirect techniques of measurement of the cardiac cycle and its phases; (4) measuring bone demineralization, and (5) evaluating the effect of isometric exercises during bed rest in preventing deconditioning and demineralization. The subjects and the experimental conditions are described, and a master protocol and descriptions of techniques are included. Author

N65-18501*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART IV: A SYSTEM FOR PROCESSING DATA COLLECTED IN THE IMMOBILIZATION STUDY UNIT

C. Vallbona, W. A. Spencer, W. Blose, D. Cardus, F. B. Vogt (Baylor Univ.) et al Washington, NASA, Mar. 1965 78 p refs

(Contract NAS9-1461)

(NASA-CR-174) OTS: HC $3.00/MF $0.75

The establishment of the immobilization study unit for evaluating the effects of bed rest required a system for processing, storing, and retrieving the data collected during the studies. A system was developed that permitted entries to punch cards of data pertaining to the subject's identification, medical history, and physiological and sociological behavior during the study. Source documents of fixed format were used for collecting data at the bedside and in the laboratories. Analog to digital conversion was achieved by manually operated automatic digitizers. Several computer programs were written that permitted application of mathematical and statistical models to the analysis of the data collected. Author

N65-18502*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART IX: THE EFFECT ON THE VITAL SIGNS AND CIRCULATORY DYNAMICS

C. Vallbona, W. A. Spencer, F. B. Vogt, and D. Cardus (Baylor Univ.) Washington, NASA, Mar. 1965 39 p refs

(Contract NAS9-1461)

(NASA-CR-179) OTS: HC $2.00/MF $0.50

This study was carried out to evaluate if periods of 3 days and 14 days bed rest would produce changes in the vital signs and in the duration of phases of the cardiac cycle. The results of 3 days indicated no obvious signs of circulatory deconditioning. When bed rest lasted 14 days, there was a trend for the blood pressure to increase throughout confinement. Circadian rhythms in the cardiac dynamics were detected. The values of the systolic and isotonic ratios and of the pulse wave velocity suggest a slight degree of stress under the conditions of the experiment. A program of isometric exercises during bed rest caused cardiodynamic changes which are strongly suggestive of greater stress. Author

N65-18532* Northrop Space Labs., Hawthorne, Calif.
APPLICATIONS OF SPACE BIOMEDICAL RESEARCH TO PROBLEMS OF REHABILITATION
S. Davis Bronson *In* NASA, Washington Transforming and Using Space-Res. Knowledge 1964 p 63-68 refs (See N65-18526 08-34) GPO: HC $0.70; OTS: MF $0.75

The congruity is pointed out between the resolution of certain problems connected with manned space flight and current problems encountered in the everyday practice of modern medicine. Similarities are noted between various terrestrial factors and weightlessness as causative factors in muscle weakness and muscle imbalance, which in turn lead to many common disorders. Optimism is expressed about the eventual application of devices, methods, and therapy devised in the space program to the ordinary diseases treated by the average physician. D.E.W.

N65-18546# Federal Aviation Agency, Oklahoma City, Okla. Psychology Labs.
AUDITORY FATIGUE: INFLUENCE OF MENTAL FACTORS
Mary Jayne Capps and William E. Collins Jan. 1965 6 p refs (AM-65-1)

Conflicting reports regarding the influence of mental tasks on auditory fatigue have recently appeared in the literature. In the present study, 10 male subjects were exposed to a 4000-cps fatigue tone at 40 dB SL for 3 min under conditions of mental arithmetic and reverie. Temporary threshold shifts, as indicated by comparing pre- and post-fatigue thresholds, were consistently greater when subjects worked mental arithmetic during exposure to the fatigue tone than when they engaged in reverie. Author

N65-18558# Federal Aviation Agency, Oklahoma City, Okla. Psychology Labs.
EFFECTS OF SEVERAL MENTAL TASKS ON AUDITORY FATIGUE
William E. Collins and Mary Jayne Capps Jan. 1965 8 p refs (AM-65-2)

Eight male subjects were exposed for 3 minutes to a 4000-cps fatigue tone at 40 dB SL. Each subject was tested under four task-conditions: mental arithmetic (MA), written long division (LD), threshold determination on a 500-cps tone (TD), and reverie (REV). Temporary threshold shifts (TTS) were computed by comparing pre- and post-fatigue thresholds. MA produced significantly more TTS than any other condition, and LD resulted in greater shifts than REV. Amount of auditory fatigue can vary with the type of mental activity performed by the subjects. Author

N65-18566*# National Aeronautics and Space Administration, Washington, D. C.
CONFERENCE ON NUTRITION IN SPACE AND RELATED WASTE PROBLEMS
T. C. Helvey 1964 408 p refs Conf. held at Univ. of South Florida, Tampa, 27-30 Apr. 1964; sponsored in cooperation with NASA and Natl. Acad. of Sci.
(NASA-SP-70) GPO: HC $2.75; OTS: MF $2.00

Conference papers on space nutrition and related waste problems, requirements in the area of nutrition and waste management, nutrition aspects of long flights, physiology and psychology of nutritional processes, waste management, long-term flight nourishment sources, novel nutrient sources, and space vehicle energy management. For individual titles see N65-18567-N65-18602.

N65-18567* National Aeronautics and Space Administration, Washington, D. C.
NUTRITION-WASTE COMPLEX—A PRESSING PROBLEM IN MANNED SPACE EXPLORATION
Michael G. Del Duca *In its* Conf. on Nutr. in Space and Related Waste Probl. 1964 p 9-11 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Approaches to the problem of nutrition and waste in manned space exploration are discussed, and three approaches are suggested: (1) storage of all the required foods, water, and breathing gases, and collection and storage of wastes; (2) storage of conventional nutrients and the use of thermal waste either for generation of power or as a heat source; (3) use of synthetic or natural nutrients which are generated from waste materials in a closed cycle. Also, critical factors in the selection of a particular waste-nutrient complex and areas which require some immediate attention are included. E.E.B.

N65-18568* National Aeronautics and Space Administration, Washington, D. C.
NUTRITION AND RELATED STUDIES IN THE OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY, NASA
Frank B. Voris *In its* Conf. on Nutr. in Space and Related Waste Probl. 1964 p 13-15 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Studies reported by NASA on metabolism and physiology as related to stresses encountered in manned space flight are: (1) to develop and understand characteristics and functions of the intestinal tract with regard to water and overall body metabolism; (2) to investigate the effects of space environmental stresses such as heat, physical exercise, and atmospheric content on the water metabolism of the human with emphasis on the mechanisms of voluntary dehydration; (3) to develop information on carbohydrate, protein, and fat metabolism relative to stress tolerance in man; (4) to study caloric, protein, and water requirements of young men subjected to simulated space stresses and foods planned for long-term space flight; (5) to determine the effects of isolation, illumination, confinement, and gaseous percentages, noise, and other stresses on the cellular metabolic processes relative to Fe^{59}; (6) to study fecal bacterial flora in man; and (7) to determine optimum space cabin environments. E.E.B.

N65-18569* National Aeronautics and Space Administration, Washington, D. C.
NUTRITIONAL TRENDS IN FUTURE MANNED SPACE FLIGHTS
S. P. Vinograd *In its* Conf. on Nutr. in Space and Related Waste Probl. 1964 p 17-21 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Nutritional trends in manned space flights are discussed in terms of the recommendations of the Space Medicine Advisory Group (SPAMAG) in their conceptual study of an orbiting research laboratory (ORL) relevant to food, water, and waste. Three categories or phases of the study are covered, the end

products anticipated are enumerated, and the present status of activity is presented. Detailed recommendations concerning mineral and vitamin requirements, diet composition, caloric requirements, human waste, research and development, and for space-flight experiments prior to the ORL are included. E.E.B.

N65-18570* National Aeronautics and Space Administration, Washington, D. C.
NUTRITION AND RELATED STUDIES IN THE OFFICE OF SPACE SCIENCE AND APPLICATIONS, NASA
Dale W. Jenkins *In its* Conf. on Nutr. in Space and Related Waste Probl. 1964 p 23-27 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Bioregenerative life support systems, metabolism reduction, skeletal calcium loss, chemically defined synthetic diet, artificial atmospheres, and the effects of space environmental factors are covered. The bioregenerative life support system, of water electrolysis (splitting water into hydrogen and oxygen by electricity) and the use of Hydrogenomonas to combine the hydrogen from the water with the carbon of carbon dioxide from the astronaut is reported. E.E.B.

N65-18571* Army Medical Service, Washington, D. C.
OVERVIEW OF UNITED STATES ARMY MEDICAL SERVICE RESEARCH IN NUTRITION
Jacques L. Sherman, Jr. *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 29-31 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

General areas of interest in nutrition and technical competence which now exists are presented. Programs of diet and food intake relating to wholesomeness of irradiated food, development of intravenous nutritional adequacy of algae and cellulose, the presence of trace elements alimentation, and vitamins in the diet are reviewed. Research programs on energy metabolism and performance, such as the loss of nutrients in sweat; the relationship of protein requirements to stress, infection, and work; and the effect of varying periodicity of food consumption are included. E.E.B.

N65-18572* Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
U.S. AIR FORCE PROGRAM ON AEROSPACE NUTRITION RESEARCH
Joseph M. Quashnock *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 33-39 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Objective, current status, and future plans are presented for the following research programs: high fat diets; human performance in survival; stress of refeeding following starvation; amino acid metabolism during stress; nutritional balance under reduced dynamic stress; effect of simulated space flight on calcium-phosphorus metabolism; nutrition and metabolic individuality; cerebral and peripheral metabolism; protein absorption and metabolism; plant foods in space flight; nutritional requirements in simulated space flight; high energy synthetic compounds; intestinal microflora and diet; protein, energy, and water requirements in simulated space flight; and evaluation of nutrients in space dietary regimes. E.E.B.

N65-18573* National Aeronautics and Space Council, Washington, D. C.
MANNED SPACE FLIGHT IN THE CONTEXT OF NATIONAL GOALS
Charles S. Sheldon, II *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 41-53 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The national space program is reviewed, national goals are identified, and the philosophy of space research and exploration is presented. It is pointed out that concern for national defense has motivated the Federal Government to put money into space technology. Statistical comparisons of the Soviet space achievements and those of the United States are included. E.E.B.

N65-18574* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
PREPARATION, HANDLING, AND STORAGE OF FOODS FOR PRESENT SPACE PROJECTS
Edward L. Michel *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 57-69 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Types and varieties of food eaten during completed NASA manned space flights, and food and nutritional design concepts for the Gemini and Apollo missions are reviewed. Menus made up of precooked, freeze-dehydrated foods supplemented by bite-size high-energy food pieces are being designed for use in both Gemini and Apollo missions. Reasons for selecting this food concept are as follows: (1) water will be produced in flight as a byproduct of the fuel cell operation; (2) freeze-dried foods have a high degree of acceptance and will allow for rapid reconstitution prior to use; (3) freeze-drying offers an excellent method for food preservation not requiring refrigeration. Food handling and storage design concepts for Gemini and Apollo are included. E.E.B.

N65-18575* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
NUTRITION AND STRESSES OF SHORT TERM SPACE FLIGHT
Paul A. Lachance *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 71-84 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Nutritional requirements for space flights which are most likely to be affected by stressors and operational malfunctions or both are water and calories. Calcium and protein imbalances are discussed, and experiments to study calcium metabolism proposed for the Gemini flights are presented. One experiment would study a facet of the cardiovascular problem, and two experiments are concerned with calcium metabolism. A demineralization experiment will involve preflight and postflight X-ray measurements of the bone density of the os calis and the fifth digit of one hand. A calcium balance experiment, which will include nitrogen balance information, will also be conducted in the Gemini project. E.E.B.

N65-18576* Whirlpool Corp., Evansville, Ind. Life Support Dept.
HANDLING AND STORAGE OF FOOD FOR LONG FLIGHTS
Norman G. Roth and John J. Symons *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 85-95 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The operation of a food management system designed for a specific orbital mission with a certain resupply requirement is described. This system illustrates the assortment of problems that may be encountered in the design of food management systems. Food packaging, water dispensers, water heater, water chiller, feeding console, and food waste storage are described. E.E.B.

N65-18577* Boeing Co., Seattle, Wash. Aerospace Div.
WASTE MANAGEMENT FOR CLOSED ENVIRONMENTS
Charles Ott *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 97-108 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The status of engineering design and development of waste management systems is presented. The problem of waste management is divided into collection, transport, treatment, and instrumented process control. Each is discussed. Representative illustrations of current water recovery techniques are included. E.E.B.

N65-18578* Army Medical Research and Nutrition Lab., Denver, Colo.
CALORIC REQUIREMENTS OF LONG FLIGHTS
C. Frank Consolazio *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 111-133 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Caloric requirements are usually determined by at least five variables—age, sex, physical activity, environmental temperature, body size, or composition. These requirement parameters are discussed, and a review of the literature on the relationship between energy requirements and environmental temperature is presented. E.E.B.

N65-18579# Harvard School of Public Health, Boston, Mass. Dept. of Nutrition
PROTEINS IN SPACE NUTRITION
D. M. Hegsted *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 135 145 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The order of priority of nutrients is water, calories, protein, and certain electrolytes. The available evidence suggests that lack of protein will probably be of little or no importance during the first week or two in space; if adequate calories are supplied. Protein needs for medium and long-term flights, protein and energy requirements which may or may not be related, effects of fat and methionine, protein and basal metabolism, and protein stress and inactivity are discussed. E.E.B.

N65-18580* Virginia Polytechnic Inst., Blacksburg. Dept. of Biochemistry and Nutrition
MINERAL AND VITAMIN REQUIREMENTS OF LONG FLIGHTS
R. W. Engel *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 147-157 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Although first concern should be for water and energy, then protein, some consideration must be given to minerals and vitamins, even though the total quantities needed for a 3-year period may not be more than a few percent of the body weight of the astronaut. In considering minerals, the first concern should be for sodium and chloride ions. Standards for vitamins and minerals, calcium requirements for balance, and iron requirements for balance are included. Brief note is taken of the special needs for considering ration or nutrient stability under conditions of prolonged storage under flight conditions. E.E.B.

N65-18581* Illinois Univ., Urbana. Dept. of Physiology and Biophysics
HUMAN NUTRITIONAL REQUIREMENTS FOR WATER IN LONG SPACE FLIGHTS
Robert E. Johnson *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 159-174 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00
(Contracts AF 18(600)-80; DA-MD-2222)

The water balance, defined as the difference between the input from all sources into the exchangeable water pool and the output from all sources, is discussed. Various components of the water balance, measurement of metabolic water, and disturbances of the water balance are reviewed. Projects Gemini and Apollo offer two opportunites and responsibilities. The first is to conduct research on the actual water requirements of the astronauts. Second, the concepts and equations used to calculate basal minumum water requirement and increments for activity, osmotic balance, and thermal environment are susceptible to experimental verification, amplification, or revision. Of all nutritional considerations, water is the most important. E.E.B.

N65-18582* California Univ., Berkeley. Lawrence Radiation Lab.
WATER GENERATION IN SPACE
Edward Teller *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 175-178 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The use of nuclear power as the energy source for lunar exploration, the importance of water and its release from rocks by heating with clean nuclear explosives, and the need for oxygen and carbon dioxide and the liberation of these gases from iron oxide and limestone, respectively, are discussed. E.E.B.

N65-18583* School of Aerospace Medicine, Brooks AFB, Tex. Bioastronautics Dept.
DIETARY REGIMES IN SPACE CABIN SIMULATOR STUDIES
B. E. Welch *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 181-190 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

A series of 16 experiments was completed. Data obtained on 40 test subjects show that the caloric requirement for an inactive man in a confined space is 32.7 kcal/kg body weight/day. No effect of the gaseous environment is evident. The dietary regimes used in these studies were dehydrated, liquid, and frozen foods. Acceptability was highest with the frozen foods. The use of each of these various dietary regimes in space has certain advantages and disadvantages. Close cooperation between mission-oriented personnel and those concerned with nutrition and metabolism should provide an optimum solution to the 14- to 60-day mission. Author

N65-18584* California Univ., Berkeley. Dept. of Poultry Husbandry
THE APPETITE FACTOR
Samuel Lepkovsky *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 191-212 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The importance of sensory stimuli, acceptability, and logistics of nutrition are discussed. Maintenance of oxygen, elimination of carbon dioxide, and supply of water and food are mentioned. It is pointed out that motivation is an important consideration. Also emphasized is the need to know what is being measured. Data obtained from animals are often applied to human beings. Before applying such information, it is advisable to determine experimentally whether the data obtained with experimental animals hold for human beings. Several examples are given. E.E.B.

N65-18585* Boston Univ., Mass. School of Medicine
GASTRIC AND BOWEL MOTILITY: EFFECT OF DIET
Franz J. Ingelfinger *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 213-219 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: $2.00

Gastric retention, colonic motility, and effects of weightlessness on them are discussed. Certain recommendations on the diets of astronauts are these: (1) Fragmentation of natural foods into small particles may have certain advantages. (2) Excess fats should be avoided because of their effect in delaying gastric evacuation. (3) Excess carbohydrates should be avoided because they enhance fermentation activity of intestinal bacteria. (4) Protein is left as the principle staple of the astronaut's diet. (5) Any form of predigested food should be avoided. (6) For long-term flights in the future, attempts to induce constipation should be abandoned in favor of dietary manipulations that moderately promote bowel evacuation. (7) The best diet is one which in taste, composition, and character is such that it might naturally be chosen on earth. E.E.B.

N65-18586* Public Health Service, Atlanta, Ga. Communicable Disease Center
INTESTINAL FLORA
W. H. Ewing *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 221-243 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The literature containing quantitative data on the subject of the intestinal flora of the human, particularly the adult, is reviewed. Tables of intestinal flora and gram-negative aerobic and anaerobic bacteria are included. It is pointed out that diets rich in carbohydrates favor increases in the numbers of gram-positive bacteria, especially *Lactobacilli* and *Bifidobacteria*, while diets with meats give rise to increases in the number of gram-negative aerobes and anaerobes. E.E.B.

N65-18587* Lankenau Hospital, Philadelphia, Pa. Div. of Research
EFFECTS OF PROLONGED BED REST
K. Rodahl, N. C. Birkhead, B. Issekutz, Jr., J. J. Blizzard, G. J. Haupt et al *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 245-252 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: $2.00

The effects of prolonged bed rest and how these effects may be eliminated or counteracted are summarized. Changes observed during prolonged bed rest are not all due to inactivity, but factors related to gravitational stress are also involved. Therefore, findings obtained during prolonged bed rest may be relevant to problems encountered during prolonged space flight, especially in the development of orthostatic hypotension. Young men were confined to the horizontal position in bed up to 63 days. The conclusions of previous studies were confirmed; that is, bed rest is indeed harmful to the individual's functional capacity. It was concluded that 1 hour of exercise daily with the aid of a simple ergometer may be sufficient to maintain the astronaut at an adequate level of physical work capacity. Further, the development of orthostatic hypotension or tilt-table intolerance is by far the most serious problem. E.E.B.

N65-18588* Agriculture Dept., Berkeley, Calif. Western Regional Research Lab.
FLATUS
Edwin L. Murphy *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 255-263 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Flatus egestion in man following the ingestion of certain foods which have a wide reputation for the formation of gas is discussed. After a nonflatulent meal, the average human being will egest 20 to 50 cc of flatus of relatively constant composition on an average of once per hour for 8 hours. A graph of flatus volume vs hours after ingestion in a control diet and after a bean meal is included. A discussion of cooking methods and additives for flatulence reduction, upper bowel activity of bean diets, effect of drugs on flatus, flatulence coefficient for diet formulation, and special considerations for astronauts is presented. E.E.B.

N65-18589* General Dynamics/Astronautics, San Diego, Calif.
INTEGRATION AND MECHANICS OF WASTE COLLECTION AND PROCESSES
George L. Drake, Jr. *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 265-271 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The requirements for waste management as an integral part of a spacecraft life-support system are described. The integration considerations are presented to show the interplay between a relatively simple system like waste management and the overall spacecraft. The major problems associated with a waste management system of a spacecraft include collection of feces, odor control, bacteria control, and prevention of toxic contamination of the cabin atmosphere. In addition, the system must provide the technique for collection and transfer of urine to the water reclamation system. Techniques investigated were freeze-drying, freezer storage, thermal decomposition, incineration, jettisoning, and storage. In addition to the discussion of these techniques, fecal collection devices were evaluated and the results are included. Major life-support system integration parameters are summarized. E.E.B.

N65-18590* California Inst. of Tech., Pasadena. W. M. Keck Engineering Labs.
LIQUID WASTES AND WATER POTABILITY IN SPACE VEHICLES
J. E. Mc Kee *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 273-280 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Wastewater reclamation in space vehicles and criteria that control the treatment of urine and other waste waters are described. Quantities of water consumed by man, standard of water quality, characteristics of waste waters; and treatment processes are included. Attention is directed to the following: (1) establishment of standards for the necessary quality of water recovered from urine; (2) research in the oxidation of urine by intermittent percolation through fine-grained media; and (3) development of apparatus and procedures to assure effective oxidation of urine in columns of fine-grained media. E.E.B.

N65-18591* Texas Univ., Austin. Dept. of Zoology
COMBINED PHOTOSYNTHETIC REGENERATIVE SYSTEMS
Jack E. Myers *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 283-297 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Regeneration of gases and the provision of food are discussed. The principles of the three regenerative methods—electrolysis, reduction, and photosynthesis—are reviewed. Included under reduction methods are both the Sabatier reaction and hydrogenomonas synthesis. The photosynthetic process is discussed in some detail. It is pointed out that there has been no rational development which leads to design principles and thence to a sound evaluation although there have been numerous attempts at small scale and pilot plant models. E.E.B.

N65-18592* California Univ., Davis.
ANIMAL FOOD FOR ASTRONAUTS
Max Cleiber *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 299-304 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Some of the principles of energy utilization for the production of animal substance are discussed. Efficiency of feed utilization and relative rate of production calculations are included for cattle, sheep, rabbits, rats, and mice. The rate of production per kilogram of body weight ranges from 14.8 kcal/day for cattle to 174 kcal/day for mice. To produce 7.4 megacalories of human food, a steer of 500-kg body weight would have to be hauled into space. The same amount of food is furnished by 296 rats which weigh 74 kg or by 1700 mice with a weight of only 42 kg. It is concluded that when weight is important, the astronauts should eat mouse stew instead of beef steaks. E.E.B.

N65-18593* School of Aerospace Medicine, Brooks AFB, Tex.
PLANT SYSTEMS AS LONG TERM FLIGHT NOURISHMENT SOURCES
Syrrel S. Wilks *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 305-315 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The nutritional aspects of plant systems and, in particular, of multicellular (broadleaf) plants are considered. Nutritional values, vitamin content, and essential amino acid content are given for endive, tampala, and chinese cabbage. Also, the vitamin and essential amino acid content for *Chlorella phrenoidosa* and *Spirodela polyrrhiza* are included. The basic requirement of plant systems for nutritional support of one man is given for algae, duckweed, endive, and chinese cabbage. E.E.B.

N65-18594* Army Medical Research and Nutrition Lab., Denver, Colo.
ALGAE SYSTEMS
Marion E. Mc Dowell and Gilbert A. Leveille *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 317-322 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Feeding studies in animals and human subjects are reviewed. The amount of nitrogen supplied by various amounts of algae fed to young men over a 6-week period and representative fecal excretion data for 1 subject on an algae diet are included. Many gaps in knowledge of algae systems are mentioned and it was concluded that many strains need to be grown under various environmental conditions that are well controlled, carefully described, and reproducible. Chemical analyses for nutrients need to be correlated with strains of algae and the conditions of growth. E.E.B.

N65-18595* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STUDY OF EFFECTS OF CARBOHYDRATES ON THE BODY UNDER STRESS AND FATIGUE
Donald R. Young *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 323-328 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Evaluation of dietary effects on performance was obtained through experimentation with male, pure-bred beagle dogs, approximately 2 years of age and weighing 8 to 12 kg. The performance tests followed a common plan of exhaustive treadmill running at a speed of 3.6 mph, the grade varying between 9 and 13 degrees of incline. Maximum work capacity was expressed as energy expenditure measured in kilocalories. Also, a program was undertaken with human subjects to further test the hypothesis of glucose synthesis. Male subjects, varying in age from 22 to 40 years of age, were tested on the treadmill for periods of 24 hours or until the onset of exhaustion. The pace varied between 2.5 and 2.7 mph and the degree of incline varied between 0 and 2 degrees. Data from these tests are included. E.E.B.

N65-18596* Florida State Univ., Tallahassee.
CHEMICAL SYNTHESIS OF PROTEINOIDS, PART 1
Sidney W. Fox, Kaoru Harada, Gottfried Krampitz, Tadao Hayakawa, and Charles Ray Windsor *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 331-338 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00
(Grant NsG-172-62)

The salient features of the state of the art of the synthesis of proteinaceous compounds are outlined. Amino acid compositions produced thermally in the presence of silica and by electric discharge and flow diagrams for the synthesis of Leuchs proteinoids are included. Synthesis of amino acids was discussed because this is a fundamental and prior problem in the context of some of the objectives of space nutrition. Also, synthesis and characterization of the proteinoids was examined. Data as chromatograms of hydrolyzates of proteinoids were included. E.E.B.

N65-18597* Bonn Univ. (West Germany).
CHEMICAL SYNTHESIS OF PROTEINOIDS, PART 2
Gottfried Krampitz and Friedhelm Knappen *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 339-341 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

The preparation of proteinoids from purified amino acids including S-35 methionine is reported. These preparations were used in feeding experiments after separation into water-soluble and water-insoluble fractions. The water-soluble fraction of the proteinoid was applied by stomach tube twice a day over a range of 7 days to male rats weighing 80 to 100 grams. The organs and tissues were checked for total radioactivity and for radioactive methionine. About 60% of the total radioactivity was not absorbed from the intestine and appeared in the feces. Nearly 37% of the total radioactivity passed the intestine wall and was found in tissues and in the urine. Data are included on the organs and tissues examined. The highest content of radiomethionine could be found in the blood proteins of rats. The results indicated that methionine stemming from thermal proteinoid can be incorporated into tissue proteins of rats. E.E.B.

N65-18598*# Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science
HIGH ENERGY NONFAT NUTRIENT SOURCES
Sanford A. Miller *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 343-351 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Results of experimental feeding of rats a diet of 35% fat and 20% 1,3-butanediol are presented. During the first week of the test there was a significant growth depression in the animals. Following the first week, the animals gained weight almost equivalent to that of the control animals. The important point is that there was growth depression during the period of adaptation. Following this adaptation period, the animals grew at a rate equivalent to the animals on a control diet. Also, 2, 4,-dimethyl heptanoic acid was investigated. Using the pure

compound, it was found that the LD-50 was about 5 grams/kg. Metabolism studies are reported for both compounds. E.E.B.

N65-18599* Mead Johnson and Co., Evansville, Ind. Dept. of Nutritional Research
USE OF FORMULA DIETS
Herbert P. Sarett *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 353-361 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Infant formula diets, tube feeding formulation, peptic ulcer formula diets, formula diets for metabolic studies, formula diets in weight control, and water requirements for formula diets are discussed. Studies showed that formula diets may be devised for many special nutritional purposes. Liquid diets may provide from 20 to 40 calories per fluid ounce. Further, it was noted that a change in diet required a few days of adaptation. Data are presented on the special nutritional conditions for which formula diets have been successfully prepared. E.E.B.

N65-18600* Martin Co., Baltimore, Md. Life Sciences Dept.
MULTIPLE USES FOR FOODS
D. L. Worf *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 363-370 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Weight saving by distributing the weight cost among several engineering and physiological requirements, and existing possibilities for using food as a basic material to perform several functions of an engineering nature in addition to its primary physiological role is explored. Utilizing food for radiation shielding, for heat protection, for structures, for containers, for clothing, for ballast, and for other miscellaneous uses is described. E.E.B

N65-18601* Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
PROTEIN, ENERGY, AND WATER REQUIREMENTS OF MAN UNDER SIMULATED SPACE STRESSES
J. E. Vanderveen, K. J. Smith, E. W. Speckmann, G. Kitzes, A. E. Prince et al *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 373-378 refs (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00
(NASA Order R-85)

Two experiments, using carefully selected young men, performed to determine the metabolic effects of prolonged wearing of unpressurized space suits, are reported. Each subject was required to perform according to an activity schedule which was designed to provide work, exercise, relaxation, and adequate sleep. Each subject completed the continuous wearing of the suit for 14 to 16 days. During this time the helmet and gloves were worn from 4 to 8 hours per day. All biochemical determinations of blood were normal. Data on the diets for the test subjects are included. It was found that a freshly prepared diet or a diet composed of precooked freeze-dried foods was equally efficient in supplying nutrient requirements. Daily water requirements were found to be 3200 to 3800 milliliters/day. Energy of 2800 kcal/day was required for subjects weighing 66 kilograms. E.E.B.

N65-18602* General Dynamics/Astronautics, San Diego, Calif.
OVERALL ENERGY MANAGEMENT AS RELATED TO NUTRITION AND WASTE
C. D. King *In* NASA, Washington Conf. on Nutr. in Space and Related Waste Probl. 1964 p 379-387 (See N65-18566 08-04) GPO: HC $2.75; OTS: MF $2.00

Energy management of spacecraft, excluding propulsion, and the significant forms of electrical and thermal energy are discussed. Weight penalties for electrical power, based on conditions of a spacecraft in a 150 nautical mile orbit at 30 degree inclination for flight late in this decade, are presented for fuel cells, solar cells, and isotopic power. Control of temperature and heat transfer are discussed. The use of waste heat in a water recovery process is illustrated. Energy management always includes a large task in thermal integration. The components cannot be considered only in the light of individual characteristics. Some of the nutrition and waste components are included in each heat-transfer circuit. It is the task of the engineer to determine an optimum arrangement compatible with characteristics of all components in each circuit. E.E.B.

IAA ENTRIES

A65-16244
A THEORY OF MACROMOLECULAR AND CELLULAR ORIGINS.
Sidney W. Fox (Miami, University, Institute of Molecular Evolution, Coral Gables; Florida State University, Institute for Space Biosciences, Tallahassee, Fla.).
Nature, vol. 205, Jan. 23, 1965, p. 328-340. 97 refs.
Research supported by NSF, General Foods Corp., Eli Lilly and Co., and Rockefeller Foundation; Grant No. NsG 173-62, U. S. Public Health Service Grant No. C-3971.

Theoretical discussion of the origin of life. The initial emphasis is on explaining the origin of amino acids as a prelude to understanding the origin of protein. It is stated that the finding that most of the amino acids common to protein are produced simultaneously from methane, ammonia, and water at 1000°C, in the volcanic range of temperature, may be especially pertinent. An ultimate objective of the experiments described was the simultaneous combination of all or nearly all the amino acids common to contemporary protein. Comparative examinations suggest that the primordial reactions must have embraced a maximum number of types of amino acid. Some of the special chemistry involved in the processes occurring when amino acids are heated is described. The results emphasize that the effect of simultaneous heating of amino acids could not be predicted from homopolymerization or attempted homopolymerization. The thermal proteinoids, as a model of abiotic polymer, demonstrate how the beginning of order could have developed at a molecular level in a prebiological period. Since no genic nucleic acid is present in the reaction, the degree of ordering that is found is ascribed to the internal influences of the amino acids themselves. The possibility that prebiological protein molecules might have arisen before prebiological nucleic acids is discussed in the light of the demonstration of internal self-control of sequence. It is thus possible to visualize the thermal conversion of amino acids to a primitive kind of protein. The manner in which primitive protein might modulate to primitive cells is treated, and a study is made of the manner in which proteinoid microspheres arise. The following subjects are also discussed: the problem of cytochemical staining of proteinoids and the possibility of explaining the difference between Gram-negativeness and Gram-positiveness; attempts to produce metabolizing microspheres by introducing catalytically active cations; ; and the use of zinc to catalyze the hydrolysis of ATP. By localizing the ATP-splitting activity of zinc it is possible to visualize how a thermal synthesis of primitive protein might have modulated to the first steps towards a primitive ATP-dependent cellular synthesis of protein. Suitable locales for spontaneous thermal geosynthesis are suggested. A. B. K.

A65-16311
LOCAL, SEGMENTAL AND SUPRASPINAL INTERACTION WITH A DORSOLATERAL SPINAL CUTANEOUS AFFERENT SYSTEM.
Arthur Taub (Massachusetts Institute of Technology, Dept. of Biology and Research Laboratory of Electronics, Center for Communications Sciences, Cambridge, Mass.).
Experimental Neurology, vol. 10, Oct. 1964, p. 357-374. 44 refs.
Research supported by the Teagle Foundation, Inc.; NSF Grant No. GN 2495; National Institutes of Health Grants No. NB 04897-01, MH 04737-04; Grants No. NsG 496; No. AF AFOSR 591-04; Contract No. AF 33(615)-1747.

Demonstration, in decerebrate and spinal preparations, of the mutability of the receptive field characteristics of single units in the spinocervical tract of the cat through local, segmental, and supraspinal mechanisms. Locally, a discrete, nonconcentric, easily fatiguable afferent inhibition, produced by light brushing and cold, is described. Segmentally, strong stimulation of the distal extremities is found to inhibit spontaneous or evoked activity in the spinocervical tract in a variety of patterns which it is suggested are related to reflex progression. Electrical stimulation of the mesencephalic tegmentum, cerebellar nuclei, and a central pontobulbar core is shown to produce a 35% constriction of receptive field area and a generalized decrease in receptive field responsiveness, with the preservation of a small, sensitive, "central" region. The production, by stimulation of the mesencepnalic tegmentum, of a negative slow wave occluding a lumbosacral dorsal root potential suggests a presynaptic mechanism for inhibition of activity in the spinocervical tract. The significance of the spinocervical tract i the mechanisms underlying reactivity to "painful" stimulation is discussed. (Author) A. B. K.

A65-16316
PRESYNAPTIC HYPERPOLARIZATION - A ROLE FOR FINE AFFERENT FIBRES.
L. M. Mendell and P. D. Wall (Massachusetts Institute of Technology, Dept. of Biology and Research Laboratory of Electronics, Center for Communications Sciences, Cambridge, Mass.).
Journal of Physiology, vol. 172, 1964, p. 274-294. 31 refs.
Research supported by the Teagle Foundation, Inc. and Bell Telephone Laboratories, Inc., Contract No. DA-36-039-AMC-03200 (E); Grants No. NsG 496; No. AF AFOSR 591-647; National Institutes of Health Grants No. MA 04737-04; No. NB 04897-01; NSF Grant No. GP 2495.

Description of experiments in spinal cats which show that the steady arrival of cutaneous impulses at the cord results in a steady depolarization of passive afferent terminals. By the use of a method for preferential blocking of large fibers by anodal polarization, it is shown that impulses in fine fibers produce hyperpolarization of the terminals of large fibers. This effect is blocked by barbiturate. If terminals are held steadily depolarized, the arrival of impulses in A fibers hyperpolarizes the terminals of passive neighbors. Positive dorsal root potentials are associated with hyperpolarization of the terminals of large diameter cutaneous fibers. C fibers hyperpolarize the terminals of cutaneous A fibers and facilitate the reflex evoked by the A fibers. The results are used to support the following postulates: (1) the spinal cord is normally continuously bombarded by some cutaneous afferent impulses, (2) one effect of this barrage is to hold the terminals of large cutaneous afferents partially depolarized, (3) afferent impulses in fine fibers hyperpolarize the terminals of large afferent cutaneous fibers, (4) afferent impulses in large fibers depolarize the terminals of neighboring large afferent cutaneous fibers, (5) hyperpolarization of the terminals is produced by inhibition of the tonic depolarizing mechanism, (6) barbiturate blocks the hyperpolarizing effect, (7) the post-synaptic excitatory effectiveness of an impulse is determined partly by the presynaptic membrane potential, and (8) the effectiveness of a large-diameter cutaneous fiber input is partly determined by the preceding balance of large and small afferent fiber activity acting through their opposing presynaptic effects. F. R. L.

A65-16372 #
TWILIGHT ZONE.
R. A. Wigent.
Approach, vol. 10, Nov. 1964, p. 1-7.

Discussion of the roles of attention, perception, emotion, and judgment as the major underlying factors in aircraft accidents caused by pilot error. Actual incidents are cited as examples. Comment is made that the prevention of such accidents is primarily the personal responsibility of the individual, and he should recognize his own problems of attention, interpretation of surroundings, emotional control, and perspective. F. R. L.

A65-16441
INSTRUMENT DISPLAYS FOR BLIND FLYING.
K. J. Holden (Queen's University, Belfast, Northern Ireland).
Royal Aeronautical Society, Journal, vol. 68, Dec. 1964, p. 833-836.

Review of the methods of presentation and the principles that led to the standard blind flying panel and a report of certain recent developments. The standard panel is found to have four major disadvantages: (1) some of the instruments have an ineffective or misleading display; (2) the pilot has to look at six instruments (height, speed, bank angle, angle of pitch, sideslip angle, and direction) and integrate their readings before he knows the aircraft position and rate of change of position; (3) having found the aircraft state, the pilot still has to deduce the correct control movements; and (4) while the pilot is looking at the instruments, he is no longer free to look out of the cockpit. Improved displays are described, including the Kelvin-Hughes flight data system, the Smiths Para

Visual Director, and the RAE (Royal Aircraft Establishment) head-up flight director. Although the standard system developed twenty years ago is seen to be nearing the end of its usefulness, it is doubted that any one new system will ever gain the unanimous approval of all users that was accorded to the original blind flying panel. W.M.R.

A65-16425 #

THE USE OF HIGH-SPEED COMPUTER-COUPLED AUTOMATIC SYSTEMS FOR NON-DESTRUCTIVE MEDICAL AND BIOLOGIC NUCLEAR ACTIVATION ANALYSIS.

Richard E. Wainerdi, Lloyd E. Fite, and Edgar L. Steele (Texas, Agricultural and Mechanical University, College Station, Tex.).

Analyse par Radioactivation et ses Applications aux Sciences Biologiques, Colloque International de Biologie, 3rd, Saclay, France, Sept. 1963, Paper. 29 p. 24 refs.

Grant No. NsG 256-62; AEC Contract No. AT (40-1)-2671.

Program to demonstrate the feasibility of applying automation and computer methods to the instrumental activation analysis of biological materials. Quantitative chemical analyses are made by measuring and interpreting the results of induced nuclear transmutations. The analyst makes use of isotopic data to calculate the number of target atoms whose bombardment results in the activity measured. Results with the IBM 709 are illustrated with experimental data on silver in rat brain tissue (small amounts of silver nitrate were fed to mice living in various fluxes of cobalt 60 radiation; at regular intervals the rats were sacrificed and brain tissues were examined for silver), selenium in blood and urine, and dysprosium used as an indigestible marker. In the rat brain tests, the average cost per analysis, including reactor cost, system-use charges, computer cost, and operator's salary, was $1.37, and the average time per analysis, including activation time, sample transport time, counting time, data readout time, computer time, and data tabulation time, was 2.6 min. In microanalyses, the precision appears to be on the order of 0.2 μg. W.M.R.

A65-16466

EVOKED RESPONSES IN RELATION TO VISUAL PERCEPTION AND OCULOMOTOR REACTION TIMES IN MAN.

John S. Barlow (Massachusetts General Hospital, Neurology Service, Neurophysiology Laboratory, Boston; Massachusetts Institute of Technology, Research Laboratory of Electronics, Dept. of Electrical Engineering, and Center for Communication Sciences, Cambridge, Mass.).

New York Academy of Sciences, Annals, vol. 112, May 8, 1964, p. 432-467. 77 refs.

Public Health Service Research Career Program Award No. 5-K3-NB-9201; Public Health Service Grant No. B-3752.

Description and discussion of results of experiments in which responses evoked by visual stimuli are studied in relation to oculomotor reaction times, and in relation to some of the phenomena associated with visual perception. Sudden changes in the vertical position of a spot on an oscilloscope screen were used as stimuli and as tracking signals, and motor responses consisted of the corresponding redirections of gaze to the successively new positions of the spot. In addition, averaged responses, with eyes closed, to flashes of light from a stroboscope were obtained. Potentials evoked by the shifting spot of light were generally appreciably smaller, and greater in latency, than those evoked by bright flashes of light with the eyes closed, but the amplitude of certain components of the former was clearly increased during tracking for some subjects, an effect that may have been due to the fact that the fovea was more frequently stimulated during tracking than when the eyes were fixed. A comparison, for one subject, of the results of psychophysical experiments with those of the electrophysiological recordings provided some tentative evidence that the subjective perception of spot-shifts takes place, on the average, rather early - i.e., within 40 msec or less, a finding that suggests that visual perception of simple stimuli may be more closely related to specific visual pathways than to non-specific ones. Only minimal evidence of an early, specific response was, however, obtained in the present series of experiments for spot-shifts as visual stimuli. A.B.I

A65-16467

DATA ACQUISITION AND ANALYSIS TECHNIQUES IN A BRAIN RESEARCH INSTITUTE.

W. R. Adey (California, University, Medical Center, Depts. of Anatomy and Physiology, and Brain Research Institute, San Francisco, Veterans Administration Hospitals, Long Beach and Los Angeles, Calif.).

New York Academy of Sciences, Annals, vol. 15, July 31, 1964, p. 844-866. 11 refs.

National Institutes of Health Grants No. B1883, No. M3708, No. B2501; Grants No. AF61-81, No. NsG 203-62.

Discussion of the use of mathematical techniques in a brain-research institute. A narrow-band FM multiplex tape-recording system was developed to accommodate the large number of data channels characterizing neurophysiological experiments. Smaller recorders, designed primarily for flight use, are also employed. At the present time, digital conversion of analog records is done with the aid of a converter designed to handle 14 channels of analog input, including four histogram channels. Since this converter does not employ buffer storage, certain steps must be taken to provide the requisite buffering. Small, special-purpose digital or analog computers are capable of performing such simple operations as averaging or auto- or cross-correlation functions within desirable time limits during the experiment. More complex techniques, such as cross-spectral analysis, digital filtering techniques revealing phase-and-amplitude information, and various forms of matrix analysis can be performed only on large computers. Studies were undertaken aimed at utilizing computing techniques of progressively increasing complexity in the evaluation of brain-wave data as the basis for a realistic model of cerebral organization, based on the possibility of nonlinear and stochastic characteristics. A.B.K.

A65-16552

REVIEW OF ANTIMOTION SICKNESS DRUGS FROM 1954-1964.

Charles D. Wood, Robert S. Kennedy, and Ashton Graybiel (U.S. Navy, School of Aviation Medicine, Pensacola, Fla.; Arkansas, University, Medical School, Dept. of Pharmacology, Little Rock, Ark.).

Aerospace Medicine, vol. 36, Jan. 1965, p. 1-4. 50 refs.

Discussion of experience during the past ten years with various anti-motion-sickness drugs, including anticholinergics, antihistamines, and tranquilizers. Hyoscine (Scopolamine) appears to be one of the most effective drugs, although its severe side effects of drowsiness, vertigo, and dry mouth limit its usefulness. Meclizine (Bonamine) and Cyclizine (Marezine) are reported to be the most effective of the antihistamines, with a level of effectiveness approaching that of hyoscine. In addition, their side effects are milder than those of most other preparations. Promethazine appears to be the only proven anti-motion-sickness drug among the tranquilizers, though Thietylperazine (Torecan) seems to be quite promising. Among the miscellaneous other drugs considered are Meprobamate (Miltown) and Trimethobenzamide (Tigan). In addition, the use of various combinations of drugs is considered, including the use of Amphetamine to counteract the depressant action of some of the anti-motion-sickness drugs. P.K.

A65-16554

LEARNING-SET PERFORMANCE OF SQUIRREL MONKEYS AFTER RAPID DECOMPRESSION TO VACUUM.

Duane M. Rumbaugh and Joseph W. Ternes (San Diego State College, San Diego, Calif.).

Aerospace Medicine, vol. 36, Jan. 1965, p. 8-12. 7 refs.

NASA-USAF-supported research.

Review of tests to determine the effect that decompressing nonhuman primates has on their ability to perform a complex behavioral task learned prior to decompression. Twenty squirrel monkeys were decompressed to near vacuum (less than 2 mm Hg) for time intervals up to 90 sec, and then twice tested for their proficiency in a learning set task, first at one week and then again at two months after decompression. Of the 18 animals surviving the decompression, no loss in learning set proficiency was detected. Animals in the more severely decompressed groups required more time to recover to apparent normality. They were less inclined to eat and drink after decompression, and lost significantly more weight than the other groups. Short-term interference with vision and hearing was noted. It is concluded that, if fatality does not occur, subsequent restoration of function to predecompression baselines is highly probable. (Author) P.K.

A65-16553
CORONARY FLOW RESPONSE TO HYPOCAPNIA INDUCED BY HYPERVENTILATION.
William J. McArthur (British Columbia, University, Dept. of Physiology, Vancouver, British Columbia, Canada).
Aerospace Medicine, vol. 36, Jan. 1965, p. 5-8. 22 refs.

Experimental investigation, using anesthetized dogs, of the effect of hyperventilation-induced hypocapnia on coronary flow. The materials and procedures used are described. It is found that coronary flow tends to decrease as the alveolar ventilation is increased. This occurs both when ventilation rate was increased and when tidal volume was increased. Associated with the increased alveolar ventilation was a marked and closely correlated change in systemic CO_2 tension. It is thus concluded that the response observed was primarily due to changes in blood CO_2 tension. P.K.

A65-16555
TOLERANCE TO TRANSVERSE (+Gx) AND HEADWARD (+Gz) ACCELERATION AFTER PROLONGED BED REST.
Perry B. Miller and Sidney D. Leverett, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Dept. and Biodynamics Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 36, Jan. 1965, p. 13-15. 9 refs.

Investigation of the effects of prolonged bed rest on the tolerance to the transverse (+Gx) acceleration of a simulated Gemini re-entry profile, and to a headward (+Gz) acceleration. As judged by the degree of physical discomfort, the ability to respond to a central light, or the presence of electrocardiographic abnormalities, tolerance to +Gx was unaffected by four weeks of absolute bed rest. In each of 11 subjects studied, heart rates during peak acceleration were higher after bed rest than before. As judged by the level of acceleration at which central vision was lost, no significant change in tolerance to headward (+Gz) acceleration of rapid onset was observed after two weeks of modified bed rest or after four weeks of absolute bed rest. After each type of bed rest, the majority of the subjects had decreased tolerance to headward acceleration of gradual onset, but the mean decrease was not statistically significant. Mean heart rate at equivalent levels of +Gz were significantly higher after both periods of bed rests. (Author) P.K.

A65-16556
METABOLISM OF SOME SNAP RADIONUCLIDES IN MINIATURE SWINE.
R. O. McClellan, L. K. Bustad, and R. F. Keough (General Electric Co., Hanford Laboratories, Biology Laboratory, Richland, Wash.).
(Aerospace Medical Association, Annual Scientific Meeting, 35th, Miami, Fla., May 11-14, 1964.)
Aerospace Medicine, vol. 36, Jan. 1965, p. 16-20. 21 refs.
AEC Contract No. AT (45-1)-1350.

Study of the gastrointestinal absorption in miniature swine of three radionuclides potentially usable in SNAP auxiliary power devices. The amounts absorbed are found to be less than 0.3% for Sr^{85} titanate, and less than 0.01% for Ce^{144} chloride and Pm^{147} perchlorate. Ten days after the oral administration of $Sr^{85}TiO_3$, Sr^{85} was detectable only in the skeleton. Following either oral or intravenous administration of Ce^{144} or Pm^{147}, the majority of the administered radionuclide was found in the skeleton and the liver. Because of the extremely low gastrointestinal absorption of Ce^{144} and Pm^{147}, their radiation hazard would be determined by the radiation dose delivered to the gastrointestinal tract, while for Sr^{85} titanate absorption, the deposition would be sufficient to make the radiation dose to the skeleton the critical consideration in the evaluation of its hazard. (Author) P.K.

A65-16557
STUDY OF AN INSTRUMENTED ANALYTICAL SYSTEM FOR EXTRATERRESTRIAL STUDY OF ATMOSPHERES, POSSIBLE LIFE FORMS AND SOILS.
E. A. Botan, J. Phaneuf, and J. Lambert (Avco Corp., Research Center, Wilmington, Mass.).
Aerospace Medicine, vol. 36, Jan. 1965, p. 21-25. 17 refs.

Description of a proposed lightweight instrument package which can be landed on an extraterrestrial body to sample and analyze the environment. The system employs UV, visible, and IR microspectrometry, microscopy, and emission spectrometry, and converts the data obtained to telemetry signals for transmission to Earth. The possible information obtainable from the proposed package is discussed. Television techniques would yield information concerning size, shape, and possible cellular or morphological characteristics. The presence of hydroxyls, methyls, amidos, carbonyls, and double bonds is just one of the structural features that can be determined by absorption spectrometry, which can also determine protein and nucleic-acid structures. Emission spectroscopy will determine the presence of virtually all the elements of the periodic table for the samples examined. Thus, a comprehensive (inorganic, organic, and biological) analysis of the particles can be made. P.K.

A65-16558
INITIAL STIMULATING EFFECT OF WARMTH UPON PERCEPTUAL EFFICIENCY.
E. C. Poulton and D. M. Kerslake (British Medical Research Council, Applied Psychology Research Unit, Cambridge; Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Aerospace Medicine, vol. 36, Jan. 1965, p. 29-32. 15 refs.
Research sponsored by the British Flying Personnel Research Committee.

Study of the transient effects on performance of a few minutes' exposure to increased environmental temperature. Twelve men listened to letters for 20 min and simultaneously monitored five dials arranged in a semicircle, once at 113°F and once at 77°F. Absolute humidity was maintained at 10 mm Hg and air movements at 500 ft/min, giving effective temperatures of 86°F and 65°F, respectively. The results indicate the following sequence of changes in perceptual efficiency produced by entering a hot environment: first, the initial stimulation from warmth on the skin produces an increase in the level of arousal; as the temperature receptors of the skin adapt to the thermal stimulation, the level of arousal falls below normal; as the body temperature continues to rise, the subject becomes uncomfortably hot, raising his level of arousal above normal; finally, all performances deteriorate as the subject begins to collapse from heat. P.K.

A65-16559
BIOCHEMICAL EFFECTS OF MECHANICAL STRESS. I - CONTROL OF P^{32} RELEASE FROM RAT FEMUR IN VITRO.
C. C. Solomons, D. Shuster, and A. Kwan (McGill University, Dept. of Biochemistry, Montreal, Canada).
Aerospace Medicine, vol. 36, Jan. 1965, p. 33, 34. 8 refs.
Research supported by the Medical Research Council of Canada and McGill University; Public Health Service Grant No. A-134-65.

Study of the effect of mechanical force on the release of P^{32} from the femurs of male rats. The rats were injected intraperitoneally with $Na_2HP^{32}O_4$ (one microcurie/gm body weight) and sacrificed at 9, 17, 21, 43, and 65 hrs later. The bones were treated in vitro with Krebs-Ringer bicarbonate solution for one hr, and the release of P^{32} measured. It is found that intermittent tension (250 gm applied 300 times/min) reduced the release of newly incorporated P^{32} (up to 18 hrs before sacrifice), and increased the rate of release of P^{32} incorporated 18 to 65 hrs before sacrifice. The results suggest that the actions of vitamins, hormones, and mechanical stress on the remodeling ability of the skeleton may be fundamentally related. (Author) P.K.

A65-16560 #
MULTI-FILTER SYSTEM FOR WATER RECLAMATION.
H. Wallman, J. A. Steele, and J. A. Lubitz (General Dynamics Corp., Electric Boat Div., Research and Development Dept., Chemical Engineering Section, Groton, Conn.).
(Aerospace Medical Association, Annual Scientific Meeting, 35th, Miami, Fla., May 11-14, 1964.)
Aerospace Medicine, vol. 36, Jan. 1965, p. 35-39. 6 refs.
Contract No. NAS 1-2208.

Description of multifilter systems developed to recover potable water from cabin-air dehumidification condensate and to reclaim used wash water for reuse. Samples of air-conditioning condensate from nuclear submarines during periods of sealed operation and from space-station simulators are analyzed to determine likely

dehumidification-water composition. In addition, typical wash water compositions are determined. Two multifilter systems are described. The dehumidification water system consists of a canister containing activated carbon and a 0.45 μ bacterial filter, and the wash water system consists of two carbon canisters, one resin canister and a particulate filter. Both systems are found to give recovered water of the required quality, and the multifilter concept is recommended on the basis of its high reliability, simplicity, zero power requirement, and inherent zero-g capability. P.K.

A65-16561
CHRONIC ACCELERATION SICKNESS.
Russell R. Burton and Arthur H. Smith (California, University, Dept. of Animal Physiology, Davis, Calif.).
Aerospace Medicine, vol. 36, Jan. 1965, p. 39-44. 14 refs.
NASA-Navy-supported research.

Investigation of the effects of long-term acceleration on animals. Single-combed white leghorn chickens of various ages and strains were exposed to chronic acceleration of low intensity (1.5 to 3 g) for periods of from several weeks to several months. It is found that this exposure may lead to a highly lethal "chronic acceleration sickness." This sickness is characterized by a ready reversibility upon return to normal gravity, indicating that permanent organic debility is not involved. This contention is supported by the absence of specific lesions at autopsy. Summaries of post-mortem pathological findings are presented. P.K.

A65-16562
OXYGEN COST OF WORK WHEN THE BODY WEIGHT IS NOT LIFTED AGAINST GRAVITY.
William R. Pierson and George Q. Rich (Lockheed Aircraft Corp., Lockheed-California Co., Burbank; San Fernando Valley State College, Northridge, Calif.).
Aerospace Medicine, vol. 36, Jan. 1965, p. 44-46. 19 refs.

Study of oxygen consumption, and its possible correlation with total body weight and surface area, during activities performed in a manner which does not require that the body weight be lifted against gravity. For 24 male subjects, oxygen rates were measured during rest, nine minutes of exercise, and recovery to resting levels. It is found that at no time did the oxygen consumption exceed that associated with "light" work, in spite of the vigorousness of certain of the exercises. However, for the nine minutes of exercise, over five minutes were required for the return to resting level. No correlation was found between oxygen consumption and either total body weight or surface area. (Author) P.K.

A65-16563
POST-MORTEM PULMONARY CHANGES OCCURRING IN MICE EXPOSED TO 100 PER CENT OXYGEN AT 740 MM HG.
John Q. Durfey (Memorial Sloan-Kettering Cancer Center, Dept. of Anesthesiology, New York, N.Y.).
Aerospace Medicine, vol. 36, Jan. 1965, p. 46-50. 16 refs.
Research supported by the Ohio State University Research Foundation.

Investigation of the possible post-mortem changes occurring in the lung tissue of mice dying of respiratory inefficiency from the effects of "oxygen toxicity." Autopsies were performed on mice exposed to 100% oxygen for 48 hrs, on mice exposed to 100% oxygen until oxygen toxicity and fatality ensued, and to control mice kept in air. The lungs of mice exposed for 48 hrs were found to be grossly and microscopically similar to the air controls, provided the mice were removed from the high oxygen environment immediately after or immediately before being sacrificed. However, the lungs of mice killed in oxygen, left in oxygen three hours, and then autopsied were grossly hemorrhagic, atelactic, and collapsed. They resembled closely in gross appearance the typical changes ascribed to oxygen toxicity. Light microscopy revealed no changes to substantiate oxygen toxicity, however. It appears, therefore, that delay in autopsy, together with continued exposure to high oxygen concentrations, can cause changes which produce the gross picture of the classical description of oxygen toxicity before such changes are manifested microscopically and clinically. P.K.

A65-16564
RADIATION HAZARD FROM CONTAMINATED AIRCRAFT.
R. E. Luehrs (U.S. Navy, Washington, D.C.).
Aerospace Medicine, vol. 36, Jan. 1965, p. 54, 55.

Review of surveys for the presence of radioactive contamination deposited on aircraft and picked up by flight and maintenance personnel. The surveys were taken in the Mediterranean area for the period from Feb. 7 to Aug. 2, 1963, 18 months having elapsed between the beginning of the survey and the cessation of atmospheric nuclear testing. Infinitesimal but measurable amounts of contamination, both loose and fixed, were found, and are presumably due to atmospheric testing. From Feb. to early Apr., samples taken from jet intakes showed less than 15,000 micromicro curies/ft^2, with contamination levels decreasing gradually during the ensuing months until the tests concluded. None of the personnel involved added significantly to his total body burden of radioactivity during the sampling period. P.K.

A65-16618 #
TRAINING OF MAN TO SUSTAIN WEIGHTLESSNESS [PODGOTOVKA CHELOVEKA K NEVESOMOSTI].
A. Eremin, I. Kolosov, V. Kopanev, V. Lebedev, N. Popov, and G. Khlebnikov.
Aviatsiia i Kosmonavtika, vol. 47, Jan. 1965, p. 64-70. In Russian.

Presentation of results obtained with three astronaut candidates (Komarov, Feoktistov, Egorov) in training flights along a parabolic curve. The individual vestibular and sensory reactions and the changes in pulse and breathing rate recorded for zero-G conditions lasting 10, 20, and 30 sec are tabulated. The very slight changes observed after the flights are largely attributed to the special training given to the astronauts. V.P.

A65-16780
SEMICONDUCTOR DETECTORS FOR NUCLEAR MEDICINE AND BIOLOGY.
Stephen S. Friedland, Henry S. Katzenstein, and Michael R. Zatzick (Solid State Radiation, Inc., Los Angeles, Calif.).
Nucleonics, vol. 23, Feb. 1965, p. 56-61. 15 refs.
Contract No. NASw-415.

Application of semiconductor detectors in nuclear biomedicine for detecting radioisotopes in in-vivo and uptake studies. The principles of such detectors are briefly outlined, and phosphorus-diffused-junction, surface-barrier, and lithium-drifted detectors and their applications are described. The devices are suitable for determining the uptake and excretion of radioactive isotopes in the course of research in nuclear medicine. They are used for in-vivo detection of radioactive tracers by introducing the detector into the living organism at the site to be examined. They have extensive applications as brain probes, and various techniques are described. Gastrointestinal probes are being developed to determine intestinal vascular insufficiencies, for gastrointestinal measurements, and for study of intestinal bleeding of unknown origin. Probes to estimate the radiation dose from alpha particles used in treating brain tumors are discussed, as well as circulation probes. The detectors can be used for dose and dose-rate measurement, and their dynamic range and sensitivity are discussed. F.R.L.

A65-16782
BRAIN MATURATION MEASURED BY ELECTROSHOCK SEIZURES IN RATS AT HIGH ALTITUDE (12,470 FT.; 3,800 M).
Louise M. Heim and Paola S. Timiras (California, University, Dept. of Physiology, Berkeley; White Mountain Research Station, Big Pine, Calif.).
Nature, vol. 204, Dec. 19, 1964, p. 1157-1159. 12 refs.
U. S. Public Health Service Grant No. GM-09267.

Effects of altitude acclimatization on brain maturation in Long-Evans rats taken to, or born at, the University of California's Barcroft Laboratory. An average of 5 litters of Long-Evans rats was placed into four groups: (1) sea-level controls, (2) rats born at sea level and taken to altitude at four days of age, (3) first generation altitude rats, and (4) second generation altitude rats. Shocking by the techniques of Woodbury and Davenport was begun at fifteen days of age and proceeded on alternate days. The time (in days) of appearance of hind-limb extension and fully mature adult seizure pattern in 50% of control and high-altitude rats, calculated by the method of

Litchfield and Wilcoxon, is presented in tabular form. Limb extension was delayed 2 to 3 days in the altitude rats and their fully mature seizure patterns appeared 1 to 2 days later than the control rats' patterns. In general, the delay in the appearance of adult seizures was proportional to the duration of the sojourn at high altitude. It is suggested that the delay in the appearance of the tonic-clonic seizure in the high-altitude rats may be due to retardation of brain maturation. D.H.

A65-16817
DETECTING LIFE IN SPACE.
William R. Corliss.
International Science and Technology, Jan. 1965, p. 28-34.

Description of instruments and methods under development for the detection of chemical compounds generally associated with life on Earth, the products of metabolic processes, or direct visual evidence of extraterrestrial life forms. Most of the experiments are planned for Mars, involve the collection of dust particles by sticky, retractable tapes or "vacuum cleaners," and are concerned with the presence of microorganisms. Macromolecules such as nucleic acids, proteins, and enzymes are to be identified through the use of mass spectrometers and gas chromatographs, which require the samples to be heated to provide a gaseous input, or through observations of the rotation of polarized light passed through a solution of Martian soil. A nearly ubiquitous enzyme, phosphatase, can be detected through the fluorescence of phosphate-bound fluorescein. One device, the Wolf Trap, measures two common properties of fluid cultures that contain multiplying bacteria - the increase in cloudiness or turbidity and the increase in acidity brought about by the accumulation of metabolic products - by means of a turbidometer and the well-known glass pH meter. Another, the Gulliver, collects a sample, feeds it with tagged food, and counts the radioactivity of the evolved $C^{14}O_2$ and H_2S^{35}. Microscopes coupled with TV cameras will permit measurements of the size, symmetry, and reactions to various biological stains of any Martian microorganism. The basic tenet (and a recognized limitation) of all of the proposed experiments is the assumption that life, if it exists anywhere in the solar system, will be as we know it. W.M.R.

A65-16854
ELECTRON MICROSCOPIC AND BIOCHEMICAL STUDIES OF PYRUVATE DEHYDROGENASE COMPLEX OF ESCHERICHIA COLI.
Humberto Fernandez-Moran (Chicago, University, Dept. of Biophysics, Chicago, Ill.), Lester J. Reed, Masahiko Koike, and Charles R. Willms (Texas, University, Clayton Foundation, Biochemical Institute and Dept. of Chemistry, Austin, Tex.).
Science, vol. 145, Aug. 28, 1964, p. 930-932. 6 refs.
AEC Contract No. AT (30-1)-2278; NIH Grants No. B 2460; No. C 3174; No. NB 04267; No. GM 06590; No. NsG 441-63.

Tentative model of the highly organized multienzyme system that catalyzes a multistage oxidative decarboxylation of pyruvate in Escherichia coli. The pyruvate dehydrogenase complex is composed of three enzymes (1) pyruvate decarboxylase (molecular weight 183,000); (2) lipoic reductase-transacetylase (LRT); and (3) a flavoprotein, dihydrolipoic dehydrogenase (molecular weight 112,000). There are about 16, 64, and 8 molecules of each, respectively, per molecule of complex. The pyruvate decarboxylase and flavoprotein are found to be arranged in two rings, one above the other, surrounding the LRT aggregate. It has not been found possible to specify the sequence of pyruvate decarboxylase and dihydrolipoic dehydrogenase molecules in the two rings. The complex is revealed to have a polyhedral structure with a diameter of 300 to 350 Å and a height of 200 to 250 Å. Resolution into the three components is accomplished by fractionation on calcium phosphate gel suspended on cellulose; the complex is reconstituted by mixing the isolated decarboxylase, the LRT, and the flavoprotein in 0.05 M potassium phosphate buffer (pH 7.0) in a ratio of 3:2:1 by weight, respectively. The virtual identity of the native and reconstituted complexes points up the uniqueness of the structural organization. Because of the wealth of available biochemical data on this complex, it is felt that a unique opportunity has been provided to correlate functional properties, as revealed by biochemical analysis, with ultrastructure, as revealed by electron microscopy. W.M.R.

A65-17191
SPACE SUIT PROGRESS. II - HOT STUNT MEN AND HYDRAULIC STAND-INS.
Sam Barnes.
Machine Design, vol. 37, Feb. 18, 1965, p. 160-163.

Discussion of a program initiated to design, prepare, and test Gemini suits and thermal garments. During the tests, in a space-environment simulator, the suits will be worn by Sierra Engineering's "Thermanaut" - an anthropomorphic copper man wired to record suit heat transfer and to simulate heat given off by a man. The "articulate dummy" of the Research Institute of the Illinois Institute of Technology will provide exact information to designers about the resistance of a suit to motion. Mechanical joints that duplicate the motions of complex human joints are powered by hydraulic actuators and controlled by electrical servo valves; the resistance of the suit is determined by sensors (at each of 36 joints from feet to finger tips) which indicate the amount of stress developed in the mechanical limbs in motion. V.P.

A65-17201 #
DESIGN AND DEVELOPMENT OF THE APOLLO EXTRA-VEHICULAR MOBILITY UNIT.
J. C. Beggs (United Aircraft Corp., Hamilton Standard Div., Space and Life Systems Dept., Windsor Locks, Conn.).
New York Academy of Sciences, Conference on Civilian and Military Uses of Aerospace, New York, N.Y., Jan. 11-14, 1965, Paper TP 65-01. 29 p.
NASA-supported research.

Description of a pressure suit being developed for use on the surface of the moon and discussion of certain problems involved in the development of such a suit. In describing the structure of this extra-vehicular mobility unit (EMU), the first garment is a liquid-cooled undergarment (LCG). It is in essence a plastic-tubing heat exchanger which is worn in direct contact with the body's surface to enable efficient removal of metabolic heat by direct conduction. The next garment is called the pressure garment assembly (PGA). It, with the helmet, forms an anthropomorphic pressure vessel, which, in addition to forming a pressure seal, must allow normal body motions at the appropriate joint locations. Over the PGA is worn a meteoroid protective garment (MPG), which, in turn, is covered by an extra-vehicular thermal garment (ETG) made of multiple layers of aluminized mylar. For lunar surface excursions the astronaut will carry on his back a compact assembly of various environmental control devices constituting the portable life support system (PLSS). An emergency oxygen system (EOS) is mounted on the helmet. Certain specific problems selected for discussion to illustrate the broad range of technology involved in the design and development of the EMU are: the problem of mobility and bulk in the PGA, the problem of visual protection, and the problem of cooling the astronaut during an extra-vehicular mission. From the discussions the author concludes that significant state-of-the-art advances have been made in both the area of full-pressure suits and in terms of other equipment which goes to make up the complete EMU. A.B.K.

A65-17293
SPACE SUIT PROGRESS. I - DRESS REHEARSALS FOR APOLLO.
Sam Barnes.
Machine Design, vol. 37, Feb. 4, 1965, p. 100-105.

Survey of the progress made in the development of the Apollo Extravehicular Mobility Unit. Keeping the interior of the suit from getting too hot is one of the most serious problems. An Apollo astronaut's skin will be in direct contact with loose-weave cotton-nylon underwear combined with a network of plastic tubes through which water will be pumped. A porous-plate sublimator in the backpack will cool the water. During lift-off, the three Apollo astronauts will wear the suits hooked into the Command Module's environmental control system. They will receive 100% oxygen for cooling (without backpack), but the suits will not be pressurized. If the spacecraft's 5-psia pressurization system fails, suits will automatically inflate to 3.7 psia. A research project where chimpanzees have been exposed to vacuum is described. Experimental programs are still in early stages, and few answers have been found for the questions raised. A.B.K.

A65-17351
FACTORS INFLUENCING BIOMAGNETIC ENVIRONMENTS DURING THE SOLAR CYCLE.
W. C. Levengood (Michigan, University, Institute of Science and Technology, Ann Arbor, Mich.).
Nature, vol. 205, Jan. 30, 1965, p. 465-470. 8 refs.

Examination of the effects of variations in the flux of solar and cosmic ray particles on living organisms subjected to magnetic field environments. The reported findings center around the reproductive responses of the fruit fly, Drosophila melanogaster, and involve a continuation of an investigation which demonstrated an inverse relationship between solar flare activity and the progeny yields of flies grown in magnetic fields. Speculations are also presented concerning the mechanism producing the experimentally observed trends. The environmental parameters were averaged over a 72-hour period covering the day before, the day of, and the day after the matings in the new culture. During this specific 72-hour period in the life-cycle, these organisms disclosed a high sensitivity to environmental changes. The present work was examined using a method of grouped or cell frequency data analysis. Results from grouped data are given for the most recent tests as well as a re-examination of experiments conducted over the past several years. By examining all this information, the period of coverage extends from the initial test series when the solar activity was still moderately high into the present condition of the "quiet sun." The general approach is to examine the more recent tests, then discuss results extending back toward the solar maximum. Finally, some of the perplexing aspects of the early environmental investigations are considered in the light of the recent findings. A.B.K.

A65-17372
INTESTINAL ABSORPTION OF D-GLUCOSE (IN VITRO) IN HAMSTER - EFFECTS OF A LARGE DOSE OF RESERPINE.
X. J. Musacchia, M. Jellinek, and T. Cooper (St. Louis University, Dept. of Biology and Center for Cardiovascular Research, St. Louis, Mo.).
Society for Experimental Biology and Medicine, Proceedings, vol. 117, 1964, p. 502-504. 12 refs.
Grant No. NsG 271-62; Public Health Service Grants No. AM07779-01; No. HE-06312.

Effects of 2.5 mg/kg intraperitoneal injections of reserpine in hamsters. Following the injections, intestinal absorption of D-glucose, in vitro, was measured. Rates of sugar absorption in reserpinized hamsters were altered and 24 hr after treatment the duodenal area continued to show significant reduction. In the same animals, intestinal catecholamine analyses were made in order to provide a meaningful guide to reserpine activity. The gut showed characteristic depletion in reserpine-treated animals. Histamine levels of the same tissue showed considerable variation. D.H.

A65-17482
PROLONGED ANOXIC SURVIVAL DUE TO ANOXIA PRE-EXPOSURE - BRAIN ATP, LACTATE, AND PYRUVATE.
Nancy Ann Dahl and William M. Balfour (Kansas, University, Dept. of Comparative Biochemistry and Physiology, Lawrence, Kan.).
American Journal of Physiology, vol. 207, Aug. 1964, p. 452-456. 25 refs.
National Institutes of Health Grant No. B 1151; Grant No. NsG 298-62.

Experimental investigation of the ability of rats to withstand anoxia. It is stated that rats subjected to a brief anoxia can survive 90 sec in a second anoxia, compared to a 60-sec survival time of control animals. Slower disappearance of ATP concentration in the brain during the second exposure indicates that this longer survival is due to an altered cerebral energy metabolism. Initial cerebral ATP concentration is no higher in pre-exposed animals than in controls. When glycolysis is inhibited by iodoacetate before testing in anoxia, the advantage of pre-exposure disappears, suggesting that the longer survival may be due to increased anaerobic glycolysis. Lactate accumulates faster during anoxia in the brains of pre-exposed animals than in controls, suggesting that increased anaerobic glycolysis is the cause of the prolonged survival. This effect is not due to increased cerebral glucose concentration. It is stated that a possible reason for this increased glycolysis, and thus the prolonged survival, could be an increase of a compound, such as pyruvate, capable of oxidizing NADH. The initial pyruvate is higher in pre-exposed animals than in controls, and injection of pyruvate slightly increases survival time. (Author) M.M.

A65-17486
REAL-TIME VOICE COMMUNICATION TO MARS USING EAR-BRAIN ANALOG.
John L. Stewart (Santa Rita Technology, Inc.).
Space/Aeronautics, vol. 43, Feb. 1965, p. 68, 69.

Description of a system using an ear-brain analog principle to achieve a very low data rate for voice transmission. An electronic speech processor was constructed, which, in response to spoken words, produces space-time patterns such as are thought to be of importance to the human brain. The measures obtained from the processor may be transmitted via a low-data-rate radio link to a sound generator which produces synthetic speech. It was found that the most important part of the waveform pattern in the inner ear extends from about the center of the inner ear to its entrance. This region can be described by only three measures: overall area of the pattern, centroid of the pattern, and a measure of relative pattern width. In radio communication, these three measures can be used to control a band of noise. In experiments performed, this scheme generated intelligible whispered speech at the receiving end. In tests using random two-digit numbers, a prototype system using only area and centroid measures achieved recognition scores of about 95%. A.B.K.

A65-17519
HYDROGENASE OF COLEMAN'S SULFATE-REDUCING BACTERIUM.
C. S. Buller and J. M. Akagi (Kansas, University, Dept. of Bacteriology, Lawrence, Kan.).
Journal of Bacteriology, vol. 88, Aug. 1964, p. 440-443. 7 refs.
U.S. Public Health Service Grant No. AI 04672; Grant No. NsG 298-62.

Study of some of the properties of the hydrogenase in order to elucidate the process of sulfate reduction in the Coleman organism. The hydrogenase of the Coleman organism was found to be associated with the particulate fraction of cell-free extracts. This enzyme catalyzed the oxidation of molecular hydrogen in the presence of various electron acceptors. It was also able to evolve hydrogen from reduced methyl viologen and reduced ferredoxin isolated from Clostridium pasteurianum. Other electron donors such as pyruvate and formate were capable of furnishing electrons for hydrogen evolution when suitable carriers were incorporated. (Author) J.R.

A65-17522
PHOSPHOROCLASTIC REACTION OF CLOSTRIDIUM NIGRIFICANS.
J. M. Akagi (Kansas, University, Dept. of Microbiology, Lawrence, Kan.).
Journal of Bacteriology, vol. 88, Sept. 1964, p. 813, 814.
U.S. Public Health Service Grant No. AI 04672; Grant No. NsG 298-62.

Description of some of the properties of the phosphoroclastic reaction catalyzed by clostridium nigrificans, a thermophilic sulfate-reducing bacterium. It is found that the degradation of pyruvate by clostridium nigrificans proceeds by a pathway identical to that reported by Koepsell and Johnson. The cofactors CoA, TDP, and certain divalent cations for this reaction are substantially similar to those found by Wolfe and O'Kane. J.R.

A65-17812
TWO LIGHT REACTIONS IN PHOTOSYNTHESIS.
George E. Hoch (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).
Record of Chemical Progress, vol. 25, Sept. 1964, p. 165-180. 15 refs.
National Institutes of Health Grant No. PH 43-63-36; Contract No. AF 49(638)-947; Contract No. NASw 747.

Description of the present knowledge on the nature of the two photoreactions in photosynthesis, of how they cooperate, and how the plant controls the energy flux into the two reactions. The following subjects are treated: (1) light absorbing pigments and the germination of the two-photoreaction concept, (2) chromatic transients and the "enhancement" effect, (3) effects of light color on respiration, (4) intermediates in photosynthetic electron transfer, (5) separation of the light reactions, (6) method of cooperation of the light reactions, (7) regulation of the light reactions, (8) autotrophic life, and (9) needed knowledge. M.M.

A65-17837
AUDITORY FATIGUE - INFLUENCE OF MENTAL FACTORS.
Mary Jayne Capps and William E. Collins (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).
Acoustical Society of America, Journal, vol. 37, Jan. 1965, p. 167, 168. 7 refs.

Experimental study of the influence of mental tasks on auditory fatigue. A 4000-cps fatigue tone at 40 db SL for 3 minutes was used, and 10 male subjects were exposed to the tone under conditions of mental arithmetic and reverie. It was found that temporary threshold shifts, as indicated by comparing pre- and post-fatigue thresholds, are consistently greater when subjects worked mental arithmetic during exposure to the fatigue tone than when they engaged in reverie. (Author) M. L.

A65-17930
LIFE SUPPORT SYSTEMS FOR SPACE MISSIONS.
Leonard Bongers (Martin Marietta Corp., Martin Co., Space Systems Div., Baltimore, Md.) and Bessel Kok (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).
Developments in Industrial Microbiology, vol. 5, 1964, p. 183-195. 30 refs.

Presentation of a comparative survey of regenerative, partially regenerative, and nonregenerative life support systems. Attention is focused on methods for controlling atmospheric gases and providing food in sealed environments occupied by a crew. Mission requirements strongly influence the control methods which will be employed in the environments. Also, mission time especially influences this selection. As an example, for a mission of short duration, the storage of oxygen, food, and water, and the disposal of metabolic waste products, is the obvious method. However, with an extension of mission time, chemical regeneration will partially displace the simple storage techniques. Specifically, reclamation is indicated of both the waste water and some of the oxygen bound in carbon dioxide. A further increase in mission time and crew size may make food storage uneconomical, and would require the recycling of almost all metabolic products. At present, it is considered unlikely that complete regeneration of carbon dioxide and waste products can be accomplished by other than biological means. Therefore, biosynthesis provides the only method of regeneration for missions lasting longer than several months. Two methods of bioregeneration are discussed: (1) the method of photosynthesis, which uses light energy and the metabolism of unicellular algae to maintain the biological cycle; and (2) the chemosynthetic method, which combines the electrolysis of water for the generation of oxygen, with a bacterial suspension for removing hydrogen and carbon dioxide, and producing food. The state of current knowledge and the unsolved problems associated with biological regenerative systems are reviewed. (Author) F.R.L.

A65-17996
BIODYNAMIC RESPONSE OF THE HUMAN BODY.
Henning E. Von Gierke (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Biodynamics and Bionics Div., Wright-Patterson AFB, Ohio).
(Southwest Research Institute and USAF, International Symposium on Bioastronautics and the Exploration of Space, 3rd, San Antonio, Tex., Nov. 16-18, 1964.)
Applied Mechanics Reviews, vol. 17, Dec. 1964, p. 951-958. 28 refs.
[For abstract see Accession no. A65-15537 06-04]

A65-18029
SELF-SUFFICIENCY OF NATURAL E. COLI POLYSOMES FOR AMINO ACID INCORPORATION.
I. D. Raacke and J. Fiala (Kaiser Foundation Research Institute, Laboratory of Comparative Biology, Richmond; California, University, Space Sciences Laboratory, Berkeley, Calif.).
National Academy of Sciences, Proceedings, vol. 52, Nov. 1964, p. 1283-1289. 21 refs.
Grant No. NsG 479; NSF Grant No. G 19532.

Investigation of the requirements for amino acid incorporation in isolated, active polysomes of Escherichia coli as opposed to gross ribosomal preparations consisting largely of inactive 70s particles. The methods for preparation of the crude extracts, their analyses, and their amino acid incorporation assays have been previously described. All assays were performed in the presence of KCl. The requirements for isolated polysome fractions were not found to differ qualitatively from those reported for whole ribosomal pellets. However, the fact that the activity was virtually the same in the presence and in the absence of supernatant is seen to indicate that these polysomes were enzymatically self-sufficient. Similarly, the limited effects of added sRNA, GTP, and ATP suggest that these cofactors were also bound to the polysomes, since contamination with unbound small molecules is unlikely after sedimentation through the sucrose density gradient. The absolute requirement for an energy-generating system appears to reflect the high concentration of nucleoside triphosphatases in this fraction. This apparent enzymatic self-sufficiency was investigated in further detail: in repeated experiments it was found that while the basal activity was always rather high, the effects of added supernatant and sRNA on the amino acid incorporating activity of the polysome fraction, as well as on that of the 70s, were exceedingly variable, ranging all the way from a tenfold stimulation to a tenfold inhibition. W.M.R.

A65-18031
THE EFFECT OF TEMPERATURE ON THE PROTON MAGNETIC RESONANCE SPECTRA OF RIBONUCLEASE, OXIDIZED RIBONUCLEASE, AND LYSOZYME.
Morton Mandel (Stanford University, School of Medicine, Dept. of of Genetics, Stanford, Calif.).
National Academy of Sciences, Proceedings, vol. 52, Sept. 1964, p. 736-741. 10 refs.
National Institute of Neurological Diseases and Blindness Grant No. NB-04270; National Institutes of Health Grant No. FR-00151-01; NASA Grant No. NG 81-60.

Observations of the spectra of ribonuclease and oxidized ribonuclease in a Varian H100 NMR spectrometer with a special temperature probe and of lysozyme in a Varian H60 apparatus with a standard temperature probe. Sodium 2,2-dimethyl-2 silapentane-5 sulfonate (DSS) was used as an internal reference standard for all chemical shift measurements. In ribonuclease, the structure of that part of the spectrum arising from the aromatic ring protons was found to change in the temperature range 50 to 70°C. At 70°C and above, there was significant narrowing of some of the spectral lines; in contrast, the proton spectrum of lysozyme was apparently unaffected by temperature changes to 75°C. The spectral lines of oxidized ribonuclease were much narrower than those of ribonuclease at room temperature. Higher temperatures produced some additional narrowing but otherwise the spectrum remained unchanged up to 90°C. W.M.R.

A65-18042
THE EFFECT OF RIBONUCLEASE DIGESTS OF AMINOACYL-sRNA ON A PROTEIN SYNTHESIS SYSTEM.
Mituru Takanami (California, University, Space Sciences Laboratory, Berkeley, Calif.).
National Academy of Sciences, Proceedings, vol. 52, Nov. 1964, p. 1271-1276. 17 refs.
Grant No. NsG 479.

Experimental test of a biological protein synthesis model in which growth is inhibited and an incomplete peptide chain is liberated into the soluble phase by the attachment of amino acid-nucleotide fragments to the C-terminal end of the growing chain. Escherichia coli strain B was grown in peptone broth and sRNA was prepared from the cells by the method of Zubay. The sRNA preparation was incubated with an E. coli enzyme fraction, ATP, and amino acids under conditions optimal for the incorporation of the latter. It was found that T1-ribonuclease digests of the AA-sRNA brought about the release of incomplete chains in a manner analogous to the action of puromycin. The digests were presumed to contain oligonucleotide fragments, some of which terminated with -CCA carrying an amino acid esterified to the terminal adenosyl group. Evidence was found suggesting that amino acids were transferred from the aminoacyl-oligonucleotides to the released chains. W.M.R.

A65-18202
CARBOHYDRATE METABOLISM OF MICE EXPOSED TO SIMULATED CHANGES IN GRAVITY.

Jiro Oyama and William T. Platt (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
(Federation of American Societies for Experimental Biology, Annual Meeting, 47th, Atlantic City, N. J., Apr. 16, 1963.)
American Journal of Physiology, vol. 207, Aug. 1964, p. 411-414. 22 refs.

Study of some of the initial biochemical changes in liver carbohydrate metabolism of the mouse after short-term centrifugation stress. Unrestrained mice were centrifuged for varying periods ranging from 0.5 to 10 hr at 2.5, 5, and 10 g. Liver glycogen and blood glucose levels increased significantly depending on the g load and exposure time. Adrenalectomy completely abolished the glycogen deposition response. The glycogen response was a critical function of the age of mice; unweaned mice did not respond. Blood corticosterone increased significantly prior to the deposition of glycogen. Centrifuged fed mice deposited three times the amount of glycogen of fasted mice. There was no significant difference in the amount of glycogen deposited in centrifuged mice previously starved for 1, 2, or 3 days. It is concluded that the increased glycogen deposited following centrifugation is effected by an increased elaboration of adrenal corticosterone. (Author) A. B. K.

A65-18219
DISTRIBUTION OF FOCUSED AND STRAY LIGHT ON THE RETINA PRODUCED BY A POINT SOURCE.
Glenn A. Fry (Ohio State University, School of Optometry, Columbus, Ohio).
Optical Society of America, Journal, vol. 55, Mar. 1965, p. 333-335.

Demonstration of the inadequacy for small angles of the indirect method of measuring the amount of stray light falling at the center of the fovea when the beam of light producing the stray light is focused at a point on the retina at an angle Θ from the fovea measured at the second nodal point. It is stated that stray light becomes important in the case of a strong glare source in the periphery of the field of view which produces stray light at the fovea and affects foveal vision in the same way as a patch of veiling luminance. For any given distribution of luminance in the field of view, there is created at each part of the retina a certain amount of stray light which acts as a patch of veiling luminance. It is noted that equations have been developed separately for computing stray light at the fovea for uniform and nonuniform distributions of luminance in the field of view, and that a device has been described for assessing stray light at the fovea for a given point of view and direction of viewing in any environment. M. M.

A65-18224
IONIZING RADIATION - EFFECT OF IRRADIATED MEDIUM ON SYNTHETIC PROCESSES.
Ernest C. Pollard, Marlin J. Ebert, Carolyn Miller, Kathryn Kolacz, and Thomas F. Barone (Pennsylvania State University, Biophysics Dept., University Park, Pa.).
Science, vol. 147, Feb. 26, 1965, p. 1045-1047. 9 refs.
Contract No. NsG 324.

Investigation of the sensitivity of processes of synthesis to ionizing radiation. It is stated that the incorporation of uracil-C^{14} into macromolecules in Escherichia coli cells is decreased by doses of ionizing radiation when the cells are in very dilute suspension. The decrease results from an action of irradiated medium on the cells, and a similar reaction is observed during the incorporation of thymine (indication of DNA synthesis) and of proline and valine (indicative of protein synthesis). It is noted that irradiated medium reduces the formation of β-galactosidase but does not cause the degradation of DNA. (Author) M. M.

A65-18236
THE CASE FOR GOING TO THE MOON. VI - THE CASE FOR LIFE BEYOND EARTH.
Neil P. Ruzic.
Industrial Research, vol. 7, Feb. 1965, p. 79-88, 90.

Discussion of schemes for detecting life on other planets and of the prospect of communicating with extraterrestrial beings. The subjects considered are: (1) the Moon as a hospital, (2) moonships to Mars and Venus, (3) detectors of extraterrestrial life, (4) ancient civilization on Mars, and (5) communication with intelligent extraterrestrials. It is concluded that the possibility of communicating with beings whose existince can only be surmised is sheer speculation. M. M.

A65-18287
AGING AT THE CELLULAR LEVEL.
C. Sorokin (Maryland, University, Dept. of Botany, College Park, Md.).
Experientia, vol. 20, 1964, p. 1-10. 75 refs.
NASA-supported research.

Review of experiments on the reduction in the rate of photosynthesis, respiratory activity, and general biosynthesis activity, and the accumulation of various waste products during the development of Chlorella 7-11-05, Scenedesmus, Hydrodictyon, Tetrahymena pyriformis, and other microbial unicellular organisms. A limitation affecting studies of aging in multicellular organisms has its origins in the randomness of the age distribution of cells in tissues and organs. In populations of microbial cells, however, age differences can be narrowed through the use of synchronization techniques. Distinctions are drawn between the concepts of primary and secondary aging. The essential feature of primary aging is seen to be a marked decline in metabolic activity, the immediate cause being the degradation of enzyme systems. In its pure form primary aging occurs in undifferentiated cells; in cells which eventually differentiate, the primary processes are at some moment of cell development supplemented by secondary processes of aging, and at a later stage may even be replaced by them. Cells in a multicellular system are seen to be influenced (favorably or unfavorably) by each other - i.e., by competition between cells and transportation difficulties that result in local shortages of nutrients and the accumulation of products of metabolism. Thus, it is believed that many "demonstrations" of aging in these organisms are, to a large degree, due to overcrowding, malnutrition, and disease. Aging is seen to be a universal characteristic of life, more universal than death, since death is not an inevitable event, at the cellular level. It is found to be more universal than growth and cell division, since life can persist for some time without these. Specifically, aging is considered to be a developmental aspect of metabolism. This conclusion contradicts the findings of other researchers who have assumed that aging and death are the price paid by an organism for differentiation and higher organization. W. M. R.

A65-18288
SUBJECTIVE INFORMATION AS A FUNCTION OF SOURCE INFORMATION.
Warren H. Teichner (Massachusetts, University, Dept. of Psychology, Amherst, Mass.).
Human Factors, vol. 6, Jun. 1964, p. 241-252. 8 refs.
Contract No. AF 19(628)-280.

Description of three experiments in which subjective information, defined as the amount of information in judgments of number and frequency of events, was studied. The results are said to suggest different phenomena according to whether judgments are made relative to the display or to the source from which the display is a sample. The results also suggested a variety of other phenomena regarding the effects of the number of events at a time, redundancy and the rate time of information presentation on subjective information. (Author) M. M.

A65-18289
EFFECTS OF INSTRUCTIONS ON WIRING TASK ACCOMPLISHMENT.
Robert L. Hilgendorf and John F. Ahlborn (USAF, Air University, Institute of Technology, Wright-Patterson AFB, Ohio; Purdue University, Lafayette, Ind.).
Human Factors, vol. 6, Jun. 1964, p. 253-256. 6 refs.

Attempt at determining the effects of different types of instruction on task accomplishment. Three groups of 19 subjects each were given a nonsense wiring task on an IBM machine control panel under three conditions of instruction: diagramed instructions, diagramed instructions with additional references on the control panel, and written instructions with the additional references on the control panel. It was found that the group using the diagramed instructions with the additional references on the control panel had longer task accomplishment times than the other two groups. There were no significant differences among the three groups in errors committed. (Author) M. M.

A65-18290
TROUBLESHOOTING PERFORMANCE AS A FUNCTION OF PRESENTATION TECHNIQUE AND EQUIPMENT CHARACTERISTICS.

W. R. Atchley and Donald J. Lehr (Republic Aviation Corp., Farmingdale, N.Y.).
Human Factors, vol. 6, Jun. 1964, p. 257-263. 5 refs.
Contract No. AF 33(657)-10834.

Experimental evaluation of three techniques of presenting troubleshooting information, using a paper and pencil test to simulate equipment characteristics. The subjects were 222 AF basic trainees. The results are said to indicate that procedural instructions are significantly more efficient ($p < 0.001$) than standard schematics or data flow diagrams in terms of troubleshooting time and accuracy. It is stated that the interactive effects of circuit type and circuit complexity were determinates of troubleshooting problem difficulty. As circuit complexity increases, so also does the efficiency of procedural instructions relative to the efficiency of standard schematics and data flow diagrams. (Author) M. M.

A65-18291
THE DEI TECHNIQUE FOR EVALUATING EQUIPMENT SYSTEMS FROM THE INFORMATION TRANSFER POINT OF VIEW.
Arthur I. Siegel, William Miehle, and Philip Federman (Applied Psychological Services, Wayne, Pa.).
Human Factors, vol. 6, Jun. 1964, p. 279-286. 7 refs.
Contract No. DA-36-039-sc-87230.

Presentation of a display evaluative index (DEI) technique, a calculational method for deriving a figure of merit of the effectiveness of displays of a particular equipment in transferring information to the operator which causes the operator to act on that information and perform the appropriate control action. It is stated that reliability, validity, and discriminating power results are satisfactory. (Author) M. M.

A65-18292
PROBLEMS IN EVALUATING SYSTEM MANNING REQUIREMENTS ESTIMATES AND ESTIMATION TECHNIQUES.
Sidney Gael (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Human Factors, vol. 6, Jun. 1964, p. 299-303. 9 refs.

Consideration of system manning requirements information which is desired prior to the time when it is scheduled to become available under the personnel subsystem concept. Rather than proceed from the conclusion that a new manning estimation method is needed to obtain manning information earlier, it is assumed that present methods can be used. It is stated that support for the assumption was to be obtained by validating manning requirements estimates for several systems, and assessing the adequacy of the estimation methods. Problems that arose in conducting the study are discussed. The shortcomings of the Mace B and the Bomarc manning requirements analyses are discussed along with the inappropriateness of system test data as criteria against which to evaluate manning estimates. The human factors system analysis approach, modified to account for pertinent quantitative data, is recommended for estimating manning requirements during the initial stage of system development. (Author) M. M.

A65-18293
THE EFFECT OF FLASH DISTRIBUTION AND ILLUMINATION LEVEL UPON THE DETECTION OF LOW INTENSITY LIGHT STIMULI.
Richard E. Wienke (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
(Armed Forces-National Research Council Committee on Vision, Meetings, Washington, D.C., Apr. 23-24, 1964.)
Human Factors, vol. 6, Jun. 1964, p. 305-311.

Determination of the proportion of light flashes detected by naive subjects, as a function of two flash groupings and two levels of flash intensity. One flash grouping, the "massed" condition, consisted of two groups of six flashes. The flashes were presented at the rate of one flash per second with about 1° of arc separations. The groups were separated by approximately 90 sec of time and 90° of arc. The second, or "distributed" condition, of twelve flashes was presented at the rate of one flash for each 10° of arc and 10 sec of time. The illuminance level of these two conditions was equivalent to 0.13 kmc. One group of subjects was run under the "distributed" condition when the illuminance was increased to 0.935 kmc. There was no significant difference in the proportions of subjects detecting flashes where flash distribution was the independent variable. A greater proportion of flashes was seen under the "distributed" condition than under the "massed" condition. More subjects made detections when the stimulus was 0.935 kmc than when it was 0.13 kmc. (Author) M. M.

A65-18333 #
SUBSTITUTION OF VERBAL REACTION FOR MOTOR REACTION IN SIGNAL IDENTIFICATION TASKS.
Lien-Tsung Hsu, Te-Chuang Yang, and Tsi-Chih Wang (Academia Sinica, Institute of Psychology, Peking, Communist China).
(Kexue Tongbao, no. 9, 1964, p. 820, 821.)
Scientia Sinica, vol. 14, Jan. 1965, p. 150, 151. 5 refs. Translation.

Comparison of the efficiencies of a human operator in the use of verbal and motor (key-pressing) reactions to various coded signals. In all the experiments the signals were arranged horizontally on a display panel. In the motor control experiments, two stimulus-response patterns were tested: in one, the keys were placed conveniently near the operator's right hand; in the other, the keys were placed directly beneath the signals. In the verbal reaction tests, the operator responded into a voice key recorder which turned off the signal while simultaneously registering the reaction time and response error. Higher efficiency was obtained with verbal control when the signals were few in number; as the number of signals, involving complex coding processes, increased, the rate of information gain tended to decrease. It is concluded that the adoption of verbal or motor reactions in a display design should take into account not merely the efficiencies involved, but also the compatibility between stimulus and response. W. M. R.

A65-18362
POSSIBLE APPLICATION OF THE THEORY OF THE DETECTABILITY OF A SIGNAL TO THE CALCULATION OF CERTAIN PSYCHOMETRIC FUNCTIONS [SUR LA POSSIBILITE D'APPLIQUER LA THEORIE DE LA DETECTABILITE D'UN SIGNAL AU CALCUL DE CERTAINES FONCTIONS PSYCHOMETRIQUES].
Raymond Crouzy (Muséum National d'Histoire Naturelle, Laboratoire de Physique Appliquée, Paris, France).
Académie des Sciences (Paris), Comptes Rendus, vol. 260, no. 6, Feb. 8, 1965, p. 1773-1776. 5 refs. In French.

Discussion of how to determine which phenomenon the variable of the theory of signal detectability should be compared to. In the case of the differential threshold of luminances at very weak levels, it would appear that the question is the aleatory number of nervous impulses arising at the "decision center." The theory should then be adapted to take account of the discontinuous character of the visual process. An attempted numerical application is presented. F. R. L.

A65-18373 #
INVESTIGATION OF WRITING MOTION COORDINATION IN SPACE-FLIGHT CONDITIONS [ISSLEDOVANIE KOORDINATSII DVIZHENIIA PRI PIS'ME V USLOVIIAKH KOSMICHESKOGO POLETA].
A. T. Mantsvetova, I. P. Neumyvakin, V. F. Orlova, V. A. Trubnikova, and I. M. Freidberg.
Kosmicheskie Issledovaniia, vol. 3, Jan.-Feb. 1965, p. 142-158. 15 refs. In Russian.

Presentation of the results of an analysis of the coordination of writing motion motions based on spaceship logbooks of the Soviet astronauts Titov, Nikolaiev, Popovich, Bykovskii and Tereshkova. Photographs of logbook entries and diagrams showing variations in writing patterns are presented. The effects of flight conditions on astronauts' handwriting habits are assessed. V. Z.

A65-18374 #
REACTIVITY OF AN IRRADIATED ORGANISM UNDER THE ACTION OF ACCELERATIONS OF CRITICAL MAGNITUDE [REAKTIVNOST' OBLUCHENNOGO ORGANIZMA PRI DEISTVII KRITICHESKOGO PO VELICHINE USKORENIIA].
B. I. Davydov, V. V. Antipov, and P. P. Saksonov.
Kosmicheskie Issledovaniia, vol. 3, Jan.-Feb. 1965, p. 159-166. 19 refs. In Russian.

Presentation of the results of experiments on the ability of mice, irradiated with 250 to 850 rad, to endure critical acceleration levels of 40 to 42 g. Increased ability to endure acceleration overloads is revealed in irradiated mice. An attempt is made to extrapolate data for humans from animal experiments. V. Z.

A65-18398
EVIDENCE FOR REPAIR OF ULTRA-VIOLET DAMAGED DEOXYRIBONUCLEIC ACID IN CULTURED MAMMALIAN CELLS.
Ronald E. Rasmussen and Robert B. Painter (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).
Nature, vol. 203, Sept. 26, 1964, p. 1360-1362. 13 refs.

Extension of previous work on the effects of ionizing radiation on the nucleic acid metabolism of mammalian cells in vitro. The results accumulated so far suggest that an active ultraviolet repair mechanism exists which is especially evident in cells that have incorporated bromuracil deoxyriboside (BUdR) into their DNA. HeLa S3 cells and the Chinese hamster line DFAF-33, routinely maintained in Eagle's medium, were grown as monolayers in special flasks. Two or three days prior to irradiation with 2537-Å light from a low-pressure Hg arc, the medium of half the cultures was replaced with 1.6×10^{-5} M 5-BUdR and the other half with 1.6×10^{-5} M thymidine (TdR). When HeLa S3 was grown in normal medium or medium containing TdR, the effect of UV on the incorporation of radioactive nuclei acid precursors into DNA followed nearly identical patterns, independent of the precursor used; in 5-BUdR, the extent of incorporation varied with the type of precursor. Qualitatively similar results were obtained with DFAF-33. The autoradiographic results with DFAF-33 cultures were found to be both surprising and revealing: the thymidine-grown cells exhibited no difference between irradiated and unirradiated cultures in the fraction of cells showing nuclear label; however, with BUdR-grown cells, the fraction of labelled cells in irradiated populations was, in all cases, 98% or greater, with only an occasional cell not exhibiting grains above the nucleus. With HeLa the results were even more surprising, and showed a significantly different response from those with the Chinese hamster cells: with this line not only did irradiated BUdR-grown cells exhibit almost 100% labelling, but so also did the thymidine-grown cells. It is concluded that there is a qualitative difference between the two cell lines in their response to and recovery from UV damage. W.M.R.

A65-18424 #
THE NEW PHYSIOLOGY OF VISION. III - CORPUSCLES OF LIGHT AND THE PERCEPTION OF LUMINOSITY.
C. V. Raman.
Indian Academy of Sciences, Proceedings, Section A, vol. 60, Oct. 1964, p. 211-218.

Discussion of the observation of a phenomenon considered to be a consequence of the corpuscular nature of light - that when an observer views a uniformly illuminated surface from a sufficient distance, its luminosity does not appear uniform or static, but exhibits fluctuations over its entire area. It is stated that the nature and magnitude of the observed effects depend greatly on the strength of the illumination. A striking feature is that the fluctuations continue to be conspicuous even when the illumination of the screen is thousands of times more powerful than the absolute threshold at which the sensation of light itself vanishes. The subjects considered are: (1) observations with monochromatic light, (2) factors influencing the observed effects, (3) effect of varying the luminosity, (4) effect of varying the observer's position, (5) influence of spectral composition, and (6) the origin of the fluctuations. It is concluded that the very striking nature of the fluctuations observed when the illuminating radiation is in the region of shorter wavelengths becomes intelligible when it is recalled that the corpuscles in this region represent larger quanta of energy and for the same energy are therefore fewer in number, and that, further, the chance of a corpuscle being actually absorbed and giving rise to a visual impulse is necessarily much smaller in view of the very low luminosity of these regions of the spectrum. M.M.

A65-18427
HYPOXIA - AN ANTI-DECONDITIONING FACTOR FOR MANNED SPACE FLIGHT.
Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 36, Feb. 1965, p. 97-100. 16 refs.

Brief review of the differences between the syndrome of deconditioning and the syndrome of acclimatization induced by prolonged hypoxia. Physiological deconditioning results in a clinical picture of decreased biological activity, manifested by decreased plasma volume, decreased red blood cell mass, decreased red blood cell production with inactive bone marrows, increased resting heart rate, decreased exercise tolerance, decreased orthostatic tolerance, decreased coronary blood flow, increased storage of catecholamine products in the myocardium, decreased muscle mass and muscle tone with resultant increased nitrogen excretion and increased calcium mobilization with increased calcium excretion. Acclimatization produces clinical features which are exactly opposite of those noted in deconditioning. Acclimatization results in increased organ activity with increased bone marrow activity and erythropoiesis with increased red blood cell mass, and increased blood volume. With acclimatization there is a tendency toward vagotonia with decreased heart rate. There is an increased exercise tolerance and an increased coronary blood flow. These observations suggest that prolonged hypoxia of a sufficient degree to produce suitable acclimatization is a useful agent in preventing deconditioning during manned spaceflight, and in those situations on Earth that result in deconditioning. F.R.L.

A65-18428
PERFORMANCE AND PHYSIOLOGICAL RESPONSES OF PILOTS IN SIMULATED LOW-ALTITUDE HIGH-SPEED FLIGHT.
Stanley M. Soliday and Ben Schohan (North American Aviation, Inc., Human Factors Group, Columbus, Ohio).
(Aerospace Medical Association, Annual Meeting, Miami Beach, Fla., 1964.)
Aerospace Medicine, vol. 36, Feb. 1965, p. 100-104. 9 refs.
Contract No. NASw 451(HS-819).

Results of low-altitude "flight" tests carried out by eight experienced pilots performing piloting and navigational tasks in a simulated F-111 type of aircraft. The moving base simulator had a total vertical travel of 12 ft and an acceleration capability of ± 6 G. The pilots maintained a 500-ft clearance equally well at airspeeds of 0.9 and 1.2 Mach, and over flat and hilly desert terrain. However, their ability to maintain this clearance deteriorated greatly when the degree of buffeting increased. Navigational task performance did not vary with experimental condition. Heart and respiratory rates were within a normal range for the tasks being performed, although positive correlations of both rates with vertical accelerations, and with deviations of the "aircraft" about the required clearance altitude were found. A side-stick controller was found to be much more efficient than a conventional center stick under the experimental conditions used. (Author) F.R.L.

A65-18429
CORIOLIS EFFECTS DURING PITCH AND ROLL MANEUVERS IN A PILOTED FLIGHT SIMULATOR.
John D. Stewart (NASA, Ames Research Center, Moffett Field, Calif.) and Brant Clark (San Jose State College, Dept. of Psychology, San Jose, Calif.).
Aerospace Medicine, vol. 36, Feb. 1965, p. 105-112. 7 refs.

Determination of the effects of suprathreshold values of Coriolis acceleration on the pilot of a flight simulator, with particular reference to his perception of illusory motion and his position in space. The particular Coriolis stimuli selected were those that would be anticipated in the use of the Ames five-degrees-of-freedom simulator in studies of aircraft and spacecraft. Three modes of simulator motion were used: rotation of the cockpit around the z axis at 30 ft from the center of rotation, and pitch and roll of the cockpit. The data consisted of subjective reports of apparent motion and estimates of body position. Seven experienced observers who showed normal post-acceleration and post-deceleration aftereffects of rotation on the simulator were used. Two were research pilots, and the others were the authors and three members of the Ames staff. The frequency reports of Coriolis effects increased as a function of simulator velocity from 2 to 12 rpm for both pitch and roll maneuvers. The frequency of the Coriolis effects was nearly 100% at 7 rpm and above. The duration of the Coriolis effects also increased as a function of the simulator velocity, the duration of the effects for pitch and roll being very similar. The mean duration of the reported rotation was approximately 9 sec at 2 rpm and 15 sec at 12 rpm, for the pitch and roll maneuvers used. The observer's estimate of body position tended

to be very close to the deviation of his body position from the direction of the resultant force acting on him under the various experimental conditions. The observers did, however, tend to underestimate the variation of their body position at the lower velocities in accordance with similar static estimates, but they tended to be close to the corresponding angle at 12 rpm. (Author) F.R.L.

A65-18430
FLYING STRESS IN RELATION TO FLYING PROFICIENCY.
Henry B. Hale, James P. Ellis, Jr., Edgar W. Williams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Dept., Brooks AFB, Ohio), and John C. Duffy (USAF, 35th Tactical Fighter Wing, Homestead AFB, Fla.).
(Aerospace Medical Association, Annual Meeting, 35th, Miami, Fla., May 11-14, 1964.)
Aerospace Medicine, vol. 36, Feb. 1965, p. 112-116. 11 refs.

Use of postflight urinary determinations for the purpose of evaluating flight stress in ten pilots who were practicing bombing-strafing maneuvers. Tests were conducted in daytime and at night. Control data were obtained on nonflying days. Urinary determinations included norepinephrine, epinephrine, 17-hydroxy-corticosteroids, creatinine, urea, uric acid, phosphate, potassium and sodium. By the use of this battery of determinations it was possible to appraise flight sensitivity in sympathoadrenal, adreno-cortical, and metabolic activities. The results are considered to be a good guide for further research, and suggest that flying proficiency is high when endocrine-metabolic displacement (physiological cost) is low. The observations also indicate that stress reactions to flight conform to the General Adaptation Syndrome pattern. (Author) F.R..

A65-18431
STUDY OF EFFECTS OF CONTINUOUS INHALATION OF HIGH CONCENTRATIONS OF OXYGEN AT AMBIENT PRESSURE AND TEMPERATURE.
Francis W. Weir, Dale W. Bath, Paul Yevich, and Fred W. Oberst (U.S. Army, Edgewood Arsenal Chemical Research and Development Laboratories, Directorate of Medical Research, Toxicology Div., Edgewood Arsenal, Md.).
Aerospace Medicine, vol. 36, Feb. 1965, p. 117-120. 12 refs.
USAF Project No. 7165.

Discussion of experiments where mice, rats, guinea pigs, dogs, and monkeys were exposed continuously to oxygen (95%-99%) for 240 hr, unless interrupted by death. The initial toxic effects of oxygen were labored breathing and lethargy, which occurred after 15 to 20 hr in the rats, and 36 to 42 hr in the dogs. In the monkeys, these effects occurred considerably later - 72 to 96 hr. Sex and age differences of rats did not significantly affect the toxicity of oxygen. Most animals dying during exposure showed extensive bilateral pleural effusions and pulmonary edema. Microscopically, other features were emphysema and dilatation of the tracheobronchial tree. Animals surviving 240 hr of oxygen exposure showed pulmonary edema and severe organ and tissue damage, but did not show pleural effusion. The adventitia of the tracheobronchial tree and of the large blood vessels of the lungs was edematous. Necrosis of the pulmonary vein and thickening of the pulmonary arterioles were also seen. Times to death in animals varied over a wide range, and only a few rats survived the 240-hr exposure period. All other animal species died before the end of this period. (Author) F.R.L.

A65-18432
EXPERIMENTAL CONTROLS AND BIOLOGICAL EXPERIMENTS WITH ATMOSPHERIC IONS.
Allan H. Frey (Institute for Research, State College, Pa.).
Aerospace Medicine, vol. 36, Feb. 1965, p. 121-123. 8 refs.
Contracts No. Nonr 3303(00); No. Nonr 4169(00).

Summary of data on instrumentation and on the controls which are necessary when studying the biological effects of atmospheric ions. Sources of unreliability in experiments, such as measurement devices, lack of grounding, movement of subject or specimen, etc., are identified. On the basis of these data, it is concluded that there is no experimental basis to justify the positions that ions either do or do not have a significant effect. F.R.L.

A65-18433
TOLERANCE OF THE VESTIBULAR APPARATUS OF THE HYPOTHERMIC HAMSTER TO 840 G ACCELERATION.
B. Black-Schaffer, Stanley B. Prusiner, and H. Esparza (Cincinnati, University, College of Medicine, Dept. of Pathology; Cincinnati General Hospital, Cincinnati, Ohio).
Aerospace Medicine, vol. 36, Feb. 1965, p. 123-126. 26 refs.
Grant No. NsG 75-60.

Results of the centrifugation of female golden hamsters at 2000 rpm (840 G) during profound hypothermia. Upon revival, the animals developed a syndrome characteristic of a hemilabyrinthectomy. Recovery was complete in two to three weeks. Repeated centrifugation of the same animal, after recovery from the effects of the preceding spins, resulted in the reappearance of the same syndrome, modified only by the positioning of the animal in respect to the center of the spin. Examination of the labyrinths revealed only hemorrhage in the middle and external ears, with no recognizable lesions of the internal ears. It is proposed that the extraordinary resistance of the labyrinth components to accelerative stress is accomplished by increasing, through cooling, the viscosity of the gelatinous membrane in which the otoliths are embedded, thus, in accordance with Stoke's law, minimizing the migration of the otoconia in the centrifugal field. (Author) F.R.L.

A65-18434
CIVIL AVIATION AND CONTACT LENSES.
Robert L. Wick, Jr. (Garrett Corp., Los Angeles, Calif.).
Aerospace Medicine, vol. 36, Feb. 1965, p. 127-130. 11 refs.

Discussion of the increasingly important problem in civil aviation involving the pilot who wishes to wear contact lenses. Although there are a number of theoretical hazards, as a practical matter there appear to be no contraindications. A majority of ophthalmologist aviation medical examiners, who are also pilots, approve their use if properly fitted and supervised by an ophthalmologist experienced with contact lenses. Over half of the group who also are certified by the ophthalmological board even approve their use for airline pilots. F.R.L.

A65-18443
THE CAUSES FOR HIGH SWIMMING SPEEDS OF DOLPHINS [ÜBER DIE URSACHEN DER HOHEN SCHWIMMGESCHWINDIGKEITEN DER DELPHINE].
Henrich Focke.
Zeitschrift für Flugwissenschaften, vol. 13, Feb. 1965, p. 54-61. 14 refs. In German.

Analysis aimed at clarifying the discrepancy between the high speeds attained by dolphin species and their zoologically established muscle power. The hypotheses and arguments proposed by various authors are examined and compared, and numerical calculations to assess the order of magnitude of the predictions are presented. V. P.

A65-18633
RADIATION BIOLOGY AND SPACE ENVIRONMENTAL PARAMETERS IN MANNED SPACECRAFT DESIGN AND OPERATIONS.
Aerospace Medicine, vol. 36, Feb., Section 2, 1965. 62 p. 286 refs.
Report sponsored by McDonnell Aircraft Corp. and the University of California, Los Alamos Scientific Laboratory.

Comprehensive survey of the probabilistic effects of radiation on man, of value to the present space effort, to nuclear emergency and civil defense planning, and to future space application of nuclear energy. The topics treated are: (1) space radiation environment, (2) biological effects of ionizing radiation, (3) application to spaceflight operations, and (4) state of current knowledge. Criteria are derived for consideration of man's response to space radiation exposure so that radiation risks may be taken into account, during spacecraft design and operational planning phases, along with the other inherent hazards of manned spaceflight. It is stated that the only basis for derivation of such criteria is the vast amount of data on the effects of so-called conventional radiation exposures (involving low and intermediate energy electromagnetic and particulated radiations) on animals and occasionally on man. Unfortunately, exposures in space will not be conventional either with regard to the exposure conditions or the nature, energy, and spectral distribution of the radiation. The necessity is expressed for discussing some of the general and specific aspects of the space radiation environment and some of the exposure conditions that may be contemplated. M.M.

LC ENTRIES

A65-80533
PERFORMANCE AND PHYSIOLOGICAL RESPONSES OF PILOTS IN SIMULATED LOW-ALTITUDE HIGH-SPEED FLIGHT.
Stanley M. Soliday and Ben Schohan (North Am. Aviation, Inc., Human Factors Group, Columbus, Ohio).
(Aerospace Medical Association, 35th Annual Scientific Meeting, Miami Beach, Fla., May 11–14, 1964).
Aerospace Medicine, vol. 36, Feb. 1965, p. 100–104. 9 refs.
NASA Contract NASw-451(HS-819).

Eight experienced jet test pilots performed piloting and navigational tasks while flying a TFX-type aircraft in simulated low-altitude, high-speed missions. The flights were made in a moving-base simulator that had a total vertical travel of 12 feet and an acceleration capability of ±6 g. The pilots maintained a 500-foot clearance equally well at airspeeds of 0.9 and 1.2 Mach and over flat and hilly desert terrain. However, their ability to maintain this clearance deteriorated greatly when the degree of buffeting increased. Navigational task performance did not vary with experimental condition. Heart and respiratory rates were within a normal range for the tasks being performed, although positive correlations of both rates with vertical accelerations and with deviations of the aircraft about the required clearance altitude were found. A sidetrack controller was found to be much more efficient than a conventional center stick under the experimental conditions used.

A65-80534
FLYING STRESS IN RELATION TO FLYING PROFICIENCY.
Henry B. Hale, John C. Duffy, James P. Ellis, Jr., and Edgar W. Williams (USAF School of Aerospace Med., Brooks AFB, Tex.)
(Aerospace Medical Association, 35th Annual Scientific Meeting, Miami Beach, Fla., May 11–14, 1964).
Aerospace Medicine, vol. 36, Feb. 1965, p. 112–116. 11 refs.

Postflight urinary determinations were employed for the purpose of evaluating flight stress in 10 pilots who were practicing bombing-strafing maneuvers. Tests were conducted in daytime and at night. Control data were obtained on nonflying days. Urinary determinations included norepinephrine, epinephrine, 17-hydroxycorticosteroids, creatinine, urea, uric acid, phosphate, potassium, and sodium. By the use of this battery of determinations, it was possible to appraise flight-sensitivity in sympathoadrenal, adrenocortical, and metabolic activities, The results give good leads for further research and suggest that flying proficiency is high when endocrine-metabolic displacement (physiologic cost) is low. These observations also indicate that stress reactions to flight conform to the General Adaptation Syndrome pattern.

A65-80535
THE INFLUENCE OF X-RAYS AND VIBRATION ON CELL NUCLEI OF THE BONE MARROW OF MAMMALS [DEISTVIE VIBRATSII I RENTGENOVYKH LUCHEI NA IADRO KLETOK KOSTNOGO MOZGA MLEKOPITAIUSHCHIKH].
Iu. S. Demin (USSR, Acad. of Sci., Inst. of Biol. Phys., Moskva).
Radiobiologiia, vol. 4, 1964, p. 563–568. 24 refs. In Russian.

A 100 r. dose of X-radiation and vertical vibration of 60 c.p.s. and 0.25 mm. amplitude were applied to mice for 20 min., in order to determine their combined effect on nucleus behavior in the bone marrow cells. Vibration alone produced lasting disturbance in mitosis characterized by an increase in the number of adhesions. The combined action produced a smaller number of cells with abnormal mitosis than irradiation alone.

A65-80536
THE INFLUENCE OF IONIZING RADIATION AND CORIOLIS ACCELERATION ON THE FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER [DEISTVIE IONIZIRUIUSHCHEGO IZLUCHENIIA I USKORENIIA KORIOLISA NA FUNKTSIONAL'NOE SOSTOIANIE VESTIBULIARNOGO ANALIZATORA].
V. S. Nesterenko.
Radiobiologiia, vol. 4, 1964, p. 643. In Russian.

Rabbits exposed to a 800 r dose of γ-radiation showed a sharp decrease in the response of their vestibular analyzer to Coriolis acceleration. This effect lasted through the entire course of radiation sickness.

A65-80537
FUNCTIONAL CHANGES IN GUINEA PIG ERYTHROCYTES BY LETHAL GAMMA-IRRADIATION IN VIVO [FUNKTSIONAL'NOE IZMENENIE ERITROTSITOV IN VIVO PRI GAMMA-OBLUCHENII MORSKIKH SVINOK V LETAL'NOI DOZE].
L. V. Orlova (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).
Radiobiologiia, vol. 4, 1964, p. 649–655. 33 refs. In Russian.

Normal guinea pigs display diurnal fluctuations in the degree of erythrocyte fragility of the peripheral blood. After an exposure of the animals to a 700 r. dose of whole-body γ-radiation, two phases of changes in erythrocyte fragility were noted: (1) an immediate change within the physiological limits, and (2) irreversible changes during the entire course of radiation sickness. The irreversible changes occurred one to six days after irradiation and increased until the animals died. It is possible, that the first phase was due to a direct neurohumoral effect of the radiation, while the second phase was the result of permanent pathological changes.

A65-80538
ON THE MECHANISM OF RADIOPROTECTIVE ACTIVITY OF ORTHO-META- AND PARAAMINOPROPIOPHENONES [K VOPROSU O MEKHANIZME RADIOZASHCHITNOGO DEISTVIIA ORTO-, META-I PARAAMINOPROPIOFENONOV].
E. F. Romantsev and N. I. Bicheikina (Inst. of Biophys., Minzdrav, SSSR, Moscow, USSR).
Radiobiologiia, vol. 4, 1964, p. 743–745. 7 refs. In Russian.

Ten to twenty minutes after intraperitoneal injection of 0.5 ml./200 g. of propylene glycol, 100 mg./kg. of monoaminopropiophenone (MAPP), or 100 mg./kg. of orthoaminopropiophenone (OAPP), the peripheral blood of albino rats showed no MetHb. Injections of paraaminopropiophenone (PAPP) caused gradual appearance of MetHb, 10 to 20 min. after injection. Injections of phenones 17 to 20 min. before γ-irradiation protected the animals against radiation at various degrees. The conclusion may be drawn that MetHb formation cannot be considered a main factor in the radiation protection mechanism.

A65-80539
MASSIVE DOSE RADIATION OF HIGH-ENERGY PROTON BEAMS IN BIOLOGICAL EXPERIMENTS ON MAMMALS [DOZNOE POLE DLIA OBLUCHENIIA ZHIVOTNYKH PROTONAMI VYSOKIKH ENERGII].
V. P. Afanas'ev, I. B. Keirim-Markus, E. E. Kovalev, S. S. Kuznetsova, V. A. Sakovich, I. N. Smirennyi, I. K. Sokolova, and M. A. Sychkov.
Radiobiologiia, vol. 4, 1964, p. 775–781. 18 refs. In Russian.

It is possible to obtain massive-dose radiation of a high-energy proton beam by the use of lead filters, which would satisfy all the requirements for biological experiments. The amount of radiation received could be checked by a number of dosimetric methods now in use, which are quite suitable for measuring tissue doses of protons of 100 to 700 Mev energy. Using bilateral irradiation, it is possible to produce tissue doses in a dog at equal distribution of ±10%. In irradiating large animals with 500 Mev protons, the secondary radiation can be estimated within 20% to 30% of the absorbed dose in rads. However, internal doses have not been sufficiently studied.

A65-80540
THE EFFECT OF FAST NEUTRONS ON NUCLEI IN DIFFERENT PHASES OF THE HUMAN CELL CYCLE IN TISSUE CULTURE [EFFEKT DEISTVIIA BYSTRYKH NEITRONOV NA IADRO V RAZNYKH FAZAKH TSIKLA KLETOK CHELOVEKA V KUL'TURE TKANI].
N. P. Dubinin and N. P. Mokeeva (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).
Radiobiologiia, vol. 4, Feb,. 1965, p. 554–562. 9 refs. In Russian.

The relative biological effectiveness (RBE) of fast neutrons at a mean energy of 1.2 Mev, a linear energy transfer (LET) of 50 to 150 Kev/Mc, and a dose of 5.4 rad/min. (considering the entire cell cycle) is equal or even greater than the RBE of X-rays at LET 100 Kev/mc. However, the effect varies according to the different phases of the human cell cycle. The neutron effect also differs from the X-ray or γ-ray effect, because neutrons induce secondary processes which lead to changes in the nuclear structures. When the LET value of neutrons is close to that of X-rays, the mitotic effect is similar. However, it is different for various phases. This fact indicates that not only LET, but also other factors in the interaction of the initial physical processes evoked by the neutrons, affect the final cytogenic changes. These findings suggest the need for further study of the mechanism of chemical protection, or for development of sensibilization of the radiation effect on living cells.

A65-80541
THE ROLE OF ADRENAL GLANDS IN REACTION TO IRRADIATION BY APPLICATION OF CHEMICAL PROTECTORS [ROL' NADPOCHECHNIKOV V REAKTSIIAKH NA OBLUCHENIE S PRIMENENIEM SREDSTV KHIMICHESKOI ZASHCHITY].
V. P. Korotkova and A. M. Stashkov (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Leningrad).
Radiobiologiia, vol. 4, 1964, p. 594–598. 12 refs. In Russian.

The average survival time for adrenalectomized rats and mice was considerably less than in normal animals, after they were subjected to a 600 to 800 r. dose of whole-body X-irradiation. These findings indicate an important role of the adrenals in the animals' ability to survive radiation damage. In some animals adrenalectomy caused development of an intestinal syndrome, which led to death within three to five days after exposure. The protective action of antipherin was less in the adrenalectomized than in normal mice. In rats this radioprotective drug produced no protection after adrenalectomy. However, the fact that antipherine and mercamine gave some protection in one species and not in the other indicates that the role of the adrenals may be of a secondary nature. Therefore, certain chemicals may be considered not only with regard to radiation effect but also as stimulants of the physiological protective mechanism.

A65-80542
THE APPLICATION OF A RADIOMIMETIC (ERYTHROCYTIC) MODEL FOR INVESTIGATION OF POTENTIAL RADIOPROTECTORS OF THE THIASOLIDINE GROUP [PRIMENENIE RADIOMIMETICHESKOI MODELI (ERITROTSITARNOI) DLIA IZUCHENIIA POTENTSIAL'NYKH RADIOPROTEKTOROV GRUPPY TIAZOLIDINA].
M. L. Kakushkina, Iu. B. Kudriashov, F. Iu. Rachinskii, and N. G. Dmitrieva.
Radiobiologiia, vol. 4, 1964, p. 632-637. 6 refs. In Russian.

A group of thiazolidine derivatives, with different radicals attached to the second hydrogen produced a protective effect on erythrocytes mixed with a 0.02 M solution of these compounds in physiological saline and acted upon by a radiomimetic, oxydized oleic acid, or γ-rays. The results show that the protective action depends on the type of radical. The oxidized oleic acid method, according to the author, can be used for evaluation of the protective action of aminothiols or of substances that can form aminothiols as intermediate compounds.

A65-80543
RADIOPROTECTIVE ACTION OF MELANINE IN IRRADIATION OF MICE [O ZASHCHITNOM DEISTVII MELANINA PRI OBLUCHENII MYSHEI].
G. D. Berdyshev (USSR, Akad. Nauk, Sibirsk. Otd., Inst. Tsitol. i Genet., Novosibirsk).
Radiobiologiia, vol. 4, 1964, p. 644-645. 7 refs. In Russian.

Single or repeated intraperitoneal injections of 0.5 to 1.0 ml. of a 1% suspension of melanine in alkaline physiological saline before irradiation protected mice against an 800 r. dose of X-rays. Autopsies revealed an even distribution of pigment on the surface of the omentum, intestines, and peritoneum. No mechanism of the melanine action has been proposed yet. It is possible that excitation of the protein molecules may cause them to transfer their energy to the pigment molecules.

A65-80544
THE EFFECT OF WEAK COLD STIMULI ON THERMOREGULATION OF THE BODY [K VOPROSU O VLIIANII SLABYKH KHOLODOVYKH RAZDRAZHITELEI NA TEPLOOBMEN ORGANIZMA].
B. B. Koiranskii, L. A. Ukvol'berg, and M. V. Dmitriev (Nauchnoissled. Inst. Gigieny Tr. i Profzabolevanii, Leningrad, USSR).
Gigiena i Sanitariia, vol. 10, Oct. 1964, p. 31-37. 10 refs. In Russian.

Young persons exposed to 0° C. temperature for 1 hour in a thermal chamber showed inadequate recovery of the entire thermoregulatory apparatus: (1) The number of functioning cold receptors decreased abruptly, (2) the body and skin temperature became subnormal, and (3) the pulse rate decreased by 9 to 12 beats. All these shifts persisted even after the subjects were subjected to a high air temperature of 20° to 22°C., for 1 hour. The persistent aftereffect indicated a lag of thermoregulatory adaptation, which the author states, may initiate an episode of common cold.

A65-80545
DETERMINATION OF THE TOXICITY OF THE PROPELLANTS USED IN AEROSOL CYLINDERS [OPREDELENIE TOKSICHNOSTI PROPELLENTOV, ISPOL'ZUEMYKH V AEROZOL'NYKH BALLONAKH].
V. I. Vashkov, A. P. Volkova, V. M. Tsetlin, and E. Ia. Iankovskii (Tsentr. Nauchno-Issled. Dezinfekts. Inst., Moscow; and Tsentr. Konstrukt. Biuro Sovnarkhoza Latv. SSR, Riga).
Gigiena i Sanitariia, vol. 10, Oct. 1964, p. 61-65. 8 refs. In Russian.

The azeotropic mixture of 60% freon 124 (tetrafluormonochlorethane) and 40% freon C138 (octafluorcyclobuthane) is toxic to warm-blooded animals in 10 to 15g./m.^{3} concentration. It causes slight irritation of the mucous membrane of the eye. In concentration of 15g./cm.^{3} it produces a slightly narcotic effect. Freon 12 (difluorodichloromethane) and a mixture of 40% of freon 11 (trichloromonofluoromethane) and 60% of freon 12 (difluorodichloromethane) is less toxic than the azeotropic compound freon 124/C138 6040. In insecticide sprays, the dispersing agent should not exceed 0.5g./m.^{3} in order to be considered safe for animals and humans.

A65-80546
THE RATE OF SKIN TEMPERATURE RESTORATION AFTER COOLING AS A CRITERION OF THE BODY'S RESISTANCE TO COLD [SKOROST' VOSSTANOVLENIIA TEMPERATURY KOZHI POSLE OKHLAZHDENIIA KAK POKAZATEL' USTOICHIVOSTI ORGANIZMA CHELOVEKA K KHOLODU].
Iu. N. Chusov (Gos. Ped. Inst., Novosibirsk, USSR).
Gigiena i Sanitariia, vol. 10, Oct. 1964, p. 112-113. 7 refs. In Russian.

Persons accustomed to winter swimming in icy water showed fast normalization of the skin temperature, after partial exposure of the chest to cold temperatures. The thermoregulatory mechanism, the author states, may be due to the ability of the peripheral vessels to dilate and contract, which is more efficient in individuals with well-developed muscular layers of the cutaneous arteries.

A65-80547
PSYCHOMOTOR RESPONSES AND THEIR RELATIONSHIP TO PERSONALITY TRAITS OF YOUNG MEN PERFORMING IN HIGH AMBIENT TEMPERATURE (110 F).
Carl S. Blyth and Bill W. Lovingood (N. C. U., Chapel Hill).
Research Quarterly, vol. 35, Oct. 1964, p. 241-245. 8 refs.
Contract DA. 49-007-MD-949.

Relationships between psychomotor responses and personality structure are studied. Fifteen subjects were administered the Thurstone Temperament Schedule. Stress was provided by a heat chamber with an ambient temperature of 110° F. (30% to 50% relative humidity), and walking on a treadmill which moved at 4 m.p.h. at zero grade. Analysis of the data permits the following conclusions: (a) two-hand coordination showed a positive significant relationship to the measure of competitiveness, (b) tapping showed a positive significant relationship to the vigorous and sociable traits, and (c) a significant positive relationship between strength and the active trait was found. Hand and arm steadiness had a significant negative relationship with the emotional stability trait.

A65-80548
MEDICAL CLIMATOLOGY. (Physical Medicine Library, vol. 8).
Edited by Sidney Licht, ed. (Yale Med. Library, Physical Med. Collections, New Haven, Conn.)
New Haven, Conn., Elizabeth Licht, Publisher, 1964, xix +753 p.

CONTENTS:

Selected papers have been separately abstracted.

A65-80549
BECKMAN DEFINING BIOMEDICAL TESTS FOR AIR FORCE'S MOL FLIGHT PROGRAM.
Heather M. David.
Missiles and Rockets, vol. 16, Jan. 4, 1965, p. 26-28.

Beckman Instruments recently performed a survey of available instrumentation for the Air Force Manned Orbiting Laboratory program, recommending methods of conducting measurements. Space-station requirements are for minimum preparation procedure and ability to meet normal constraints of space travel such as weightlessness, acceleration, shock, vibration, and temperature extremes. It is important that all body functions be monitored, including cardiovascular, central nervous system, gastrointestinal tract, metabolism, renal function, pulmonary function, and possible deterioration in the musculoskeletal system. Final choice of biomedical experiments will represent the minimum requirement for sufficient information to aid in predicting long-term effects of weightlessness.

A65-80550
RESPONSES OF HUMAN ELECTROENCEPHALOGRAM TO INDUCED HYPOXIA AT THE ALTITUDE OF 6,000 METER AND 8,000 METER IN THE LOW PRESSURE CHAMBER.
Haruo Ikegami and Iwao Takase (Aero-Med. Lab., Tokyo, Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 1–9. 9 refs. In Japanese.

Oxygen supply to 7 healthy adults was discontinued at altitudes of 6,000 m. and 8,000 m. in a low pressure chamber for 15 minutes and 6 minutes respectively, and electroencephalograms of the subjects were continuously recorded before, during, and after hypoxia. Results obtained were: (1) Slight desynchronization was observed before appearance of slow waves. This is considered to be due to an increasing activation effect on the brain stem reticular system originating from the chemoreceptors. This desynchronization was more apparent in hypoxia at 6,000 m. than at 8,000 m. (2) Slowing occurred gradually during hypoxia and was sometimes retained up to the hypersynchronous state. (3) Marked individual variations were observed in the length of the latent period and the degree of slowing. (4) Use of an automatic band analyzer revealed that slowing started before appearance of slow waves in the electroencephalogram. (5) Arousal patterns appeared after termination of hypoxia by supplying oxygen; the larger the partial pressure of oxygen supplied, the more marked was arousal activation. Possible mechanisms of this phenomenon were discussed. (6) Flicker fusion frequency dropped quickly in the early stages of hypoxia. Five minutes after reoxygenation, flicker fusion frequency recovered almost completely. This coincides with recovery of the electroencephalogram.

A65-80551
INFLIGHT LOSS OF CONSCIOUSNESS DURING INSTRUMENT FLYING.
Nobuo Kameda, Nobuyoshi Shimoeda, and Tomiki Saito (Gifu Hosp., Tokyo, Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 10–15. 5 refs. In Japanese.

A student pilot of a T-1A jet trainer, aged 29 years, fell into unconsciousness during instrument flying (cabin altitude 16,000 ft). After inspection of the aircraft, it was revealed that the tube of the oxygen mask was disconnected from the oxygen regulator. It seems that unconsciousness was caused not only by acute hypoxia, but by emulation of several effects, such as fatigue because of shortage of sleep, and by high psychomotor task requirements during instrument flying. Immediately after admitting the patient, slight leucocytosis (polynucleosis and relative lymphopenia, eosinophilia) and hypotension were observed. The EEG revealed polyrhythmic, irregular, low-voltage type waves, poor waves, and prevalent waves.

A65-80552
OPINIONS OF JAPANESE AIRMEN CONCERNING THE PREVENTION OF CIVIL AIRCRAFT ACCIDENTS.
Yoshihisa Tanaka (Tokyo U., Dept. of Psychol., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 16–23. In Japanese.

Results of analyses of answers given by 310 airmen to a questionnaire consisting of 12 questions indicate that the following improvements should be made to prevent future aircraft accidents: (1) Ground controlled approach or instrument landing systems should be installed at all local airports. (2) The runways of local airfields should be 1600 to 1800 m. in length. (3) More effective and extensive training is required. (4) More efficient communication systems for civil air craft are required.

A65-80553
STUDIES ON COGNITION OF BODY TILT IN CLOSED CABIN.
Fushiro Motobayashi, Sukeo Sugimoto (Nagoya U., Res. Inst. of Environ. Med., Japan), Zensho Yokose, and Mitsuyo Ito (Nagoya U., Dept of Psychol., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 24–31. In Japanese.

Results of experiments on the judgment of the visual and postural vertical have been variously interpreted in favor of dominance of either the visual or the proprioceptive variables. Studies on judgment of the vertical in space are many, but studies on the judgment of body tilt are few. This report involves the following four experiments: (1) Cognition thresholds of body tilt to the right, left, front, and back direction at four different postures such as standing upright, lying upward, sitting on a chair, and sitting straight, were measured under dark and light conditions on eight subjects. (2) The subject's estimation of body tilt was obtained under both dark and light conditions. (3) The effect of fixing the subject's head upon judgment of body tilt was observed. (4) The effects of visual cues of 3 kinds of luminescent straight lines (90° to the room floor, 45° to the room floor, and a true vertical line) upon the subject's estimation of body tilt was investigated. The results of these experiments suggest the following: Judgment of how much the body tilts is a function of interaction of muscle tension and visual cues. Vestibular functions play a minor role in judgment of the vertical. It may play an important role in the righting reflex mechanism.

A65-80554
DINAMICS [SIC] OF RESPIRATORY GASEOUS EXCHANGE UNDER HIGH OXYGEN.
Hisashi Saiki (Tokyo Jikeikai U. School of Med., Dept. of Physiol., Japan).
Japanese Journal of Aerospace Medicine and Psychology, vol. 2, Dec. 1964, p. 32–40. In Japanese.

To express the dynamic changes of various functions during exposure to high concentrations of oxygen at 1 atm., respiratory gas exchanges were examined on small mammals, and the entire process studied to the point of death. The results and conclusions are as follows: (1) The survival time of the animals exposed to O_2 was 74 hr., 11 min., 88 hr. 2 min., and 93 hr. 59 min., respectively. All the subjects died on the 4th day of O_2 exposure. (2) The subjects ate the diet and drank water ad libitum, but their body weight decreased to 89.2% and 94% of preexposure value, respectively, at the time of death. (3) Oxygen uptake decreased remarkably from the beginning of the 3rd day on. The rate of decrease was 56.2%, 59.7%, and 70%, when the preexposure value was expressed as 100%. Increase and decrease of oxygen uptake takes the form of a two-topped wave, the inhibitory part of metabolism being expressed by the middle of the wave-process. Animals with more delayed inhibitory phases followed by higher and larger peaks can survive for a longer time. In every case, just a few minutes before death, oxygen uptake approaches zero rapidly. (4) CO_2 excretion takes the form of a two-topped wave, and the wave-process is almost identical as in O_2 uptake. From CO_2 excretion of the lung, evidence of CO_2 accumulation in the body cannot be obtained. (5) According to the increase and decrease of O_2 uptake, the R.Q. goes up or down to $< 1 >$; i.e., the wave-process is identical to that expressed under (4). (6) The gas exchange process expressed above does not take a simple course of linear increase and decrease, but the form of a wave process; and there is a point where metabolism is remarkably suppressed at the time immediately preceding death. An explanation of the mechanism of the renewed increase after this suppressed phase should be expected from further studies of metabolism.

A65-80555
CARDIAC FUNCTION DURING EXERCISE.
Robert Gilbert and J. H. Auchincloss, Jr. (N. Y. State U. Upstate Med. Center, Dept. of Med., Syracuse).
Heart Bulletin, vol. 14, Jan.–Feb. 1965, p. 6–8.

Cardiac response to exercise is intimately related to the metabolic adjustments. These adjustments provide the energy required for the performance of the task. Normally, cardiac output is able to supply the exercising muscles with adequate oxygen to meet these energy requirements almost entirely by oxidative processes. In the presence of heart disease, a variety of adjustments occur to maintain cardiac output and assure adequate oxygen delivery. These include cardiac hypertrophy and dilatation, increased end-diastolic pressure, and excessive tachycardia. These measures serve to support the cardiac output while the heart functions under an increased workload. As disease progresses and these mechanisms become inadequate, peripheral forces will act to shift more blood to areas vital to exercise and to extract more oxygen from the blood that is received. To the extent that all these are inadequate, the body will rely more heavily on anaerobic metabolism to meet the energy requirements.

A65-80556
CARDIOVASCULAR FUNCTION TESTS.
R. A. Bruce, L. B. Rowell, J. R. Blackmon, and A. Doan (Wash. U., Dept. of Med., Div. of Cardiol., Seattle).
Heart Bulletin, vol. 14, Jan.–Feb. 1965, p. 9–14.

Various physiologic considerations about testing the cardiovascular function where cited, and requirements for the experimental design of tests were described. The purposes, principles, advantages, and disadvantages of several tests were outlined, while the clinical and potential epidemiological benefits of a new multistage exercise test were emphasized. Contrary to the traditional opinion of authorities on functional capactiy of cardiac patients, there are satisfactory (if not indeed excellent) tests for measuring capacity objectively, and for detecting myocardial ischemia rapidly and safely, provided reasonable precautions are used.

A65-80557
MYOCARDIAL ISCHEMIA AFTER MAXIMAL EXERCISE IN HEALTHY MEN: A METHOD FOR DETECTING POTENTIAL CORONARY HEART DISEASE?
Allen E. Doan, Donald R. Peterson, John R. Blackmon, and Robert A. Bruce (Wash. U., Dept. of Med., Seattle; and Seattle-King County Dept. of Public

Health, Div. of Cardiol.)
American Heart Journal, vol. 69, Jan. 1965, p. 11–21. 51 refs.
Wash. State Heart Assoc., and Wash. State Dept. of Health supported research.
Nat. Heart Inst. Grant H908C13.

A study of 433 asymptomatic men emphasizes the value of strenuous exercise testing in the early detection of myocardial ischemia. The sensitivity of the maximal exercise capacity test was 9 times greater than that of the double Master's 2-step test in eliciting electrocardiographic evidence of myocardial ischemia in 201 normal men who were over 34 years of age. Improved detection of potential coronary heart disease by this method is illustrated by comparison with several epidemiologic studies. If the reliability and specificity of this electrocardiographic abnormality in predicting clinical coronary heart disease is confirmed by future followup examinations, a method of detection and study of potential coronary heart disease, and factors influencing its course, will be available.

A65-80558
CHILDREN AT HIGH ALTITUDE: PULMONARY AND RENAL ABNORMALITIES.
Richard l. Naeye (Vt. U. Coll. of Med., Dept. of Pathol., Burlington).
Circulation Research, vol. 16, Jan. 1965, p. 33–38. 20 refs.
Nat. Heart Inst. Grant HE 06469-03.

Changes in pulmonary arteries and renal glomeruli were assessed in children born and resident at high altitude (Leadville, Colorado). The hypoxia appears to arrest normal neonatal decrease of pulmonary arterial smooth muscle in some of these children. No abnormalities were found in pulmonary veins or capillaries. A quantitative study also demonstrated enlargement of renal glomeruli in the hypoxic children after the first month of life, apparently due to a proliferation of normal glomerular elements.

A65-80559
EFFECT OF PROLONGED HYPOXIA UPON GRANULARITY OF RENAL JUXTAGLOMERULA CELLS.
William J. Oliver and Gerald L. Brody (Mich. U., Dept. of Pediat. and Communicable Diseases, and Dept. of Pathol., Ann Arbor).
Circulation Research, vol. 16, Jan. 1965, p. 83–88. 16 refs.
Mich. Chapter of the Natl. Kidney Disease Found., and U.S.P.H. supported research.

The various experimental models used in previous studies of the juxtaglomerular apparatus do not permit the effect of changes in oxygen tension of the renal parenchyma to be separated from that of changes in distension of the renal arterial bed. To study the isolated effect of prolonged hypoxia, three groups of rats, matched for weight, were kept in low oxygen, room air, and high oxygen environments for two weeks. The animals were pair fed with the hypoxic rats serving as the determinant group. Supplemental injections of sodium chloride were given daily to avoid the effect of sodium deprivation on the juxtaglomerular cells. It was found that the hematocrits and also the granularity of the juxtaglomerular cells were significantly increased in the hypoxic rats as compared to the other two groups. Blood pressures, serum sodium levels, and urinary excretion of sodium were comparable among the three groups. These findings demonstrate that increased granularity of the renal juxtaglomerular cells can be induced by prolonged hypoxia.

A65-80560
PERFORMANCE AND PHYSIOLOGICAL INDICANTS OF ACTIVATION IN A VIGILANCE SITUATION.
Robert G. Eason (San Diego State Coll., Calif.; and U.S. Navy Electronics Lab., San Diego, Calif.), Ann Beardshall, and Stanley Jaffe (San Diego State Coll., Calif.)
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 3–13. 17 refs.
Navy Electronics Lab. supported research.
Grant NSF GB-231.

Changes in performance and in four physiological measures during the course of a one hour vigil and as a function of signal presentation rate were studied. Based on data obtained from 6 subjects during a total of 24 vigils, performance (% correct detections) and skin conductance decreased during the course of a vigil, heart rate remained constant, and neck tension level increased. There was no consistent tendency for subjects to perform at a higher level when signals were presented at a relatively fast rate than when signals were presented at a slower rate. However, their performance was differentially affected by presentation rate, some performing better during the fast rate, some during the slow rate, and others showing no change. A positive relationship was found between the relative performance level manifested during the two rates (fast rate expressed relative to slow) and the relative magnitudes of skin conductance, heart rate, and neck tension level. The results were interpreted as supporting the hypothesis that variations in vigilance performance are in part determined by changes in activation level. The feasibility of recording physiological information in order to ascertain more accurately which factors are contributing to variations in performance in a given vigilance situation seems to have been demonstrated.

A65-80561
SENSORY DEPRIVATION HALLUCINATIONS AND OTHER SLEEP BEHAVIOR AS A FUNCTION OF POSITION, METHOD OF REPORT, AND ANXIETY.
Robert F. Morgan and Paul Bakan (Mich. State U., East Lansing).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 19–25. 15 refs.

Thirty-six college students individually experienced an hour of sensory deprivation while immobile and wearing translucent goggles. Half the sample spent the hour lying down in a horizontal position; half sitting up. Twelve subjects were randomly assigned to each of three report methods: continuous, voluntary and silent. Anxiety and other subject-characteristics were recorded. Sensory deprivation hallucinations (SDH) occurred significantly more often in the horizontal position. Reported sleeping decreased significantly with higher anxiety and continuous reporting. Report method, anxiety, intelligence, sex, daydreaming, and non-SDH visual imagery were not significantly related to SDH occurrence or vividness. Effects of horizontal position were interpreted as due to stimulus generalization from sleep. The horizontal position, analogous to the sleeping position, elicited SDH which conceivably may be analogous to dreams.

A65-80562
PERCEPTUAL DEPRIVATION TOLERANCE AND ADEQUACY OF DEFENSES.
Nancy A. Wright and David S. Abbey (Manitoba U., Winnipeg, Canada).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 35–38. 18 refs.
Defence Res. Board, Canada Grant 9425-08.

The Rorschach test was administered to 14 subjects who had endured a week of perceptual deprivation and to 7 subjects who had terminated isolation prematurely. An index of control, equivalent to the proportion of defense demand to effectiveness of defense, was derived for each subject. Groups with high- and midcontrol indices tended to be composed of successful subjects whereas the group with a low-control index tended to be composed of unsuccessful isolation subjects.

A65-80563
MASKING OF CUTANEOUS SENSATIONS IN MULTIPLE STIMULUS PRESENTATIONS.
Earl A. Alluisi, Ben B. Morgan (Louisville U., Ky.), and Glenn R. Hawkes (Army Med. Res. and Develop. Command, Washington, D. C.)
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 39–45. 13 refs.
U.S. Army Med. Res. and Develop. Command Contract MD-2525.

Ten subjects made absolute judgments of electrocutaneous stimuli consisting of from one to three simultaneous stimulations of six loci. There were three loci in symmetrical positions on either side of subject's body—one on each shoulder blade, one on each arm between the elbow and the shoulder, and one on each side of the body just above the belt line. Each subject responded with 1 of 2 response alphabets during 11 sessions of 41 trials each over a period of 3 days. Differences between the two response alphabets were not significant, and neither were differences attributable to the interaction of the response alphabets with the number of loci stimulated. Increases in the percentages of erroneous responses with increases in the number of loci stimulated were both large and statistically significant; these increases were interpreted as evidence of a central mechanism of cutaneous masking.

A65-80564
BACKWARD MASKING FOR LETTERS.
Peter H. Schiller (Mass. Inst. of Technol., Cambridge).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 47–50.

This study investigated extent of backward masking for letters under conditions where test stimulus and masking stimulus were the same or different. Two response measures were used, detection of location and identification of the test stimulus. The extent of masking, as assessed by detecting location, was greater when test and masking stimuli were identical; as assessed by identification, masking was greater when test and masking stimuli were different.

A65-80565
LEVEL OF DISPLAY INTEGRATION IN COMPENSATORY TRACKING.
Philip B. Sampson and Edwin H. Elkin (Tufts U., Medford, Mass.)
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 59–62.

Four male subjects performed compensatory tracking for 20 2-min. trials on each of 4 displays differing in the degree of integration of 2 input signals and in the presence or absence of a secondary interference task with each display. The order of superiority of the displays was consistent with their level of integration, with the most highly integrated display yielding the best performance. The interference task lowered performance on each display, but an expected interaction between display integration and interference task did not prove to be significant.

A65-80566
EFFECT OF AROUSAL AND INTELLIGENCE ON BINOCULAR RIVALRY RATE.
William F. Hodges and Robert Fox (Vanderbilt U., Nashville, Tenn.)

Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 71–75. 8 refs.

Variation in rate of binocular rivalry alternation was measured in 40 undergraduate males as a function of physiological arousal induced by threat of shock and as a function of differences in verbal intelligence. Neither variable was related to change in rate. Visual acuity and phoria were not correlated with rate. Temporal reliability of rate was on the order of 0.90. For all subjects rate increased significantly over trials ($p < .01$). Interpretations of these data are discussed.

A65-80567
PERCEPTION BIBLIOGRAPHY: XVII. PSYCHOLOGICAL INDEX: NO. 13, 1906.
C. H. Ammons and R. B. Ammons (Mont. State U., Missoula).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 96–98. 74 refs.

This is a selection of 74 items related to perceptual problems from the above volume.

A65-80568
MOTION ELEMENT SYNTHESIS—AN ASSESSMENT.
Robert H. Schappe (Ohio U., Athens).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 103–106. 22 refs.

An element of motion cannot be specified in isolation but only in relation to other elements in the motion cycle. Adherents to time and motion study principles have assumed that all motions can be analyzed into elements, and these additively combined as though each was independent of the others. Studies in which travel distance and manipulation were systematically varied have shown that elements of each interact with the other. Other studies have examined the import of perceptual factors and precision in motion cycles and have arrived at the same conclusion: elements of motion cannot be specified independently but only in relation to the other elements in the cycle. This contention is related to the Gestalt concept that the whole is more than the sum of the parts.

A65-80569
PRE- AND POST-EXPOSURE PROCESSES IN TACHISTOSCOPIC IDENTIFICATION.
Wilma A. Winnick and Rhea L. Dornbush (N. Y. City U., Queens Coll., Flushing).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 107–113. 9 refs.

Results are reported from two experiments bearing on right-left retinal differences in tachistoscopic identification. The first demonstrated a significant right-left difference in scores for words, but no differences for anagrams interspersed with the words in random succession. In the second, instructional sets (pre- and post-exposure) set up directional tendencies leading to right-left differences in ease of identification. These findings are viewed as favoring an attentional rather than a neurological basis for right-left retinal differences in identification; specifically, they point to the role of previous reading habits in arousing sets conducive to directional eye movements.

A65-80570
EFFECTS OF STIMULUS AND FIELD SIZE ON THE ACCURACY OF ORIENTATION IN THE HOMOGENEOUS ENVIRONMENT.
Milton S. Katz, William Metlay, and Paula Cirincione (U.S. Naval Training Device Center, Port Washington, N. Y.)
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 167–172.

The effects of various size targets and the extent of the visual field on the accuracy of orientation in the homogeneous environment were investigated by requiring subjects to recenter 4 different targets, starting from 11 locations, in a 270^{0} homogeneous field. The results showed that: (1) each subject positioned all four targets in a preferred field, (2) small error scores and consistency in positioning around perceived centers were found with only three of the four targets, (3) in all cases the largest error and greatest variability was in centering the smallest target, (4) absolute errors were not related in any systematic fashion to the initial starting points, and (5) with respect to initial target presentations, i.e., left and right fields, subjects' errors tended to be smaller in the field containing that subject's perceived center. It was suggested that the variability of the small target could be accounted for, in part, by the autokinetic effect.

A65-80571
ELECTRODERMOGRAM (TARCHANOFF EFFECT) DURING SLEEP.
R. Broughton, R. Poire, and C. A. Tassinari (Centre St. Paul, Marseille; and Centre Psychotherap., Nancy, France).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 181–182.

Spontaneous electrodermal responses, i.e., changes in cutaneous potential (EDR) were uninfluenced by falling asleep, increased with Stages II, III, and IV, and decreased in rapid eye movement (REM) sleep (where they were often related to REM bursts), in Stage II after REM sleep, and after movements. Ease of evoking EDR's varied directly with the frequency of spontaneous EDR's. EDR's diffused from the head down the body axis.

A65-80572
THE BLIND FINGERS.
Robert Buckhout (Wash. U., Seattle).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 191–194.

An investigation of aphotic digital color sensing (finger vision) was conducted with students attempting to detect an odd color with their fingers when normal visual contact was eliminated. The results did not support the hypothesis that dermal color discrimination occurs in man. Interpretation of the data raises doubts about previously published statistical support of the hypothesis.

A65-80573
AUDITORY DISTRACTION AND COMPENSATORY TRACKING.
J. M. Hack, H. W. Robinson, and R. G. Lathrop (Rutgers U., Douglass Coll., New Brunswick, N. J.).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 228–230. 5 refs.
U.S. Navy Contract N6-2269-2066.

As a partial replication of a study reporting no differences in compensatory tracking due to an intermittent auditory distraction, the current study included control of individual differences and a more sensitive measure of tracking performance. Results indicated an initial decrement in performance due to auditory distraction, followed by an adaptation to the distracting condition.

A65-80574
APPARATUS FOR MEASUREMENT OF DYNAMIC VISUAL ACUITY.
Albert Burg (Calif. U., Los Angeles).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 231–234.
Grant PHS AC-00015.

An apparatus is described by means of which dynamic visual acuity, or the ability to perceive an object when there is relative motion between the observer and the object, can be measured. The system is based on a rotating slide projector (mounted above subject's head) by means of which visual acuity targets are projected upon a cylindrical screen. The targets follow a horizontal, linear path at variable speeds. The system also is designed to provide flexibility in the study of the phenomenon of dynamic visual acuity.

A65-80575
PACING AND ANXIETY LEVEL ON THE PURSUIT ROTOR.
R. Dale Nance (Wis. U., Milwaukee).
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 325–326.

The relationship of manifest anxiety (Taylor Manifest Anxiety Scale) to performance level on both the unpaced and the paced rotor, as well as to transfer between the two kinds of practice, was investigated. Subjects were 40 university men and women with no previous experience. The most obvious relationship with anxiety was obtained in the case of the highly anxious male subjects.

A65-80576
TIME IMAGERY, INTROVERSION AND FANTASIED PREOCCUPATION IN SIMULATED ISOLATION.
Robert H. Knapp and Paul S. Lapuc (Wesleyan U., Middletown, Conn.)
Perceptual and Motor Skills, vol. 20, Feb. 1965, p. 327–330.
Natl. Inst. of Mental Health Grant M-2178.

Forty-nine subjects were administered the Knapp Time Metaphor Scale (dynamic-directional or passive-oceanic time images), the Myers-Briggs Type Indicator (introversion-extroversion dimension), and the Hypothetical Isolation Test. The latter is a new test in which the subjects indicate the sort of regime they would establish to maintain physical and psychological well-being under conditions of extreme isolation. The propensity to view time in passive-oceanic images was shown to be correlated with introversive tendencies and with a preoccupation with moral and rational discipline under conditions of extreme hypothetical personal isolation. The existence of this threefold syndrome is seen as related to the character and orientation of the ego structure manifesting itself in three separate but highly correlated ways. A hypothesis is proposed that, lacking secure anchorage to outer events, introverts are more susceptible to despair than extroverts in hypothetical isolation.

A65-80577
CHANGES OF SERUM GLUTAMIC OXALOACETIC TRANSAMINASE FOLLOWING EXERCISE IN PATIENTS WITH AND WITHOUT CORONARY DISEASE.
H. J. Nerdrum and S. Nordoy (Ulleval Hosp., Central Lab. and Med. Dept. VIII, Oslo, Norway).
Scandinavian Journal of Clinical and Laboratory Investigation, vol. 16, 1964, p. 617–623. 11 refs.

Spectrophotometric determinations of serum glutamic-oxaloacetic transaminase (SGOT) were made on 37 patients asked to perform on a bicycle ergometer work of 300 kgm./min. for 3 minutes. A statistically significant difference was demonstrated, 10 minutes after the test, between the slight decrease in healthy individuals and the slight increase in patients with coronary disease, ischemic ECG changes after the exercise, and no nitroglycerin medication.

A65-80578
BIOCHEMICAL AND ELECTROCARDIOGRAPHIC EFFECTS OF HYPOCARBIA: STUDIES DURING EXTRACORPOREAL CIRCULATION.
Murry W. Andersen and Goran William-Olsson (N. Y. State U., Surgical Res. Labs., and E. J. Meyer Mem. Hosp., Buffalo).
Archives of Surgery, vol. 90, Feb. 1965, p. 290–293. 9 refs.
Grant PHS H-3720.

Extreme degrees of hypocapnia were produced experimentally in dogs by employing oversized oxygenators during extracorporeal circulation. The resultant decrease in blood potassium and phosphorus levels and increase in lactic acid were somewhat more marked than were previously produced by pulmonary hyperventilation and continued progressively during the time interval of these experiments. Marked hypocapnia electrocardiographic changes were produced in only one experiment although suggestive changes occurred in others. The significance of such induced hypocapnia in relation to digitalis intoxication and cardiac arrhytmias during and after surgical operations is emphasized.

A65-80579
HYPOXIA—AN ANTI-DECONDITIONING FACTOR FOR MANNED SPACE FLIGHT.
Lawrence E. Lamb (USAF School of Aerospace Med., Aerospace Med. Sci. Div., Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, Feb. 1965, p. 97–100. 16 refs.

A problem area in manned space flight is deconditioning, caused by physical confinement and the decreased workload secondary to the absence of body weight. The syndrome of deconditioning results in a clinical picture of decreased biological activity manifested by numerous well documented physiological adjustments. A large number of the physiological alterations noted in deconditioning are exactly the opposite of those induced by hypoxia. In this paper a brief review is presented of the differences between the syndrome of deconditioning and the syndrome of acclimatization induced by prolonged hypoxia, thereby suggesting a means of counteracting at least a portion of the problems of deconditioning.

A65-80580
CIVIL AVIATION AND CONTACT LENSES.
Robert L. Wick, Jr.
Aerospace Medicine, vol. 36, Feb. 1965, p. 127–130. 11 refs.

One of the problems currently increasing in magnitude in civil aviation involves the pilot who wishes to wear contact lenses. Although there are a number of theoretical hazards, as a practical matter, there appear to be no contraindications. A majority of ophthalmologist aviation medical examiners, who are also pilots, approve their use if properly fitted and supervised by the ophthalmologist experienced with contact lenses. Over half of the group who also are certified by the ophthalmological board even approve their use for airline pilots.

A65-80581
STUDY OF EFFECTS OF CONTINUOUS INHALATION OF HIGH CONCENTRATIONS OF OXYGEN AT AMBIENT PRESSURE AND TEMPERATURE.
Francis W. Weir, Dale W. Bath, Paul Yevich, and Fred W. Oberst (U.S. Army Edgewood Arsenal Chem. Res. and Develop. Labs., Toxicol. Div., Edgewood Arsenal, Md.)
Aerospace Medicine, vol. 36, Feb. 1965, p. 117–120. 12 refs.

Mice, rats, guinea pigs, dogs, and monkeys were exposed continuously to oxygen (95% to 99%) for 240 hours, unless interrupted by death. The initial toxic effects of oxygen were labored breathing and lethargy, which occurred after 15 to 20 hours in the rats and 36 to 42 hours in the dogs. In the monkeys these effects occurred considerably later, 72 to 96 hours. Sex and age differences of rats did not significantly affect the toxicity of oxygen. Most animals dying during exposure showed extensive bilateral pleural effusions and pulmonary edema. Microscopically, other features were emphysema and dilation of the tracheobronchial tree. Animals surviving 240 hours of oxygen exposure showed pulmonary edema and severe organ and tissue damage but did not show pleural effusion. The adventitia of the tracheobronchial tree and of the large blood vessels of the lungs was edematous. Necrosis of the pulmonary vein and thickening of the pulmonary arterioles were also seen. Times to death in animals varied over a wide range, and only a few rats survived the 240-hour exposure period. All other animal species died before the end of this period.

A65-80582
EXPERIMENTAL CONTROLS AND BIOLOGICAL EXPERIMENTS WITH ATMOSPHERIC IONS.
Allan H. Frey (Inst. for Res., State College, Pa.)
Aerospace Medicine, vol. 36, Feb. 1965, p. 121–123. 8 refs.
Contracts Nonr 3303(00) and Nonr 4169(00).

Data on instrumentation and on the controls, which are necessary when studying the biological effects of atmospheric ions, are summarized in this paper. Sources of unreliability in experiments, such as measurement devices, lack of grounding, movement of subject or specimen, etc., are identified. On the basis of these data, it is concluded that there is no experimental basis for the advocates of the polar positions that ions do or do not have a significant effect.

A65-80583
TOLERANCE OF THE VESTIBULAR APPARATUS OF THE HYPOTHERMIC HAMSTER TO 840 G ACCELERATION.
B. Black-Schaffer, Stanley B. Prusiner, and H. Esparza (Cincinnati U., Coll. of Med., Dept. of Pathol.; and Cincinnati Gen. Hosp., Ohio).
Aerospace Medicine, vol. 36, Feb. 1965, p. 123–126. 26 refs.
NASA Grant NsG75-60; and Grant PHS 5T5 GM4-08.

Hamsters which are centrifuged at 2000 r.p.m. (840 g) during profound hypothermia develop, upon revival, a syndrome characteristic of a hemilabyrinthectomy. Recovery is complete in two to three weeks. Repeated centrifugation of the same animal, after recovery from the effects of the preceding spins, results in the reappearance of the same syndrome, modified only by the positioning of the animal in respect to the center of the spin. Examination of the labyrinths reveals only hemorrhage in the middle and external ears with no recognizable lesions of the internal ears. It is proposed that the extraordinary resistance of the labyrinth components to accelerative stress is accomplished by increasing, through cooling, the viscosity of the gelatinous membrane in which the otoliths are embedded, thus (Stoke's Law) minimizing the migration of the otoconia in the centrifugal field.

A65-80584
PROJECT APOLLO: MAN TO THE MOON.
Tom W. Alexander, Jr.
New York, Harper and Row, 1964, xvi+234 p. $4.50.

This book is a historical review of the origin and political currents behind the development of the Apollo project, as well as a popular account of the phases of operation in getting a man to the Moon. It includes descriptions of the engineering aspects of building the rockets and the spacecraft itself. Various aspects of the flight are described such as orbiting the Moon, the time spent on the Moon, the flight back to Earth, reentry and navigation. Dangers from the space environment are discussed. Training and qualifications of the astronauts, as well as the part played by other men, are reviewed in a separate chapter. Another chapter is devoted to a brief account of the Gemini flights and their relation to the Apollo project. The concluding chapters of the book deal with the Russian Moon project and its chance of success, various aspects of life support on the Moon, social and economic impact of the Space Age, and future plans in manned space exploration.

A65-80585
METABOLISM OF THE RETINA. V. THE ROLE OF MICROSOMES IN VITAMIN A ESTERIFICATION IN THE VISUAL CYCLE.
J. Stevens Andrews and Sidney Futterman (Mass. Eye and Ear Infirmary, Howe Lab. of Ophthalmol., Boston; and Harvard Med. School, Boston, Mass.)
Journal of Biological Chemistry, vol. 239, Dec. 1964, p. 4073–4076. 10 refs.
Grants PHS NB-02769 and HE-04051.

In light adaptation in the retina, the vitamin A synthesized by the visual cell outer segments is subsequently converted to vitamin A ester by retinal microsomes. The visual cell outer segments play no role in vitamin A esterification. The esterification of vitamin A by retinal microsomes occurs without the addition of supplements or cofactors. The principal fatty acids present in vitamin A ester synthesized by retinal microsomes are palmitic, stearic, and oleic acids. The microsomal reaction product is similar in composition to the vitamin A ester synthesized by the intact retina.

A65-80586
COMPARATIVE VALUES OF THE EXCITATION OF THE VESTIBULAR APPARATUS USING ROTATORY AND CALORIC TESTS [UPOREDNE VRIJEDNOSTI PODRAZIVANJA VESTIBULARNOG APARATA ROTATORNIM I KALORICKIM TESTOM].
Bosko Milojević and Radovan Subotić (Zagreb U., Med. Fac., Clin. for Ear, Nose and Throat Diseases, Yugoslavia).
Radovi Medicinskog Fakulteta u Zagrebu, vol. 11, 1963 p. 39–49. In Croatian.

Rotatory and caloric tests of the vestibular part of the labyrinth together yield more information on the vestibular function than each test by itself. In directional nystagmus of the vestibular apparatus it is advisable to perform both tests. It is also recommended that both tests be employed in cases where the results of one test are not in agreement with the clinical picture and the audiogram. Cupulometry in addition to the caloric test gives more information on the locus of the lesion, particularly in diagnosis of retrolabyrinthine lesion.

A65-80587
CARBOHYDRATE METABOLISM AND SURVIVAL OF RATS IN ACUTE ANOXIA [METABOLIZAM UGLJICNIH HIDRATA I PREZIVLJAVANSE STAKORA U AKUTNOJ HIPOKSIJI].
Vjekoslav Fišter (Zagreb U., Med. Fac., Pathophysiol. Inst., Yugoslavia).
Radovi Medicinskog Fakulteta u Zagrebu, vol. 11, 1963, p. 51–75. 91 refs. In Croatian.

Exposure of rats fasted for 12 hours to an atmospheric pressure of 250 mm. Hg for 30 minutes raised blood sugar levels by 52.6%. This rise did

not occur in rats fasted for 24 hours or in alloxan-diabetic rats. Thirty minute exposure to barometric pressures of 250 and 360 mm. Hg did not abolish insulin effect on blood sugar level. Blood sugar levels influenced survival time of rats in conditions of acute hypoxia. At 170 mm. Hg barometric pressure, survival times were longer for rats made hyperglycemic either through alloxan-diabetes or intravenous glucose. Insulin and Midosal (a sulfonamide with blood sugar lowering property) shortened the survival time. Prolonged survival times of diabetic rats were decreased by administration of insulin. The author emphasizes the fact that a pathological hyperglycemia (diabetes) acts to raise the rat's resistance to acute hypoxia. Chlorpromazine administered to rats under conditions of acute hypoxia lowered their resistance markedly, in spite of a 122.2% elevation of blood sugar level.

A65-80588
TELEMETRIC MONITORING OF ARRHYTHMIAS IN ACUTE MYOCARDIAL INFARCTION.
Edwin L. Rothfeld, Arthur Bernstein, Asa H. Crews, Jr., Victor Parsonnet, and I. Richard Zucker (Newark Beth Israel Hosp., Cardiac Lab., N. J.)
(American College of Cardiology Annual Meeting, Boston, Feb. 17–21, 1965).
American Journal of Cardiology, vol. 15, Jan. 1965, p. 38–44. 7 refs.
N. J. State Dept. of Health and N. J. Heart Assoc. supported research.
NIH Grant 5RO1-HE 07059-02.

A relay telemetric system was developed for the continuous monitoring and recording of the electrocardiogram in patients with acute myocardial infarction. The results in the first six cases are described. The monitor demonstrated arrhythmias in all the cases, with episodes of ventricular tachycardia in four of the six. Most of the disturbances in rhythm were not detected on frequent clinical examinations and conventional electrocardiograms. Continuous electrocardiographic monitoring provides for immediate recognition of arrhythmias and also serves as an important investigative tool for study of the electrogenesis of these potentially fatal complications of myocardial infarction.

A65-80589
SOME DATA ON THE TOXICITY OF SYNTHETIC AND ETHYLATED SYNTHETIC GASOLINES [NEKOTORYE DANNYE O TOKSICHNOSTI SINTETICHESKOGO I ETILIROVANNOGO SINTETICHESKOGO BENZINOV].
S. N. Sinitsyn (F. F. Erismana Res. Inst. for Hyg., Moscow, USSR).
Farmakologiia i Toksikologiia, vol. 27, Sep.–Oct. 1964, p. 619–620. In Russian.

Synthetic gasoline was found to be less toxic to mice than a synthetic ethylated or an aviation gasoline brand. The tolerated concentrations were: 90 mg./l. of synthetic, 60 mg./l. of ethylated synthetic, and 55 mg./l. of the aviation gasoline brand. The safe dose in mice for the synthetic brand was found to be 5 mg./l. In rabbits exposed to synthetic ethylated gasoline fumes for 6 months, the white count dropped from 8,000 to 5,500, with an increase in segmented neutrophils and lymphocytes. No effect was noted on the number or type of erythrocytes.

A65-80590
MECHANISM OF INCREASING OSMOTIC RESISTANCE OF RAT'S ERYTHROCYTES WITH ADAPTION TO HYPOXIA [K VOPROSU O MEKHANIZME POVYSHENIIA OSMOTICHESKOI REZISTENTNOSTI ERITROTSITOV ADAPTIROVANNYKH K GIPOKSII KRYS].
Z. I. Barbashova (I. M. Sechenov Inst. of Evolutionary Physiol., Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 50, Nov. 1964, p. 1385–1392. 9 refs. In Russian.

Rats trained in altitude chambers for one month showed better adaptation to hypoxia than animals which were under training for a three month period. Those trained for one month showed stimulation in hemopoiesis: an increase in hemoglobin concentration, in the number of erythrocytes and reticulocytes, and a shift to the left. The longer trained rats showed (in some cases) high hemoglobin concentration and many immature red cells. The reticulocyte count was high. In animals showing good adaptation to hypoxia, the erythrocytes exhibited greater stability in saline solution, but saponine hemolysis was normal. In alkaline solution erythrocyte hemolysis was the same for both groups.

A65-80591
STRUCTURAL BACKGROUNDS FOR THE FORMATION OF CONDITIONED REFLEXES TO VISUAL AND ACOUSTIC STIMULI [O STRUKTURNYKH OSNOVAKH FORMIROVANIIA USLOVNYKH REFLEKSOV NA ERITEL'NYE I ZVUKOVYE RAZDRAZHITELI].
M. M. Khananashvili (USSR, Acad. Med. Sci., Inst. Expt. Med., Leningrad).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 6, 1964, p. 27–35. In Russian.

In dogs and cats the cortex of large hemispheres were isolated from all subcortical structures, leaving the vascular membrane of the cortex intact to permit minimum disturbance of cerebral circulation. This operation permitted the study of the role of the specific thalamus nuclei—external and internal geniculate bodies—in the conditioned reflexes to acoustic and visual stimuli. The results indicate that the conditioned reflexes to visual stimuli are associated primarily with the cortex, while the origin of the reflex to the acoustic stimulation can be traced to the midbrain.

A65-80592
THE ROLE OF THE SYMPATHICOADRENAL SYSTEM IN PROPHYLACTIC ULTRAVIOLET TREATMENT [REAKTSIIA SIMPATIKO-ADRENALOVOI (SIC) SISTEMIY PRI PROFILAKTICHESKOM UL'TRAFIOLETOVOM OBLUCHENII].
M. L. Koshkin, A. G. Idlina, O. V. Anisimova, and A. A. Filatova (Med. Inst., Dept. of Gen. Hyg., Kharkov, USSR).
Gigiena i Sanitariia, vol. 11, Nov. 1964, p. 13–18. 12 refs. In Russian.

In school children small doses of ultraviolet radiation, designed to supplement insufficient exposure to sunlight, produced an increase in catecholamine elimination in the urine (particularly noradrenaline). In these subjects the phagocytic activity of the blood leucocytes was elevated. These results indicate stimulation of the sympathetic system controlling the suprarenal activity, by ultraviolet radiation.

A65-80593
PREVENTIVE AND THERAPEUTIC USE OF ULTRAVIOLET RAYS IN DAMAGE CAUSED BY IONIZING RADIATION [PROFILAKTICHESKOE I TERAPEVTICHESKOE PRIMENENIE UL'TRAFIOLETOVYKH LUCHEI PRI PORAZHENIIAKH IONIZIRUIUSHCHIM IZLUCHENIEM].
V. D. Adbuvaliaev.
Gigiena i Sanitariia, vol. 11, Nov. 1964, p. 39–42. In Russian.

Preliminary exposure to small doses of ultraviolet radiation (4×10^6 erg./cm.^{2}), or treatment after exposure to ionizing radiation, alleviated the severity of radiation sickness in rats, subjected to 900 r of X-radiation, and prolonged the animal's life. A larger dose (24×10^6 erg./cm.^{2}) applied before or after exposure to ionizing radiation (250 r) aggravated tissue damage and retarded leucocyte normalization.

A65-80594
MEASUREMENT OF EYE MOVEMENTS DURING A MICHOTTE LAUNCHING EVENT.
Gunnar Jansson (Uppsala U., Psychol. Lab., Sweden).
Scandinavian Journal of Psychology, vol. 5, 1964, p. 153–160. 14 refs.

The verbal responses and the eye movements of subjects viewing a Michotte launching event (disc method) were recorded. The subjects were divided into two main groups: those reporting launching on every exposure and those giving no launching response at all. These two groups were compared with regard to several eye movement variables. They did not differ on the first exposure but did so on repeated exposures, indicating that what a subject perceives on the first exposure influences his eye movements on the following exposures.

A65-80595
PERCEPTION OF MOTION AND CHANGING FORM: A STUDY OF VISUAL PERCEPTION FROM CONTINUOUS TRANSFORMATIONS OF A SOLID ANGLE OF LIGHT AT THE EYE.
Gunnar Johansson (Uppsla U., Psychol. Lab., Sweden).
Scandinavian Journal of Psychology, vol. 5, 1964, p. 181–208. 16 refs.
NSF and Swedish Council for Social Sci. Res. supported research.

It is shown how geometrically changing projections of objects which move and/or change their shape carry no specific information about form and three-dimensional motion. How, then, does the visual apparatus produce specific percepts from such nonspecific changing stimuli? By applying an analog computer technique, changing projections of artificial objects are generated on a cathode ray tube screen. These projections are fed into the eye by means of an optical device where they form a continuously changing solid angle of homogeneous light. The main conclusion is that it is a principle of perceptual three-dimensionality which gives specificity to the percepts. Preliminary statements of principles for prediction of perceived motion in depth from a given change in proximal stimulus are presented.

A65-80596
DYNAMICS OF VARIATION OF THE NITROGEN AND PHOSPHORUS CONTENT IN THE MEDIUM UNDER VARIOUS CONDITIONS OF INTENSIVE CULTIVATION OF CHLORELLA [DYNAMIKA IZMENENII SODERZHANIIA AZOTA I FOSFORA V SREDE V RAZLICHNYKH USLOVIIAKH INTENSIVNOGO VYRASHCHIVANIIA KHLORELLY].
M. G. Vladimirova and E. D. Kuznetsov (USSR, Acad. of Sci., K. A. Timiriazev Inst. of Plant Physiol., Moscow).
Fiziologiia Rastenii, vol. 11, Sep.–Oct. 1964, p. 827–837. 22 refs. In Russian.

The time variation of nitrogen and phosphorus consumption by two alga strains, Chlorella pyrenoidosa Chick 82 and Chlorella sp. K, cultivated in the Tamiya medium was studied. Three methods of cultivation of the alga were compared: In glass vessels, in chambers and in a semi-industrial reactor. It is shown that removal of nitrogen from the nutrient medium was linear for both strains at the logarithmic growth stage. Removal of nitrogen per unit biological weight of Chlorella is consumed under conditions when

the alga growth is more rapid. Figures are presented characterizing the removal of nitrogen and phosphorus from the nutrient medium per gram of produced dry weight under various conditions of growth.

A65-80597
PATHWAYS IN FORMATION OF AMINO ACIDS DURING PHOTOSYNTHESIS [K VOPROSU O PUTIAKH OBRAZOVANIIA AMINOKISLOT PRI FOTOSINTEZE].
E. G. Zak and A. A. Nichiporovich (USSR, Acad. of Sci., K. A. Timiriazev Inst. of Plant Physiol., Moscow).
Fiziologiia Rastenii, vol. 11, Nov.-Dec. 1964, p. 945-950. 18 refs. In Russian.

Studies of the molecular structure of phosphoglyceric acid, glycine, serine, and alanine in Chlorella pyrenoidosa tissues, grown in a medium containing a C^{14} labeled compound and exposed to light for 4 to 13 seconds, disclosed that the prime precursor of alanine and serine was phosphoglyceric acid. Glycine did not seem to be one of the precursors of serine, which was formed by a nonreductive aminization of 2-phosphoglyceric acid. Phosphoglyceric acid was not a precursor of glycine.

A65-80598
DIRECTED BIOSYNTHESIS OF CARBOHYDRATES IN CHLORELLA [NAPRAVLENNYI BIOSINTEZ UGLEVODOV U KHLORELLY].
G. L. Kliachko-Gurvich (USSR, Acad. of Sci., K. A. Timiriazev Inst. of Plant Physiol., Moscow).
Fiziologiia Rastenii, vol. 11, Nov.-Dec. 1964, p. 978-987. 22 refs. In Russian.

It is widely believed that metabolism in Chlorella is of a predominantly protein-lipoid nature, and therefore large amounts of carbohydrates cannot be accumulated in the alga. On the other hand it is well known that carbohydrates are one of the main products of photosynthesis in Chlorella and a certain increase of the carbohydrate content has been noted in several investigations. In this connection the accumulation of carbohydrates in Chlorella was studied. It was found that under strong illumination, which ensures a high rate of photosynthesis and accumulation of dry substance, and in the absence of nitrogen in the medium, cell division stops but growth continues. Biosynthesis in Chlorella sp. K. changes in such a way that carbohydrate synthesis becomes predominant and the protein/carbohydrate ratio greatly decreases. The maximal amount of carbohydrates which could be obtained was 55% of dry weight. The main form of carbohydrates in Chlorella sp. K. is starch which may comprise 45% of dry weight.

A65-80599
ASSIMILATION OF NITRATE AND AMMONIUM NITROGEN BY CHLORELLA PYRENOIDOSA PRINGSHEIM 82T [ASSIMILIATSIIA NITRATNOGO I AMMONIINOGO AZOTA U CHLORELLA PYRENOIDOSA PRINGSHEIM 82T].
N. G. Tomova, Z. G. Evstigneeva, and V. L. Kretovich (Bulgarian Acad. of Sci., M. Popov Inst. of Biol., Sofia; and USSR Acad. of Sci., A. N. Bakh Inst. of Biochem., Moscow).
Fiziologiia Rastenii, vol. 11, Nov.-Dec. 1964, p. 988-997. 14 refs. In Russian.

A comparative study of consumption of N^{15}-labeled ammonium and nitrate nitrogen was carried out in cells of a synchronous culture of Chlorella pyrenoidosa which was preliminarily subjected to nitrogen deficiency during a single development cycle (8:16 hours light: darkness). $KN^{15}O_3$ and $N^{15}H_4H_2PO_4$ were added at the beginning of the next developmental cycle. The suspension was sampled during 7 hours of the illumination period after 15 minutes, 1, 2.5, 5, and 7 hours (cell division does not begin during the first 7 hours). The cells were separated by centrifugation and 80% boiling alcohol was used for extraction. The amounts of soluble and insoluble nitrogen and their N^{15} content were determined in the residue and in the extract. The amount of amino acids in the extract was determined by quantitative paper chromatography. It is found that nitrogen-starved Ch. pyrenoidosa consumes ammonium nitrogen at a higher rate than nitrate in the soluble as well as in the insoluble form of nitrogen. Measurement of the amount of N^{15} confirms the conclusion that ammonium nitrogen is consumed with greater ease. The most important products formed as a result of consumption of ammonium and nitrate nitrogen are alanine and glutamic acid. During the 15-minute exposure alanine synthesis was particularly rapid if ammonium was added. Evidently, ammonium nitrogen is a more available form than nitrate nitrogen since the energy requirements are less stringent. Thus the difference in nitrate and ammonium nitrogen consumption is due to rate differences.

A65-80600
A PILOT PLANT FOR OBTAINING LARGE CROPS OF UNICELLULAR ALGAE [TIPOVAIA USTANOVKA DLIA MASSOVOGO KUL'TIVIROVANIIA ODNOKLETOCHNYKH VODOROSLEI].
V. V. Pinevich, N. N. Verzilin, and S. I. Stepanov (Leningrad State U., USSR).
Fiziologiia Rastenii, vol. 11, Nov.-Dec. 1964, p. 1084-1089. 10 refs. In Russian.

Standard installations for cultivation of unicellular algae of unique design are described. Extensive and readily comparable experiments under very different conditions can be carried out by applying the installations described. Composition of the nutrient medium, initial inoculation concentrations, and strains of protococcus algae are recommended which may serve as standards in investigation of some problems of the physiology of algae in open-air installations.

A65-80601
NYSTAGMOGRAPHIC ANALYSIS OF THE FAST COMPONENT OF VESTIBULAR NYSTAGMUS EVOKED BY RADIAL ACCELERATION [NISTAGMOGRAFICHESKII ANALIZ BYSTROGO KOMPONENTA VESTIBULIARNOGO NISTAGMA, VYZVANNOGO RADIAL'NYM USKORENIEM].
M. M. Levashov (I. P. Pavlov Inst. of Physiol., Lab. for Auditory Analyser Physiol., Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 50, Dec. 1964, p. 1424-1433. 17 refs. In Russian.

In rabbits, the velocity of the quick component (VQC) of the vestibular nystagmus, caused by horizontal acceleration, changed in the course of rotation, either increasing or decreasing, particularly at the beginning and after rotation. These variations in VQC did not coincide with the changes in velocity of the slow component (VSC), and were most pronounced at the beginning of the postrotational nystagmus. During the first 2000 msec. after the rotation was stopped, VQC increased reaching the maximum at 600 to 1120 msec., which was followed by a decrease. These changes indicate a relationship between VQC and the vestibular apparatus function and could be used in evaluating the latter.

A65-80602
ASSYMETRY OF TONIC VAGAL EFFECTS ON THE HEART [OB ASIMMETRII TONICHESKIKH VLIIANII BLUZHDAIUSHCHIKH NERVOV NA SERDTSE].
I. A. Serdiuchenko (Med. Inst., Dept. of Physiol., Dniepropetrovsk, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 50, Dec. 1964, p. 1450-1457. 21 refs. In Russian.

A cold block of the nerve trunk was used in dog experiments for the study of the neural regulation of cardiovascular activity. During the initial stages, the vagus block caused pulmonary hyperventilation. The block of the vagus trunk resulted in an increase in cardiac rhythm, blood pressure and pulmonary ventilation, which was more pronounced on the left side.

A65-80603
PHYSIOLOGICAL MECHANISMS OF CHEMICAL HEAT REGULATION AND THEIR PECULIARITIES UNDER HYPOXIC CONDITIONS [FIZIOLOGICHESKIE MEKHANIZMY KHIMICHESKOI TERMOREGULIATSSI I IKH OSOBENNOSTI PRI GIPOKSII].
K. P. Ivanov (I. P. Pavlov Inst. of Physiol., Lab. for Ecol. Physiol., Leningrad, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 50, Dec. 1964, p. 1476-1483. 12 refs. In Russian.

Slight ambient temperature variations at the critical point combined with variations in the gas-exchange process in albino rats resulted in fluctuations of physiological data relative to contractile muscular activity, expressed in changes in body temperature and movements and in appearance of chills. During hypoxia, suppression of muscular activity resulted in a reduction of the gas-exchange process. The results indicate how important a role muscular contractions play in the mechanisms of chemical thermoregulation.

A65-80604
SIMULTANEOUS CARDIOSCOPIC SCAN AND VECTORCARDIOGRAPHIC RECORDING [ELEKTROKARDIOTOPOSKOPIIA S ODNOV REMENNOI YEKTORKARDIOGRAFIEI].
R. Z. Amirov (USSR, Acad. of Med. Sci., Inst. Cardiovascular Surg., Lab. for Clin. Physiol., Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 50, Dec. 1964, p. 1500-1506. In Russian.

A fast method for extensive scanning of the cardiac electrical field, together with a simultaneous recording of the electrocardiogram and vectocardiogram, permits a new approach to interpretation of the ECG and VCG.

A65-80605
OXYGEN AND THE EYE.
Cecil C. Beehler (USAF School of Aerospace Med., Aerospace Med. Div., Dept. of Expti. Surg., Brooks AFB, Tex.)
Survey of Ophthalmology, vol. 9, Dec. 1964, p. 549-560. 102 refs.

The current interest in biomedical research, calling for human beings to be subjected to prolonged exposure to high-oxygen environments, requires careful consideration of the possible hazards involved. A review of the literature clearly indicates that oxygen is capable of producing severe systemic toxicity. In the 1950's, it was found that prolonged exposure to oxygen was responsible for retrolental fibroplasia in premature infants. Consideration of the physiology of increased oxygen tensions of the eye shows that, as compared with other tissues, unusually high tensions may occur in the aqueous and vitreous. Experimental studies in many animals

have revealed a variety of pathologic changes, some of which resemble those found in retrolental fibroplasia. Recent studies have found that these changes are not limited to immature animals. Investigators, working independently, have produced severe and irreversible changes in numerous mature, experimental animals. Careful consideration therefore should be given to the eye in any experiment involving prolonged exposure of human beings to high-oxygen environments.

A65-80606
THE ROLE OF CHEMORECEPTORS IN THE CAROTID REGION OF THE ANESTHETIZED CAT IN THE RESPIRATORY RESPONSE TO ISOLATED CHANGES IN THE HYDROGEN ION CONCENTRATION AND CO_2 TENSION OF THE BLOOD [DIE ROLLE DER CHEMORECEPTOREN DES CAROTISGEBIETS DER NARKOTISIERTEN KATZE FUR DIE ANTWORT DER ATMUNG AUF ISOLIERTE ANDERUNG DER WASSERSTOFFIONEN-KONZENTRATION UND DES CO_2-DRUCKS DES BLUTES].
Byron Katsaros (Gottingen U., Inst. fur Klin. Physiol., Germany).
Pflugers Archiv fur die gesamte Physiologie des Menschen und der Tiere, vol. 282, 1965, p. 157-178. 54 refs. In German.

In 16 vagotomized cats anesthetized with chloralose-urethane, CO_2 response curves were determined at elevated inspiratory O_2 (35%) during normal acid base balance, in metabolic acidosis, and in metabolic alkalosis. The experiments were repeated after severing the sinus nerves. The isolated drives of CO_2 and H^+ were determined by a graphical method using the data in acidosis and in normal state, or alkalosis and normal state. Cutting the vagosympathetic and depressor nerves caused the total CO_2 sensitivity (slope of CO_2 response curve) to increase. At the same time, the intercept of the CO_2 response curve with the abscissa (pCO_{2A}) was shifted to the right, suggesting the disappearance of a (nonspecific) respiratory drive. Severing sinus nerves caused only minor changes of the isolated CO_2 (0% to 13%) and H^+ effects (<33%). Additionally to the (small) decrease of slope, severing of the sinus nerves caused a shift of the CO_2 response curve to the right by 5,6 torr at normal acid-base balance. It is concluded that in the presence of sufficiently high arterial pO_2 the role in respiratory regulation of isolated CO_2 and isolated H^+ effects on the chemoreceptors of the carotid region is small compared to the more central effects. The role of a possibly nonspecific respiratory drive conducted in the sinus nerves, however, is considerable. The nature of this drive is not yet clear.

A65-80607
THE EFFECT OF CUTTING OF SINUS NERVES ON THE RESPIRATION OF THE ANESTHETIZED CAT AT ARTIFICIALLY MAINTAINED CONSTANT ARTERIAL PRESSURE AND ITS DEPENDENCY ON THE CO_2 PRESSURE [DER EFFEKT DER DURCHTRENNUNG DER SINUSNERVEN AUF DIE ATMUNG DER NARKOTISIERTENKATZE BEI KONSTANT GEHALTENEM ARTERIELLEM DRUCK UND SEINE ABHANGIGKEIT VOM CO_2-DRUCK].
Byron Katsaros (Göttingen U., Inst. für Klin. Physiol., Germany).
Pflügers Archive für die gesamte Physiologie des Menschen und der Tiere, vol. 282, 1965, p. 179-185. 6 refs. In German.

In 18 cats lightly anesthetized with chloralose-urethane, in which vagosympathetic trunks including depressor nerves had been denervated beforehand, the sinus nerves were severed while mean arterial pressure was being kept constant at about 150 torr using a pressurized vessel attached to the femoral arteries. Sinus nerves were cut in a first group of 9 cats during inhalation of 35% O_2 in N_2 and in a second group of 9 cats during inhalation of 4% CO_2, 35% O_2 in N_2. Lung ventilation and arterial pressure were recorded; arterial O_2 pressure was determined in blood samples. The average decrease of respiratory minute volume was 134.1 ml. $min.^{-1}$ in the first and 569.1 ml. $min.^{-1}$ in the second group, i.e., 22%±3% and 27%±4% of the control values respectively. It is concluded that the distinct decrease of ventilation which is observed after cutting sinus nerves at elevated inspiratory pO_2 cannot be explained either by a preexistent drive of ventilation by low oxygen pressure in the chemoreceptors or by the change of blood pressure.

A65-80608
THE EFFECT OF CUTTING THE SINUS NERVE ON THE RESPIRATION OF THE ANESTHETIZED CAT AT CONSTANT ARTERIAL PRESSURE MAINTAINED ARTIFICIALLY AT LOW LEVEL AND THE EFFECT OF STEPWISE CHANGES IN THE ARTERIAL PRESSURE ON THE RESPIRATION BEFORE AND AFTER SEVERANCE OF THE SINUS NERVES [DER EFFEKT DER DURCHTRENNUNG DER SINUSNERVEN AUF DIE ATMUNG DER NARKOTISIERTEN KATZE BEI KONSTANT GEHALTENEM ARTERIELLEN DRUCK IN TIEFEM NIVEAU UND DER EINFLUSS STUFENWEISER ANDERUND DES ARTERIELLEN DRUCKS AUF DIE ATMUNG VOR UND NACH-DURCHTRENNUNG DER SINUSNERVEN]
Byron Katsaros (Göttingen U., Inst. für Klin. Physiol., Germany).
Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere, vol. 282, 1965, p. 186-192. 6 refs. In German.

Ventilation and arterial pressure were recorded in eight anesthetized cats with severed vagosympathetic trunks including depressor nerves. Arterial pressure was changed stepwise and kept at constant level between changes. Sinus nerves were severed and the effects of stepwise change of arterial pressure on ventilation again was recorded. Steady state ventilation at an arterial pressure of 146 torr is not significantly different from steady state ventilation at arterial pressure of 146 torr. Cutting the sinus nerves at low level (80 torr) of mean arterial pressure is followed by a decrease of ventilation which is not significantly different from the decrease found when cutting sinus nerves at an arterial pressure of 146 torr. If mean arterial pressure is lowered from 160 to 120 and 80 torr, ventilation each time returns to its initial value after a transient increase. After cutting the sinus nerves, steady state ventilation again is not influenced by the mean arterial pressure. The transient increases of ventilation after diminution of arterial pressure therefore must partly be considered as consequences of changes of the cerebral circulation rather than as being caused by diminution of pressoreceptor impulse traffic.

A65-80609
TELEMETRIC STUDY OF ELECTROCARDIOGRAM IN RACE HORSES [ETUDE TELEMETRIQUE DE L'ELECTROCARDIOGRAMME DU CHEVAL DE SPORT.]
P. Benazet, R. Bordet A. Brion, M. Fontaine, and J. Sevestre (Ecole Natl. vet. d-Alfort, France).
Recueil de Medecine Veterinaire de l'Ecole d'Alfort, vol. 140, Jun. 1964, p. 449-459. 12 refs. In French.

The authors describe the techniques and various steps of electrocardiography in the race-horse. They use surveying instruments transmitting the electrocardiographic signals by means of Hertzian waves without connection of a cable between the animal and the recording apparatus. The values of duration of electrocardiographic waves during the sinusoidal variations, the values of the electric-corrected systole (QTc) described a cycle that may be a test of cardiac adaptation to hydraulic strains.

A65-80610
OBSERVATIONS ON THE ROLE OF DIMINISHED OXYGEN TENSION IN THE FUNCTIONAL HYPEREMIA OF SKELETAL MUSCLE.
John Ross, Gerard A. Kaiser, and Francis J. Klocke (Natl. Heart Inst., Cardiol. Branch, Bethesda, Md.)
Circulation Research, vol. 15, Dec. 1964, p. 473-484. 42 refs.

The hypothesis that lowered tissue oxygen tension acting on vascular smooth muscle can explain functional hyperemia in skeletal muscle was examined in ten dogs. A comparison was made between the blood flow increment that accompanied rapid, rhythmic contraction of a gastrocnemius muscle and the flow change that occurred in the same muscle at rest during its perfusion with venous blood obtained from the resting or contracting gastrocnemius muscle of the opposite leg. Blood oxygen tension (Po_2), pH, and carbon dioxide tension (Pco_2) were measured in samples of venous blood from the muscle. There was no evidence that the perfusion circuit traumatized the perfused blood. During functional hyperemia, the increases in blood flow averaged 173%, and the average venous Po_2 was 25 mm. Hg. During venous perfusion, the maximum increases in blood flow averaged 56%, and the average venous Po_2 was 23 mm. Hg. When the muscle was stimulated to contract during its perfusion with venous blood, increases in blood flow occurred which averaged 143%, despite additional falls in venous blood Po_2 that averaged only 3 mm. Hg. These studies suggest that the effect of lowered Po_2 on vascular smooth muscle does not produce sufficient vasodilatation to explain functional hyperemia in skeletal muscle.

A65-80611
URINARY EXCRETION OF PHENOL BY MEN EXPOSED TO VAPOUR OF BENZENE: A SCREENING TEST.
S. G. Rainsford and T. A. Lloyd Davies.
British Journal of Industrial Medicine, vol. 22, Jan. 1965, p. 21-26. 7 refs.

The metabolism of benzene differs from that of other aromatic hydrocarbons; the excretion of phenol in the urine of workers exposed to ambient benzene bears a linear relationship to the degree of exposure. A semi-quantitative screening test using stable reagents not requiring special apparatus or laboratory facilities permits an estimation of urinary phenolic bodies, and hence the exposure to benzene. The test may be used (a) to determine whether individual workers need further investigation because of exposure to benzene, (b) as a group test to determine whether the environment is acceptable, and (c) to determine whether solvents often regarded as safe contain benzene.

A65-80612
VARIABLES OF PERCEIVED COLOR.
Ralph M. Evans (Eastman Kodak Co., Photographic Technol. Div., Rochester, N. Y.)
Journal of the Optical Society of America, vol. 54, Dec. 1964, p. 1467-1474.

The variables of perceived color are reconsidered critically. Two ways of viewing color are distinguished as modes of perception: (1) perceiving the effect of light entering the eye, as such, and (2) perceiving the effect produced by an object on the perceived color of light. For the light mode of perception, there are at least four and possibly six or more independent perceptual variables for the general case. For the object mode this number is reduced by at least one. Both modes can be reduced to three perceptual variables by simple restrictions, but in general the three to which

they reduce are not the same. Four perceptual variables are necessary (and perhaps sufficient) to describe the color perceptions produced by light sources, illumination, and both reflecting and transmitting objects. They each produce part or all of the perceptions of the four-dimensional color-perception continuum produced by a single homogeneous aperture color with a homogeneous surround.

A65-80613
A MODEL OF LOUDNESS SUMMATION.
Eberhard Zwicker (Tech. Hochschule Stuttgart, Germany) and Bertram Scharf (Northeastern U., Boston, Mass.)
Psychological Review, vol. 72, Jan. 1965, p. 3–26. 39 refs.
Grant PHS NB 04464.

A psychological model is presented that explains why loudness summates across frequency as it does and that permits the precise calculation of loudness from the physical spectrum. Loudness is represented by geometrical patterns derived from the masking of pure tones by narrow bands of noise. The masking patterns are converted to loudness patterns by means of the critical-band function that relates tonalness in Barks to frequency in cycles per second and a power function that relates specific loudness, loudness per Bark, to sound-pressure level (SPL). Plotted on the coordinates of specific loudness and tonalness, the geometrical patterns are integrated to yield a value in sones$_G$ for the overall loudness. Calculated values are compared to experimental values obtained from loudness balances with three types of sound.

A65-80614
ROC CURVES FOR RECOGNITION OF VISUAL PATTERNS.
Wayne Lee (Calif. U., Berkeley).
Psychonomic Science, vol. 2, Jan. 15, 1965, p. 51–52.
NIH Grant GM 11128.

The confidence rating technique was used to generate z-deviate, receiver-operating characteristic (ROC) curves for the recognition of one of two possible visual patterns. The patterns were O's and Landolt rings. The mean linear slopes for each pattern pair were about 45°, but there was some evidence of downward curvilinearity.

A65-80615
RESPONSE COMPETITION AND/OR INHIBITION IN TWO-CHOICE REACTION TIME.
Sylvan Kornblum (Mich. U., Ann Arbor).
Psychonomic Science, vol. 2, Jan. 15, 1965, p. 55–56.
NIH Grant MH-07197.

A two-choice reaction time experiment was conducted in which it was demonstrated that the reaction time for a particular finger is subject to change depending on the alternatives with which it is paired. This finding, it is argued, raises questions regarding the adequacy of controls which select the experimental data from only one finger in an effort to minimize the effects of interfinger variability. It is also a demonstration of R-R compatibility effects, and as such, lends experimental support to the hypothesis that a measurable portion of the reaction time interval is consumed by the processes associated with the inhibition of competing incorrect response alternatives.

A65-80616
RESPONSIVENESS IN THE VISUAL SYSTEM DURING VARIOUS PHASES OF SLEEP AND WAKING.
J. T. Walsh and J. Pierre Cordeau (Montreal U., Dept. of Physiol., Lab. of Sci., Canada).
Experimental Neurology, vol. 11, Jan. 1965, p. 80–103. 48 refs. Med. Res. Council of Canada supported research.

Potentials were evoked in visual cortex of freely moving cats with chronically implanted electrodes, by stimulation of optic chiasma and optic radiations. Waves 1 and 4 were averaged during relaxed waking, arousal (sight of mouse, barking of dog, RF stim.), slow wave sleep (SWS), and fast wave sleep (FWS). Amplitudes of wave 1 from chiasma stimulation and of wave 4 from radiation stimulation were used as a measure of transmission at the lateral geniculate and cortical relays, respectively. Results show that, accompanying the shifts from SWS to waking and from waking to arousal, there are corresponding increases in wave 1 of chiasmatic potential and decreases in wave 4 of radiation potential. The thalamic facilitation and the decreases in cortical responsiveness are greatest when waking is compared to SWS. However sudden waking from SWS is accompanied by marked but transient (5 to 15 sec.) increase in both thalamic and cortical excitabilities. Therefore, with this method of measurement the transition phase from sleep to waking appears to be qualitatively different from either sleep or wakefulness as steady states. In FWS, thalamic transmission is at arousal levels and cortical excitability at approximately SWS levels, i.e., both waves 1 and 4 are close to maximum values.

A65-80617
X-RAY AND ULTRAVIOLET SENSITIVITY OF SYNCHRONIZED CHINESE HAMSTER CELLS AT VARIOUS STAGES OF THE CELL CYCLE.
W. K. Sinclair and R. A. Morton (Argonne Natl. Lab., Div. of Biol. and Med. Res., Ill.)
Biophysical Journal, vol. 5, Jan. 1965, p. 1–25. 25 refs.

Populations of Chinese hamster cells, synchronized by selecting for cells at or close to division, were exposed to 250 kvp X-rays and to ultraviolet light at different stages of the cell cycle and colony-forming ability examined thereafter. These cells were found to be most resistant to X-rays during the latter part of the DNA synthetic period (S) and to be about equally sensitive in the pre-DNA (G_1) and post-DNA (G_2) synthetic period. The response to ultraviolet light differed from that to X-rays. Resistance was greatest in G_2 and changes in both shoulder and slope of the survival curves occurred throughout the cell cycle. The X-ray and ultraviolet responses for component stages of the cell cycle were respectively compounded into expected survival data for a log phase asynchronous population of hamster cells and found to agree well with direct experiment.

A65-80618
THE EFFECTS OF FLUORIDE ON THE GROWTH OF CHLORELLA PYRENOIDOSA.
A. O. Smith and B. R. Woodson (Va. State Coll., Dept. of Biol., Petersburg).
Virginia Journal of Science, vol. 16, Jan. 1965, p. 1–8. 12 refs.

Fluoride causes growth inhibition in cultures of Chlorella pyrenoidosa. The antimetabolite has its greatest effect at concentrations greater than 10^{-3} M. No proportionality can be established between the concentrations of fluoride and the percentages of inhibition occurring at these concentrations. A 10^{-3} M concentration of glucose-1-phosphate is effective in the reversal of fluoride caused inhibition although no reversal was demonstrated in the presence of 10^{-1} M fluoride.

A65-80619
EMERGENCY EXPOSURE LIMITS.
American Industrial Hyg. Assoc., Toxicol. Committee.
Industrial Hygiene Journal, vol. 25, Nov.–Dec. 1964, p. 578–586. 12 refs.

The first three of a new series of guides to emergency exposure limits are presented. These limits are intended to give guidance to industrial hygienists in the management of single, brief exposures to airborne contaminants in the working environment. Emergency exposure limits for nitrogen dioxide, 1,1-dimethylhydrazine, and 1,1,1-trichloroethane are presented with supporting information.

A65-80620
INDUSTRIAL HYGIENE SUPPORT IN A MISSILE PROGRAM.
Eugene B. Trucano (Boeing Co., Ind. Hyg. Eng. Group, Seattle, Wash.)
Industrial Hygiene Journal, vol. 25, Nov.–Dec. 1964, p. 607–609.

Three ways in which industrial hygiene has played a vital role in supporting a missile program are reviewed and discussed. They include assisting in eliminating health hazards in (1) fluidized bed coating reactor, (2) remote site testing, and (3) life support systems.

A65-80621
CHANGES OF SERUM GLUTAMIC-OXALOACETIC TRANSAMINASE AND SERUM LACTIC DEHYDROGENASE ON PHYSICAL EXERTION.
H. J. Nerdrum and K. J. Berg (Ullevål Hosp., Central Lab., Oslo, Norway).
Scandinavian Journal of Clinical and Laboratory Investigation, vol. 16, 1964, p. 624–629. 20 refs.

An investigation of enzyme activity changes in serum, subsequent to physical exertion, is reported. After a short maximal exertion, a transient rise in glutamic-oxaloacetic transaminase (SGOT) activity is found, while there is no change in lactic dehydrogenase (SLDH) activity. After prolonged, strenuous exertion there is no change in SGOT activity, while SLDH activity is raised. The importance of using a nicotinamide-adenine dinucleotide hydrogenase-dependent method in the enzyme determination is stressed. The possible reasons for the enzyme changes are discussed briefly.

A65-80622
RADIOPROTECTIVE EFFECT OF AMINOCAPROIC ACID AND OF PANCREATIC TRYPSIN INHIBITOR IN RAT.
Z. Danysz, D. Kocmierska-Grodzka, S. Niewiarowski, and J. Prokopowicz (School of Med., Dept. of Pharmacol., and Dept. of Physiol. Chem., Bialystok, Poland).
Bulletin de L'Académie Polonaise des Sciences, Série des Sciences Biologiques, vol. 12, 1964, p. 445–449. 9 refs.

The protective action of E-amino-caproic acid (EACA) and pancreatic trypsin inhibitor (PTI) upon the survival of rats exposed to X-ray irradiation was studied. EACA is a specific inhibitor of plasminogen activation by plasmin, whereas PTI is a peptide inhibiting the function of many proteolytic enzymes such as trypsin, plasmin, and chymotrypsin. The results show some radioprotective effect of EACA and PTI in rats. This is proved by an increased survival of irradiated animals treated with one of the two substances a short time before the irradiation. The mechanism of the radioprotective effect of both inhibitors is not clear. However, the inhibition of protease activity in the tissues of irradiated animals is not excluded. The number of already known radioprotective agents is very high; however, they all belong

to one type of compound, namely antioxidants. The idea of using proteolytic enzyme inhibitors as radioprotective agents deserves special attention.

A65-80623
BENEFICIAL FALLOUT FROM AEROSPACE MEDICAL RESEARCH.
Richard L. Bohannon.
(Delivered at the 71st Annual Meeting of the Association of Military Surgeons of the United States, Washington, D. C., 20 Oct. 1964).
Military Medicine, vol. 130, Feb. 1965, p. 120–122.

Aerospace medical research has already made great contributions to clinical practice, the most important of which was in the field of biomedical instrumentation, such as bio-sensors useful to clinicians, surgeons, and anesthesiologists. Environmental control studies produced improvements of medical and surgical equipment. Knowledge of effects of noise, vibration, acceleration, and deceleration clarified and resolved problems of safe operation of ground, sea, and air vehicles. The capability developed to test subjects under different situations and stresses can contribute to better understanding of health and disease. The understanding of ionizing energies can be of help in diagnostic and therapeutic aspects of clinical medicine. The development of a great number of electronic instruments does and will facilitate all phases of medicine. The list of benefits from aerospace medical research for our everyday lives is large and will continue to grow.

A65-80624
PRESSURE SUITS—THEIR EVOLUTION AND DEVELOPMENT.
Frederick R. Ritzinger, Jr. and Ellis G. Aboud.
Air University Review, vol. 16, Jan.–Feb. 1965, p. 23–32.

The concept of the pressure suit for high altitude flying originated in 1922. By 1940, five separate nations had established programs for developing practical models which were constructed by 1945. Since 1949, eighteen types of pressure suits and helmets, together with individual and special support equipment, have been developed in the United States. Between 1947 and 1963, thirty-nine different projects were contracted by the USAF to different manufacturers for applied research in this area. In anticipation of the space suit requirements for Gemini, Manned Orbiting Laboratory, and Apollo programs, considerable research continues to be programmed.

A65-80625
CARDIAC RATE AS A FUNCTION OF CHANGES IN RESPIRATION.
George E. Deane (Harpur Coll., Endicott, N. Y.)
Psychological Reports, vol. 16, Feb. 1965, p. 41–42.
Grant PHS MH-06590-02.

Cardiac activity was recorded while 6 male subjects inhaled sharply for 1 sec. and then exhaled for 6 sec. The mean cardiac rate taken over 15 trials showed an initial marked acceleration followed by a deceleration during the inhale-exhale cycle. Since these cardiac changes are similar to those which have been considered attributable to the conditioning procedure, in future cardiac conditioning studies, respiration needs to be controlled or recorded.

A65-80626
SOME FACTORS AFFECTING THE PERCEPTION OF VERTICALITY.
R. S. Olson, D. F. Diehm, and L. F. Elfner (Kent State U., Ohio).
Psychological Record, vol. 15, Jan. 1965, p. 51–55. 10 refs.

An experiment was performed to assess the effects of practice, set, sex, and familiarity with the apparatus on the perception of verticality. The subjects were 50 men and 50 women, all undergraduates. A miniaturized rod-and-frame apparatus was used to obtain measures of error in the judgment of verticality. The experimental conditions were (a) no special instructions, (b) familiarization with the apparatus before testing, (c) instructions to induce set, (d) practice sessions then testing, and (e) set plus practice. Women produced more errors than men. Even with practice this difference is significant. Practice was the only other significant effect, with no interactions. An analysis of the practice sessions suggested that improvement was inhibited by the subjects' gradual adaptation to the reality of the tilted frame.

A65-80627
A METHOD FOR CONTINUOUS MONITORING OF THE END-TIDAL PARTIAL PRESSURE OF OXYGEN.
P. D. Newberry, J. P. Aziz, and R. A. Stubbs (Inst. of Aviation Med., Toronto, Ontario).
(Fifth Annual Clinical Conference of the Canadian Forces Medical Service, held at the Institute of Aviation Medicine, Toronto, Ontario, April 13–15, 1964).
Medical Services Journal, Canada, vol. 20, Oct. 1964, p. 745–752.

The capability of the Beckman polarographic, gas-phase alveolar partial pressure of oxygen (P_{O_2}) sensor used with an end-tidal sampling device in monitoring end-tidal P_{O_2} was investigated. Samples for a comparison of the end-tidal P_{O_2} recorded by the P_{O_2} sensor with the value recorded by a mass spectrometer were taken from an expiratory chamber. It was determined that the P_{O_2} sensor will record the end-tidal P_{O_2} in various combinations of rate and tidal volume from breath to breath, with an average error of +2 mm. Hg. In the condition which resulted in the greatest error, a high rate (30 per minute) and a small tidal volume (500 ml.), the mean error was +4 mm. Hg.

A65-80628
THE EFFECT OF CAMPHOR ON THE CARBOHYDRATE-PHOSPHORUS AND OXIDATION METABOLISM OF THE MYOCARDIUM IN HYPOXIA
[VLIIANIE KAMFARY NA UGLEVODNO-FOSFORNYI I OKISLITEL'NYI OBEN MIOKARDA PRI GI POKSIII].
A. S. Saratikov and G. E. Barkovskaia.
Farmakologiia i Toksikologiia, vol. 6, Nov.–Dec. 1964, p. 703–706. 10 refs. In Russian.

The state of hypoxia is characterized by a reduced level in the myocardium of glycogen, adenosine-triphosphate and of phosphocreatine, by an increased content of lactic acid, by an intensive anaerobic glycolysis, and by inhibited internal respiration. The presence of camphor in the myocardium of animals subjected to hypoxia inhibits anaerobic glycolysis, breakdown of glycogen, of adenosine-triphosphate and phosphocreatine, raises the lactic acid content, and activates internal respiration. It does not influence the activity of cytochrome-oxidase and succino-dehydrogenase of the myocardium.

A65-80629
PERIPHERAL ATTENTION OF TWO AGE GROUPS IN HOT CONDITIONS.
Clifford R. Bell and Kenneth A. Provins (London School of Hyg. and Tropical Med., M.R.C. Environ. Physiol. Res. Unit, Great Britain).
Journal of Gerontology, vol. 20, Jan. 1965, p. 72–75.

The performance of seven young (aged 23 to 32 years) and six old (aged 39 to 53 years) coal miners on a peripheral attention task was examined over ten experimental days in five degrees of climatic stress ranging from 68° F. (E.T.) to 87° F. (E.T.). Significant differences in mean performance levels of the two groups were found in terms of both response times and the proportion of signals failing to evoke a response. A significant improvement in performance over the ten days of the experiment was found in both subject groups. Although the five degrees of climatic severity were given in a random order over subjects, no effect of this variable was found in the performance of the peripheral attention task.

A65-80630
THE EFFECT OF TEMPERATURE ON THE PRESERVATION OF PURINE AND PYRIMIDINE BASES.
A. Minton and E. Rosenberg (Calif. U., Dept. of Bacteriol., Los Angeles).
Geochimica et Cosmochimica Acta, vol. 28, Dec. 1964, p. 1953–1959. 10 refs.

The aerobic solid phase decomposition of the five major naturally occurring purine and pyrimidine bases of the nucleic acid was studied spectrophotometrically. Throughout the temperature range 115° to 264° C., the decompositions follow first-order kinetics and obey the Arrhenius relationship except in the case of gaunine where a distinct change in slope was noted at about 200° C. The energies of activation and temperature ranges studied are as follows: cytosine, 36·2 kcal/mole (121° to 246° C.); thymine, 23·4 kcal/mole (115° to 221° C.); uracil, 32·3 kcal/mole (115° to 196° C.); adenine, 36.4 kcal/mole (115° to 221° C.); guanine 23·4 kcal/mole (115° to 196° C.); 11·6 kcal/mole (196° to 264° C.). Extrapolations suggest that under the conditions studied adenine and cytosine would have half-lives of approximately 10^6 years at 25°, guanine and uracil would have half-lives of between 10^4 and 10^5 years, while thymine would have a half-life of less than 10^3 years.

A65-80631
THE LOCUS OF REACTION TIME CHANGE WITH SET, MOTIVATION, AND AGE.
Alfred D. Weiss (Natl. Inst. of Health, Natl. Inst. of Mental Health, Lab. of Psychol., Section on Aging, Bethesda, Md.)
Journal of Gerontology, vol. 20, Jan. 1965, p. 60–64. 16 refs.

In a simple auditory reaction time (RT) experiment, using irregularly ordered preparatory intervals of 1, 2, 3, and 4 sec., time measurements of electromyographic changes were obtained to separate the premotor and motor components of reaction time. After an initial series of determinations, shock-driving at the subject's median RT was used to assess the locus of effect of motivational change. Changes in RT because of set and motivation occurred predominantly in the premotor component and were therefore seen primarily as central rather than peripheral phenomena. However, since unpracticed subjects were used, the effects attributed to motivation might include practice effects. The predominant difference in RT between the two age groups lay in the premotor component. Computation of comparative conduction times in the peripheral nervous system suggests that the difference is largely in the central nervous system. Extrapolation from data in the literature suggests that the difference in effective stimulus intensity because of hearing impairment in the aged may account for only a small fraction of the age-related RT difference.

A65-80632
EFFECT OF BODY BUILD ON THE QRS VOLTAGE OF THE ELECTROCARDIOGRAM IN NORMAL MEN: ITS SIGNIFICANCE IN THE DIAGNOSIS OF LEFT VENTRICULAR HYPERTROPHY.
Stanley E. Kilty and Eugene Lepeschkin (Vt. U. Coll. of Med., Div of Exptl. Med., Burlington).

(Presented in part at the Seventh Interamerican Congress of Cardiology, Montreal Canada, on June 15, 1964).
Circulation, vol. 31, Jan. 1965, p. 77-84. 21 refs.
Cardiovascular Res. Training Grant He-5502.

Various sets of QRS voltage that are used in the diagnosis of left ventricular hypertrophy were determined from the electrocardiograms of 300 normal men judged to be free from cardiopulmonary disease, and these were correlated to body build expressed in terms of ponderal index. A correlation was found for all voltages studied, and a highly significant correlation was found for the criteria $R_I + S_{III}$, greatest R + greatest S in the precordial leads, and greatest R + S in a single precordial lead. Age or activity did not appear to be specific factors in the population studied. Graphs were constructed for the latter three sets of voltages defining upper limits of normal for various values of the ponderal index. By using these sets of voltage criteria in conjunction with this index, one would hopefully improve both accuracy and specificity in the electrocardiographic diagnosis of early left ventricular hypertrophy.

A65-80633
RADIATION BIOLOGY AND SPACE ENVIRONMENTAL PARAMETERS IN MANNED SPACECRAFT DESIGN AND OPERATIONS.
Wright H. Langham (Los Alamos Sci. Lab., N. Mex.), Phillips M. Brooks (McDonnell Aircraft Corp., St. Louis, Mo.), and Douglas Grahn, ed. (Argonne Natl. Lab., Ill.)
Aerospace Medicine, vol. 36, Feb. 1965 (Section II), vii+55 p. 286 refs.
McDonnell Aircraft Corp., St. Louis, Mo. and Los Alamos Sci. Lab., N. Mex. supported research.

This report attempts to derive criteria for consideration of man's response to space radiation exposure so that radiation risks may be taken into account during spacecraft design and operational planning phases, along with othe inherent hazards of manned space flight. Included are the following: (1) space radiation environment (general considerations, geometrically trapped radiation, solar particle events, galactic radiation, and secondary radiations); (2) biological effects of ionizing radiations (general considerations, early somatic effects, late or delayed somatic effects, genetic effects, and factors modifying radiation effects, e.g., nature and quality of space radiation, depth-dose distribution and partial-body exposure, spacecraft design and operational factors, and medical treatment); and (3) state of current knowledge, including major problems requiring increased research emphasis.

A65-80634
STEREOKINERADIOGRAPHY. I. PERCEPTION OF MOTION AND DEPTH.
Majic S. Potsaid (Harvard Med. School, Cambridge, Mass.; and Mass. Gen. Hosp., Boston).
New England Journal of Medicine, vol. 271, Nov. 12, 1964, p. 1048-1057. 21 refs.
Grant NIH AM-03671.

If not an understanding then, at least, an appreciation of the anatomic (geometric), the physiological, and the psychological processes involved in awareness of the three dimensions of space is essential in solving stereokineradiographic problems. To date the evidence is unequivocal that one does not experience a genuine sensation of depth unless the eyes convey to the brain two dissimilar views of an object. All versions of stereokineradiography should present disparate two-dimensional images--one to each eye of the observer.

A65-80635
THE ASSESSMENT, MANAGEMENT AND CONTROL OF HEAT STRESS.
A. R. Lind (Royal Infirmary, Dept. of Med., N. C. B. Physiol. Branch, Edinburgh, Great Britain).
IN: HEAT STRESS AND HEAT DISORDERS.
Philadelphia, Pa., F. A. Davis Co., 1964, p. 1-124. refs.

Part one of the textbook, Heat Stress and Heat Disorders, covers the following topics on the assessment, management, and control of heart stress: (1) occurrence and extent of heat stress on man; (2) physiology of thermoregulation; (3) heat exchanges between the body and its environment; (4) evaluation of heat stress and strain; (5) thermal limits of different types of occupation; and (6) control of heat stress.

A65-80636
DISORDERS DUE TO HEAT.
C. S. Lelthead (Liverpool School of Tropical Med., Liverpool, Great Britain).
IN: HEAT STRESS AND HEAT DISORDERS.
Philadelphia, Pa., F. A. Davis Co., 1964, p. 127-136. refs.

The first chapter of part two of the textbook, Heat Stress and Heat Disorders, deals with some disorders due to heat. The topics discussed are: (1) definition, classification, and incidents of heat disorders; (2) heat syncope; (3) disorders of water and electrolyte balance; (4) disorders with skin lesions; and (5) heatstroke and heat hyperpyrexia.

A65-80637
PSYCHOLOGICAL EFFECTS OF HEAT.
R. D. Pepler.
IN: HEAT STRESS AND HEAT DISORDERS.
Philadelphia, Pa., F. A. Davis Co., 1964, p. 237-253. refs.

The last part of the textbook, Heat Stress and Heat Disorders, deals with the psychological effects of heat. The following topics are discussed: (1) effect of short exposure to heat, and (2) prolonged exposure to heat environments.

A65-80638
AUDITORY EVOKED RESPONSES AND THE EEG STAGES OF SLEEP.
Harold L. Williams, Henry C. Morlock, Jr., Jean V. Morlock, and Ardie Lubin (Walter Reed Army Inst. of Res., Washington, D.C.)
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 172-181.

Auditory evoked responses were studied during waking and sleeping. Young male subjects slept in an electrically shielded chamber with a constant ambient noise level of 60 decibels relative to 0.0002 dynes/cm^2. Bipolar and monopolar recordings of evoked potentials in response to clicks were obtained and related to electroencephalographic stages of sleep. Changes in the form of the evoked potential throughout the different sleep stages, waking, and reading are illustrated by specific examples.

A65-80639
NATURE OF AVERAGE EVOKED POTENTIALS TO SOUND AND OTHER STIMULI IN MAN.
Reginald G. Bickford, James L. Jacobson, and D. Thane R. Coty (Mayo Clin. and Mayo Found., Rochester, Minn.)
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 204-223.
Grants NIH B-2056 and B-3225.

A human sonomotor response system has been described in which click stimuli produce widespread activation of the muscular system with latencies ranging from 6 msec. (inion, cervical) to 50 msec. (leg). These responses can be detected throughout the cranial musculature and are believed to be the basis of the so-called cortical responses to auditory stimulation. Studies using patients with various lesions of the audiovestibular system have indicated that the receptors in the sonomotor response are vestibular rather than cochlear. Hence, the test cannot be used as a valid measure of hearing function. A varying degree of myogenic contamination can be shown to accompany the averaged evoked responses to other sensory inputs (light, somesthetic) and suggest the need for caution in the interpretation of average responses derived from the human scalp.

A65-80640
EXCITABILITY CYCLE OF THE VISUAL CORTEX IN MAN.
L. Ciganek (Slovak Acad. of Sci., Inst. of Exptl. Med., Dept. of Clin. Electrophysiol., Bratislava, Czechoslovakia).
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 241-253. 17 refs.

The excitability cycle of the human visual cortex was studied by means of paired flashes, separated by varying intervals. The stage of excitability is expressed in the form of the excitability index R_2/R_1 (R_2= amplitude of the potential evoked by the second-test stimulus; R_1= amplitude of the response to the first-conditioning stimulus). The following results were obtained: an absolute refractory period of 40 msec., 2 subsequent maxima of facilitation ($R_2 > R_1$), 100 and 200 msec. after the stimulus, and an incomplete subnormal period between them (150 msec.). The facilitation in the third wave of the primary response is much greater than in other waves. The waves of the response to the test stimulus are lengthened. The excitability indexes are greater with higher levels of alertness as indicated by the background EEG activity and vice versa. Focusing the attention upon the flashes increases the response to the test stimulus, distraction of the attention depresses it.

A65-80641
VISUAL EVOKED RESPONSES IN MAN: NORMATIVE DATA.
Kenneth A. Kooi and B. K. Bagchi (Mich. U., Neuropsychiat. Inst., Ann Arbor).
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 254-269. 28 refs.
Grant NIH-G-NB-02560.

Normative values for amplitudes and latencies of major components of the averaged visual evoked response, obtained from examination of 100 medically screened adults, have been presented for three cerebral regions (electrode positions: left infraorbital; left frontal; left and right central; left, right and midoccipital; and cervical). Complexity of configuration, regional differences, and intraindividual consistency have been emphasized. No relationship emerged between either the amplitude of the occipitoparietal wave or the vertex sharp wave and eye color, color blindness, type of refractive error, pupil size, subjective estimate of light intensity, hours of sleep, alpha frequency, alpha amplitude, and an alpha persistence index. Low order correlations were found between the amplitude of the occipitoparietal wave and latency of parietal wave II and age.

A65-80642
OBSERVATIONS ON PHOTICALLY EVOKED OCCIPITAL AND VERTEX WAVES DURING SLEEP IN MAN.
K. A. Kooi, B. K. Bagchi, and R. N. Jordan (Mich. U., Neuropsychiat. Inst., Ann Arbor).
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 270–280. 11 refs.
Grant NIH-G-NB-02560.

Cerebral responses to light were consistently altered during sleep. The occiput negative phase observed at 60 to 100 msec. during waking was typically reduced in amplitude and, in some subjects, a positive deflection developed within this latency range. Augmentation of a later negative event occurred in most of the subjects. Latencies of late components were usually increased while those of early deflections were not appreciably changed. The exact form of the response was found to be related to stimulus intensity and individual components were observed to be either increased or decreased in magnitude as the light was made brighter. This "paradoxical intensity effect" appeared of particular importance in analyzing two components of the vertex sharp wave.

A65-80643
ARTIFICIAL SYNTHESIS OF EVOKED RESPONSES TO LIGHT FLASH.
Robert Efron (Boston V. A. Hosp., Neurophysiol.-Biophys. Res. Unit, Mass.)
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 292–304. 10 refs.

Recent experiments on temporal perception related to sensory evoked potentials are described. Time for the transmission of sensory message for visual stimuli is dependent upon the intensity of the stimulus, with approximate delay of 10 msec. per log unit reduction of intensity. Exploration of cerebral on- and off-responses in relation to psychological concept of duration showed that the complex waveform of evoked response disappears after about 500 msec. in response to a longer light flash of 800 msec. despite the fact that the light is still on. When the light is finally turned off a new and different off-response occurs. With very short light flashes of less than 25 msec. an off-response was not detected. The subject reported that these flashes were experienced as durationless. These events are related to reaction times.

A65-80644
INTERACTION BETWEEN THE VISUAL EVOKED RESPONSE AND TWO SPONTANEOUS BIOLOGICAL RHYTHMS: THE EEG ALPHA CYCLE AND THE CARDIAC AROUSAL CYCLE.
Enoch Callaway III and Robert S. Layne (Calif. U. School of Med., Dept. of Psychiat., San Francisco; and Langley Porter Neuropsychiat. Inst., San Francisco, Calif.)
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 421–431. 8 refs.
Contract Nonr-2931(00); and Grant CDMH-G-61-1-24.

The visual evoked response was studied in relation to two spontaneous biological rhythms, i.e., EEG alpha cycle, and the cardiac cycle. A small influence of the alpha phase on the visual evoked response was demonstrated. Changes in the evoked response seemed to parallel the behavioral effects of alpha phase, since the maximum differences in motor reaction time dependent upon alpha phase at stimulation are only around 10 msec. In the cardiac cycle the early portion is a low-arousal phase with longer reaction times, while the latter portion is a high-arousal phase with speeded up reaction times. This relationship held even with two patients whose natural pacemakers had been replaced by transistorized pacemakers. The differences in the visual evoked responses during high- and low-arousal phases of the cardiac cycle were consistent within a single individual but varied from individual to individual. These changes did not run parallel to behavioral events (reaction time). A tentative interpretation is offered that whereas alpha phase influences the reaction time early in the course of neural events leading from stimulus to response, the cardiac arousal cycle influences reaction time later, e.g., by influencing motor readiness.

A65-80645
EVOKED RESPONSES IN RELATION TO VISUAL PERCEPTION AND OCULOMOTOR REACTION TIMES IN MAN.
John S. Barlow (Mass. Gen. Hosp., Neurophysiol. Lab., Boston; and Mass. Inst. of Technol., Res. Lab. of Electronics, Cambridge).
Annals of the New York Academy of Sciences, vol. 112, art. 1, May 8, 1964, p. 432–467. 77 refs.
Army and AF supported research.
Grant PHS 5-K3-NB-9201; Grant B-3752 from Natl. Inst. of Neurol. Diseases and Blindness; Grant NSF B-16526; Grant NIH MH-04737-02.

Averages of parieto-occipital evoked potentials were obtained from recordings made during visual tracking of a light spot on an oscilloscope screen and from recordings carried out while gaze was maintained fixed at the center of the oscilloscope screen. Averaged responses, with eyes closed, to flashes of light were also obtained. Oculomotor reaction times were determined by averaging of electro-oculographic potentials, and by cross-correlation of the latter with the spot-position signals. Potentials evoked by shifting light spot were smaller and greater in latency than those evoked by light flash with the eyes closed. Consideration of the latencies of the components of the former suggests that they may represent nonspecific rather than specific evoked responses in the visual system. Psychophysical experiments give evidence that the subjective perception of spot-shifts takes place within 40 msec. or less. This finding points to specific visual pathways for perception of simple stimuli. The findings from these electrophysiological and psychophysical experiments are discussed in relation to the question of quantization of time in the nervous system.

A65-80646
PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND THE CEREBELLUM: REPORTS ON PAPERS PRESENTED AT THE FIRST ALL-UNION CONFERENCE, ON THE PROBLEMS OF PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND THE CEREBELLUM, OCTOBER 21–26, 1961, AT EREVAN [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA: SBORNIK DOKLADOV I VSESOIUZNOGO SOVESHCHANIIA PO VOPROSAM FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA, 21–26 OKTIABRIA 1961 G., EREVAN].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, 611 p. In Russian.
(See A65-80647 through A65-80652)

Papers pertinent to bioastronautics have been abstracted separately.

A65-80647
THE EFFECT OF HIGH ALTITUDE ON THE SPECIFIC FUNCTIONS CONTROLLED BY THE AUTONOMIC NERVOUS SYSTEM [VLIIANIE VYSOTNYKH FAKTOROV NA NEKOTORYE VEGETATIVNYE FUNKTSII].
N. A. Agadzhanin.
IN: PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND OF THE CEREBELLUM [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, p. 20–27. In Russian. (See A65-80646)

In experimental animals breathing of ambient air at 5,000 to 6,000 m. altitudes or breathing air under increased pressure at 1,200 m. altitude resulted in a drop of blood oxygen saturation. Breathing pure oxygen at 5,000 to 6,000 m. altitude led to normalization of the electrocardiogram, blood pressure, and pulse and respiration rates. The results indicate that in order to prevent any physiological disturbance due to hypoxia at high altitudes in man, the efficiency of the pressure suit becomes an important factor.

A65-80648
THE ROLE OF THE NERVOUS SYSTEM IN THE REACTION OF KIDNEYS TO SMALL INTERNAL DOSES OF IONIZING RADIATION [O ROLI NERVNOI SISTEMY V REAKTSII POCHEK NA DEISTVIE MALYKH DOZ VNUTRENNEGO IONIZIRUIUSHCHEGO OBLUCHENIIA].
Ia. I. Azhipa and G. A. Filiashina (OBN AN SSR, Gruppa indivld. rabot akad. A. D. Speranskogo, Moscow, USSR).
IN: PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND OF THE CEREBELLUM [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, p. 28–36. 26 refs. In Russian. (See A65-80646).

Denervation of the kidneys in experimental animals increased the sensitivity of the organism to ionizing radiation and had a paranecrotic effect on the parenchymal tissue attributable to a disturbance in the trophic action of the nervous system. However, a direct effect of the nervous system can not be excluded. General injury of the blood components may also contribute to the sensitivity increase.

A65-80649
POSSIBILITY OF RESTORATION OF THE SOMATIC AND VEGETATIVE FUNCTIONS LOST AFTER EXPOSURE OF THE CENTRAL NERVOUS SYSTEM TO IONIZING RADIATION [O VOZMOZHNOSTI VOSSTANOVLENIIA UTRACHENNYKH SOMATICHESKIKH I VEGETATIVNYKH FUNKTSII POSLE IONIZIRUIUSHCHEGO OBLUCHENIIA TSENTRAL'NOI NERVNOI SISTEMY.
V. D. Dmitriev (Inst. Radiats. Gigieny, Leningrad, USSR).
IN: PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND OF THE CEREBELLUM [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, p. 254–265. 17 refs. In Russian. (See A65-80646).

Exposure of the lumbar spinal cord or of the brain centers to radium emanation caused disturbances in somatic and vegetative functions in experimental animals. Exposure of the central nervous system to large doses caused extensive and irreparable damage to both functions, and structural

damage to the corresponding brain centers. Brief exposure of the central nervous system to small doses of radon caused temporary disturbance of sensorimotor functions. Preliminary injections of sodium amytal or bromide, before or during the exposure, evoked activity of the compensating adaptability mechanism. The organism of cold-blooded animals could tolerate radiation exposure better at low temperatures. Ionizing radiation had a lasting effect on nervous system tolerance to stress. The animals which recovered from the ionizing effect did not tolerate the functional stress as well as the controls.

A65-80650
REACTION OF THE AUTONOMIC CENTERS OF THE HYPOTHALAMUS AND CEREBELLUM TO DISTURBANCES DUE TO IONIZING RADIATION [REAKTSIIA VEGETATIVNYKH TSENTROV GIPOTALAMUSA I MOZZHECHKA NA VOZDEISTVIE IONIZIRUIUSHCHEI RADIATSII].
N. P. Smirnova (USSR, Acad. Med. Sci., Inst. Biophys., Moscow).
IN: PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND OF THE CEREBELLUM [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, p. 505–512.
16 refs. In Russian. (See A65-80646).

Experiments on rabbits disclosed existence of various mechanisms which involve the vegetative centers of the hypothalamus and cerebellum during the organism's response to ionizing radiation. The response of the hypothalamus may be considered to be of a primary nature, while the vegetative centers react through the reticular formation of the medulla.

A65-80651
THE ROLE OF THE AUTONOMIC NERVOUS SYSTEM IN THE REGULATION MECHANISM OF THE PULMONARY TONUS AND IN THE INCREASE OF THE ORGANISM 'S TOLERANCE TO SUDDEN CHANGES IN BAROMETRIC PRESSURE [ROL' VEGETATIVNOI NERVNOI SISTEMY V MEKHANIZME REGULIATSII TONUSA LEGKOGO I PUTI POVYSHENIIA USTOICHIVOSTI ORGANIZMA K BOL'SHIM PEREPADAM BAROMETRICHESKOGO DAVLENIIA].
I. M. Khazen.
IN: PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND OF THE CEREBELLUM [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, p. 568–576.
18 refs. In Russian. (See A65-80646).

Atropine alleviates abnormal visceral reflexes caused by sudden changes in barometric pressure, as was noted in animal studies. Gradual training of animals in pressure chambers resulted in conditioned reflex adaptivity. Administration of histamine caused a shift in neuroendocrine activity together with an increase in pulmonary vessel tonus, thus increasing their resistance to expansion. All these reactions accomplish one purpose, prevention of disturbance in pulmonary circulation and possible alveolar rupture.

A65-80652
THE ACTION OF THE CEREBELLUM ON POTENTIALS EVOKED IN THE VISUAL CENTERS OF THE CORTEX [O VLIIANII MOZZHECHKA NA VYZVANNYE POTENTSIALY V ZRITEL'NOI KORE].
M. V. Khanbabian (Inst. fiziol. im. L. A. Orbeli AN ArmSSR, Erevan, USSR).
IN: PROBLEMS OF THE PHYSIOLOGY OF THE AUTONOMIC NERVOUS SYSTEM AND OF THE CEREBELLUM [VOPROSY FIZIOLOGII VEGETATIVNOI NERVNOI SISTEMY I MOZZHECHKA].
Edited by A. M. Aleksanian.
Erevan, Izdatel'stvo Akademii Nauk Armianskoi SSR, 1964, p. 577–581.
15 refs. In Russian. (See A65-80646).

Stimulation of the cerebellum by a high-frequency current (300 c.p.s.) sharply suppressed the visual potential in cats under chlorazole anesthesia. The effect was lasting and could be explained by cerebellum action on the cortex by way of its mesencephalic reticular branches, which have nerohumoral characteristics. However, chlorazole anesthesia alone increased the excitability of the cortex neurons, and this fact must be taken into account. The state of the circulatory system may also contribute to the overall effect. These findings may substantiate the concept of adaptive influence of the cerebellum on the function of the cortex of the large hemisphere.

A65-80653
THE EFFECT OF FOOD DEPRIVATION ON BLOOD SUGAR LEVEL, FOOD INTAKE AND CONDITIONING IN RABBITS WITH MEDIAL HYPOTHALAMIC LESIONS.
Maria Krystyna Lewinska (Lodz U., Lab. of Animal Physiol., Poland).
Acta Biologiae Experimentalis, vol. 24, 1964, p. 219–246. 59 refs.

In rabbits previously deprived of food, the conditioned reflex frequency and the blood sugar level showed rhythmic changes after food intake. Bilateral lesions of the medial and ventromedial areas of the hypothalamus caused an increase in food intake and an occasional drop in the blood sugar level. Those responses were exaggerated by injury of the area above the ventromedial nucleus. During starvation, rhythmic variations in the blood sugar level were noted in hyperphagic animals, without any correlation with food intake, indicating a disturbance in the glucoreceptive mechanism through the satiety centers. Lesions of the satiety centers caused excitation of the food centers. Gradual food deprivation, before and after the operation, resulted in loss of food intake even in hyperphagic animals. The results confirmed the assumption that disturbances caused by injury of the satiety centers affect the mechanism of stopping the act of eating rather than the mechanism of initiating the food intake.

A65-80654
CONTROL OF THE CIRCADIAN RHYTHM IN SEROTONIN CONTENT OF THE RAT PINEAL GLAND.
Solomon H. Snyder, Mark Zweig, Julius Axelrod, and Josef E. Fischer (NIH, Natl. Inst. of Mental Health, Lab. of Clin. Sci., Bethesda, Md.)
Proceedings of the National Academy of Sciences, vol. 53, Feb. 1965, p. 301–305. 20 refs.

The presence of a circadian rhythm in serotonin content of the rat pineal gland was confirmed. This rhythm persists in blinded rats and in rats kept in constant darkness but is abolished by one additional period of light. The suppressive effects of light exposure act via the retinae. The rhythm is unaffected by hypophysectomy, thyroidectomy, adrenalectomy, or oöphorectomy. Superior cervical ganglionectomy or decentralization of the superior cervical ganglia abolishes the pineal serotonin rhythm.

A65-80655
A COMPARISION OF THE PROBLEM-SOLVING ABILITY OF YOUNG, MIDDLE-AGED AND OLD SUBJECTS.
N. E. Wetherick (Liverpool U., Med. Res. Council, Unit for Res. on Occupational Aspects of Ageing, Great Britain).
Gerontologia, vol. 9, 1964, p. 164–178.

Three groups of adult male subjects in their twenties, forties and sixties respectively, matched for nonverbal intelligence, were given three separate problems on a simple piece of problem-solving apparatus. No tendency was apparent for old subjects to accumulate more redundant information than young subjects. There was no difference between the groups in performance on the first problem; on the second problem younger subjects were inclined to guess and old subjects did very badly; on the third (and most difficult) problem the performance of young and middle-aged subjects slumped but old subjects did well. It is suggested that intelligent old subjects may retain an ability to learn from experience which enables them to compete with younger subjects who are equal or even superior to them in nonverbal intelligence.

A65-80656
GENETIC EFFECT OF LOW RADIATION DOSES AND THE PROBLEMS OF CHEMICAL RADIOPROTECTION [GENETICHESKII EFFEKT MALYKH DOZ RADIATSII I PROBLEMY KHIMICHESKOI ZASHCHITY].
N. P. Dubinin and L. G. Dubinina (USSR, Acad. of Sci., Inst. Biol. Phys., Moscow).
Radiobiologiia, vol. 4, 1964, p. 854–861. 22 refs. In Russian.

Aminoethylisothiouronium, serotonine, or streptomycin, applied to human cell tissue cultures before exposure to a 50r dose of γ-radiation protected to various degrees the chromosomal structure in different phases of mitosis. The protective effect decreased when the radiation dose increased. However, no protection was noted when the radiation dose was low (25r). The degree of protection also varied with each compound. The threshold of protection varied for γ-rays and X-rays. The results obtained indicate a need for special studies of the genetic effects of small doses of ionizing radiation on organic functions.

A65-80657
MUTAGENIC AND ANTIMUTAGENIC ACTION OF RADIOPROTECTORS [PROTIVOLUCHEVYE SOEDINENIIA KAK MUTAGENY I ANTIMUTAGENY].
N. P. Dubinin and V. K. Shcherbakov (USSR, Acad. of Sci., Inst. Biol. Phsy., Moscow).
Radiobiologiia, vol. 4, 1964, p. 862–864. 22 refs. In Russian.

Mutagenic and antimutagenic properties of cysteamine, cysteine hydrochloride, and arginine were studied on growing plant cells during mitosis. These compounds are considered to be radioprotectors, but the results of mitosis experiments showed that in greater concentrations they could produce mutagenesis. These findings have created a need for further study of the effects of concentrations of these compounds on various phases of the physiological state of an organism.

A65-80658
EFFECT OF UV-RAYS ON CHLORELLA [DEISTVIE UF-LUCHEI NA KHLORELLU].
I. D. Anikeeva, E. N. Vaulina, and V. A. Shevchenko (USSR, Acad. of Sci., Inst. Biol. Phys., Moscow).
Radiobiologiia, vol. 4, 1964, p. 883–892. 28 refs. In Russian.

Different strains of chlorella exhibited various degrees of tolerance to ultraviolet radiation. The most stable strain was found to be LARG-1. The survival time curves for various UV doses are sigmoid shaped, showing a

gradual increase in mutation frequency, reaching a maximum, and subsequently declining. UV-radiation affected not only the working culture, but also the following generations, thus changing the entire character of growth.

A65-80659
CHEMICAL PROTECTION OF CHLORELLA AGAINST UV-RADIATION [KHIMICHESKAIA ZASHCHITA KHLORELLY OT UF-IZLUCHENIIA].
S. A. Durymanova (USSR, Acad. of Sci., Inst. Biol. Phys., Moscow).
Radiobiologiia, vol. 4, 1964, p. 923–924. In Russian.

Direct incorporation of thiourea (0.005M), hydroxynone (0.03M, or hydrosulfite (0.03M) into the medium, or application of a thin film of each of these compounds on the glass receptacles containing suspensions of Chlorella vulgaris, resulted in a protective effect of those compounds during exposure to ultraviolet radiation. This fact may be explained by their ability to absorb ultraviolet rays. However, a potassium iodide solution, when used in the same way, formed molecular iodine under the influence of radiation and, thereby, contributed to its lethal action.

A65-80660
TEMPORARY AND PERMANENT HEARING LOSS: A TEN-YEAR FOLLOW-UP.
Joseph Sataloff, Lawrence Vassallo, and Hyman Menduke.
Archives of Environmental Health, vol. 10, Jan. 1965, p. 67–70. 6 refs.
Found. for Med. Res. in Hearing supported research.

There is no apparent relationship between temporary threshold shift (TTS) produced experimentally by exposure to a pure tone and permanent threshold shift (PTS) in employees exposed for 11 years to average daily noise levels of 90 db. overall with a maximum of about 85 db. in any of the 3 octave bands between the frequencies 300 to 2400. Noise induced hearing loss does not seem to be progressive in personnel who worked for 11 years with reduced daily maximum noise levels of about 85 db. in any of the 3 octave bands between 300 to 2400. Subjects with normal hearing showed no evidence of noise-induced PTS in such an environment.

A65-80661
STABILIZATION OF THE RETINAL IMAGE: A REVIEW OF METHOD, EFFECTS, AND THEORY.
E. G. Heckenmueller (Cincinnati U., Ohio).
Psychological Bulletin, vol. 63, Mar. 1965, p. 157–169. 39 refs.

A summary is presented of three basic methods used in reducing or stopping involuntary eye movements in order to produce a stable retinal image. This stabilization produces some degree of fading or disappearance of the target being viewed. Additional effects on such factors as acuity and contrast thresholds are considered, as well as the effects of such variables as exposure time, flicker, attention, meaning, and target complexity on the nature and extent of target disappearance. Some explanations for the phenomenon are presented, and the theoretical implications of variant stimulation on the perceptual process are discussed.

A65-80662
ELECTROCARDIOGRAPHIC CHANGES DURING DAILY WORK AND ACUTE EXERCISE IN PERMANENT INHABITANTS OF HOT AREAS.
Mordechai Toor, Joseph H. Yahini, Izhar Zahavi, Shaul Massry, and Jacob Agmon (Beilinson Hosp., Histadrut Inst. of Occupational Health and Environ. Physiol. and Cardiopulmonary Lab., Petah Tiqva, Israel).
American Heart Journal, vol. 69, Feb. 1965, p. 181–194. 34 refs.

Electrocardiographic changes seen during daily work or after a hike under different conditions of hydration in young and healthy permanent residents of hot areas on 189 working days and in 71 walking experiments are described. Even at rest, there was a slight increase in heart rate which paralleled the rise in ambient temperatures. The rise in heart rate after daily work or after two hours of walking was most marked in subjects under a restricted intake of water, was less marked in subjects under free intake of water, and was least marked in those under forced intake of water. An increase in the QT/TQ ratio, prolongation of the corrected Q-T interval, and a decrease in the magnitude of the ventricular gradient were observed in subjects working or walking under restricted intake of water. These changes were less marked in subjects under free intake of water and were least marked in those under forced intake of water, independent of the changes in heart rate. The possibility that the electrocardiographic changes observed can be related to the decrease in the venous return as a result of dehydration and/or to a transient relative coronary insufficiency is discussed.

A65-80663
EFFECT OF L-NOREPINEPHRINE ON RIGHT ATRIAL PRESSURE AND THE "SQUARE WAVE RESPONSE" TO THE VALSALVA MANEUVER.
A. O'Neill and L. Cudkowicz (Victoria Gen. Hosp.; and Dalhousie U., Dept. of Med., Halifax, Nova Scotia, Canada).
American Heart Journal, vol. 69, Feb. 1965, p. 220–228. 15 refs.
Grant Defence Res. Board of Canada DRB 9310-96.

Infusion of 1-norepinephrine (4 micrograms per min.) into the right atrium of the 9 patients of Group I (who showed a normal response of the peripheral arterial blood pressure to the Valsalva maneuver) led to the emergence of the square wave response to the Valsalva maneuver within approximately 10 minutes of the infusion and subsequent to the maximum elevation in peripheral arterial blood pressure. The square wave phenomenon constitutes an abnormally sustained systolic and diastolic arterial blood pressure during continuous airway straining, and the total absence of bradycardia and overshoot in systemic arterial pressure during phase four of the Valsalva maneuver. The resting mean right atrial pressure rose significantly from 6.7/2.7 to 15.8/10.3 mm. Hg ($p =< 0.01$) and remained unchanged after the Valsalva maneuver, i.e., 15.7/10.1 mm. Hg ($p => 0.1$). No statistical difference was obtained between the resting mean right atrial pressures of patients who showed the square wave response (Group II) and those of the patients who received infusion of 1-norepinephrine ($p => 0.1$), and it is suggested that an elevated central venous and right atrial mean pressure of an increment of intrathoracic pressure not exceeding 40 mm. Hg becomes associated with the square wave phenomenon.

A65-80664
DISTRIBUTION OF BLOOD FLOW AND THE PRESSURE-FLOW RELATIONS OF THE WHOLE LUNG.
J. B. West and C. T. Dollery (Hammersmith Hosp., Postgraduate Med. School, Dept. of Med., London, Great Britain).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 175–183. 14 refs.
Med. Res. Council supported research.

Effects of changes in pulmonary arterial (P_a), venous (P_v), and alveolar (P_A) pressures on the overall pressure-blood flow relations of an isolated dog lung were reexamined. In the preparation used, the distribution of blood flow was predictable from previous measurements with radioactive gases. The results showed that the pressure-flow relations of the whole lung were greatly affected by the distribution of blood flow within it. For example, the pulmonary vascular resistance (PVR) of the lung depended on whether all the lung was perfused with blood or not, and thus whether there was an unperfused zone at the top of the lung where P_a was less than P_A (zone 1). Again the pressure-flow relations of the lung were shown to depend on how much of the lung had a P_v less than P_A (zone 2), and how much had a P_v which exceeded P_A (zone 3). The effects on PVR of changing P_v or P_A could be explained on this basis. No evidence of a critical closing pressure in the vessels of the expanded lung was found. It was concluded that although the overall pressure-flow relations of the whole lung were complicated, the flow through individual vessels could be accounted for by the simple mechanical effects of pressures inside and outside the vessels.

A65-80665
POSTURAL EFFECT ON VENTILATORY CONTROL.
N. R. Anthonisen, D. Bartlett, Jr., and S. M. Tenney (Dartmouth Med. School, Dept. of Physiol., Hanover, N.H.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 191–196. 24 refs.
Grants H-2888(C6) and HTS-5322 from Natl. Heart Inst.

Minute ventilation, alveolar CO_2 tension, and arterial CO_2 tension were studied in human subjects during passive tilt from the supine to the erect position. These measurements showed that the erect position was associated with relative alveolar hyperventilation. The hyperventilation of the erect position was found to be almost entirely reversible if hydrostatic effects were removed by water immersion to the level of the xiphoid. Postural changes in ventilation correlated with circulatory changes, suggesting a causal relationship. However, the possibility of a gravity-sensitive abdominal receptor which influences ventilation was not eliminated.

A65-80666
BODY OXYGEN CONSUMPTION AND PULMONARY VENTILATION IN OBESE SUBJECTS.
Robert I. White, Jr. and James K. Alexander (Baylor U. Coll. of Med., Dept. of Med., Houston, Tex.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 197–201. 25 refs.
Grant PHS (H-3006).

Postabsorptive body oxygen consumption (Vo_2) and pulmonary minute ventilation (Ve) were measured 164 times in 109 very obese subjects at rest. A statistically significant relationship was found between Vo_2 and total body weight. The correlation coefficients for the relationships between Ve and total body weight and Ve and body surface area were less significant. The mean calculated basal metabolic rate was within normal limits. The mean values for Vo_2 in the obese subjects were considerably higher than those predicted at ideal weight, while the mean values for oxygen consumption per kilogram body weight were lower than those reported in normal subjects. The mean percentage increase in oxygen consumption per kilogram excess weight ($\Delta Vo_2/\Delta$ Kg) approached the value for percentage of cell mass in excess weight, suggesting that $\Delta Vo_2/\Delta$ kg may be a function of the increment in cell mass with obesity. Similarly, since basal metabolic rate remained unchanged, proportionate increments in body surface area and cell mass appeared to occur with the development of obesity.

A65-80667
MOTOR CONTROL OF PULMONARY AIRWAYS STUDIED BY NERVE STIMULATION.
C. R. Olsen, H. J. H. Colebatch, P. E. Mebel, J. A. Nadel, and N. C. Staub (Calif. U. Med. Center, Cardiovascular Res. Inst., San Francisco).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 202–208. 36 refs.
Grants PHS HE-06285; HT-549; and HTS-5251; and Calif. State Dept. of Public Health Contract 305.

To investigate the motor control of the pulmonary airways we combined electrical stimulation of the cervical efferent vagus nerves of cats and dogs with measurement of pulmonary resistance (R_L) and anatomic dead space (V_D), and with anatomic study of rapidly frozen lungs. Stimulus frequencies between 1 and 12/sec. produced almost the full range of R_L responses in eight cats. The major constrictor response to stimulation of one vagus nerve was in the lung of the same side in dogs and cats. A decrease of V_D associated with the increase of R_L in five cats during bilateral vagal stimulation suggested that the R_L change resulted from a generalized or large airway narrowing, rather than a local constriction. In seven cats whose lungs were frozen at end inspiration during unilateral vagal stimulation, the lobar bronchi on the stimulated side were smaller in diameter than comparable bronchi of the other side. In only two of seven cats was there definite constriction of the small cartilaginous and membranous airways of the stimulated side by the criterion of longitudinal mucosal ridges; in two there was slight constriction and in the other three, no change. Respiratory bronchioles and alveolar ducts of frozen sections were not constricted.

A65-80668
EFFECT OF LIPEMIA AND HEPARIN ON ARTERIAL CARBON DIOXIDE TENSION.
Joseph J. Barboriak, Ross C. Kory, Lyle H. Hamilton, and Sandy I. Helman. (Wood V. A. Hosp., Res. Serv.; and Marquette U. School of Med., Depts. of Pharmacol., Med., and Physiol., Milwaukee, Wis.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 221–224. 11 refs.
Wis. Heart Assoc. supported research.

Intravenous injection of heparin to lipemic subjects was followed by a rapid rise in arterial P_{CO_2}, amounting to 4.7 mm. Hg. 15 min. after the injection; the alveolar P_{CO_2} did not seem to be affected. In fasting subjects the postheparin rise in arterial P_{CO_2} was less pronounced. Subsequent studies showed that the observed P_{CO_2} rise occurred in vitro in the drawn blood and was due to an accumulation of unesterified fatty acids, liberated by the heparin induced lipoprotein lipase.

A65-80669
RATE OF LUNG COLLAPSE AFTER AIRWAY OCCLUSION ON 100% O_2 AT VARIOUS AMBIENT PRESSURES.
William G. Robertson and Leon E. Farhi (N. Y. State U., Dept. of Physiol., Buffalo).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 228–232. 15 refs.
Contract AF 33(616)-6823; and Contract Nonr-969(03).

The volume, time, and rate of collapse of the lungs following tracheal occlusion were studied in rats breathing O_2 at ambient pressures between 1520 mm. (2 atm.) and 190 mm. (equivalent to 33 000 ft. altitude). Theoretical calculations and experimental data show that (1) the rate of lung collapse is directly related to the O_2 uptake and inversely related to the barometric pressure minus the sum of alveolar CO_2 and water vapor pressure, and (2) the total time required for producing complete lung collapse is proportional to the lung volume at the time of occlusion and to the barometric pressure minus the sum of alveolar CO_2 and water vapor pressure and inversely proportional to the O_2 uptake. The collapse time, with the lungs occluded at functional residual capacity dropped from 22.6 sec. at sea level to 3.5 sec. at 190 mm. Hg. The rate of collapse was found to remain essentially constant during any experiment, as could be predicted from the analysis of the factors involved. The time required for collapse, in any species, at any lung volume and V_{O_2}, can be determined with a nomogram.

A65-80670
PULMONARY CIRCULATION IN ACCLIMATIZED MAN AT HIGH ALTITUDE.
H. N. Hultgren, J. Kelly, and H. Miller (Stanford U. School of Med., Dept. of Med., Cardiol. Div., Palo Alto, Calif.; and Presbyterian Med. Center, San Francisco, Calif.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 233–238. 29 refs.
Santa Clara County Heart Assoc. supported research.
Contract DA-49-193-MD-2274.

Cardiac catheterization studies have been carried out in 20 acclimatized adults at an altitude of 12 300 ft. in the Peruvian Andes. Mean pulmonary artery pressure was 22 mm. Hg (range 14 to 31 mm. Hg) compared to 15 mm. Hg (range 11 to 17 mm. Hg) observed in sea-level subjects. The pulmonary artery wedge pressure was normal and calculated pulmonary arteriolar resistance was increased by 180% over sea-level values. The arteriovenous oxygen content difference and oxygen consumption were slightly greater at high altitude, but the cardiac output was normal. There was no relationship between hematocrit and pulmonary artery pressure or resistance, suggesting that in the high-altitude resident, blood viscosity in a hematocrit range of 40% to 78% does not significantly affect resistance to blood flow. Nine subjects studied at 14200 ft. had the same mean pulmonary artery pressure (22 mm. Hg, range 17 to 32 mm. Hg) as the larger group at 12 300 ft.

A65-80671
EFFECT OF OXYGEN UPON PULMONARY CIRCULATION IN ACCLIMATIZED MAN AT HIGH ALTITUDE.
H. N. Hultgren, J. Kelly, and H. Miller (Stanford U. School of Med., Dept. of Med., Cardiol. Div., Palo Alto, Calif.; and Presbyterian Med. Center, San Francisco, Calif.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 239–243. 18 refs.
Santa Clara County Heart Assoc. supported research.
Contract DA-49-193-MD-2274.

The response to breathing 100% oxygen was studied in 26 acclimatized residents of the Peruvian Andes at altitudes of 12 300 and 14 200 ft. Arterial oxygen saturation increased from 86% to 96%. Mean pulmonary artery pressure decreased by 5 mm. Hg., and cardiac output did not change. Calculated pulmonary arteriolar resistance was lowered. Pulmonary artery pressure during oxygen breathing was not decreased to normal values observed at sea level. The data suggest the presence of two factors responsible for the increase in pulmonary arteriolar resistance at high altitude: (1) hypoxic vasoconstriction which is reversed by oxygen breathing and (2) anatomic alterations which are not affected by oxygen breathing. Oxygen breathing at high altitude also produced a slowing of the heart rate and increased the relative height of the secondary or tidal wave of the brachial arterial pressure pulse.

A65-80672
CONTROLLED FREQUENCY BREATHING DURING MUSCULAR EXERCISE.
T. W. Lamb, N. R. Anthonisen, and S. M. Tenney (Darmouth Med. School, Dept. of Physiol., Hanover, N.H.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 244–248. 11 refs.
Grant PHS HTS-53322(C3); and Grant HE-02888-07 from Natl. Heart Inst.

Three human subjects exercised at two and four m.p.h. on a treadmill while breathing room air and 100% oxygen. Respiratory frequency was voluntarily controlled at 6,12 and 24 breaths/min. so that the only ventilatory response possible was a change in tidal volume. Mean CO_2 tension of arterialized venous blood was maintained constant near the resting value by each subject under all experimental conditions, including oxygen breathing, with the exception of 1 subject who hyperventilated at 2 m.p.h. while breathing 24 times/min. Oscillations in alveolar and arterial P_{CO_2} within each respiratory cycle were markedly altered by respiratory frequency and the intensity of exercise. Varying levels of the work of breathing were observed while the arterial P_{CO_2} remained constant. It is concluded that the oscillations in arterial P_{CO_2} and P_{O_2} which are observed at rest and during muscular exercise and associated phenomena, not controlling stimuli.

A65-80673
INTRA-ARTERIAL BLOOD PRESSURE DURING EXERCISE WITH DIFFERENT MUSCLE GROUPS.
Per-Olof Astrand, Bjorn Ekblom, Roger Messin, Bengt Saltin, and Jesper Stenberg (Kunglia Gymnastiska Centralinst., Dept. of Physiol., Stockholm, Sweden).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 253–256. 16 refs.
Swedish Natl. Assoc. and Swedish Sports Federation supported research.

In 13 subjects intra-arterial blood pressure, heart rate, blood lactate, oxygen consumption, and pulmonary ventilation were respectively measured during submaximal and maximal arm and leg exercise. Blood pressure usually increased linearly with the oxygen uptake, this increase being significantly more pronounced for arm than leg work. The site of the catheter, mostly the femoral artery, can partly account for the difference, recorded blood pressure being constantly higher in the resting limb. Nevertheless, simultaneously recorded pressures in arm and leg give significantly higher values during cranking. Larger increases in peripheral vascular resistance in the resting extremities during arm work, as well as the important static work produced by cranking are possible explanations for this difference. This fact might have clinical interest.

A65-80674
SECONDARY VENTILATORY RESPONSE TO EXERCISE: MODIFICATION BY AGENTS WHICH ALTER CBF.
Richard A. Krumholz and Joseph C. Ross (Ind. U. School of Med., Heart Res. Center and Dept. of Med., Indianapolis).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 257–262. 17 refs.
Grants HE-04080; HE-06228; and HTS-5363 from Natl. Heart Inst.; and Contract AF 33(616)-8378.

Ventilation increases at the onset of exercise. Another abrupt increase, the secondary ventilatory response, occurs later. This study gives further observations on the secondary ventilatory response and its modification by O_2 breathing and other agents which alter cerebral blood flow. The secondary ventilatory response is similar to the response which follows release of arterial tourniquets inflated on the thighs, which is delayed in time of onset by O_2 breathing and infusion of aminophylline and NH_4Cl and accelerated

by CO_2 breathing and $NaHCO_3$ infusion. This suggested that the respiratory center response may, to some extent, be dependent upon cerebral blood flow. The onset of the secondary ventilatory response was delayed by 100% O_2 breathing. Infusion of NH_4Cl significantly delayed the onset of the secondary rise and $NaHCO_3$ tended to make it come sooner. The timing of the secondary ventilatory response, then, was changed by substances which alter cerebral blood flow. It is suggested that the secondary ventilatory response may be due to a blood-borne substance released from working muscles.

A65-80675
EFFECTS OF OVERHYDRATION ON MAN'S PHYSIOLOGICAL RESPONSES TO WORK IN THE HEAT.
Saul V. Moroff and David E. Bass (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 267–270. 17 refs.

The question was asked whether men could work in the heat with less physiological strain if they drank water in excess of expected fluid losses than if they merely replaced their losses as they worked. Thirty volunteer soldiers walked on 2 successive days for 90 min. at 3.5 m.p.h. on a level treadmill, at a temperature of 120/80°F. dry bulb/wet bulb. Each man drank 2000 ml. water before the walk on one day and no water before the walk on the other; 1200 ml. were drunk during the walk on both days. Overhydration resulted in significantly lower rectal temperatures and pulse rates and significantly higher sweat rates than did the control state. The matched groups of six men each were then acclimatized to heat by daily 100-min. walks under the conditions described above. One group was overhydrated during each day of the acclimatizing period; the other was not. Overhydration did not affect the pattern of acclimatization to heat; conversely, acclimatization to heat did not alter the above described acute response to overhydration. The hypothesis that overhydration is beneficial to men working in the heat was supported by this study.

A65-80676
TOLERANCE OF HOT, WET ENVIRONMENTS BY RESTING MEN.
Ralph F. Goldman, Edward B. Green, and P. F. Iampietro (U.S. Army Natick Labs., Natick, Mass.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 271–277. 22 refs.

Studies were conducted on 10-man groups exposed at rest to 51 different hot, wet environmental conditions. Tolerance times of unacclimatized volunteers established objectively, as the time of occurrence of a rectal temperature of 102.5°F. and/or a heart rate of 180 beat/min., were similar to reported values established on a subjective basis. The wet and dry bulb index (WD) of environment was the best predictor of tolerance time. Prior acclimatization to work in hot, dry conditions did not result in prolonged tolerance for resting men exposed to hot, wet environments; neither did it alter the rates of sweat production, final skin temperatures, or rates of increase in heart rate or rectal temperature during these resting, hot, wet environmental exposures. Finally, passive resting in hot, wet environments (up to three hr./day) did not prolong tolerance times or induce other manifestations of heat acclimatization during subsequent resting exposures to hot, wet environments for either unacclimatized or prior, hot, dry, acclimatized subjects.

A65-80677
CUTANEOUS CIRCULATION DURING DEHYDRATION AND HEAT STRESS.
Leo C. Senay, Jr. and Margaret L. Christensen (St. Louis U. School of Med., Mo.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 278–282. 14 refs.
Grants PHS HE-07075-01; and H-4939-05.

Resting subjects were exposed for 12 hr. to 43°C. dry bulb, 28°C. wet bulb with and without rehydration; average weighted cutaneous opacity pulse amplitudes decreased 19.5%. An apparent relationship between calculated stroke volume and cutaneous pulse amplitudes existed. A 26% increase in heart rate offset decreases in perfusion per beat and probably contributed to a rise in diastolic pressure. Increases in skin temperature paralleled those of oral temperatures. In most subjects, evaporative rates were slightly lower during dehydration. Certain dehydrating subjects maintained sweat rates at control levels, but this did not prevent an increase in both oral and skin temperatures. Failure of temperature regulation in these experiments does not appear to be due to a decrease in heat transport or evaporation but rather to a lack of responsiveness of the sudomotor and vasomotor systems to increases in body temperature. Reasons for the temperature rise appear complex.

A65-80678
ORAL/RECTAL TEMPERATURE DIFFERENCES DURING WORK AND HEAT STRESS.
N. B. Strydom, C. H. Wyndham, C. G. Williams, J. F. Morrison, G. A. G. Bredell, and A. Joffe (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab. and Math.-Statist. Div., Johannesburg, South Africa).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 283–287. 17 refs.

Fifty-two groups of about 20 men each were exposed for 5 hours to various combinations of work rate, environmental temperature, and wind velocity. Hourly observations were made of oxygen intake and oral and rectal temperatures. Oral/rectal temperature differences increased significantly with time only under those conditions where steady-state responses were not achieved. Increasing wind velocity from 50 to 400 cm./sec., raising air temperatures from 27° to 36°C., and combinations of these factors had no significant influence on the difference between the recorded temperatures. The main contributing factor to oral/rectal temperature difference is work rate. Increasing energy consumption from 2.5 to 9.0 Cal./min. resulted in a rectilinear increase in average difference from 0.5° to 1.1°C. A warning is expressed against the indiscriminate use of oral temperatures in work and heat studies.

A65-80679
SAFE EXPOSURE OF MEN TO SEVERE HEAT.
C. R. Bell, R. F. Hellon, R. W. Hiorns, P. B. Nicol, and K. A. Provins (London School of Hyg. and Trop. Med., M.R.C. Environ. Physiol. Res. Unit, England).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 288–292. 11 refs.

Eight men were exposed to hot environments which ranged from 37°C./30°C. to 63°C./47°C. dry- and wet-bulb temperatures. They remained in the heat until they showed signs of distress just before collapsing. The time taken to reach this state was found to be hyperbolically related to the severity of the environment when this was expressed as a weighted sum of wet- and dry-bulb temperatures. Separate hyperbolae were found for standing and working subjects. After the deduction of a suitable safety margin, the resulting curves and their equations make possible the prediction of safe exposure times for severe heat.

A65-80680
AEROBIC WORK CAPACITY AND PLASMA FFA TURNOVER.
B. Issekutz, Jr., H. I. Miller, P. Paul, and K. Rodahl (Lankenau Hosp., Div. of Res., Philadelphia, Pa.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 293–296. 18 refs.
Grant NIH HE 07697-02.

Mongrel dogs with indwelling arterial and venous catheters ran on a treadmill at a speed of 100 m./min. and a grade of 15°. Palmitate-1-C^{14} was infused at a constant rate; the rate of release and the rate of removal of the plasma FFA were calculated. During exercise the O_2 uptake was about the same in all animals, but the rate of increase of the blood lactate varied widely according to the physical condition of the animal. There was a negative correlation ($P < .001$) between the changes in the rate of release of FFA ($\triangle\mu$Eq/kg, min.) and the rate of increase of lactate. If this latter exceeded 59 mg./100 ml. in 30 min., the FFA turnover decreased below the resting level. Since it is known that lactate infusion in itself decreases the release of FFA, it is concluded that the rise of blood lactate during exercise, which reflects the state of aerobic work capacity, is an important factor affecting the participation of the adipose tissue in the exercise metabolism.

A65-80681
ENERGY METABOLISM IN HYPNOTIC TRANCE AND SLEEP.
Hrishikesh Jana (Smt. N. H. L. Munic. Med. Coll., Dept. of Physiol., Gujarat, India).
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 308–310. 7 refs.

The energy metabolism of 14 healthy males was studied before and during a hypnotic trance in the basal state. Metabolic rates during the basal waking, the basal hypnotic trance, and the basal sleep were also determined in three subjects for three consecutive days, respectively. It was observed that a hypnotic trance does not significantly influence the metabolic rates in a basal condition while natural sleep lowers the basal metabolic rates by 8.73%.

A65-80682
CONTINUOUS RADIO TELEMETRY OF HYPOTHALAMIC TEMPERATURES FROM UNRESTRAINED ANIMALS.
Robert O. Rawson, Jan A. J. Stolwijk, Hans Graichen, and Robert Abrams (John B. Pierce Found. Lab., New Haven, Conn.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 321–325.

A system of radio telemetry has been designed which continuously records body temperatures of unrestrained animals with a resolution of 0.05°C. over transmission distances of 100 to 1,000 ft., permitting observations on free running animals for indefinite periods of time. Continuous 24-hr. recordings were made of hypothalamic temperatures telemetered from cold-acclimatized and unacclimatized dogs living in cold, neutral, and hot environments. During night hours, dogs usually exhibited a decrease in hypothalamic temperature of 0.5° to 1.0°C. below daylight levels. Superimposed on the day-night temperature cycle are marked fluctuations of 0.1° to 0.5°C. at a rate of 0.1°C./min. These variations are associated with the level of motor activity, arousal, and with periods of dozing. Shivering in the cold is exhibited even though hypothalamic temperature may be elevated above a level at which no shivering occurs in a neutral environment.

A65-80683
AN EXPERIMENTAL CHAMBER FOR LONG-TERM STUDIES OF CHRONIC HYPOXIA IN SMALL ANIMALS.
Norman M. Sulkin and George Jones (Bowman Gray School of Med., Depts. of Anat. and Eng., Winston-Salem, N.C.)
Journal of Applied Physiology, vol. 20, Mar. 1965, p. 346-348.
Dysautonomia Soc. supported research.
Grants B-342 and B-2748 from Insts. of Neurol. Diseases and Blindness.

An experimental chamber was designed in which chronic hypoxia, as well as adaptation to hypoxia, could be studied over prolonged periods of time in 36 or more small laboratory animals. Rats have been kept in this chamber for periods up to 90 days with oxygen levels from 21% down to 3%, the percentage of oxygen being controllable to 0.25%. The chamber is temperature controlled and maintains a constant relative humidity which may be predetermined. Oxygen levels are maintained by adjusting input of air and nitrogen. The nitrogen tanks are attached to an automatic manifold control which maintains a constant flow of nitrogen even while nitrogen tanks are being changed. It is practical to have a bank of six to eight nitrogen tanks attached to the manifold. Such a bank of nitrogen tanks may last from 4 to 12 days depending on the percentage of oxygen desired. The percentage of oxygen in the chamber is measured directly by means of an oxygen analyzer.

A65-80684
PULMONARY RETENTION AND EXCRETION OF MERCURY VAPORS IN MAN [RETENCE A VYLUCOVANI PAR RTUTI V PLICICH U CLOVEKA].
Jaroslav Teisinger (Inst. of Ind. Hyg. and Occupational Diseases, Prague, Czechoslovakia).
Pracovní lékařství, vol. 16, Nov. 1964, p. 393-397. 19 refs. In Czech.

Experiments were carried out in an exposure chamber, in which subjects inhaled, for 7 hours, mercury vapors in concentrations of 100 to 200 mg./m^3. During nasal inspiration and mouth expiration, retention was 76%. During mouth inhalation, retention was only 56%. The rate of retention was constant through the experiment. In persons who had worked with mercury vapors for many years, the amount retained was the same as in other individuals. Mercury was, evidently, retained in the upper respiratory tract because none was found in the alveolar air. Desaturation took place primarily by urinary excretion, but the process was slow and irregular, therefore the absorbed amount could not be measured exactly.

A65-80685
PROBLEMS OF BRIGHTNESS UNEQUALITY IN THE VISUAL FIELD OF WORKERS [K PROBLEMATIKE NEROVNOMERNOSTI JASOV V ZORNOM POLI PRACOVNIKA].
Vladimir Mařák.
Pracovní lékařství, vol. 16, Nov. 1964, p. 407-410. In Czech.

Measurements of contrast sensitivity of the eye were studied as related to unequality of brightness in the wider visual field. It was found that additional brightness of 2.5 sb. in various positions (10° to 50° from the visual axis) decreased contrast sensitivity by 7% to 8%, when the background had zero brightness. Sensitivity decreased with increase in additional brightness (1.5 sb. at 40° decreased contrast sensitivity by 4%). An increase in background brightness to 13 nt. resulted in diminishing the negative glare effect and abolished the uniform brightness of the background. Flickers of an additional source sharply lowered contrast sensitivity, particularly at low frequencies (50 to 1 c.p.s). Great individual differences were noted.

A65-80686
BINOCULAR FUSION NOT AFFECTED BY OBSERVER'S INTERPRETATION OF THE STIMULUS.
Samuel C. McLaughlin and Kenneth I. Rifkin (Tufts U., Medford, Mass.)
Psychonomic Science, vol. 2, Feb. 1, 1965, p. 67-68.
Grant PHS NB 04540-03.

Prism vergence thresholds were compared under two conditions: (a) in which each subject believed that he was looking at a single object with both eyes; and (b) in which each subject believed that he was looking at two different objects, one seen from each eye. Thresholds were not significantly different under the two conditions.

A65-80687
A U-SHAPED BACKWARD MASKING FUNCTION IN VISION.
Naomi Weisstein (Chicago U., Ill.) and Ralph Norman Haber (Rochester U., N.Y.)
Psychonomic Science, vol. 2, Feb. 1, 1965, p. 75-76. 11 refs.
Grant PHS MH-03244.

Errors in discriminating the letters O and D in a forced-choice design were measured on four subjects when the exposure of either letter was accompanied or followed by a ring encircling it. The delay between offset of the letter and onset of the ring varied from concurrent presentation of both, through a 0 msec. delay to 120 msec. delay, in steps of 10 msec. The letter and ring were presented randomly in one of four positions in a centrally located row, with the other three positions always empty. Accuracy was a U-shaped function of the delay between letter and ring for all four subjects. An explanation of the discrepancy between these findings and those of Eriksen and Collins (Psychon. Sci., 1964, p. 313-314) is offered.

A65-80688
CORRELATIONS OF THE DIENCEPHALIC NYSTAGMOGENIC AREA WITH THE BULBO-VESTIBULAR NYSTAGMOGENIC AREA.
P. Montandon and Marcel Monnier (Basel U., Physiol. Inst., Switzerland).
Brain, vol. 87, Dec. 1964, p. 673-690. 14 refs.
Sandoz AG Basel supported research.

Localization of the nystagmogenic area was determined on rabbits by electrical stimulation (at an intensity of 0.1 to 1.0 v., a frequency of 50 c.p.s., and a duration of 0.5 msec.) of the diencephalic dorsolateral region, medial to the lateral geniculate body. The stimulus evoked horizontal nystagmus with a quick contraversive component. Direct stimulation of the vestibular nuclei (superior and medial) caused horizontal nystagmus with a quick ipsiversive phase and, in some cases, vertical nystagmus. Simultaneous stimulation of the nystagmogenic diencephalic and vestibular areas, ipsilaterally or contralaterally, showed that the diencephalic nystagmogenic area moderated the nystagmogenic action of the ipsilateral vestibular nuclei and increased the action of the contralateral vestibular nuclei. Anatomical connection between the diencephalic nystagmogenic area, the medial longitudinal bundle, and the vestibular nuclei confirms a diencephalovestibular correlation. The anatomical connections of the diencephalic nystagmogenic area with the lateral geniculate body and superior colliculus do not exclude the possibility of participation of the optical system in this area.

A65-80689
INTERRELATIONSHIPS OF VARIOUS SPECIES OF PROTOCOCCAL ALGAE AND THEIR BACTERICIDAL EFFECT IN JOINT CULTIVATION.
R. I. Levina (Belorussian Sanit. and Hyg. Res. Inst., Minsk, USSR).
(Mikrobiologiia, vol. 33, Jan.-Feb. 1964, p. 140-147).
Microbiology, vol. 33, Jan.-Feb. 1964, p. 120-126. 9 refs. Translation.

Seven pure cultures of protococcal algae (Sc. obliquus, Sc. quadricauda, Ankistrodesmus arcuatus, Chl. terricola, Chl. ellipsoidea, Raphidonema sempervirens) isolated from sewage in biological ponds of Minsk were used in this investigation. Sterile test tubes were filled with 20 ml. of sterile nutrient and were inoculated with a fixed number of algal cells. Each experiment was conducted in three rows of test tubes. In one row two species of algae were introduced into the tubes, and in the other two rows of each species were installed separately (controls). Antagonistic relationships between some species of protococcal algae were discovered. The algae exhibiting the strongest algostatic action are Sc. obliquus, Sc. quadricauda, and Ankistrodesmus. Raphidonema does not exhibit this activity. The algostatic and bactericidal properties of algae are correlated. In joint cultivation of algae exhibiting strong algostatic and bactericidal action with less active algae, the bactericidal effect is additive.

A65-80690
PHYSIOLOGICAL REGULATION IN MOIST HEAT BY YOUNG AMERICAN NEGRO AND WHITE MALES.
Sharon K. Riggs and Frederick Sargent, II (Ill. U., Dept. of Physiol. and Biophys., Urbana).
Human Biology, vol. 36, Dec. 1964, p. 339-353. 15 refs.
Grant NIH-G-GPM-15,106.

Nineteen paired-groups of white and Negro subjects were selected for evaluation of the question of racial differences in heat tolerance. Criteria for pairing were (1) similar history of diet, water, and work during study; (2) concurrent participation in investigative procedures; and (3) matching within 10% for height, weight, surface, and fat-free body weight. The weather was generally hot and humid. During the first two weeks the mean maximum and minimum temperatures were 32.2° and 15.6°C.; in the second two weeks these temperatures were 34.4° and 19.5°C. Negroes had lower rates of sweating than whites, but the difference was significant in only one of three tests. Rectal temperatures were similar in both groups on all occasions. In one of three tests, the pulse after a one-hour march was significantly lower among Negroes. Twenty-two heat casualties (irregular pulse and failure to complete heat acclimatization test; clinical hypohidrosis; and heat exhaustion) were observed. Only one was a Negro, who exhibited hypohidrosis. Statistical examination demonstrated that the Negroes had significantly fewer episodes than whites. These facts, and in particular the clinical ones, suggest that these young Negro males may have had better adaptive capacity for the stresses of heat, limited water, and survival rations than the white males studied.

A65-80691
INVESTIGATIONS ON HYPERTHERMIA DURING EXERCISE IN MAN (UNTERSUCHUNGEN ZUR ARBEITSHYPERTHERMIE DES MENSCHEN).
J. Kitzing and A. Bleichert (Hamburg U., Physiol. Inst., West Germany).
Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere, vol. 282, 1965, p. 242-249. 12 refs. In German.

This study investigates the possible effect of partial neuromuscular block on the body temperature during exercise. The experiments are performed on 5 well-trained healthy male persons (20 to 25 years old). During muscular work of 3 mkp./sec. on a bicycle-ergometer, the body temperature (measured in the lower third of the esophagus) remains constant at a room

temperature of 34° C. If the same persons receive an intravenous infusion of d-tubocurarine during the exercise, the time course of body temperature, under all experimental conditions, shows no deviations from the control values. This finding does not support the assumption, that the increase of body temperature during work may be attributed to an irradiation of impulses from the cortex to thermoregulatory centers.

A65-80692
PSYCHOLOGICAL INVESTIGATIONS ON THE EFFECTS OF NOISE ON WORKING BEHAVIOR IN MAN [PSYCHOLOGISCHE UNTERSUCHUNGEN UBER DEN EINFLUSS VON GERAUSCHEN AUF DAS ARBEITSVERHALTEN DES MENSCHEN].
R. Rimkus (Med. Akad., Hyg. Inst., Magdeburg, Germany).
Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 10, Nov. 1964, p. 790–798. 7 refs. In German.

The effect of noise was investigated in (1) experiment I with 38 subjects performing a motor task in ambient noise (bandwidth 1600 to 3200 c.p.s., loudness 80 phon) and in intermittent industrial noise (loudness 80 phon), 50 minutes in each; (2) experiment II with 20 subjects solving a practical problem under the above noise conditions, loudness 70 phon; and (3) experiment III with 11 subjects performing complicated mathematical calculations (Düker, 1949) under the above noise conditions at a loudness of 90 phon. The esults suggest that noise influences mental and motor performance in a qualitative rather than quantitative way, whereby the organism is forced to increased activity and affect output to offset the effect of noise. In this sense noise constitutes a physical and mental stress.

A65-80693
ON FITNESS TESTING AND STRESS TOLERANCE IN MAN [ZUR LEISTUNGSBEURTEILUNG UND BELASTBARKEIT DES MENSCHEN].
J. Keul, H. Roskmann, and H. Reindell (Freiburg i. Br. U., Med. Universitätsklin., West Germany).
(Symposium on Age, Sport, and Circulation, in the Eidg. Turn- und Sportschule, Magglingen, Switzerland, Oct. 12–13, 1963).
Schweizerische Zeitschrift für Sportmedizin, vol. 12, 1964, p. 19–46. 34 refs. In German.

Spiroergometric tests and stress electrocardiograms are by themselves inadequate for an assessment of cardiovascular function, as illustrated by a case history of severe coronary pathology in an athlete. Instead, the authors advise the use of the ratio between maximum oxygen uptake per heart beat and heart volume. In cardiac insufficiency, the normal linear relationship is disrupted. The use of this ratio (deviations from the normal of 50) permits a differential diagnosis of limited cardiovascular efficiency of an untrained individual with a small heart and that of an individual with cardiac hypertrophy of pathological origin. The influence of age and sex on this ratio is also considered.

A65-80694
CIRCULATORY TIME AND HEART MINUTE VOLUME UNDER PHYSICAL STRESS IN YOUNG MEN WITH NORMAL CIRCULATION [KREISLAUFZEIT UND HERZMINUTENVOLUMEN UNTER KORPERLICHER BELASTUNG BEI KREISLAUFGESUNDEN JUNGEN MANNERN].
M. E. Rothlin and U. Alsleben (Kantonspital, Kardiol. Arbeits Gemeinschaft, Zürich, Switzerland).
(Symposium on Age, Sport, and Circulation, in the Eidg. Turn- und Sportschule, Magglingen, Switzerland, Oct. 12–13, 1963).
Schweizerische Zeitschrift für Sportmedizin, vol. 12, 1964, p. 73–79. 7 refs. In German.

The circulatory time, the heart minute volume, and the pulse rate were measured in 12 healthy young men at rest and while performing physical work in a recumbent position. Acceleration of circulation during effort was indicated by the lowered appearance time, i.e., the time interval from the moment of injection of a dye in the basilic vein of one arm to the first appearance of the dye in the brachial artery of the other arm. During light work the heart minute volume increases through a rise in the pulse rate and the stroke volume; as the work load is increased only the pulse rate rises while the stroke volume remains practically constant.

A65-80695
INTERPRETATION OF SUB-MAXIMAL AND MAXIMAL ERGOMETRIC TESTS: MODIFICATIONS ACCORDING TO AGE AND TRAINING [INTERPRETATION DE TESTS ERGOMETRIQUES SUB-MAXIMAUX ET MAXIMAUX MODIFICATIONS SELON L'AGE ET L'ENTRAINEMENT].
Jean-Claude Didisheim and Pierre Roch (Centre Medico-Sportif, Policlin. Med., Geneva, Switzerland).
(Symposium on Age, Sport, and Circulation, in the Eidg. Turn- und Sportschule, Magglingen, Switzerland, Oct. 12–13, 1963).
Schweizerische Zeitschrift für Sportmedizin, vol. 12, 1964, p. 80–89. 6 refs. In French.

Comparisons of ergometric measurements carried out at maximum and submaximum efforts, respectively, on 71 athletes between the ages of 16 and 60 on a bicycle ergometer (time = 6 minutes; work load = 150 watts) led to the following conclusions: (1) In evaluating the results obtained when a submaximum effort is employed, allowance must be made for age to preclude overrating the physical efficiency in older individuals (expressed in cardiac frequency and oxygen consumption values). (2) At submaximum effort, the ergometric tests are not sensitive enough to express small differences in efficiency between the various athletes, particularly in insufficiently trained persons. Physical efficiency is generally underestimated in highly trained, and overestimated in lesser trained athletes.

A65-80696
WORK CAPACITY AND AGE [ARBEITSKAPAZITAET UND ALTER].
M. Gander, J. J. Pitteloud, and G. Forster (Zürich U., Med. Universitatspoliklin., Switzerland).
(Symposium on Age, Sport, and Circulation, in the Eidg. Turn- und Sportschule, Magglingen, Switzerland, Oct. 12–13, 1963).
Schweizerische Zeitschrift für Sportmedizin, vol. 12, 1964, p. 90–97. 6 refs. In German.

The capacity for work of persons aged over 40 years was investigated with the object of arriving at a better appraisal of normal or diminished efficiency. For this purpose 116 men over 40 years of age were subjected to ergometric loading in the step test (Pitteloud and Forster) and the total hemoglobin was assayed by the carbon monoxide method (Sjöstrand). These studies revealed a decrease of the maximum pulse rate and of the total hemoglobin content during old age. With regard to Sjöstrand's correlation between total hemoglobin and efficiency at a pulse rate of 170 per minute there were observed in young persons the same values, with roughly the same range of dispersion, as had been found by the Swedes. Older persons, however, showed on the average a lower efficiency in comparison with the total hemoglobin content. In all the subjects the capacity for work was extrapolated to a pulse rate of 170 per minute, which however does not hold for individuals over 40 years of age. In such cases one ought to extrapolate to a corrected pulse rate which corresponds to the actual submaximum performance.

A65-80697
THE ELECTROGRAPHIC STUDY OF VOLUNTARY MOVEMENTS [K VOPROSU OB ELEKTROGRAFICHESKOM VYRAZHENII PROIZVOL'NYKH DVIZHENII].
M. P. Ivanova and F. M. Talyshev (Central Res. Inst. of Phys. Culture, Physiol. Dept., Moscow, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Nov.–Dec. 1964, p. 947–952. 12 refs. In Russian.

Variations in electroencephalogram tracings were studied in subjects who had been asked to produce a certain movement with the right hand. When the subjects were instructed to repeat the movement, the phase of depression in the basic rhythm was not of the same duration in different areas of the large hemisphere cortex. It was longer in the sensory-motor area than in the parietal-occipital area, and longer in the contralateral than in the ipsilateral zone. After verbal directions from the investigator, the movements became more accurate, the time of muscular action decreased, but the latent period increased, simultaneously with an increase in the phase of desynchronization of cortical rhythm, particularly in the motor zone. When the verbal instructions were terminated, reversal occurred.

A65-80698
CORRELATION OF SPECIFIC AND NON-SPECIFIC RESPONSES TO LIGHT REVEALED IN HUMAN ELECTROENCEPHALOGRAM [SOOTNOSHENIE SPETSIFICHESKOGO I NESPETSIFICHESKOGO OTVETOV NA SVET V ELEKTROENTSEFALOGRAMME CHELOVEKA].
L. M. Puchinskaia (USSR, Acad. of Med. Sci., Burdenko Inst. of Neurosurg., Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol 14, Nov.–Dec. 1964, p. 957–965. 19 refs. In Russian.

Responses to light evoked in the human EEG were simultaneously recorded from different points of the cerebral cortex on ink and cathode oscilloscopes. A specific response to light varying in form was recorded in the posterior parts of the hemisphere. After repeated stimulations, the response became more distinct, its amplitude increased, and the area of manifestation extended. The nonspecific response was the most pronounced in the central areas. After repeated stimulations, the zone of manifestation shifted towards the stimulus projection field. Thus, the areas of manifestation of specific and nonspecific responses overlapped. The area of overlapping increased with repeated stimulations owing to the spread of the specific response towards the anterior parts, and of the nonspecific towards the posterior parts of the hemispheres.

A65-80699
SOME PECULIARITIES OF CONDITIONED REFLEXES TO COMBINED ACOUSTIC AND VISUAL STIMULI IN DOGS [O NEKOTORYKH OSOBENNOSTIAKH YRABOTKI USLOVNYKH REFLEKSOV NA SLOZHNYE ZVUKOVYE I ZRITEL'NYE RAZDRAZHITELI U SOBAK].
N. S. Popova (USSR, Acad. of Med. Sci., Inst. of Brain, Lab. of Conditioned Reflexes, Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Nov.–Dec. 1964, p. 999–1006. 12 refs. In Russian.

Conditioned reflexes in dogs were formed by visual and acoustic stimuli, one following the other after a definite time interval. Some stimuli were followed by food offerings. In the formation of the conditioned reflex, the difference in response to visual and acoustic stimuli were more pronounced during the phase of intensifying the nervous impulses. It required a larger time interval between two similar signals to evoke responses to light than to an acoustic stimulus. Light flicker and a picture used together did not produce any definite pattern of the formation of the conditioned reflex. The results indicate a faster impulse transmission through the visual than through the acoustic pathways.

A65-80700
CHARACTERISTICS OF EVOKED POTENTIALS DURING EXTINCTION OF ORIENTING RESPONSE IN DOGS [K KHARAKTERISTIKE VYZVANNYKH POTENTSIALOV PRI UGASHENII ORIENTIROVOCHNOI REAKTSII U SOBAKI].
L. K. Danilova (USSR, Acad. of Sci., Pavlov Inst. of Physiol., Lab. of Physiol. and Expti. Pathol. of Higher Nervous Activity, Leningrad).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Nov.–Dec. 1964, p. 1007–1012. 17 refs. In Russian.

The dynamics of changes in evoked potentials and the oculomotor reflex to clicks during extinction of the orienting response to them was studied on dogs with electrodes chronically implanted in the auditory cortex. The oculomotor response was completely extinguished after repeated clicks and the evoked potential, on undergoing certain changes (shortening of time characteristics, amplitude decrease, changes in configuration, appearance of additional positive oscillation) was stabilized and was not extinguished. A comparison of the changes in the responses under investigation has shown that there is no correlation dependence between them and that their changes during extinction of the orienting reflex do not proceed in parallel.

A65-80701
DEPENDENCE OF RESPONSE OF INDIVIDUAL NEURONS OF RABBIT'S LATERAL GENICULATE BODY TO THE INTENSITY OF LIGHT STIMULUS [ZAVISIMOST' REAKTSII OTDEL'NYKH NEIRONOV LATERAL'NOGO KOLENCHATOGO TELA KROLIKA OT INTENSIVNOSTI SVETOVOGO RAZDRAZHITELIA].
T. G. Beteleva (Moscow U., USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Nov.–Dec. 1964, p. 1048–1056. 14 refs. In Russian.

Responses of 34 cells of the lateral geniculate body to a short light flash were recorded in alert rabbits. It was possible to classify the responses into 3 groups: (1) with short latencies, appearing in 20 to 30 msec.; (2) with long latencies, arising in 50 to 60 msec. and (3) combined, which lasted from the 20th to the 30th msec. up to the 80th to the 90th msec. The total number of impulses in the responses of various types and the intervals between them did not depend on the intensity of the stimulus. A part can be singled out in any type of response, which is characterized by the greatest number of impulses coinciding in time with a number of responses. The difference in the responses to flashes of different intensity is expressed in these coinciding impulses. For cells of all types, it consists, with a greater brightness of stimulus, in a shorter time that passes from the moment of the flash to the appearance of coinciding impulses. The cells of the first type, unlike the others, produce a selective reaction to light, which is manifested in a greater frequency of impulse coincidence in the responses to one of the brightness applied.

A65-80702
ANALYSIS OF INTERACTION BETWEEN EVOKED POTENTIALS AND BACKGROUND BIOELECTRICAL ACTIVITY OF RABBIT CEREBRAL CORTEX [ANALIZ VZAIMODEISTVIIA VYZVANNYKH POTENTSIALOV I FONOVOI BIOELEKTRICHESKOI AKTIVNOSTI KORY GOLOVNOGO MOZGA KROLIKA].
A. Ia. Supin (Moscow U., Lab. of Bionics, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Nov.–Dec. 1964, p. 1057–1068. 38 refs. In Russian.

A study was made on rabbits of the dependence of primary responses of the visual cortex on their relationships with different kinds of cortical spontaneous electric activity. It has been found that the dependence of the positive phase and of the general amplitude of response on its correlation with the oscillations of stress-rhythm, sleep spindles, and irregular activity are approximately the same for every kind of activity and are relatively slight. In contrast, the same dependence for alpha-like waves has a magnitude several times larger. Introduction of a correction for a possible physical summation of background and evoked potentials does not diminish the difference between the influence of the alpha-like rhythm on evoked potentials and that of other kinds of activity. An assumption has been made that the influence of alpha-like activity on the visual primary responses cannot be attributed to the general properties of spontaneous bioelectrical activity, and that the functional significance of the alpha-like rhythm differs from that of other kinds of activity.

A65-80703
INHIBITION IN THE SYSTEMS OF VISUAL CORTEX NEURONS [O TORMOZHENII V SISTEMAKH NEIRONOV ZRITEL'NOI OBLASTI KORY].
I. N. Kondrat'eva (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 14, Nov.–Dec. 1964, p. 1069–1078. 20 refs. In Russian.

A microelectrode study was made of the responses of a rabbit's visual cortex neurons to specific and nonspecific stimuli. The responses to flashes and to stimulation of the lateral geniculate body were of a phasic nature: primary increase of spike frequency was followed by an inhibitory pause and then by a new phase of activation. Latencies of the phases independently varied in one and the same neuron. The inhibitory phase was of a global systemic nature: it involved simultaneously a great number of cortical neurons. A comparison of changes in the mean frequency of neuron impulsation in response to flashes with surface evoked potential has shown that the first phase of impulsation acceleration corresponds to the positive oscillation of the evoked potential, the inhibitory pause—to the slow negativity of the secondary response, and the second phase of excitation—to the secondary positiveness. A comparison of the data obtained with materials published by other authors points to the existence of such a phasic pattern of excitatory and inhibitory processes in response to a specific stimulus in the whole optic system from the retina to the cortex. Responses to nonspecific stimuli are not phasic.

A65-80704
METABOLIC ROLES OF INORGANIC POLYPHOSPHATES IN CHLORELLA CELLS.
Shigetoh Miyachi, Ryuzi Kanai, Sayoko Mihara, Shizuko Miyachi, and Shigeji Aoki (Tokyo U., Inst. of Appl. Microbiol.; and Tokugawa Inst. for Biol. Res., Tokyo, Japan).
Biochimica et Biophysica Acta, vol. 93, Dec. 9, 1964, p. 625–634. 15 refs. Min. of Educ., Rockefeller Found., and Charles F. Kettering Found. supported research.

A new type of inorganic polyphosphate (poly-P_1) was detected in Chlorella cells and named Poly-P_1 "D". Using uniformly P^{32}-labeled Chlorella cells which were subjected to various environmental conditions, the metabolic role of Poly-P_1, as well as Poly-P_1's "A", "B", and "C" were investigated. Results revealed that Chlorella cells contain at least two groups of poly-P_1 which function differently; one group, Poly-P_1's "C" and "A", plays a role as the phosphate donor for the syntheses of intracellular phosphorus compounds such as DNA and phosphoprotein under normal photosynthetic conditions, and the other group, Poly-P_1's "B" and "D", functions as the phosphate reservoir which is mobilized only when no exogenous phosphate source is available.

A65-80705
EFFECT OF ACCLIMATIZATION TO MUSCULAR EXERCISE IN A HOT ENVIRONMENT ON OXIDATIVE ENZYMES IN THE TISSUES OF DOGS.
E. Bedrak and V. Samoiloff (Negev Inst. for Arid Zone Res., Dept. of Environ. Med., Beersheva, Israel).
Journal of Endocrinology, vol. 31, Jan. 1965, p. 179–180. 11 refs.

Twelve Alsatian male dogs, 12 to 15 months old, weighing 17 to 22 kg. were used in this investigation. One group of 6 animals, the controls, were trained and maintained in an environment of 10° to 20°C. and 30% to 60% relative humidity. Each dog underwent a training program lasting 14 days consisting of a daily run on a treadmill (4 km./hr. at a gradient of 8%) for 2 hours. The other group of 6 animals, the acclimatized dogs, performed the same exercise but in a hot environment (35° to 40° and 30% to 50% relative humidity) during at least 14 consecutive days. Within 10 min. after death, tissue samples were taken, immediately frozen at −20°C., and analyzed within a few days. Results indicate clearly that while acclimatization to exercise in a hot environment greatly enhanced the activity of hepatic oxidative enzymes, the cardiac and adrenal enzymes, as well as muscle cytochrome oxidase showed a consistent decline in activity. Apart from the results on the enzymic responses of the liver, it appears that in the acclimatization of dogs to exercise in a hot environment there is a tendency for lower metabolic heat production. The increase in renal succinoxidase and cytochrome oxidase activity are in agreement with findings of other investigators. These results coupled with the fact that acclimatization to a hot environment leads to the acceleration of aldosterone synthesis in vivo, support the hypothesis that the physiological retention of sodium as mediated by aldosterone may be caused by an activation of specific enzymes of this hormone.

A65-80706
IGNORING IRRELEVANT INFORMATION.
P. M. Rabbitt (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge. Great Britain).
British Journal of Psychology, vol. 55, Nov. 1964, p. 403–414. 20 refs.

The task of scanning a visual display to identify certain symbols may involve ignoring the presence of others, and so may be compared with Donders's 1862 study of the "c-reaction", in which a response was required to only one of a set of five possible phonemes presented to a subject in random succession. For visual displays of letters of the alphabet the time

required to ignore a symbol as irrelevant is shown to depend upon the vocabulary of items for which the search is conducted. Incidental learning of irrelevant symbols is shown to be related to the same variable. It is shown that performance in situations of this type is analogous to that in which subjects respond to groups of stimuli rather than to particular items, and stimulus and response entropy are independently varied.

A65-80707
SEQUENTIAL ERRORS IN A TIME-SHARING TASK.
G. S. Tune (Harvard U., Cambridge, Mass.)
British Journal of Psychology, vol. 55, Nov. 1964, p. 415–419.

An experiment is described in which subjects were required to maintain a set pattern of responses while simultaneously engaged in a monitoring task. The results showed that selective deterioration in performance took place which was demonstrable only by means of a sequential analysis of responses and not by a simple count of the errors made. The results are discussed in relation to a concept of performance decrement which proposes that regression through the various levels at which a task is organized is a function of the capacity of short-term memory.

A65-80708
TRANSFER OF TRAINING BETWEEN SPACE-ORIENTED AND BODY-ORIENTED CONTROL SITUATIONS.
M. Hammerton and A. H. Tickner (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
British Journal of Psychology, vol. 55, Nov. 1964, p. 433–437. 7 refs.

An experiment was designed to determine whether skill in a control task is learned as a pattern of body-oriented limb-movements, or as a system of space-oriented relationships. A control task was set up which could be correctly oriented: A, both bodily and spatially; B, bodily but not spatially; C, spatially but not bodily. Four groups of six subjects were used severally to study transfer of training from A to B, B to A, A to C, and C to A. It was found that transfer to condition C was significantly the worst. It is tentatively concluded that this type of skill is learned mainly as a body-oriented pattern of limb-movements.

A65-80709
CHANGES IN RESPIRATION DURING ACCLIMATIZATION IN THE INTERIOR OF ANTARCTICA.
I. I. Tikhomirov (Moscow Med. Stomatol. Inst., Dept. of Normal Physiol., USSR).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Jan. 1964, p. 20–23.)
Bulletin of Experimental Biology and Medicine, vol. 57, Jan. 1964, p. 19–21. 20 refs. Translation.

Observations were made at the Soviet Antarctic station, Vostok. Tachypnea and considerable hyperventilation were observed during the first days after arrival at the station. With acclimatization, frequency of respiration restored to normal, pulmonary ventilation decreased, reaching the lowest level during the polar night period (however, even during that period it is 1 1/2 times greater than the normal value); the depth of respiration increased considerably. During the whole period of stay in Antarctica every individual had Cheyne-Stokes respiration, especially during sleep. Dyspnea increased considerably, even during slight physical strain. Composition of alveolar air became stabilized at a new level corresponding to a partial oxygen pressure of 53 to 56 mm. Hg and to CO_2 pressure of 26 to 29 mm. Hg. Blood oxygenation during quiet respiration was 80% to 87% increasing with voluntary hyperventilation to 85% to 94%. Hypoxemia rose considerably with voluntary breath holding and physical strain.

A65-80710
EFFECT OF HIGH-FREQUENCY MICROWAVES ON THE ABSORPTIVE ACTIVITY OF THE STOMACH AND INTESTINE.
V. R. Faitel'berg-Blank (Ukrainian Res. Inst. of Spa Therapy and Chemotherapy, SSR).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Jan. 1964, p. 43–48.)
Bulletin of Experimental Biology and Medicine, vol. 57, Jan. 1964, p. 43–45. 10 refs. Translation.

Glucose absorption was studied on dogs with an isolated stomach pouch (after Pavlov) and with an isolated loop of the small intestine. Glucose was introduced into the pouch in a 20% solution for 60 min. and into the isolated intestine in a 7% solution for 30 min. A study was made of the influence of the power of the field of centimeter waves and of the length of action, as well as of the effect produced on the receptor zones located far from the epigastric area on the absorptive capacity of the stomach and intestine. The action of the centimeter waves of 50 and 70 W. power on the epigastric area for 10 min. increased absorption; this phenomenon was even more pronounced with a power of 120 W. and the same duration of the experiment. In irradiation of the cervical sympathetic ganglia area and of the posterior surface of the left hip by means of centimeter waves (50 W.) for 10 min. there is a rise in the glucose absorption in the stomach and in the intestine. With a 20 min. action of centimeter waves (50 W.) glucose absorption in the ventricle and intestine is irregular. In some of the animals absorption decreased, whereas in others it was somewhat over the normal level. Examination of temperature inside the stomach and intestine during the action of centimeter waves, as well as control experiments on the effect of d'arsonvalization of the absorptive activity of the stomach and intestine have shown that both thermal and oscillatory factors are involved in the mechanism of the centimeter wave cited.

A65-80711
CHANGES IN EVOKED POTENTIALS IN THE EEG IN MAN DURING COMBINATION OF TWO INDIFFERENT STIMULI.
L. M. Puchinskaia (USSR, Acad. of Med. Sci., N. N. Burdenko Inst. of Neurosurg., Lab. of Electrophysiol., Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Feb. 1964, p. 6–11.)
Bulletin of Experimental Biology and Medicine, vol. 57, Feb. 1964, p. 128–132. 21 refs. Translation.

A study was made of induced potentials in the EEG of man following combination of a tone with a flash of light. In most of the persons examined, a nonspecific response to a preliminarily extinguished tone was reproduced after its very first combination with light. On the second day of investigation the area of its manifestation was shifted to the posterior portions of the hemispheres. During subsequent days the response came irregularly sometimes in the anterior and sometimes in the posterior portions of the hemispheres. Nonspecific response to light, combined with the tone, appeared irregularly from one experiment to another; during the second day (as compared to the first) its manifestations were very irregular. On certain days of the investigation the specific response to light had an optimal intensity, the number of reactions subsequently declining, down to complete disappearance of the response.

A65-80712
INTERRELATIONSHIP OF ADRENAL CORTEX AND THYROID GLAND UNDER NORMAL CONDITIONS AND IN COLD STRESS.
A. D. Nozdrachev and L. D. Fedorova (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Feb. 1964, p. 45–47.)
Bulletin of Experimental Biology and Medicine, vol. 57, Feb. 1964, p. 165–167. 16 refs. Translation.

As demonstrated, chronic administration of cortisone (0.5 mg daily) under conditions of normal temperature reduced thyroid gland activity. Cortisone administration of the same dose against a background of cold stress gave a reverse effect. Thyroid gland function not only was depressed, but the stimulating effect of cold was even more intensified. The data obtained indicate that the action of corticosteroids on thyroid gland function under conditions of cold stress differed from that under normal temperature conditions.

A65-80713
THE INFLUENCE OF AN ULTRA-HIGH FREQUENCY ELECTROMAGNETIC FIELD ON THE ELECTRICAL ACTIVITY OF AN ISOLATED STRIP OF CEREBRAL CORTEX.
Iu. A. Kholodov.
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Feb. 1964, p. 98–101.)
Bulletin of Experimental Biology and Medicine, vol. 57, Feb. 1964, p. 217–220. 12 refs. Translation.

A neuronally isolated strip of cerebral cortex in a nonanesthetized rabbit was shown to change its electrical activity after application of a UHF field of 1,000 v./m. to the head. The reaction of the strip to the UHF field occurred in 52% of the cases and was usually shown by an increased amplitude of the potentials. At times, however, the electrical activity was reduced, or irregular waves having a frequency of 1 to 3 cycles per second appeared. The nature of the response of the strip was not a function of its position in the brain. The latent period of the reaction of the strip was on average 27 sec., and the aftereffect lasted 1 to 5 min.; both these times were shorter than the corresponding times for the response of the intact brain to UHF radiation.

A65-80714
A TRANSISTOR DEVICE FOR REMOTE RECORDING OF HEART RATE, RESPIRATION, AND MOVEMENTS.
R. V. Unzhin and V. V. Rozenblat (Sci. Res. Inst. of Workers Welfare and Ind. Disease, Lab. of Functional Diagn.; and Sverdlovsk Med. and Phys. Culture Center, Lab. of Med. Radioelectron., Moscow, USSR).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Feb. 1964, p. 117–120.)
Bulletin of Experimental Biology and Medicine, vol. 57, Feb. 1964, p. 237–241. 13 refs. Translation.

A description is given of a single-channel transistorized instrument, type CRD-3. It provides for separate radio recording of various physiological quantities, according to the sensitive elements used. Records which may be made from an individual moving freely include: heart rate (from the R-wave of the electrocardiograph led off from the skin of the chest), pneumogram of the chest (by means of a rheostat element), and frequency and

duration of different phases of the respiratory movements (recorded through the closing of contacts). The instrument includes an amplifier, a multivibrator, and a transmitter all powered from miniature storage cells. The usefulness of multipurpose instruments allowing transmission of different sorts of information over a single channel was demonstrated.

A65-80715
EFFECT OF THE CONDITIONS OF ADAPTATION OF THE OPTIC ANALYZER TO [SIC] THE FUNCTION OF THE THERMORECEPTORS OF THE HUMAN SKIN.
L. M. Kurilova (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Mar. 1964, p. 3–6.)
Bulletin of Experimental Biology and Medicine, vol. 57, Mar. 1964, p. 251–253. 12 refs. Translation.

A discussion is presented of the effect produced by light stimulation applied to the optic analyzer alone on the function of the temperature analyzer. The cutaneous-temperature analyzer was kept on constant illumination and temperature. The light effects from the retinal photoreceptors on the cutaneous thermoceptor system led to reflex changes of the functional rate of the latter. Conditions of the optic analyzer of light adaptation caused reflex adjustment of cold receptors with regard to heating. Dark adaptation of the eyes changed the functional state of the cold receptors, corresponding to their adjustment to low temperatures.

A65-80716
EFFECT OF HYPERCAPNIA ON THE BLOOD SUPPLY TO THE HEART IN CHRONIC EXPERIMENTAL CONDITIONS.
I. N. Kriushina (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Mar. 1964, p. 15–19.)
Bulletin of Experimental Biology and Medicine, vol. 57, Mar. 1964, p. 263–266. Translation.

Experiments were carried out on dogs in chronic conditions without anesthesia. The changes in the volume velocity of the coronary circulation were recorded by the thermoelectric method. Respiration, blood pressure, and ECG were registered simultaneously. Hypercapnia of different degrees was provoked by inhalation of gas mixtures with 3%, 5%, 7%, 10%, and 15% CO_2 for 1 to 10 min. The changes in coronary circulation in response to hypercapnia were either biphasic (reduction at the beginning of the action, replaced by its gradual increase, as in dogs under anesthesia), or monophasic (increase only). During the first phase there was constriction of the coronary vessels, and during the second, dilatation. Characteristic of dogs without anesthesia were inconstancy, a lesser degree and a shorter duration of constriction (during the first phase). Evidently while awake the animals possesed greater compensatory powers for overcoming the vasoconstrictor effects of CO_2 on the coronary vessels than did dogs under anesthesia.

A65-80717
THE EFFECT OF ANTIBIOTIC THERAPY ON THE SEROTONIN AND HISTAMINE CONTENT IN THE BLOOD AND ORGANS OF IRRADIATED RABBITS.
Z. A. Popenenkova (USSR, Acad. of Med. Sci., N. F. Gamaleya Inst. of Epidemiol. and Microbiol., Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Mar. 1964, p. 59–61.)
Bulletin of Experimental Biology and Medicine, vol. 57, 1964, p. 306–308. 21 refs. Translation.

Single total X-ray irradiation of rabbits (at a dose of 95 R.) caused considerable reduction of serotonin (5-hydrotryptamine) and of the histamine level in the blood, brain, and small intestine. Three-week antibiotic treatment of the irradiated rabbits had no significant effect on the marked reduction of serotonin content in the blood, brain, and of histamine in the blood, brain, and small intestine; it also failed to materially affect the serotonin content in the small intestine.

A65-80718
INFLUENCE OF AREA OF APPLICATION AND DURATION OF THERMAL STIMULATION OF CUTANEOUS RECEPTORS ON FUNCTIONAL CHANGES IN THE VISUAL ANALYZER.
L. M. Kurilova and T. M. Dmitrieva (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol.; and Lab. of Physiol. and Pathol. of the Sense Organs, Moscow).
(Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 57, Apr. 1964, p. 20–23.)
Bulletin of Experimental Biology and Medicine, vol. 57, Apr. 1964, p. 396–398. 16 refs. Translation.

The problem of the functional interrelationship between thermal cutaneous and visual analyzers are discussed. The area of skin stimulated and the period of stimulation were shown to be significant in relation to their influence on the functional state of the visual analyzer. Reflex changes in the visual analyzer system can be observed only if the temperature of stimulus is adequate. The effectiveness of the stimulus is directly proportional to the area of the skin and to the time for which it is applied.

A65-80719
DISTURBANCES IN THE MECHANISM OF MITOSIS IN MICROSPORES OF TRADESCANTIA PALUDOSA DURING FLIGHT ON BOARD OF THE SOVIET SATELLITE SPACECRAFT "VOSTOK-5" [VOZNIKNOVENIE NARUSHENII MEKHANIZMA MITOZA V MIKROSPORAKH TRADESCANTIA PALUDOSA POD VLIIANIEM RAZLICHNOI PRODOLZHITEL'NOSTI POLETA NA KORABLE-SPUTNIKE VOSTOK-5].
N. L. Delone, V. F. Bykovskii, and B. B. Antipov.
Doklady Adademii Nauk SSSR, vol. 159, Nov. 11, 1964, p. 439–441. In Russian.

The effect of weightlessness on mitosis was studied on plant tissues (Tradescantia paludosa) placed on board the Soviet satellite spacecraft, Vostok 5. Thin sections of microspores were made and fixed on microscopic slides after 1, 51, and 80 orbits (1.5, 76, and 120 hours, respectively, after takeoff). The last slide was prepared 3.5 hours after landing (125 hours after takeoff). Certain changes during various phases of mitosis were noted, but no definite conclusions could be drawn as to the cause of each injury, because the ambient temperature varied during the flight, and the time of fixation was different in each case. The degree of disturbance was slight, and not all cells were affected. However, samples taken later in flight showed greater effects than the earlier sections. The reentry impact did not seem to affect the mitotic process.

A65-80720
THE EFFECT OF COOLING OF SOMATO-SENSORY CORTEX CENTERS ON THE RESPONSE POTENTIALS TRANSMITTED BY THE THALAMUS NUCLEUS [VLIIANIE OKHLAZHDENIIA SOMATOSENSORNOI KORY NA OTVETNUIU AKTIVNOST' PEREKLIUCHAIUSHCHEGO IADRA TALAMUSA].
A. G. Rabin (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).
Doklady Akademii Nauk SSSR, vol. 159, Nov. 11, 1964, p. 466–468. 11 refs. In Russian.

In cats, the response potentials of the posterior central nucleus were evoked by subthreshold stimulation of the contralateral somatic nerves. Simultaneously the primary cortical responses were registered. Local cooling of the cortex resulted in suppression of primary responses of the cortical centers, together with lowering of the negative phase amplitude of the thalamus center potential or its complete disappearance, but did not affect the positive phase. Warming of the area led to normalization of potentials. Alternating cooling of both cortical areas did not produce the same degree of suppression. It becomes evident, that response potentials of the reticular formation of the brain stem and the thalamus, which depend on the functional state of the cortical neurons of the second somatosensory area, regulate the afferent flow. The reticular influence is specific for each sensory modality.

A65-80721
UPTAKE OF THE PHOSPHATE GROUP IN PHOSPHOLIPID SYNTHESIS IN BRAIN AND LIVER IN RATS DURING HYPOXIA AND AT THE POSTHYPOXIC PERIOD [OBMEN FOSFATNOI GRUPPY FOSFOLIPIDOV MOZGA I PECHENI KRYS PRI GIPOKSII I V POSTGIPOKSICHESKOM PERIODE].
D. A. Chetverikov and S. V. Gasteva (USSR, Acad. of Sci., Inst. of Physiol. Imenii. P. Pavlova, Moscow).
Doklady Akademii Nauk SSSR, vol. 159, Nov. 11, 1964, p. 469–472. 14 refs. In Russian.

The results of experiments carried out on rats, in which a labeled inorganic phosphate was employed in order to follow the phospholipid metabolism during hypoxia and the post-hypoxic state, showed a lowering in the uptake of the phosphate group by the phospholipids of brain and liver tissues. Hypoxia was accompanied by tissue hyperemia. The suppression of phosphate lipid synthesis in these tissues could be attributed not to oxygen deficiency but rather to a fall in tissue temperature, which was the result of the hypoxic state, and may be considered a defense mechanism for conserving the oxygen reserve. The resulting low metabolic rate allows the cells of the central nervous system, and perhaps of other tissues, to conserve energy generated at a lower rate.

A65-80722
EFFECT OF EMOTIONAL STRESS ON THE FREE AMINO ACID IN BLOOD CONTENT [IZMENENIE SODERZHANIIA SVOBODNYKH AMINOKISLOT V KROVI PRI NERVNO EMOTSIONAL'NOM NAPRIAZHENII].
Z. N. Lebedeva and Z. Iu. Nuriakhmetov.
Voprosy Pitaniia, vol. 23, Jul.–Aug. 1964, p. 23–26. 11 refs. In Russian.

Chromatographic determination of free amino acids of whole blood in pilots who underwent an emotional stress during high-speed missions disclosed a fall in free amino acid concentration after the flight. A significant drop was noted in acids taking part in the transamination process, such as threonine, leucine, isoleucine, valine, lysine, glutamic acid, and alanine. These findings indicate above normal utilization of these essential acids during physiological stress.

A65-80723
TRYPTOPHAN REQUIREMENTS UNDER NERVOUS STRESS (O POTREBNOSTI V TRIPOFANE PRI NERVNOM NAPRIAZHENII .
T. A. Braksh and A. V. Popova.
Voprosy Pitaniia, vol. 23, Nov.-Dec. 1964, p. 21-25. 9 refs. In Russian.

Addition of tryptophan and vitamin B_6 to the food over a period of 1.5 months in experiments carried out on dogs under nervous stress (elimination of unconditioned reinforcement) caused changes in the correlation of basic nervous processes towards intensified internal inhibition. This gives ground to presume that under nervous tension the tryptophan and vitamin B_6 demand is rising. Control tests with 5-oxytryptophan indicate participation of serotonin in the physiological effect thus produced.

A65-80724
EMBRYO DEVELOPMENT AND CHICK GROWTH IN A HELIUM-OXYGEN ATMOSPHERE.
Harold S. Weiss, Ronald A. Wright, and Edwin P. Hiatt (Ohio State U. Col' of Med., Dept. of Physiol., Environ. Physiol. Lab., Columbus).
Aerospace Medicine, vol. 36, Mar. 1965, p. 201-206. 15 refs.
NASA Grant NsG-295-62.

Fertile White Leghorn eggs were incubated in approximately 79 percent He, 21 percent O_2 with up to 1 to 2 percent residual N_2 in a sealed plastic isolator in which temperature, relative humidity, O_2, and CO_2 were controlled. Live, healthy chicks were hatched in He-O_2 but only half as many as in a comparable air system. The poorer He-O_2 hatch was due mainly to late embryonic death. Hatching time was similar but the He chicks were 8 percent smaller. During development He embryos showed neither gross defects nor differences in dry weight or in total nitrogen, but He eggs lost 27 percent more weight. During an additional 4 weeks in their respective atmospheres, chick growth and hematology were similar but the He birds consumed up to 16 percent more feed and had higher heart and respiratory rates. Increased conduction of heat in He may be responsible for the observed effects.

A65-80725
EFFECTS OF HYPERBARIC OXYGEN ON SOME COMMON PATHOGENIC BACTERIA.
A. G. Towers (Royal Natl. Orthopaed. Hosp., Inst. of Orthopaed., Stanmore, Great Britain), M. C. Path, and W. I. Hopkinson (Vickers Group Res. Estab., Sunninghill, Great Britain).
Aerospace Medicine, vol. 36, Mar. 1965, p. 211-213. 8 refs.

The effect of hyperbaric oxygen at 2 atmospheres absolute pressure at 37° C. on a number of microorganisms pathogenic for man has been investigated. Short intermittent exposures of the cultures had little effect on the morphology or colonial characteristics, and long continuous exposure to hyperbaric oxygen failed to reveal true oxygen dependent mutants but did produce a number of variant colonies.

A65-80726
HUMAN FACTORS IN "CAUSE UNDETERMINED" ACCIDENTS.
Emmert C. Lentz (Inspector Gen., Life Sci. Div., Norton AFB, Calif.)
Aerospace Medicine, vol. 36, Mar. 1965, p. 214-222. 32 refs.

USAF aircraft accidents over a four-year period that remain categorized as cause undetermined indicate that the man-machine complex tends to fail during the stressful phases of flight. Loss of control and high-speed impact are factors common to many of this series. Man's limitations and specifically his ability to maintain orientation, i.e., disorientation, are major problems in the operation of high performance aircraft. Aircraft performance has advanced to the place where exploration of the operational perimeters of the craft is reserved for the test pilot. Experienced combat pilots may still be novices with respect to the vagaries of the aircraft they fly. Safety of flight is enhanced by the division of duties with a qualified copilot.

A65-80727
EFFECTS OF POSITIVE G ON CHIMPANZEES IMMERSED IN WATER.
Kenneth R. Coburn (Naval Air Eng. Center, Aerospace Crew Equipment Lab., Philadelphia, Pa.), Peter H. Craig, (Pa. U., School of Vet. Med., Philadelphia), and Edward L. Beckman (Natl. Naval Med. Center, Naval Med. Res. Inst., Bethesda, Md.)
Aerospace Medicine, vol. 36, Mar. 1965, p. 233-245. 11 refs.

A concept for the prevention of the deleterious effects of high accelerative forces upon animals by immersing them in water in a constant volume g capsule has been proposed by Gray. A series of experiments was carried out to evaluate the validity of this concept by subjecting primates to accelerations of up to +31 in such a system. The pathological and physiological findings of these experiments demonstrated that mediastinal emphysema and air embolism were produced in all animals by overpressurization of the lungs in the constant volume g capsule either during the acceleration period, or by pressurization of the lungs prior to centrifugation or by both mechanisms. In addition, circulatory failure occurred at the higher magnitudes of acceleration.

A65-80728
EFFECTS OF GUST-INDUCED AND MANEUVERING ACCELERATION STRESS ON PILOT-VEHICLE PERFORMANCE.
Thomas E. Wempe (NASA, Ames Res. Center, Biotechnol. Div., Moffett Field, Calif.)
Aerospace Medicine, vol. 36, Mar. 1965, p. 246-255. 6 refs.

A simulator study was conducted to assess the effects of gust-induced and maneuvering acceleration stress on pilot-vehicle performance during extended periods of low-level, high-speed flight. NASA test pilots were subjected to this acceleration stress on the Ames Height Control Simulator, a device capable of realistically reproducing the vertical acceleration environment of this flight mode. The primary piloting task consisted of "flying" as close as possible to a 250-foot clearance height above the terrain without ground contact by use of conventional aircraft controls while viewing aircraft instruments and a display depicting the terrain configuration ahead and below. Controlled variables were aircraft velocity, cockpit motion, gust intensity, additional secondary tasks, the presence of a bending mode vibration near the visceral resonance frequency and the requirement for monitoring an automatic terrain-following system.

A65-80729
OUTPATIENT STARVATION IN NORMAL AND OBESE SUBJECTS.
Joseph D. Brown and Donald H. Pulsifer (81st Tactical Hosp. APO, New York, N.Y.)
Aerospace Medicine, vol. 36, Mar. 1965, p. 267-269. 6 refs.

Twenty-five overweight personnel and three persons of normal weight were subjected to ten days starvation as outpatients. Each was required to continue performing his routine duties and to walk two miles per day, while consuming only noncaloric liquids. Fourteen of the overweight personnel and all three of the normal subjects completed the ten-day fast and no serious ill effects or drops in job performance were noted. The severity of subjective symptoms, including irritability, easy fatigability and gastritis, were in indirect proportion to the obsesity of the individual, being negligible in the obese and moderately severe in those of normal weight. The author suggests that on the basis of this study the military should reevaluate its present emphasis on the need for food in a survival situation, particularly in those circumstances following a nuclear event.

A65-80730
A FIVE-YEAR HISTORY OF SAILPLANE ACCIDENTS.
Robert L. Wick, Jr. (Garrett Corp., Los Angeles, Calif.)
Aerospace Medicine, vol. 36, Mar. 1965, p. 269-272. 5 refs.

Approximately 117 glider accidents have been reported during the 5-year period, 1958 to 1963, inclusive. Twelve of these were fatal. Some of these pilots possessed medical certificates and some did not. Factors involved in sailplane flight and sailplane accidents are also presented. It is not possible at present to assess the value, if any, of a medical examination in the prevention of accidents among sailplane pilots.

A65-80731
RATE OF THE REACTION OF CARBON DIOXIDE WITH HUMAN RED BLOOD CELLS.
H. P. Constantine, Margot R. Craw, and R. E. Forster (Pa. U., School of Med., Dept. of Anesthesiol.; and Graduate School of Med., Dept. of Physiol., Philadelphia).
American Journal of Physiology, vol. 208, Apr. 1965, p. 801-811. 23 refs.
Grants NIH 2G-215 (C3) and HE-04108.

A CO_2 electrode was adapted for use in a continuous-flow rapid-reaction apparatus to measure the kinetics of the hydration-dehydration reactions of CO_2. The dehydration constant of the reaction was found to be 80 $sec.^{-1}$ at 37° C. Red blood cell suspensions were mixed with bicarbonate solutions to alter suddenly the carbon dioxide tension around the cells from 42 to 57, and from 3 to 37 mm. Hg. The velocity constants for the hydration of CO_2 inside the cell were 236 and 772 $sec.^{-1}$, respectively, as compared with the uncatalyzed rate of 0.11 $sec.^{-1}$. These uninhibited rates are 0.16 and 0.54 the potential catalyzed rate in the cell, suggesting that some other process is rate limiting. In the presence of 0.25 g./liter acetazolamide, the velocity constants decreased to 28 and 65 $sec.^{-1}$, respectively.

A65-80732

PEAK OXYGEN INTAKE DURING PHYSICAL FITNESS PROGRAM FOR MIDDLE-AGED MEN.

John Naughton and Francis Nagle (Okla. U. Med. Center, Depts. of Med. and Physiol.; and Central YMCA, Phys. Dept., Oklahoma City).

JAMA, vol. 191, Mar. 15, 1965, p. 103–105. 15 refs.
Grants PHS HE-06286-04 and HTS 54-06.

A group of presumably healthy, sedentary men participated in a physical fitness program for seven months. Their maximum oxygen intake was determined during either a standard treadmill test or an all-out run or both. Eighteen men tested on the treadmill before and after the test had an increase in their peak oxygen uptake from 31.3 to 36.8 ml./kg./min. ($P < 0.001$). Ten of the subjects who were tested by both methods before and after seven months of training had statistically significant increases in their peak oxygen intakes. Their peak performance was consistently higher with the all-out run than it was on the treadmill. Eight men failed to increase their peak energy expenditure following training; four of these subjects were tested twice with the treadmill test and their peak performances remained the same before and after the program.

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