AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

NASA SP-7011 (01)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during the period April, 1964–June, 1964

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. AUGUST 1964

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INTRODUCTION

SP-7011 (01) is the second issue of *Aerospace Medicine and Biology*, NASA's continuing bibliography for the abstracting and announcement of current references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project (AMBBP) of the Library of Congress, the American Institute of Aeronautics and Astronautics, 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, SP-7011.

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 during the period April 1–June 30, 1964.

Each entry in SP-7011 (01) consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography AUGUST 1964

STAR ENTRIES

N64-15034 Deutsche Versuchsanstalt für Luft- und Raumfart, Bad Godesberg (W. Germany) Inst. für Flugmedizin

PRESENTATIONS OF CO-WORKERS OF THE INSTITUTE FOR FLIGHT-MEDICINE OF THE DVL IN LONDON AND PARIS (1960 AND 1961) [VORTRAGE DER MITARBEITER DES INSTITUTS FUR FLUGMEDIZIN DER DVL IN LONDON UND PARIS (1960 UND 1961)]

Oct. 1963 154 p refs Papers in language of congress at which presented: 11 in ENGLISH, 2 in FRENCH; each has a GERMAN version

(DVL-205) Available from Vereinigte Universitäts- U. Fachbuchhandlungen, R.-Wagner-Str. 1, Cologne, W. Germany

CONTENTS:

N64-15035 Deutsche Versuchsanstalt für Lüft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin

MEASURING THE INDIVIDUAL STRESS-SENSITIVITY BY MEANS OF OXYGEN-WANT

K. E. Klein, H. Brüner, and D. Jovy *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 5–15 refs In ENGLISH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

Pilots were tested, with regard to their efficiency under oxygen deficiency, up to the moment of beginning loss of muscular tonus. Based upon the results of the test, the pilots were grouped into types A and B. Pilots of group A had an average of 6 to 7 minutes until the onset of central-nervous-system functional disturbances. Pilots of group B had an average onset of considerably more than 12 minutes. After the subjects were placed into groups A and B, they were submitted once more to 5 minutes of oxygen deficiency. Eosinophiles were counted up to 4 hours after exposure to the stressor. It is shown that in persons of the more stable-B type, the decrease in eosinophiles was only half as much as compared to the more vegetatively unstable A-types, and the reincrease started earlier. There is a significant difference between the two groups ($P < 0.01$). In general, the response of the eosinophile cells is considered to be a symptom of the organism's reaction to an unspecified stressor, and there exist numerous indications of adreno-cortex activitation, i.e., output of cortical hormones. However, adrenaline, serotin, etc., also play a part. The test demonstrated a method by which pilots who have a lower stress sensitivity can be selected.

I.v.L.

N64-15036 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
MODIFICATION OF THE INDIVIDUAL STRESS-SENSITIVITY BY ADAPTATION TO OXYGEN-WANT IN THE LOW-PRESSURE CHAMBER
H. Brüner, K. E. Klein, and D. Jovy *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 16-28 refs In ENGLISH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

Modification of the individual stress sensitivity by adaptation to oxygen deficiency in a low-pressure chamber was investigated. Results indicate that it is possible to improve considerably the altitude tolerance of a pilot by an intermittent oxygen-deficiency exposure daily of only 1/2 hour for a 4-week period, without respiration, circulation, erythrocytes, and hemoglobin showing changes up to this moment. However, a simultaneous, strong decrease in the adreno-cortical reaction points to the fact that changes have occurred in the organism that necessitate a much lesser adrenal activation than before, under equally unspecific terms. It can be summarized that a person with an oxygen-deficiency shows sensitivity toward an unspecified stressor, regardless of whether this sensitivity depends on a different functional state of the adreno-cortex, as in the first adaptation phase of the individual, or on a probably different quality of cell metabolism as in an unadapted type, with an average of 6 to 7 minutes until the onset of central-nervous-system functional disturbances, and as in an unadapted type where the average onset time of such disturbances is more than 12 minutes. I.v.L.

N64-15037 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
THE VARIOUS CONDITIONS OF THE "ALKALI RESERVE" IN OXYGEN-DEFICIENCY [LES DIVERS COMPORTEMENTS DE LA "RESERVE EN ALCALI" EN MANQUE D'OXYGENE]
H. Kunzmann *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL In London and Paris (1960 and 1961) Oct. 1963 p 28-33 in FRENCH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

The hyperventilation alkalosis, associated with the reduction of the partial pressure of carbon dioxide, was common to all cases studied. However, in 30% of the test subjects, the acid-base equilibrium was not only affected by the hyperventilation alkalosis but also by a rise in bicarbonate concentration, which caused an increase in the entire carbon dioxide content. A shifting to the left of the oxygen-bonding curve is associated with an alkalinization of the blood. Since it is known that the decisive criterion is not the sufficient oxygen uptake but the oxygen delivery to the tissue during reduced pressure, a compensation must be attempted, i.e., a shifting to the right of the oxygen-bonding curve by a reduction in the hydrogen concentration. This occurs in people acclimated to high altitudes. Acclimatization to high altitude does not depend on the heart or the lungs; it is primarily due to changes in blood composition. I.v.L.

N64-15038 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
THE ENCYMATICAL INCORPORATION OF IRON INTO PROTOPORPHYRIN UNDER CONDITIONS OF OXYGEN-WANT
G. Schafer and K. H. Weiner *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 34-41 In ENGLISH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

The enzymatical incorporation of iron into protoporphyrin under conditions of oxygen deficiency in rabbits was investigated. Results are summarized as follows: The activity of heme synthesis in the liver of animals under hypoxia is visibly increased compared to the same activity under normal conditions. After the homogenates had been exposed to air for several hours, the activity had decreased; it was noted that the activity of the liver, bone marrow, and spleen under oxygen-deficiency conditions was much lower than under normal conditions. It is not known whether protoporphyrin or protoporphyrinogen is physiologically the primary substance for the conversion of iron into hemoglobin. The following conclusions can be drawn from these results: (1) The heme synthesis activity of the liver, spleen, and bone marrow is increased by oxygen deficiency. (2) Hemoglobin will probably be synthesized by smaller structural elements under conditions of oxygen defieiency. (3) An adaptation of the organism to chronic oxygen deficiency is combined with an increase in activity or increase (of the specific enzyme protein) of the heme synthesis. I.v.L.

N64-15039 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
EFFECTS OF HYPOXIA ON THE ALBUMIN METABOLISM IN MAMMIFER ORGANISMS ILLUSTRATED BY WAY OF GLUTAMIC ACID-OXALIC ACETOUS ACID-TRANSAMINASIS IN SERUM
G. Schafer and K. H. Weiner *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 42-50 In ENGLISH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

The influence of continuous inspiratory hypoxia of more than 980 hours on those intermediary modifications of albumin metabolism in young rabbits, which manifest themselves in the changes in activity of glutamic acid-oxalacetic acid-transaminase in serum, was investigated. The strong fluctuations in the S-G-O-T-level (serum-glutamic acid-oxalacetic acid-transaminase level) at the beginning of hypoxia and during the transition period to normal conditions indicate a badly adapted regulation of the metabolism in the rabbits. After transition to normal oxygen conditions, a strong increase in transaminase activity in serum took place. It was only after 17 days that the transaminase level gradually started to decrease, but it was still visibly increased 42 days after exposure to oxygen deficiency. These findings support the theory that the albumin metabolism had not yet normalized at this time, whereas the hemoglobin contents and the blood picture had returned to their original values. Also, tests on adult rabbits are discussed. I.v.L.

N64-15040 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
HYPERELECTROLYTAEMIA AND INTRAVASCULAR FORMATION OF GAS BUBBLES IN RAPID DECOMPRESSION
O. Wunsche and H. Hartmann *In its* Presentation of Co-Workers of the Inst. for Flight-med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 51-59 In ENGLISH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

Albino rats that have been premedicated with an electrolyte solution containing 0.4% $KHCO_3$, 0.2% CaI_2, and 0.2% $NaHCO_2$ show fewer intravascular air bubbles after decompression from 0 to 18,000 m (60,000 ft) altitude than untreated controls. Gas bubbles are found in 80% to 90% of the untreated rats, but they are observed in only 10% to 20% of the premedicated animals. The electrolyte solution causes an increase of the sodium, potassium, and calcium level in the serum, as well as dehydration. The origin of the intravascular air bubbles after rapid decompression is discussed. It is suggested that the greater part of the air bubbles probably does not originate from gas liberated from the blood, but from air penetrating the vascular system from the alveoli. This can be expected only at a positive pressure of 80 mm Hg within the alveoli. Author

N64-15041 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
MEASURING AND CRITICAL EXAMINATION OF THE INFLUENCE OF DRUGS ON THE PERFORMANCE ABILITY OF AVIATORS
D. Jovy, H. Bruner, and K. E. Klein *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 60–73 refs In ENGLISH and GERMAN Presented at the 5th European Congr. of Aviation Med., London, 1960 (See N64-15034 07-16)

The influence of antiemetics, tranquilizers, sedatives, and analeptics on the performance ability of pilots was investigated. The testing procedure enabled the determination of all decisive factors of psychomotor performance, such as coordination and reaction, intensity and duration of attention, as dependent on disposition and will-power, in one sum total. In this test procedure, the person has to choose from a pool of differently sized pellets a suitable one to place into a correspondingly sized opening of a rhythmically revolving roll. The speed of the roll and, thus, the release of the individual openings, can be regulated. The speed may be increased up to 60 pellets to be inserted per minute, or be demanded for a certain time as a continuous maximum efficiency. The test results are recorded by an indicator that sets a mark for each correctly inserted pellet. For evaluation, the number of such marks/min in percent is taken as a basis for computing a so-called psychomotor-performance index. I.v.L.

N64-15042 Deutsche Versuchsanstalt für Luft- and Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
DECOMPRESSION SICKNESS AND AIR EMBOLISM
H. Hartmann and O. Wunsche *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 74–81 In ENGLISH and GERMAN Presented at the Intern. Congr. of Aviation and Cosmonautical Med., Paris, 1961 (See N64-15034 07-16)

When decompression experiments that have been made on rats are applied to man, the results indicate the following: All symptoms that occur within a few seconds after decompression are, in all probability, caused by pulmonary air embolism, whereas at least a few minutes are required for the intravascular liberation of the physically dissolved nitrogen. Special danger exists for persons when the ratio of the inspiratory and expiratory period is shifted toward a prolonged expiratory phase. This danger applies to all emphysematous persons, as well as to all persons with an increased respiratory resistance due to spastically changed bronchi and bronchioles. Not only are the rapidity of the pressure drop and the amount of the pressure difference of importance but also of importance is the respiratory phase. The most unfavorable case is a depression that occurs when the glottis is closed and the thorax is in the inspiratory position. When a pressure drop is anticipated, (for instance, when a person jumps from a plane in which the interior cabin pressure is higher than the ambient pressure), the risk of air embolism could be diminished if the person exhales before the cabin seat is ejected. I.v.L.

N64-15043 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
ON THE INFLUENCE OF OXYGEN-WANT ON THE BIOSYNTHESIS OF HEME FORMATION
G. Schafer and H. Weiner *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 82–87 In ENGLISH and GERMAN Presented at the Intern. Congr. of Aviation and Cosmonautical Med., Paris, 1961 (See N64-15034 07-16)

The effect of oxygen deficiency on the biosynthesis of heme formation was investigated. The reaction was effected *in vitro* by the incubation of radioactive iron and protoporphyrin in the presence of organ homogenate, in which the enzyme has been enriched by pretreatment. The enzyme activity was measured by the amount of incorporated iron (Fe^{59}). The radioactivity of the Fe^{59} heme was measured in a scintillation counter. Results indicate that there is a regulation system already present in this early phase of erythropoiesis, which provides an effective response to the actual oxygen requirement of the specific cellular tissue, particularly because nearly all parenchymatous organs are capable of this reaction. However, it is not clear how the heme, which had been formed in the specific organs, is incorporated into the maturing red-blood cell. I.v.L.

N64-15044 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
SOME QUANTITATIVE AND MORPHOLOGICAL CHANGES OF HUMAN BLOOD UNDER DIFFERENT STRESSES [DES CHANGEMENTS QUANTITATIFS ET MORPHOLOGIQUES DU SANG HUMAIN SOUS DES CHARGES DIFFERENTES]
H. Kunzmann *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 88–93 In FRENCH and GERMAN Presented at the Intern. Congr. of Aviation and Cosmonautical Med., Paris, 1961 (See N64-15034 07-16)

The erythrocyte count was elevated by physical work and oxygen-deficiency stress. However, in the case of oxygen deficiency, the maximum in the count occurred during exposure to the deficiency, and the counts after the end of the test were less than that of the equilibrium count. During physical work, the highest counts were obtained after the end of the test, and were further elevated after rest. An increase in reticulocytes, perhaps indicating an increased activity of the erythropeotic system, occurred only in oxygen-deficiency tests. The total number of leucocytes during each of the stresses (physical work, acute oxygen-deficiency, and short-time acceleration in a centrifuge) increased. This increase continued five minutes after the end of the test, and the count was above the equilibrium level an hour later. The relative count of the neutrophilic nuclear-segmented granulocytes remained almost constant for the duration of the test. Although a partial lymphocyte increase occurred in all of the stress tests, a persistent lymphopenia was observed with increasing test duration. Parallel to this, the eosinophile count, after an intially short time increase, changed. The above-mentioned changes indicate a change in the white-cell blood picture after a multiple distribution of corticosteroids, and can be a reflection of the compensatory hormonal adaptation. Transl. by I.v.L.

N64-15045 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
ON THE UNSPECIFIC STIMULATION OF THE ORGANISM BY VARIOUS STRESSORS
D. Jovy, H. Bruner, and K. E. Klein *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 94–108 refs In ENGLISH and GERMAN Presented at the Intern. Congr. of Aviation and Cosmonautical Med., Paris, 1961 (See N64-15034 07-16)

The unspecific stimulation of the organism by various stressors was investigated. Results indicate that the unspecific adaptive system actually responded markedly in the same persons under all chosen kinds of stress, no matter whether the stressor was oxygen deficiency, muscular work, heat, cold, or acceleration. Even acceleration, which might also be considered a specific stressor, also leads, to eosinopenia and increased corticoid output. These findings show that the unspecific adaptive mechanism is of basic importance to resistance against all stressors. The main factor should be the indirect supporting role played by the corticoids. As biological catalyzers, they enable and favor metabolic processes, and promote the attempt of the organism to return to a normal state, regardless of the type of the previous disturbance. I.v.L.

N64-15046 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
THE IMPORTANCE OF A LONG-TERM SOJOURN IN HIGH MOUNTAIN REGION (ANDES MTS.) FOR THE CONDITIONING OF FLYING PERSONNEL
K. E. Klein, H. Bruner, and D. Jovy *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 109–121 refs In ENGLISH and GERMAN Presented at the Intern. Congr. of Aviation and Cosmonautical Med., Paris, 1961 (See N64-15034 07-16)

A sojourn of several weeks at an altitude of 6,200 m, in a changing climate, and the performance of moderate physical work induce a marked adaptation in the unspecific hypophyseo–adrenocortical system. In addition, they distinctly improve the reaction of circulation, respiration, metabolism, and other physiological functions to different stress situations. These results show an increased resistance against stressors, which is of importance to flying performance and survival, at least in emergency situations. I.v.L.

N64-15047 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (W. Germany) Inst. für Flugmedizin
PERCEPTION PROBLEMS IN HIGH-SPEED FLIGHT
Siegfried Fichtbauer *In its* Presentation of Co-Workers of the Inst. for Flight-Med. of the DVL in London and Paris (1960 and 1961) Oct. 1963 p 122–133 refs in ENGLISH and GERMAN Presented at the Intern. Congr. of Aviation and Cosmonautical Med., Paris, 1961 (See N64-15034 07-16)

This report deals with visual-perception factors associated with the prevention of supersonic-aircraft collisions. These factors are: (1) the time required for the perception process connected with judging the flight attitude of the other aircraft and taking preventive action; (2) the turning radius, at Mach-3 speed, which is still tolerable to passengers; (3) the maximum distance at which a pilot with normal eyesight can detect another aircraft; and (4) the visibility at cruising level. A discussion of these factors leads to the conclusion that in order to have a fully effective air-traffic control system, it will be necessary to divide air space into two or three regions, e.g., one for prop aircraft, another for subsonic jet aircraft, and a third for the supersonic aircraft. The different regions should be controlled by different types of radar. I.v.L.

N64-15051 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
A THEORY OF ION TRANSPORT ACROSS CELL SURFACES BY A PROCESS ANALOGOUS TO ELECTRON TRANSPORT ACROSS LIQUID-SOLID INTERFACES
Freeman W. Cope 6 Dec. 1963 20 p refs
(NADC-MA-6325; Rept. 24; AD-428119)

A kinetic theory of ion transport across cell surfaces has been developed in a form analogous to the kinetic theory of electron transport across solid–liquid interfaces of biological particles. The ionic theory is based on the observation that, at least in one instance, the voltage–current behavior for ion conduction across a cell surface is describable by the Tafel equation, in analogy to the conduction of electrons across solid–liquid interfaces. The theory predicts that the kinetics of ion transport across cell surfaces should conform to the Elovich rate equation, which is shown to be true for various experimental data. Author

N64-15052 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
FLASHBLINDNESS: A PROBLEM OF ADAPTATION
J. H. Hill and Gloria T. Chisum 4 Dec. 1963 12 p refs Presented at the ACLANT Symp. for NATO Med. Officers and Health Ministers held at the Naval Med. Res. Inst., Nat. Naval Med. Center, Bethesda, Md., 29–30 Oct. 1963
(NADC-MA-6327; AD-429241)

Flashblindness, the temporary reduction in visual sensitivity due to exposure to a high-intensity flash, is a potential problem to pilots of modern high-performance aircraft. Some of the possible solutions to this problem are presented and evaluated in this paper. A brief description of the visual processes affected is given. The relation of light adaptation and dark adaptation of the eye to the changing lighting conditions and the recovery of sensitivity to a functional level are discussed. The suitability of fixed density goggles as a protective system is examined, and the results of the simulation of protective devices with closing times of 33 μsec, 165 μsec, and 9.8 msec are reviewed. Eye patch studies are also discussed. Author

N64-15093 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
ANALYSIS OF LIMITING THERMAL CONDITIONS ENCOUNTERED BY A MANNED SPACE SUIT IN ORBIT Technical Documentary Report, May 1959–Jul. 1963
Thomas F. Irvine, Jr. (N.Y. State U.) and Kenneth R. Cramer Nov. 1963 26 p refs
(AMRL-TDR-63-102; AD-429184) OTS: $0.75

Three thermal problems have been examined that occur in the design of space suits to be used when personnel are outside the parent vehicle. The first concerns the time–temperature variation of an infinite thermal conductivity suit exposed to extreme conditions of heating and cooling. The second is related to temperature differences that may occur from the top to the bottom of the suit, thereby causing physiological discomfort. Finally, a scheme was examined whereby these temperature differences might be ameliorated by circulating a fluid in passages behind the suit material. Author

N64-15105 Naval School of Aviation Medicine, Pensacola, Fla.
HUMAN QUALITY CONTROL
James R. Berkshire In ONR Solution to Navy Probl. through Advanced Technol. [1963] p 31–40 (See N64-15101 07-01) OTS: $5.00

The method for selecting men for aviation training is discussed. Minimum training standards that will result in the early elimination of potential training and job failures must be imposed at various levels of the training process. In order to transform all of a student's valid past performance scores into a single statement of the probability of his success or failure, a computer was used. R.T.K.

N64-15106 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
PILOT PERFORMANCE DURING CENTRIFUGE SIMULATIONS OF ACCELERATION ENVIRONMENTS
Randall M. Chambers and W. S. Wray In ONR Solution to Navy Probl. through Advanced Technol. [1963] p 41–88 refs (See N64-15101 07-01) OTS: $5.00

A report is presented of the results of centrifuge simulation studies of manned space flights and of proposed spacecraft. The major effects of long-term accelerations on human performance and physiology are presented. Physiological tolerance to $+G_x$, $+G_z$, $-G_x$, and $-G_z$ acceleration vectors are discussed, and it is demonstrated that, in addition to physiological tolerance limits, there are also performance tolerance limits that define the realizable functioning of any particular overt-behavior system during acceleration. Major concepts in protection are discussed. Some of the pasic principles of centrifuge simulation of space vehicles are outlined, and the use of the Aviation Medical Acceleration Laboratory centrifuge in astronaut training is reviewed. The effects of various acceleration profiles on visual performance, response time, complex psychomotor-skill performance and higher mental function, and motivation and emotional behavior are outlined. R.T.K.

N64-15107 Naval Air Engineering Center, Philadelphia, Pa. Air Crew Equipment Lab.
RESEARCH IN LIFE SUPPORT SYSTEMS FOR AIRBORNE AND SPACE VEHICLES
Roland A. Bosee In ONR Solution to Navy Probl. through Advanced Technol. [1963] p 89-97 (See N64-15101 07-01) OTS: $5.00

Results of investigations in human engineering, altitude tolerance, atelectasis, and negative impact are reported. Other problems discussed are: environmental protection; aeroembolism with respect to the projected Apollo missions; and the likelihood that the combined stresses of launch acceleration, the 100% oxygen in the ambient environment, and reentry acceleration might cause atelectasis during projected Gemini missions. R.T.K.

N64-15153 Joint Publications Research Service, Washington, D.C.
THE RADIOSENSITIVITY OF BIRDS
10 Feb. 1964 5 p refs Transl. into ENGLISH of an article from Biol. Deystviye Radiatsii (Lvov), no. 1, 1962 p 81-83 (JPRS-23169; OTS-64-21531) OTS: $0.50

Five species of birds were X-irradiated to determine, within a 30-day period, the lethal doses in 50% of the test animals. The great radiosensitivity in birds varies only slightly (400 to 600 r) among the species studied. There is impairment of motor coordination, of pecking reflex, and of flight orientation. R.L.K.

N64-15165 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeronautical Research Inst.
THE PERCEPTION OF DEPTH FROM BINOCULAR DISPARITY
Walter C. Gogel May 1963 12 p refs
(CARI-63-10)

This study was concerned with the factors involved in the perception of depth from binocular disparity. A binocularly observed configuration of constant convergences, constant visual size, and having constant binocular disparities was made to appear at two different distances in a monocularly observed field-of-view. Both the perceived frontoparallel sizes and the perceived depth within the configuration were measured by means of a kinesthetic (hand) adjustment. It was found that the perceived frontoparallel size and the perceived depth in the binocularly observed configuration increased as the perceived distance of the configuration increased. It is concluded that the perceived depth resulting from a constant binocular disparity will differ depending upon the perceived size per unit of visual angle of frontoparallel extents in its depth vicinity. Author

N64-15167 Joint Publications Research Service, Washington, D.C.
THE APPLICATION OF CYBERNETICS IN PEDAGOGY
P. R. Atutov *In its* Cybernetics in Pedagogy and Commun. 11 Feb. 1964 p 1-9 refs Transl. into ENGLISH from Sov. Pedagogika (Moscow), v. 26, no. 8, 1962 p 147-152 (See N64-15166 07-01) OTS: $0.75

Certain methodological problems are discussed in an attempt to ascertain the possibilities of using cybernetics in pedagogy. For the broad introduction of new methods into pedagogical research, it is necessary to achieve a careful study of the qualitative aspects of the pedagogical process, with an aim toward revealing the general tendencies in its development. In order to understand the entire process of the movement as a whole and to foresee its further development, it is necessary to know how to determine the leading tendency and to isolate it from the variegated mass of individual instances, without moving into the foreground the attendant and the accidental. For the successful solution of these tasks, it is necessary to have creative scientific groups made up of mathematicians, educators, psychologists, and engineers. P.V.E.

N64-15169 Joint Publications Research Service, Washington, D.C.
THE SPEECH SIGNAL IN CYBERNETICS AND COMMUNICATIONS
A. A. Pirogov *In its* Cybernetics in Pedagogy and Commun. 11 Feb. 1964 p 17-19 ref Transl. into ENGLISH from Elektrosvyaz (Moscow), no. 8, 1963 p 75 (See N64-15166 07-01) OTS: $0.75

A review is presented of a book entitled, "The Speech Signal in Cybernetics and Communications: The Transformation of Speech as Applicable to the Tasks of the Technology of Communications and Cybernetics." P.V.E.

N64-15181 National Research Corp., Cambridge, Mass. Research Div.
EFFECTS OF SIMULATED SPACE ENVIRONMENTS ON THE VIABILITY OF MICROORGANISMS Final Report, 15 Apr. 1961-30 Apr. 1963
Gerald J. Silverman (MIT), Rosario P. Giammanco, Norman S. Davis (MIT), Frank C. Benner, and Cecil G. Dunn (MIT) 18 Dec. 1963 34 p refs
(NASA Contract NASr-41)
(NASA CR-55288) OTS: $3.60 ph, $1.22 mf

Spores of five test organisms, *Bacillus subtilis* var. *niger*, *Bacillus megaterium*, *Bacillus stearothermophilus*, *Clostridium sporogenes*, and *Aspergillus niger*, and soils were exposed while under ultrahigh vacuum to temperatures of from −190° to +170° C for 4 to 5 days. Up to a temperature of 25°C, no loss in viability of the test spores was noted when compared to original populations maintained at room temperature and atmospheric pressure over a desiccant. At elevated temperatures, differences in resistivity occurred so that at 88° C only *B.subtilis* var. *niger* and *A.niger* survived in appreciable numbers. At 107° C, only *A.niger* spores survived, but none were recoverable after exposure to 120° C. In comparison, *B.subtilis* var. *niger* survived at atmospheric pressure and 90° C for 5 days, but none of the other spores were viable after 24 hours. Author

N64-15202 California U., Berkeley Lawrence Radiation Lab.
PRELIMINARY REPORT ON STUDIES OF ERYTHROPOIESIS AND ADRENAL-CORTICAL FUNCTION ON MT. EVEREST
William E. Siri *In its* Semiann. Rept.-Biol. and Med., Spring 1963 p 1-11 refs (See N64-15201 07-01) OTS: $2.75
(Supported by NASA, AEC, NSF, and AFOSR)

The following were studied: (1) the rate of plasma-iron disappearance and erythropoietic activity, (2) examination of blood smears for reticulocyte counts, (3) hemoglobin concentration, (4) hematocrit and red blood cell count, (5) platelet count, (6) adrenal-corticalsteroid analyses and urine chemistry, (7) basal heart rate, (8) resting blood pressure, (9) the recovery patterns of both heart rate and blood pressure following exercise, and (10) weight loss during the expedition. R.T.K.

N64-15203 California U., Berkeley Lawrence Radiation Lab.
STUDIES ON THE MAMMALIAN RADIATION SYNDROME WITH HIGH-ENERGY PARTICULATE RADIATION I. DIFFERENCE IN INJURY MODE AND ITS DOSE RATE DEPENDENCE FOR 100 kVp X RAYS AND 730 MeV PROTONS
James K. Ashikawa, Charles A. Sondhaus, Cornelius A. Tobias, Clyde Greenfield, and Jerry Howard *In its* Semiann. Rept.-Biol. and Med., Spring, 1963 p 12-18 refs (See N64-15201 07-01) OTS: $2.75
(Supported by NASA)

In proton-irradiated mice (after various doses of proton radiation at 1,000 and 100 rad/min), peak mortality occurred at 4 to 6 days postirradiation. For mice irradiated with 30-day lethal doses of 100 kVp X-rays, peak mortality occurred at 12 to 14 days postirradiation. A fivefold increase in dose rate from 20 to 100 rad/min produced few deaths from the gut syndrome, but the higher dose rate did effect an enhancement of the marrow syndrome similar to that observed for gut syndrome with proton irradiation. The cumulative mortality data for proton irradiation indicated a marked increase in incidence and abruptness of 4- to 6-day gut deaths in animals receiving a proton dose at 1,000 rad/min, compared to those irradiated at 100 rad/min. At 5 days, 30% mortality was observed in the 100 rad/min animals, whereas 60% mortality had already been reached in the 1,000 rad/min groups, although the 30-day mortality was the same in both groups for a given total dose. For X-ray irradiation, 10% 6-day deaths were observed at 20 rad/min, whereas 30% 6-day deaths were observed at 100 rad/min. P.V.E.

N64-15204 California U., Berkeley Lawrence Radiation Lab.
DEPTH DOSE IN LARGE PHANTOMS IRRADIATED OMNIDIRECTIONALLY WITH HIGH-ENERGY PROTONS
Charles A. Sondhaus, Palmer G. Steward, and Roger W. Wallace *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 19–28 refs (See N64-15201 07-01) OTS: $2.75
(Supported by NASA)

The preliminary results are presented of computer calculations carried out to predict approximately the dose, particle energy, and linear energy transfer (LET) distribution in an omnidirectionally irradiated spherical phantom as a function of incident primary-particle energy and of sphere diameter. The output of the computer program is in the form of depth-dose data and fraction of dose due to protons in each of several energy intervals at each dose point in the sphere; the LET distribution is calculated from the latter at each depth. The data were calculated for tissue-equivalent spheres of diameter 5 to 100 cm, exposed omnidirectionally to monoenergetic proton fluxes of energy between 20 and 730 Mev. The curves of depth dose for a 30-cm-diam. sphere were essentially flat down to about 200 Mev, indicating that uniform whole-body exposure of large animals is possible at this energy or higher. Below the 200 Mev energy region, the ratio of surface to midline dose increases rapidly with decreasing energy and increasing sphere diameter, the midline dose from primaries alone becoming zero at the lowest energies considered. P.V.E.

N64-15205 California U., Berkeley Lawrence Radiation Lab.
THE ALPHA-PARTICLE OR PROTON BEAM IN RADIOSURGERY OF THE PITUITARY GLAND FOR CUSHING'S DISEASE
John A. Linfoot, John H. Lawrence, James L. Born, and Cornelius A. Tobias *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 29–40 refs (See N64-15201 07-01) OTS: $2.75
(Supported by AEC)

Recent studies of pituitary and adrenal function as well as a greater awareness of pituitary tumors in patients with bilateral adrenal hyperplasia require that the pituitary gland again be considered primarily in the treatment of Cushing's disease. Two patients, one without a demonstrable pituitary tumor and another with an ACTH-secreting pituitary adenoma, were successfully treated by pituitary irradiation with alpha particles, which were imparted extremely high energies in a large accelerator. These penetrating heavy particles provide a more satisfactory form of teletherapy than X-ray or gamma-ray sources because larger amounts of ionizing radiation can be delivered safely to the sella turcica. Author

N64-15206 California U., Berkeley Lawrence Radiation Lab.
PRELIMINARY REPORT ON HISTOPATHOLOGICAL CHANGES IN BRAIN FOLLOWING HEAVY-PARTICLE IRRADIATION
Larry W. McDonald, James L. Born, John H. Lawrence, and John T. Lyman *In its* Semiann. Rept.—Biol. and Med., Spring 1963 p 41–54 refs (See N64-15201 07-01) OTS: $2.75

A study of the histological changes occurring in areas of the brain nearest the pituitary (as a result of heavy-particle irradiation of the pituitary) resulted in the following observations: (1) The threshold for observable radiation changes in the cerebrum was about 4.0 krads in 11 days of alpha-particle irradiation in a series of 17 cases; greater correlation was found with an exposure of more than 5.5 krads. (2) The changes at the dose levels of 4 to 9 krads in 11 days appear related to alterations in the vasculoastrocytic unit, with early swelling of cells of the vessel walls, particularly of the small arterioles; astrogliosis was observed early but was not a prominent feature. (3) An increase in the number of PAS positive bodies was noted with a 5.6 to 9 krad exposure. (4) No definite change could be noted in the nerve cells in the dose range of 4 to 9 krads. A graft-rejection-type reaction is suggested to account for the delayed necrosis of the brain that occurred at doses above 6.0 krads with a survival of over 1,000 days. P.V.E.

N64-15207 California U., Berkeley Lawrence Radiation Lab.
MODIFICATION OF RADIATION EFFECTS WITH MAGNETIC FIELDS
Nabil M. Amer *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 55–58 refs (See N64-15201 07-01) OTS: $2.75
(Supported by NASA and AEC)

An investigation into the modifying effect of a constant magnetic field on the course of wing development of *Tribolium confusum* produced the following results: (1) At a given temperature and X-ray dose, a higher magnetic field produced relatively greater protective effect. (2) The magnetic field had a significantly decreasing effect on spontaneously occurring wing abnormality at 38° C but not at 30° C, where very few abnormalities were found. (3) Postirradiation protection by magnetic fields was much more marked at 38° C than at 30° C. (4) At 38° C the effect was significant at 2.2 and 3.6 kg for each X-ray level tested; at 30° C using 2.2 and 3.6 kg, pupae exposed to radiation showed no effect at all. It is concluded that postirradiation magnetic field protection is most effective where synergism between X-ray and temperature occurs. P.V.E.

N64-15208 California U., Berkeley Lawrence Radiation Lab.
MULTICOMPARTMENT INTERPRETATION OF RADIATION-DAMAGE CURVES
Aldo Rescigno *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 59–64 refs (See N64-15201 07-01) OTS: $2.75
(Supported by NASA and AEC)

A mathematical development is presented that can be used to obtain the relationship between an increment in radiation dosage and the increase in the number of cells (out of a group of irradiated cells) affected by the increase in radiation, where: (1) the cells are assumed to be composed of one or more compartments; and (2) radiation damage to a particular cell depends on radiation damage being sustained either by a single compartment or by a combination of compartments. P.V.E.

N64-15210 California U., Berkeley Lawrence Radiation Lab.
SEDIMENTATION PROPERTIES OF NUCLEATED AND NONNUCLEATED CELLS IN NORMAL RAT BONE MARROW
Howard C. Mel *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 69–74 refs Submitted for Publication (See N64-15201 07-01) OTS: $2.75

The process of differential sedimentation leading to separation of the nonnucleated and nucleated cells in bone marrow is discussed. This sedimentation process, which takes place in a continuously flowing system under only 1 gravity, is believed to depend strongly on cell size. It results in apparently anomalous sedimentation behavior of the nucleated and nonnucleated cellular components—namely, the more rapid sedimentation of the nucleated cells. P.V.E.

N64-15211 California U., Berkeley Lawrence Radiation Lab.
DIFFUSION-GRAVITY CONTROLLED ENZYME-SUBSTRATE REACTION
Howard C. Mel *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 75–82 refs (See N64-15201 07-01) OTS: $2.75 (Supported by AEC)

A description is presented of the phenomenon of induced microconvectional instability (or "droplet sedimentation") in a continuous flowing system and of experiments in which it was used to control a steady-state model enzyme–substrate reaction. It was found that "competitive diffusion" and normal gravity interact to transport lysozyme rapidly into its separated substrate in an initially stably layered flow-system. A continuous steady-state enzyme reaction is thus controlled by gravity and by the diffusion coefficients of inert components. It is concluded that should this transport mechanism play a role in any biological function, then in "weightlessness" the function would be altered or would cease to operate. P.V.E.

N64-15212 California U., Berkeley Lawrence Radiation Lab.
CONVECTION IN LOW GRAVITATIONAL FIELDS
Milton J. Polissar *In its* Semiann. Rept.–Biol. and Med., Spring, 1963 p 83–98 (See N64-15201 07-01) OTS: $2.75 (Supported by NASA)

A description is presented of experiments carried out in an attempt to answer the following types of questions: (1) Given a cylinder containing a heavy solution in its lower half and a light solution in its upperhalf, what is the nature of the motion of the liquid when the cylinder is rotated through an angle of 90° about an axis perpendicular to its own axis, and how is the motion affected by a decrease in the gravitational force. (2) Given two reservoirs containing solutions of densities ρ_1 and ρ_2, with $\rho_1 > \rho_2$, and with the denser solution situated above the lighter solution, what is the mechanism of exchange of solutions between the two reservoirs if they are connected by a tube of length H and rudius R; how are the qualitative and the quantitative characteristics of the counterflow exchange affected by the values of H, R, and by the viscosity, η, of the fluid; and what are the qualitative effects on the volume exchange when the gravitational acceleration g (considered as a variable) is progressively decreased to a very small fraction of the value of g at the surface of the earth. P.V.E.

N64-15213 California U., Berkeley Lawrence Radiation Lab.
PATTERNS OF HIGH- AND LOW-DENSITY LIPOPROTEIN DISTRIBUTIONS IN MAN
Alex V. Nichols, Robert K. Tandy, and Oliver F. deLalla *In its* Semiann. Rept.—Biol. and Med., Spring, 1963 p 99–117 refs (See N64-15201 07-01) OTS: $2.75

High- and low-density ultracentrifugal lipoprotein data for a healthy human population are evaluated in terms of their distribution properties. Appreciable and significant differences in the relative constellations of mean serum-lipoprotein concentrations appear at the extremes of the distributions determined for specific lipoprotein species. The implications of these distribution data for health and disease are discussed. Author

N64-15214 California U., Berkeley Lawrence Radiation Lab.
A CYTOPHOTOMETRIC METHOD FOR STUDY OF THE ERYTHROID DEVELOPMENT SEQUENCE IN MAMMALS
Lawrence R. Adams and Charles A. Sandhaus *In its* Semiann. Rept.–Biol. and Med., Spring, 1963 p 118–125 refs (See N64-15201 07-01) OTS: $2.75

A system is presented that solves the problem of determining the total cellular quantities of absorbing materials in cells where such cell materials are irregularly distributed. The system is sufficiently sensitive to measure with reasonable accuracy a total cellular hemoglobin amounting to less than 10% of the amount in a mature erythrocyte. The photographic method described can record 100 usable cell images on an 8-inch strip of 35-mm film. The film is exposed and developed in such a manner that the light transmission through the photographic cell image is a linear function of the amount of absorbing material in each subarea of the cell being analyzed. P.V.E.

N64-15215 California U., Berkeley Lawrence Radiation Lab.
SENSITIVITY OF THE POSITRON SCINTILLATION CAMERA FOR DETECTING SIMULATED BRAIN TUMORS
Alexander Gottschalk and Hal O. Anger *In its* Semiann. Rept.–Biol. and Med., Spring, 1963 p 126–129 refs (See N64-15201 07-01) OTS: $2.75

The results of a phantom study with the positron scintillation camera are compared with the findings of a similar study with the conventional positron scanner using As^{74}. The results indicated that the positron scintillation camera is a more sensitive instrument for the detection of brain lesions than the conventional positron scanner since it detects lesions one-third to one-fifth as large in volume for each ratio of tumor-to-brain concentration studied. P.V.E.

N64-15216 California U., Berkeley Lawrence Radiation Lab.
USE OF A WHOLE-BODY COUNTER IN TURNOVER STUDIES WITH Ca^{47}
Thornton Sargent, John A. Linfoot, Henry Stuffer, and John H. Lawrence *In its* Semiann. Rept.–Biol. and Med., Spring, 1963 p 130–138 refs (See N64-15201) OTS: $2.75

A whole-body counter has been used to study Ca^{47} turnover in normal subjects, in patients with metastatic breast cancer, and in patients with acromegaly. Patients with osseous metastases of breast cancer have greatly increased turnover rate. Patients with acromegaly have increased retention of calcium, presumably in bone, and the extent of increased retention seems to correlate with the severity of the disease. Author

N64-15217 California U., Berkeley Lawrence Radiation Lab.
HEAVY-PARTICLE IONIZATION (H, He, Li, B, C, N, O, F, Ne, Ar) AND THE PROLIFERATIVE CAPACITY OF NEOPLASTIC CELLS *IN VIVO*
Karen Sillesen, John H. Lawrence, and John T. Lyman *In its* Semiann. Rept.–Biol. and Med., Spring, 1963 p 139–151 refs (See N64-15201 07-01) OTS: $2.75

Using two neoplasms in mice, the relative biologic effect (RBE) of several heavy particles with various energies, nuclear mass, and charge was studied in an attempt to aid in further understanding the mechanism of action of densely ionizing radiation. The following conclusions were drawn from the investigation: (1) The Bragg-peak ionization produced by 910-Mev alpha particles has a greater RBE than the plateau region of ionization, as measured by the proliferative capacity of neoplastic cells grown in the living animal after irradiation; this is an advantage in the use of these particles in therapy. (2) Disappearance of the oxygen effect requires a very high linear energy transfer (LET). P.V.E.

N64-15242 California U., Berkeley Lawrence Radiation Lab.
CHEMICAL ELEMENTS IN THE SERUM OF MAN IN HEALTH AND DIABETES MELLITUS. X-RAY EMISSION SPECTROGRAPHIC DETERMINATIONS
Lynn Richard Anspaugh (Ph.D. Thesis) Sep. 1963 81 p refs
(Contract W-7405-eng-48)
(UCRL-10873) OTS: $2.00

The use of the X-ray spectrograph in determining the levels of chemical elements in serum is discussed. Particular attention is devoted to the development of proper background correction formulae and tests of experimental reliability. These spectrographic and analytical techniques were used to determine the levels of 29 elements in a pooled serum-powder sample from 125 healthy males and individual serum-powder samples from 33 diabetic subjects. Limits of sensitivity varied from 0.01 to 24 μg/cc whole serum, depending on the particular element studied. Diabetics were found to have significantly higher levels of phosphorus and potassium ($p < 0.01$). A highly significant correlation between serum copper levels and the age at onset of diabetes was found. There was not an inverse correlation between serum copper and serum iron levels, as would be expected if this effect were due to fortuitous infections in the individuals with high serum copper. The possible significance of these findings in the pathogenesis of diabetes is discussed. Author

N64-15293 Joint Publications Research Service, Washington, D.C.
COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF BACTERIA COLLECTORS IN DETERMINING BACTERIAL AEROSOL CONCENTRATION
V. S. Kiktenko et al 18 Feb. 1964 9 p refs Transl. into ENGLISH of an article from Gigiyena i Sanit. (Moscow), no. 10, 1963 p 45–48
(JPRS-23283; OTS-64-21590) OTS: $0.50

An objective method was established, based on the utilization of a flow ultramicroscope, for determining the partial concentration of bacterial aerosols. Connected to the flow ultramicroscope is a highly sensitive photoelectric installation and an electromechanical counter that permits automatic computation of particles of the aerosol passing through the cuvette of the flow ultramicroscope. Using this method of determining the concentration of a bacterial aerosol, a comparative evaluation of the collecting capacity of various instruments (bacterial collectors of various types as well as with cotton filters saturated with a mixture of 3% gelatin and vaseline oil) was carried out. Based on the results of the evaluations, it was found that with a bacteria collector having a cotton-wool filter saturated with a 3% solution of gelatin and vaseline oil, it is possible to determine 89% of all the microorganisms found in the unit of volume of air in the cuvette chamber. The collecting capacity of instruments without filters varied from 0.3% to 14%. P.V.E.

N64-15305 California U., Berkeley Space Sciences Lab.
EVIDENCE FOR LIFE ON MARS
D. G. Rea Repr. from Nature (London), v. 200, no. 4902 12 Oct. 1963 p 114–116 refs
(NASA Grant NsG-101-61)

The evidence for and against the existence of life on Mars is briefly discussed. In particular, the various arguments for the existence of Martian life discussed are: (1) the various colors, including green, exhibited by the dark areas; (2) the seasonal changes in the visual albedo and polarization of the dark areas; (3) the ability of the dark areas to regenerate after an extensive "dust storm;" and (4) the presence of 2,700 to 3,000 cm^{-1} "absorption" bands, attributed to organic molecules. As a result of the discussion, it is suggested that the life interpretation is very tenuous and that inorganic interpretations should be given greater credence. P.V.E

N64-15307 Maryland U., College Park
INJURY AND RECOVERY OF PHOTOSYNTHESIS IN CELLS OF SUCCESSIVE DEVELOPMENTAL STAGES: TEMPERATURE EFFECTS
Constantine Sorokin Repr. from Microalgae and Photosynthetic Bacteria, 1963 p 99–109 refs
(NASA Grant NsG-70-60)

Temperature dependence of the fluctuations in photosynthetic activity in the course of a photosynthetic experiment was studied on the synchronized 4-hour cells of the high-temperature strain 7-11-05 of *C. pyrenoidosa*. Observations at 25° C revealed the same fundamental pattern in changes in photosynthetic activity with time as that previously described at 39° C, and the same basic trends: the upward trend thought to be a reflection of the preponderance of the anabolic processes and the downward trend indicating a prevalence of the catabolic processes. Light characteristics of these trends were at 25° C qualitatively similar to those at 39° though due to temperature effects a response to the increase in light intensity was in absolute figures smaller at 25° than at 39° C. Temperature dependence was clearly indicated for the upward trend. The effect of temperature on the downward trend depended on the light intensity at which it was studied. Author

N64-15327 Joint Publications Research Service, Washington, D.C.
PROBLEMS IN PROTECTING HUMAN BEINGS FROM RADIATION IN SPACE
Ye. S. Matusevich and S. G. Tsypin 19 Feb. 1964 13 p refs Transl. into ENGLISH of an article from Atomnaya Energ. (Moscow), v. 15, no. 6, Dec. 1963 p 499–504
(JPRS-23306; OTS-64-21606) OTS: $0.50

The sources of ionizing radiation in outer space and their biological effect are examined. The weight of the shield of the spacecraft is estimated. It is shown that the weight of the shield must be several tons when the craft passes through radiation belts and during solar flares. Galactic cosmic radiation protection during prolonged interplanetary flights will undoubtedly be very substantial and weigh about 10 tons. Author

N64-15334 Joint Publications Research Service, Washington, D.C.
STUDIES IN GAS METABOLISM OF COLD-BLOODED ANIMALS AND MIGRATIONS AND RADIOACTIVITY OF CERTAIN MARINE ANIMALS
18 Feb. 1964 56 p refs Transl. into ENGLISH of 3 articles from Zool. Zh. (Moscow), no. 11, Nov. 1963 p 1593–1612 and 1722–1724
(JPRS-23285; OTS-64-21592) OTS: $1.50

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1. DIURNAL COURSE OF THE INTENSITY OF GAS METABOLISM IN COLD-BLOODED ANIMALS G. G. Vinberg and Yu. S. Belyatskaya-Potayenko p 2–20 refs
2. DOWNSTREAM DESCENT AND DIURNAL VERTICAL MIGRATIONS OF BENTHIC INVERTEBRATES IN THE AMUR O. A. Klyuchareva p 21–49 refs
3. RADIOACTIVITY OF SOME MARINE ANIMALS OF FEODOSIYSKIY BAY O. G. Mironov p 50–54 refs

N64-15335 Joint Publications Research Service, Washington, D.C.
TEMPERATURE REACTION OF THE SKIN DURING IRRADIATION WITH MICROWAVES OF LOW INTENSITY
Yu. A. Osipov and T. V. Kalyada 18 Feb. 1964 12 p refs Transl. into ENGLISH of an article from Gigiena i Sanit. (Moscow), no. 10, 1963 p 73–78
(JPRS-23287; OTS-64-21594) OTS: $0.50

The temperature reaction of the skin of open surface of the human body was investigated during irradiation with three-centimeter and ten-centimeter waves having continuous and impulse-modulated vibrations with the full flow of the capacity being from 10 to 20 $\mu W/cm^2$, i.e., lower than thermogeneous. Results are: (1) Irradiation with microwaves, the intensity of which is considerably lower than that causing overall thermal heating, caused a positive reaction of the skin of the exposed surfaces of the body, both in the irradiated portion and in other parts of the body. (2) The positive reaction of the skin was weak in persons not previously subjected to irradiation. The degree of reaction increased in persons working under conditions of microwave irradiation, in direct relation to the length of employment. (3) The increase in the skin temperature cannot be explained, as the direct heating of the irradiated surface by the microwave energy transmitted to the body and absorbed by the skin is of insignificant quantities. The increase is probably of a reflex nature. (4) The data obtained contradict the supposition concerning the nonthermal action of small-intensity irradiation. I.v.L.

N64-15336 Joint Publications Research Service, Washington, D.C.

SOVIET DIAGNOSTIC RADIOLOGY, A SURVEY OF THE PUBLISHED LITERATURE, 1959-1963

Victor Dukoff 20 Feb. 1964 70 p refs

(JPRS-23317; OTS-64-21611) OTS: $2.00

This survey covers the following topics: (1) methods of clinical and experimental radiodiagnosis as applied to various organs and tissues—tomography, angiography, isotopic radiography, pneumography, contrast methods, pneumoperitoneum, pneumomediastinography, and cholangiography, electrokymography, cineroentgenography, teleroentgenography, and radiodiagnostic procedures; (2) prophylactic fluorography; (3) training of roentgenologists and organizational problems; (4) congresses on roentgenology and radiology; and (5) an outline of plans for the years 1962 to 1970. R.T.K.

N64-15341 California U., Los Angeles Lab. of Nuclear Medicine and Radiation Biology

SEMIANNUAL PROGRESS REPORT FOR THE PERIOD ENDING DECEMBER 31, 1963

[1963] 109 p refs

(Contract AT-(04-1)-GEN-12)

(UCLA 520)

Short summaries are presented of work carried out in radiobiology, biochemistry, pharmacology and toxicology, nuclear medicine, biophysics, and environmental radiation. P.V.E.

N64-15345 Naval School of Aviation Medicine, Pensacola, Fla.

EXCRETION OF 17-HYDROXYCORTICOSTEROIDS, CATECHOLAMINES, AND UROPEPSIN IN THE URINE OF NORMAL PERSONS AND DEAF SUBJECTS WITH BILATERAL VESTIBULAR DEFECTS FOLLOWING ACROBATIC FLIGHT STRESS

James K. Colehour and Ashton Graybiel 10 May 1963 14 p refs Joint Report with NASA

(NASA Order R-47)

(NASA CR-55623; BuMed. 1) OTS: $1.60 ph, $0.80 mf

Six men with labyrinthine defects and 11 normal subjects were exposed to flight stress in an AD5 aircraft in an effort to determine the role of the vestibular organs in the excretion of catechols and steroids. Chemical measurements revealed that a significant increase in excretion of these stress hormones occurred in response to flight stress in case of the normal but not of the L-D subjects, which must have been attributable to the presence and absence, respectively, of the sensory organs of the inner ear. No significant changes in release of uropepsin were observed for either group. It is concluded that the vestibular organs must be taken into account in evaluating the effects of actual and simulated flight stresses where the gravitational inertial force environment is a variable. Author

N64-15346 Naval School of Aviation Medicine, Pensacola, Fla.

EXPERIMENTS WITH *DROSOPHILA MELANOGASTER* IN MAGNETIC FIELDS

Perry Close and Dietrich E. Beischer 1 Aug. 1962 13 p refs Joint Report with NASA

(NASA Order R-39)

(NASA CR-55625; BuMed-7) OTS: $1.60 ph, $0.80 mf

No genetic effects of homogeneous magnetic fields were observed on *Drosophila* up to a field strength of 120,000 gauss and an exposure time of 1 hr; neither do such effects seem to exist in strong inhomogeneous fields with high gradients of field strength. In most of the experiments, the biological systems were exposed during the total development time from egg to imago. Synergetic effects on *Drosophila* of the magnetic field in combination with X-radiation, starvation, hyperoxia, and hypoxia have also not been observed. Author

N64-15347 Naval School of Aviation Medicine, Pensacola, Fla.

A COMPARISON OF THE SYMPTOMATOLOGY EXPERIENCED BY HEALTHY PERSONS AND SUBJECTS WITH LOSS OF LABYRINTHINE FUNCTION WHEN EXPOSED TO UNUSUAL PATTERNS OF CENTRIPETAL FORCE IN A COUNTER-ROTATING ROOM

Ashton Graybiel and Walter H. Johnson 22 Jun. 1962 18 p refs Joint Report with NASA

(NASA Order R-47)

(NASA CR-55621; BuMed-70) OTS: $1.60 ph, $0.80 mf

With head fixed and eyes closed, all of the subjects perceived the changing direction of resultant force with respect to themselves as an illusion of rotation and the direction of resultant force as a tilt from the vertical with respect to the earth or floor of the room. With room lighted it appeared to be tilted, the oculogravic illusion, and in this regard there may have been differences between the normal and labyrinthine defective subjects. Some of the normal but none of the L-D subjects experienced symptoms of motion sickness. This group difference must have been attributable to the auricular sensory organs, and these differences are discussed under two headings, precipitating and predisposing factors. Predisposing factors accounted for the great interindividual variance in susceptibility. These are discussed briefly in terms of basic and acquired factors. Author

N64-15348 Naval School of Aviation Medicine, Pensacola, Fla.

THE VALIDITY OF TESTS OF CANAL SICKNESS IN PREDICTING SUSCEPTIBILITY TO AIRSICKNESS AND SEASICKNESS

Robert S. Kennedy and Ashton Graybiel 27 Jun. 1962 11 p refs Joint Report with NASA

(NASA Order R-47)

(NASA CR-55620; BuMed-71) OTS: $1.60 ph, $0.80 mf

It was found that a positive relationship existed between performance in the tests of canal sickness and airsickness. This relationship also existed during exposure to heavy seas and to a lesser extent to moderate seas. In general, it may be concluded that the individual's performance in the standard procedure used to produce canal sickness aboard the slow-rotation room and his reaction to caloric stimulation are predictive of his susceptibility to air and seasickness. Author

N64-15349 Naval School of Aviation Medicine, Pensacola, Fla.

HUMAN PERFORMANCE DURING TWO WEEKS IN A ROOM ROTATING AT THREE RPM

Fred E. Guedry, Jr., Robert S. Kennedy, Charles S. Harris, and Ashton Graybiel 28 Aug. 1962 29 p refs Joint Report with NASA

(NASA Order R-47)

(NASA CR-55622, BuMed-74) OTS: $2.60 ph, $1.07 mf

Four men were tested before, during, and after being rotated at 3 rpm for 2 weeks in a slow-rotation room. The men also lived in the room preceding the commencement of the rotation. Tests of intellectual and physiological function were included. The principal finding was that no serious psychological or physiological deficit was detected during 2 weeks of rotation or during the subsequent readaptation to normal environment. The only test showing pronounced deterioration of performance at the beginning of rotation and upon returning to normal environment was the Graybiel–Fregly posture test. This means that any task requiring ordinarily difficult locomotion would be disturbed at these critical intervals. Ordinary walking with adequate visual reference was not so obviously affected. Results are discussed in relation to problems of rotating space stations, the vestibular system, and experiments involving optically distorted visual information. Author

N64-15350 Naval School of Aviation Medicine, Pensacola, Fla.

POSITIONAL ALCOHOL NYSTAGMUS IN RELATION TO LABYRINTHINE FUNCTION

Charles S. Harris, Frederick E. Guedry, and Ashton Graybiel 3 Dec. 1963 22 p refs Joint Report with NASA

(NASA Order R-47)

(NASA CR-55619, BuMed-76) OTS: $2.60 ph, $0.86 mf

Individuals without functional labyrinths did not exhibit nystagmus comparable in quality or magnitude to results obtained from a group of normal subjects. Several individuals suspected of having residual otolith function exhibited weak responses reminiscent of PAN, but the "responses" may have been attributable to artifacts. A relationship was found in normal subjects between nystagmus obtained by caloric stimulation and nystagmus obtained by positional alcohol testing. The relationship between nystagmic output and arousal was found to be essentially the same for positional alcohol nystagmus as for nystagmus obtained by other procedures. All labyrinthine-defective subjects tested for alcohol gaze nystagmus exhibited alcohol gaze nystagmus. Author

N64-15351 Naval School of Aviation Medicine, Pensacola, Fla.

ROTARY AUTOKINESIS AND DISPLACEMENT OF THE VISUAL HORIZONTAL ASSOCIATED WITH HEAD (BODY) POSITION

Earl F. Miller II and Ashton Graybiel 5 Mar. 1963 13 p refs Joint Report with NASA

(NASA Order R-47)

(NASA CR-55618; BuMed-77) OTS: $1.60 ph, $0.80 mf

The visual horizontal as judged by four normal subjects was recorded every 2 seconds during periods lasting up to 23 minutes. Each subject was tested in an upright, then in a recumbent (left side) position. In both positions the procedure was identical. It was found that a lack of visual cues did not appreciably influence the accurate and relatively stable localization of the horizontal in the upright position; however, in the recumbent position removal of these cues caused, after a brief lag period, a gradual spontaneous rotation of the phenomenal horizontal up to a maximum displacement typical for each subject. Superimposed upon these perceptual changes was the considerable fluctuant movement in horizontality, which was described as a form of autokinesis (rotary). Qualitatively, the time course of these perceptions was similar and highly reliable for all subjects. In a subsequent (recumbent) trial, two subjects observed the target for thirty minutes in the dark. The error perceived remained essentially at the same level for one subject, but decreased significantly for the other. Author

N64-15352 Naval School of Aviation Medicine, Pensacola, Fla.

A SIGNAL CONDITIONER AND ELECTRODE TECHNIQUE FOR NYSTAGMUS MEASUREMENTS

W. Carroll Hixson and Jorma I. Niven 6 Mar. 1963 18 p refs Joint Report with NASA

(NASA Order R-37)

(NASA CR-55167; BuMed-78) OTS: $1.60 ph, $0.80 mf

An instrument was developed utilizing commercially available transistor preamplifiers that allows the simultaneous registering of horizontal and vertical nystagmic eye motions as derived from corneo-retinal potentials. The unit is capable of operating in the acceleration environment afforded by either stimulus device and can be calibrated and controlled from a remote operating station. A description is also provided of the surface electrode techniques utilized in conjunction with the instrument to obtain reliable nystagmus data. Author

N64-15353 Naval School of Aviation Medicine, Pensacola, Fla.

A BIOINSTRUMENTATION CONTROL CENTER FOR THE HUMAN DISORIENTATION DEVICE Final Report

W. Carroll Hixson and Jorma I. Niven 11 Mar. 1963 57 p refs Joint Report with NASA

(NASA Order R-1)

(NASA CR-55615; BuMed-79) OTS: $5.60 ph, $0.80 mf

The Human Disorientation Device, a multiaxis rotator comprising an experimental capsule, electromechanical drive system, and basic controls, was developed to generate angular acceleration profiles of known magnitude and duration with precise and repeatable quantification of the rotatory stimuli. It was then desired to extend the control system and provide instrumentation for observing, monitoring, and controlling the performance of subjects in this two-axis, angular-acceleration environment. The implementation of an integrated instrumentation system for the acquisition and analysis of biomedical data and for the correlation of precise simulator variables with the bioelectronic requirements of the experimental programs is described. Author

N64-15354 Naval School of Aviation Medicine, Pensacola, Fla.

ROLE OF THE OTOLITH ORGANS IN THE PERCEPTION OF HORIZONTALITY

Earl F. Miller II and Ashton Graybiel 19 Mar. 1963 22 p refs Joint Report with NASA

(NASA Order R-37)

(NASA CR-55616; BuMed-80) OTS: $2.60 ph, $0.86 mf

The influence of the sensory organs of the inner ear on man's ability to align a visual target with the horizontal was measured utilizing (1) discrete and (2) continuous setting methods. Both test methods yielded similar results under all test conditions. When visual background cues were present, settings of the luminous line target to the horizontal were quite accurate in the nine normal and ten labyrinthine defective (L-D) subjects placed in three head (body) positions: upright, recumbent, and inverted. Removal of empirical visual cues revealed, particularly in the recumbent position, that qualitatively all subjects perceived the typical lag in onset, relatively slow rotation to the maximum illusion, and rotary

autokinesis. Quantitatively, however, there were significant intergroup differences. In spite of the fact that there was some overlap in the group distributions of settings obtained in the upright and recumbent positions, indicating other factors were involved, the intergroup perceptual differences are best explained as an effect of loss of otolith function in the L-D subjects. It was concluded that the otolith organs in man act to increase his accuracy in egocentric visual localization, at least in the upright and recumbent positions. Author

N64-15355 Naval School of Aviation Medicine, Pensacola, Fla.

PERCEPTION OF THE POSTURAL VERTICAL FOLLOWING PROLONGED BODILY TILT IN NORMALS AND SUBJECTS WITH VESTIBULAR DEFECTS

Brant Clark and Ashton Graybiel 10 Apr. 1963 9 p refs Joint Report with NASA

(NASA Order R-37)

(NASA CR-55614); BuMed-81) OTS: $1.10 ph, $0.80 mf

This study was carried out to compare the effect of prolonged bodily tilt of varying amounts on the perception of the postural vertical in normal subjects and in subjects with defective vestibular mechanisms in order to obtain additional data concerning the function of the otoliths in the perception of the postural vertical. Two conditions of delay before the subjects set themselves to vertical and four degrees of tilt comprised the experimental design. A 2 × 2 × 4 analysis of variance showed significantly greater average errors for the 10 men with defective vestibular function than for the nine normal men, for prolonged delay in recovery to vertical and for the larger tilts. Author

N64-15363 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

LACK OF PREDICTABILITY IN RATS TO EXHIBIT CHRONIC OXYGEN POISONING Interim Report

George H. Kydd, L. Kowalski, and R. Mc Gowan 30 Dec. 1963 12 p refs Presented at the Aerospace Med. Assn. Meeting, Apr. 1963, under the title "Specificity of Chronic Oxygen Toxicity"

(NADC-MA-6324; AD-428048)

Sprague-Dawley descended rats have been repeatedly exposed to oxygen at high pressure. Chronic oxygen toxicity was obtained in one group of animals while in two other groups no permanent paralysis was obtained. It is suggested that a third factor, perhaps environmental, may have a role in predisposing rats to the development of the chronic signs of oxygen toxicity. The relationship of chronic to acute signs is discussed. Author

N64-15374 Air Force Cambridge Research Labs., Bedford, Mass.

SEVERAL PROPERTIES OF A VOCAL SOUND PITCH OBSERVED FROM THE VIBRATIONS OF THE TRACHEAL OUTER WALL

Shizuo Hiki Bedford, Mass., AFCRL, [1963] 7 p refs Transl. into ENGLISH from Accoust. Soc., Japan, Meeting, 1961 by Emmanuel Coll.

(Contract AF 19(604)-8505)

(E-T-J-63-5; AD-428505)

Data are presented on properties of vocal-sound pitch variations observed from the vibrations of the tracheal outer wall as an aid to pitch determination from vocal-sound wave patterns coming from the mouth. Among the properties studied were: distribution of pitch periods, conscious gentle variation, incidental sudden variations, and fine variations. R.T.K.

N64-15382 Joint Publications Research Service, Washington, D.C.

PHYSICO-CHEMICAL RESEARCH

17 Feb. 1964 47 p refs Transl. from RUSSIAN into ENGLISH of 3 articles

(JPRS-23254; OTS-64-21575) OTS: $1.25

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1. NEW DRUGS FOR THE TREATMENT OF DISEASES OF THE CENTRAL NERVOUS SYSTEM S. S. Liberman and M. D. Mashkovskiy p 1-17 refs (See N64-15383 07-16)

2. PHARMACOLOGY OF THE SYMMETRICAL BIS-QUATERNARY DERIVATIVES OF 9-METHYL-3, 9-DIAZOBICYCLO-(3,3,1)-NONANE M. D. Mashkovskiy and B. A. Medvedev p 18-31 refs (See N64-15384 07-16)

3. THE CHOLINOLYTIC ACTIVITY AND PHYSICO-CHEMICAL PROPERTIES OF ALKYLAMINOETHYL BENZILATES S. G. Kuznetsov and S. N. Golikov p 32-44 refs (See N64-15385 07-16)

N64-15383 Joint Publications Research Service, Washington, D.C.

NEW DRUGS FOR THE TREATMENT OF THE CENTRAL NERVOUS SYSTEM

S. S. Liberman and M. D. Mashkovskiy *In its* Physico-Chem. 17 Feb. 1964 p 1-17 refs Transl. into ENGLISH from Med. Prom. SSSR (Moscow), v. 13, no. 3, 1959 p 6-13 (See N64-15382 07-16) OTS: $1.25

The following drugs and their uses are discussed: (1) diphenylmethane derivatives, used primarily as tranquilizers for treating various forms of psychoneuroses and neuroses(benadril, covatix, atarax, Benactizine, Frenquell, and Piridrol); (2) propanol derivatives, used as tranquilizers, with no effect on the vegetative branch of the nervous system, yet having a significant antispasmodic effect in the case of spasms induced by strychnine and Korasole (Myanesin, Meprotan, Prenderol, Neuroton, and Robaxin); (3) derivatives of unsaturated tertiary alcohols, tranquilizing sleep-inducing drugs that possess antispasmotic properties (Sonbinol, N-Oblivon, Ethchlorvynol, Valamin, Dolcental, and Repocal); (4) Diphenazin, a tranquilizer that causes an active neuroplegic effect on the central nervous system; and (5) Nostyn (Ethylurea), a mild tranquilizer that normalizes the behavior of patients and causes general calming P.V.E.

N64-15384 Joint Publications Research Service, Washington, D.C.

PHARMACOLOGY OF THE SYMMETRICAL BIS-QUATERNARY DERIVATIVES OF 9-METHYL-3, 9-DIAZABICYCLO-(3, 3, 1)-NONANE

M.D. Mashkovskiy and B. A. Medvedev *in its* Physico-Chem. Res. 17 Feb. 1964 p 18-31 refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), v. 23, no. 6, 1960 p 493-499 (See N64-15382 07-16) OTS: $1.25

Symmetrical bis-quaternary derivatives of 9-methyl-3,9-diazabicyclo-(3.3.1)-nonane (diiodomethylates of 1,6-bis-[9-methyl-3,9-diazabicyclo-(3,3,1,)-nonano-3]-hexane, 1,5-bis-[9-methyl-3,9-diazabicyclo-(3,3,1,)-nonano-3]-pentane, and 1,4-bis- [9-methyl-3,9-diazabicyclo-(3,3,1,)-nonane-3] -butane) were investigated and found to produce a strong blocking effect on the neuromuscular conductivity. The most effective curariform preparation was diidomethylate of 1,4-bis-[9-methyl-3,9-diazabicyclo-(3,3,1,)-nonano-3]-butane. The blocking effect on the behavior of nervous excitation in vegetative ganglia was less pronounced for the investigated substances. P.V.E.

N64-15385 Joint Publications Research Service, Washington, D.C.

THE CHOLINOLYTIC ACTIVITY AND PHYSICO-CHEMICAL PROPERTIES OF ALKYLAMINOETHYL BENZILATES

S. G. Kuznetsov and S. N. Golikov *In its* Physico-Chem. Res. 17 Feb. 1964 p 32-44 refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), v. 24, no. 3, 1963 p 275-279 (See N64-15382 07-16) OTS: $1.25

The m-cholinolytic activity, basicity, and lipoidophilic properties of a series of alkylaminoethyl esters of benzilic acid were investigated along with certain dialkylamino-ethyl esters of the same acid. As a result of a comparison of cholinoytic activity, chemical structure, and indicated physicochemical properties of the compounds, it is shown that structural characteristics of their ammonium group effect their cholinolytic activity. It is suggested that filling of the space around the nitrogen atom in cholinolytic substances plays a significant role in their activity. P.V.E.

N64-15397 Joint Publications Research Service, Washington, D.C.

HYGIENIC PROBLEMS IN THE RADIOACTIVE CONTAMINATION OF OUTER SPACE

18 Feb. 1964 8 p Transl. into ENGLISH of an article from Gigiyena i Sanit. (Moscow), no. 10, 1963 p 3-7
(JPRS-23284; OTS-64-21591) OTS: $0.50

Of particular interest to the hygienist are the radionuclides of strontium 90 and barium 140, and the speed with which these elements enter human and animal bodies through plants. Different radionuclides are absorbed differently into the stomach and intestinal tracts. Strontium 90, iodine 131, and cesium 137 are absorbed easily; radioactive isotopes of rare-earth elements, actinidia, and precious metals are absorbed in insignificant amounts. Strontium 90 is considered one of the most dangerous radionuclides, since it accumulates in the bone and has a half-life of 29 years. It is also found that ionizing radiation from fallout causes changes in the desoxyribonucleic acids of sex cells, thus affecting hereditary traits. Since there is no threshold mutational dose, any small dose of ionizing radiation can lead to the formation of mutations. The report includes data on the worldwide distribution of strontium 90 in soil and milk and on those micron-size particles ("hot" particles) that are, nonetheless, large enough to contain radioactive material (10^{-11} to 10^{-8} curie per particle). E.K.R.

N64-15398 Argonne Cancer Research Hospital, Chicago, Ill.

SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION

Leon O. Jacobson and Margot Doyle, eds. Sep. 1963 149 p refs
(Contract AT(11-1)-69)
(ACRH-20) OTS: $2.50

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15. A SMALL ANIMAL SCANNING SYSTEM R. N. Beck and D. B. Charleston p 136-143 refs

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N64-15417 Joint Publications Research Service, Washington, D.C.

ON THE NATURE OF IMAGE (MENTAL REFLECTION IN THE LIGHT OF IDEAS OF CYBERNETICS)

V. S. Tyukhtin 25 Feb. 1964 137 p refs Transl. into ENGLISH of a book "O Prirode Obraza (Psikhicheskoye Otrazheniye v Svete Idei Kibernetiki)" Moscow, State Higher School Publ. House, 1963 p 3-123
(JPRS-23370; OTS-64-21636) OTS: $2.75

The following topics are discussed: (1) empirical signs of mental reflections and difficulties connected with explaining them; (2) two aspects of the analysis of the psyche; (3) similarity—the model and the signal; (4) the content and form of a signal; (5) physical similarity and the image; (6) conditions and mechanism of realization of the sensory image; (7) image and the conventional sign; (8) the nature of image and the problem of modeling mental functions; (9) the nature of image and certain methodological problems of psychology; and (10) the essence and general principles of reflection. R.T.K.

N64-15518 Cincinnati U., Ohio

AN EVALUATION OF BRANCHING AND MOTIVATIONAL PHRASES IN A SCRAMBLED BOOK

R. J. Senter, A. Nieberg, J. S. Abma, and R. L. Morgan Wright-Patterson AFB, Ohio, Behavioral Sci. Lab., Nov. 1963 19 p refs
(Contract AF 33(657)-10234)
(AMRL-TDR-63-122; AD-429459) OTS: $0.50

This study evaluated three experimental versions of the scrambled text "The Arithmetic of Computers" by Norman A. Crowder. The three versions were: (1) unmodified, (2) modified by deletion of motivational phrases, and (3) straight line having neither motivational phrases nor branching. Results showed no significant differences in amount learned or in study time. Author

N64-15540 Naval School of Aviation Medicine, Pensacola, Fla.

FREQUENCY RESPONSE OF THE HUMAN SEMICIRCULAR CANALS. II. NYSTAGMUS PHASE SHIFT AS A MEASURE OF NONLINEARITIES

W. Carroll Hixson and Jorma I. Niven 26 Jul. 1962 20 p refs Joint Report
(NASA Order R-37)
(NASA CR-55624; Rept. 73) OTS: $1.60 ph, $0.80 mf

The existence of nonlinearities in the steady-state response of the oculovestibular system to sinusoidal angular acceleration is demonstrated by evaluation of corneo-retinal potential recordings obtained at rotation frequencies of 0.02 to 0.20 cps with peak acceleration levels ranging from 10 to 80 deg/sec^2. The experimental and theoretical considerations involved in using the nystagmus transition technique to study these nonlinearities are discussed, and an illustrative application of their quantification is presented. Author

N64-15550 Republic Aviation Corp., Farmingdale, N.Y. Life Sciences and Space Environment Lab.
STUDY OF THE NORMAL FECAL BACTERIAL FLORA OF MAN Quarterly Progress Report, 1 Oct.-31 Dec. 1963
Lorraine S. Gall et al 2 Jan. 1964 29 p
(NASA Contract NASw-738)
(NASA CR-55561; RAC-931-2) OTS: $2.60 ph, $1.07 mf

Twenty "type" cultures were established from the results of screen tests of more than 1,000 individual cultures. Most of these were strict anaerobes, particularly those isolated from the 10 individual healthy adult males in the study, and they maintained their particular anaerobic character and morphology even during the several transfers made to "establish" these "type" cultures. The continued isolation of fecal bacteria of 10 healthy young men resulted in more than three-fourths of these cultures fitting into some group of the 20 "type" cultures so far "established." The bacteria carried by any one individual usually consisted of three or four separate "types" that often appeared in two or more separate fecal samples. R.L.K.

N64-15557 Tokyo U. (Japan) Inst. of Industrial Science
ENGINEERING APPROACHES TO FUNCTION OF FINGERS
Tadashi Yamashita and Masahiro Mori Nov. 1963 59 p refs (*Its* Serial 90, v. 13, no. 3)

This research is used to design and construct an artificial hand for engineering use. It has three fingers, each of which has three degrees of freedom; the resulting nine degrees of freedom (joints) are actuated independently by compressed air and automatically controlled by sequential control techniques, using feedback from the sensory organs at each joint. Control circuits and tables of sequential actions are shown. R.L.K.

N64-15570 Baylor U., Houston, Tex. Coll. of Medicine
ELECTROPHYSIOLOGIC CHARACTERISTICS AND INTERPRETATION OF SKIN POTENTIALS
Robert Edelberg AF School of Aerospace Med., Brooks AFB, Tex. Nov. 1963 14 p refs
(Contract AF 41(609)-1527)
(SAM-TDR-63-95; AD-429965)

The relation of skin potential and endosomatic galvanic skin response (GSR) to surface electrolytes reveals that the surface layer cannot explain the total potential difference across the skin. Furthermore, wide variations in surface potential induced by varying electrolyte concentrations have no effect on the GSR. Results are consistent with a base potential generated by two membranes in series—an outer one accessible to surface electrolytes, but not participating in the GSR, and an inner one inaccessible to surface media, but responsible for the positive component of the GSR. Microelectrode studies show there is a third structure in parallel, the sweat gland, which has different electrical characteristics and produces negative endosomatic waves. The two endosomatic GSR components manifest stimulus-response specificity and are apparently under independent neural control. Author

N64-15586 IIT Research Institute, Chicago, Ill.
RESEARCH ON THE CHEMICAL COMPOSITION AND DIGESTIBILITY OF ALGAL CELL WALL Technical Documentary Report [10 Oct. 1962-31 Aug. 1963]
Milton J. Becker and Alan M. Shefner Wright-Patterson AFB, Ohio, Biomedical Lab., Nov. 1963 35 p refs
(Contract AF 33(657)-10066)
(IITRI-L6002-4; AMRL-TDR-63-115; AD-429803) OTS: $1.00

Cell walls of the alga Chlorella pyrenoidosa 7-11-05 were isolated and purified. The carbohydrates present as monosaccharides in the purified cell walls and in chemical fractions of the cell walls were analyzed by paper chromatography and thin-layer chromatography (TLC). Rhamnose, glucose, and galactose were the predominant monosaccharides. Arabinose was not present in significant quantities in the cell walls or fractions thereof. Conditions for the large-scale heterotrophic growth of C. *pyrenoidosa* 7-11-05 were explored and found to be feasible. Studies on the growth and partial digestion of the algal cells by a fungus, *Asperquillus oryzae*, were found to be feasible. Such studies were oriented toward controlled feedings of the alga, the alga–fungus mixture, and the fungus to young rats. Author

N64-15590 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
ATMOSPHERE OF THE SPACE SHIP
Yuriy Ivanov 25 Oct. 1962 6 p Transl. into ENGLISH from Sov. Latviya (Moscow), no. 194, 17 Aug. 1962
(FTD-TT-62-1545/1; AD-290833)

Comparisons are made of three possible methods of regulating the gaseous content of the atmosphere in the cabin of a spaceship; the control of cabin temperature is discussed. Particular emphasis is placed on an automatic system of controlling the gaseous composition of the air by employing sensitive elements that detect the deviation in the content of oxygen, carbon dioxide, and moisture, and a regulator that controls the rate of corresponding reactions in the regenerator. For temperature control, attention is directed toward a system of shutters on the spaceship that makes it possible to change the radiation capacity, increase the effectiveness of the heat regulation, and ensure high precision in holding a given temperature for the cabin. C.L.W.

N64-15592 Arizona U., Tucson Engineering Research Labs.
STUDY AND RESEARCH ON ELECTRONIC SIMULATION OF THE BIOLOGICAL CLOCK II
Andrew P. Sage, Jr., Keith E. Justice, and James L. Melsa Wright-Patterson AFB, Ohio, Electron. Technol. Lab. May 1963 75 p refs
(Contract AF 33(616)-7677)
(ASD-TDR-63-136; AD-428234) OTS: $2.00

The term "biological clock" has been given to the phenomenon displayed by organisms, both plants and animals, that pace their functions in a cyclic fashion that is related in some way to environmental stimuli. This report extends a previous report on the biological clock to include: (1) Design and construction of an experimental facility to compare specific data from the electronic model with animals subjected to the same environmental conditions simulated on the model; (2) Biological experimentation and statistical analysis of the biological results to test validity of the biological clock and suggest improvements for the mathematical and electronic model; (3) Cellular analysis of some functional aspects of the c(t) generation in order to initiate establishment of a one-to-one correspondence with the model of the biological clock; (4) Investigation of adaptive and learning system capabilities of the biological clock; and (5) Development of a better model for the biological clock and possible engineering system implications. Author

N64-15622 Joint Publications Research Service, Washington, D.C.

PSYCHOPATHOLOGY AND BIOCHEMISTRY OF EXPERIMENTAL PSYCHOSES PRODUCED BY ANTICHOLINERGIC HALLUCINOGENS

H. Bultasova et al 19 Feb. 1964 13 p Transl. into ENGLISH of an article from Ideggyogy. Szemle (Budapest), v. 13, no. 8, Aug. 1960 p 225-234

(JPRS-23296; OTS-64-21598) OTS: $0.50

Benactyzine was administered to 12 subjects in a dose of 40 to 75 mg and lead, in the majority of persons, to an experimental psychosis of Bonhoeffer's exogenic reaction type. When the psychotic changes were at their maximum, a striking drop in the excretion of 5-hydroxy-indoleacetic acid (5-HIAA) was observed in the majority of experimental subjects. The psychotogenic action is explained hypothetically as an intervention in the serotonin and acetylcholine metabolism. Author

N64-15672 European Atomic Energy Community, Brussels (Belgium)

STUDIES ON THE DISTRIBUTION OF TRACE ELEMENTS IN A MOLLUSK FROM A FRESHWATER ENVIRONMENT, BY ACTIVATION ANALYSIS

F. Girardi and Margaret Merlini Joint Nuclear Res. Center, Ispra Establishment (Italy), Biology and Nuclear Chemistry Services, 1963 28 p refs Presented at the Symp. on Radioact. Analysis and its Appl. to the Biol. Sci., Saclay (France), 26-28 Sep. 1963

(EUR-474.e) Available from Belgian American Bank and Trust Co., N.Y., account No. 121.86: 40 BF

A semiautomated system for the determination of trace elements in biological materials by means of activation analysis is described. The system is based on the chemical separation of elements in the irradiated specimens by chromatographic procedures; automatic gamma spectrometry, with the use of sample changers; and automatic treatment of the experimental data by computer techniques. Although the system has not yet been perfected, it appears that approximately 100 samples per month with 12 to 15 elements per sample can be determined. It is possible, therefore, to use this system for an accurate and more thorough investigation of well-chosen, biologically significant elements. The biological results obtained on *Unio*, a bivalve from Lake Maggiore, revealed the presence of elements never before determined in a mollusk from a freshwater environment. Author

N64-15676 Joint Publications Research Service, Washington, D.C.

TREATMENT OF RADIATION INJURY AND SICKNESS

24 Jan. 1964 38 p refs Transl. into ENGLISH of 5 articles from Med. Radiol. (Moscow), v. 8, no. 11, Nov. 1963 p 3-9, 30-33, 47-50, and 55-63

(JPRS-22879; OTS-64-21376) OTS: $1.00

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N64-15677 Joint Publications Research Service, Washington, D.C.

THE MAIN PRINCIPLES IN THE DISPENSARY CARE OF PERSONS WORKING WITH SOURCES OF IONIZING RADIATION AND OF SCIENTIFIC ANALYSIS OF THE RESULTS OF MEDICAL OBSERVATION OF THEM

A. K. Gus'kova *In its* Treat. of Radiation Injury and Sickness 24 Jan. 1964 p 1-9 (See N64-15676 07-16) OTS: $1.00

For the organization of dispensary observation of a radiological category, all the main concepts of general industrial hygiene and occupational pathology remain in force. Special radiometric laboratories should be provided in order to clarify the quantitative characteristics of radiation effect. An essential part in the organization of dispensary observation and subsequent scientific analysis is the documentation of medical examinations. The diagnosis of various cases of occupational radiation sickness should be based on a good knowledge of the standard indices for the symptoms being investigated. E.W.

N64-15678 Joint Publications Research Service, Washington, D.C.

TREATMENT OF RADIATION INJURIES OF THE SKIN AND MUCOUS MEMBRANES WITH CHLOROPHYLL-CAROTENE PASTE

L. M. Stukova, S. V. Strutsovskaya, V. A. Repina, and V. P. Luk'yanov *In its* Treat. of Radiation Injury and Sickness 24 Jan. 1964 p 10-14 refs (See N64-15676 07-16) OTS: $1.00

Application of the chlorophyll-carotene paste to the area of radiation lesions of the skin caused a rapid elimination of necrotic onlays from the wound surface, stimulated the development of granulation tissue and epithelization, and contributed to acceleration of the healing processes. The use of the chlorophyll-carotene paste in a mixture with novocain solution provided for elimination of painful sensation in the area of radiation lesion. E.W.

N64-15679 Joint Publications Research Service, Washington, D.C.

POSSIBILITY OF DETERMINING THE BODY'S REACTION TO IRRADIATION WITH SMALL DOSES OF IONIZING RADIATION BY MEANS OF OBSERVATION OF THE PHOSPHENE THRESHOLD OF THE RETINA

V. Glavaty, Z. Dienstbier, and M. Zhak *In its* Treat. of Radiation Injury and Sickness 24 Jan. 1964 p 15-20 refs (See N64-15676 07-16) OTS: $1.00

The results of the series of experiments performed showed that the phosphene threshold method is not suitable as a diagnostic technique for the determination of low radiation doses because only about 28% of the investigations indicated involvement of ionizing radiation in the increase of the phosphene index. E.W.

N64-15680 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF PRELIMINARY IMMUNIZATION WITH LIVING VACCINES ON THE COURSE AND OUTCOME OF RADIATION SICKNESS IN RABBITS

A. M. Sudnov *In its* Treat. of Radiation Injury and Sickness 24 Jan. 1964 p 21-27 refs (See N64-15676 07-16) OTS: $1.00

Preliminary subcutaneous injection of STI anthrax vaccine is capable of reducing the mortality rate of animals from radiation sickness. The reduction in the mortality rate is attributed to the development of a vaccinal process in the body, which leads to an increase in its protective forces. Author

N64-15681 Joint Publications Research Service, Washington, D.C.

DISTRIBUTION OF P^{32} IN THE TISSUES OF RAT ORGANS AFTER THE EFFECT OF PENETRATING RADIATION AND THE ADMINISTRATION OF ACTH

P. I. Lomonos and A. Shamakhmudov *In its* Treat. of Radiation Injury and Sickness 24 Jan. 1964 p 28-35 refs (See N64-15676 07-16) OTS: $1.00

After rats are injected with two units of ACTH per 100 grams of body weight, there is a marked increase in the tissue permeability of the suprarenal glands, and pronounced changes occur in the peripheral blood composition. The degree of change observed is related to the time that has elapsed after injection of the hormone. On the third day of radiation sickness following whole-body irradiation with an X-ray dose of 800 r, the permeability of all the investigated organs increases markedly, whereas on the first and sixth days of radiation sickness, it is not much different from the control. For the first few hours after the injection of ACTH into irradiated animals on the third day of radiation sickness, the tissue permeability is reduced; after nine hours, the previous level is regained. After the injection of ACTH into animals on the first and sixth days of radiation sickness, the tissue permeability of the organs remains unchanged, with the exception of the tissue of the suprarenal glands; in the latter it is considerably increased six and nine hours after injection. Author

N64-15716 Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena

PREPARATION AND PROPERTIES OF A FREE SOIL ENZYME

Michael H. Briggs and Leah Segal (Victoria U., Wellington) Repr. from Life Sci. no. 1, 1963 p 69-72

(Supported by Victoria U. Research Committee)

An attempt was made to extract urease from soil, as a free enzyme, by a mild treatment that would not disrupt cells. Examinations indicate that the preparation obtained from the soil was a mixture of proteins possessing urease activity. The properties of this soil urease were, however, significantly different from those of ureases from other sources. E.W.

N64-15726 Milan U. (Italy) Centro di Cibernetica e di attivita Linguistiche

TOWARDS THE MECHANIZATION OF MENTAL ACTIVITIES

Silvio Ceccato et al [30 Jul. 1963] 78 p refs

(Contract AF 61(052)-362)

(RADC-TDR-63-528; AD-427084)

Research on the construction of a machine that observes and describes the events of its surroundings and its internal events ("Talking Automaton") is discussed. The report contains studies concerning: (1) the conceptual difficulties that a program of this type gives rise to; and (2) the block diagram of the machine and the scheme of the optical explorer with which the machine is equipped. Author

N64-15730 Joint Publications Research Service, Washington, D.C.

THE BIOSTRATIGRAPHIC SEPARATION OF BOTTOM SEDIMENTS AT STATION NO. 3802 IN THE EQUATORIAL PACIFIC

V. V. Mukhina 26 Feb. 1964 13 p refs Transl. into ENGLISH of an article from Okeanologiya (Moscow), v. 3, no. 5, 1963 p 861-869

(JPRS-23403; OTS-64-21657) OTS: $0.50

The station was located at latitude 3° 17'00" S. and longitude 172° 52'4" W. at a depth of 5329 m. The four biostratigraphic horizons were distinguished, according to the data from diatom analysis, species composition, and diatom population, as I from 0 to 25 cm from the top of the core, II from 25 to 135 cm, III from 135 to 205 cm, and IV from 205 to 266 cm. The deposits of horizon I correspond to the Holocene epoch, II and IV to the glacial periods, and III to the interglacial period. The data indicate that: (1) Diatoms in the surface waters of the equatorial Pacific became more abundant when the climate became colder rather than warmer. This was evidenced by the fact that the maximum number of large *Coscinodiscus nodulifer* was found in horizons II and IV. Consequently, conditions were created in the glacial epochs that favored the mass development of diatoms. (2) The climatic changes during sediment formation in the equatorial Pacific were not sharp, judging by the succession in species composition. Tropical species survived throughout the entire period of time reflected in the cores, but were most abundant in horizon I. I.v.L.

N64-15741 School of Aerospace Medicine, Brooks AFB, Tex.

CELLULAR OXYGEN CONSUMPTION AT LOW OXYGEN TENSIONS

Robert J. Reyes and J. Ryan Neville Nov. 1963 11 p refs (SAM-TDR-63-68; AD-430363)

A baseline study has been made of various factors—including pH, cell concentration, temperature, and metabolic state—which might affect the critical oxygen tension (C.O.T.) of *Saccharomyces cerevisiae*. The metabolic state and temperature are found to have a significant effect on the C.O.T. The C.O.T. in the starved condition is independent of temperature, but the exogenous state exhibits an increase in C.O.T. with an increase in temperature. A comparison of the C.O.T. value at 25° C gave approximately 4 mm $HgPo_2$., in the exogenous state and less than 1 mm $HgPo_2$ in the starved state. These results, in general, confirm earlier studies. No effect of the C.O.T. by pH or cell concentration changes could be found. The C.O.T. of cytochrome-deficient *Neurospora crassa* mutants has been compared with that of normal strain, and no difference was observed. The polarographic methodology as applied to cellular oxygen consumption is described, and the practical significance that the C.O.T. measurement may have in study of cellular processes is discussed. Author

N64-15742 School of Aerospace Medicine, Brooks AFB, Tex.

IDENTIFICATION AND SIGNIFICANCE OF PAROTID FLUID CORTICOSTEROIDS

Fred H. Katz and Ira L. Shannon Oct. 1963 12 p refs

(SAM-TDR-63-86; AD-430367)

Parotid fluid was previously shown to possess free 17-hydroxycorticosteriod (17-OH-CS) levels that paralleled those in serum and reached a maximum two hours after corticotropin or cortisol administration to normal men. The present study demonstrated that intravenously administered cortisol appeared rapidly in the parotid fluid, and that parotid fluid 17-OH-CS levels would serve as reliable indicators of adrenal

function. This was borne out by studies in a patient with Cushing's syndrome as well as in those showning adrenal hyporesponsiveness. These data are compatible with the hypotesis that only nonprotein-bound free 17-OH-CS reaches the parotid fluid. Conjugated 17-OH-CS was not found in appreciable quantity in parotid fluid. Chemical and radioisotopic technics indicated cortisol and cortisone to be the major human parotid fluid 17-OH-CS. Parotid tissue from the dog converted cortisol to cortisone. Radioactive aldosterone, estrogen, and androgen appeared in parotid fluid after intravenous injection. Author

N64-15743 School of Aerospace Medicine, Brooks AFB, Tex.
CORRELATION OF DISSOLVED NITROGEN IN WHOLE BLOOD WITH SELECTED WHOLE BLOOD CONTITUENTS
Omar V. Greene, Jr. Dec. 1963 10 p refs
(SAM-TDR-63-92; AD-430064)

The relationship of several whole blood constituents to the quantity of nitrogen in solution in the blood was studied by correlating the measured quantities of each with the amount of nitrogen present. The constituents and their mean values were as follows: whole blood lipids—589.62 mg%; plasma lipids—598.45 mg%; total blood water—77.33%; hematocrit—46.12%. The mean value for nitrogen in solution was 0.01273 ml per milliliter of whole blood (Bunsen solubility coefficient). With the exception of hematocrit versus nitrogen, all correlation coefficients were found to be negative. None of the correlations were found to be significant. Author

N64-15744 School of Aerospace Medicine, Brooks AFB, Tex.
STUDIES IN DECOMPRESSION SICKNESS: CARDIORESPIRATORY RESPONSES OF ANESTHETIZED DOGS TO COMPRESSION THERAPY FOLLOWING EXPERIMENTAL DECOMPRESSION SICKNESS
Robert J. Mc Iver and Sidney D. Leverett, Jr. Dec. 1963 13 p refs
(SAM-TDR-63-94; AD-430123)

Decompression sickness was studied by use of a special technique for the production and recognition of the disorder in laboratory animals. Objective evidence is presented for substantiating the use of compression therapy in the treatment of both caisson and altitude types of decompression sickness. There is suggestive evidence that even very small overpressures may be of benefit in treating or transporting some cases of severe altitude decompression sickness. The importance of rapid recognition and treatment is emphasized, as well as careful scrutiny of all patients who appear to be "hyperventilating" after decompression, especially those patients with other signs or symptoms of decompression sickness. Author

N64-15745 Minnesota U., Minneapolis
THORACIC CAGE IMPEDANCE MEASUREMENT: CANCELLATION OF RESPIRATION EFFECTS ON TRANSTHORACIC IMPEDANCE
Edwin Kinnen and William Kubicek Brooks AFB, Tex., School of Aerospace Med. Dec. 1963 9 p refs
(Contract AF 41(657)-403)
(SAM-TDR-63-99; AD-429938)

Monitoring transthoracic electrical impedance related to cardiac activity has been hampered by changes in the measured impedance due to respiration. It is necessary to nullify respiration effects if a relatively undistorted cardiac activity waveform is to be recorded continuously during respiration. Both direct filtering and subtraction of the respiration signal from the composite respiration-cardiac waveform have been considered. Methods used to obtain a respiration signal for subtraction purposes were based on (1) a chest circumference measurement obtained with a bellows and pressure transducer, (2) the detection of an impedance change due solely to respiration, and (3) the utilization of the phase-angle signal associated with the transthoracic impedance. Promising results were obtained when the phase-angle signal was combined with the composite respiration-cardiac waveform. The effect of respiration impedance change on the resulting waveform was less than 50% of the cardiac activity signal under resting-breathing conditions. Author

N64-15746 Jefferson Medical Coll., Philadelphia, Pa.
THYROIDAL INFLUENCE ON ALTITUDE TOLERANCE
Domenic A. De Bias and Wang Yen Brooks AFB, Tex., School of Aerospace Med., Dec. 1963 7 p refs
(Contract AF 41(657)-253)
(SAM-TDR-63-101; AD-429507)

This investigation is aimed at obtaining support for the concept that lesser amounts of cortisol are effective in prolonging the survival time of thyroidectomized rats exposed to altitude because of a decreased catabolism of the steroid in hypothyroid animals. The data indicate that hyperthyroid animals are more susceptible to altitude exposure than are normal animals; a greater amount of cortisol is required to protect such animals than is required to protect altitude-exposed adrenalectomized animals that have also been thyroidectomized. Increased thyroid function in altitude-exposed animals is indicated by measurements on the following parameters, which were increased: thyroidal uptake of I^{131}, release of thyroidal I^{131}, erythrocyte uptake of I^{131}-labeled triiodothyronine. Author

N64-15747 Lockheed-Georgia Co., Marietta Human Factors Research Dept.
HUMAN GROUP PERFORMANCE DURING CONFINEMENT Final Report
Earl A. Alluisi, Thomas J. Hall, Glenn R. Hawkes, and W. Dean Chiles (AFSC) Nov. 1962 137 p refs
(Contract AF 33(616)-7607-M4)
(ER-6024; AD-429858) OTS: $10.50

The purpose of this study was to investigate the feasibility of using a work-rest schedule of 4-hours-on-duty and 2-hours-off relative to using a 4-on and 4-off schedule in the operation of advanced aerospace systems. Six Air Force Academy Cadets were confined for 15 days in a simulated advanced-system crew compartment while following the 4-2 schedule, and two 5-man crews of USAF pilots were confined for 30 days while following the 4-4 schedule. With the smaller crew and the 4-2 schedule, 4 work stations were operated continuously for the 15 days, whereas 5 were operated by the two 5-man crews, who alternated 4-hour work shifts continuously for 30 days. While on duty, the operators were tested with a battery of 6 performance tasks, 2 of which were crew-performance tasks requiring interactions among crewmembers in the form of exchanges of information, cooperation, and temporal coordination. In addition, the data of the present studies were compared with those of a previous 15-day test of two B-52 combat-ready crews, who worked the 4-2 schedule, while being tested with a battery of 5 individual performance tasks. Author

N64-15752 Air Force Systems Command, Bedford, Mass.
HUMAN ENGINEERING EVALUATION OF A-MOBILE AIR TRAFFIC CONTROL AND COMMUNICATION SYSTEM, AN/TSQ-47
John Coules and Stephen E. Stuntz Dec. 1963 27 p refs
(ESD-TDR-63-656; AD-429879)

The potential hazards to personnel of gas-turbine power generators were assessed for noise output and portability. Results showed moderate to severe hearing damage risk for personnel working in the vicinity of the generators. The generator unit appears to be an unsafe load for four airmen to lift and carry with the hand grips as configured. Speech intelligibility tests were conducted on a portion of the RACEP communication system. Results indicated potentially serious limitations of this equipment for field use. Author

N64-15753 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
PSYCHOPHYSIOLOGICAL ASPECTS OF REDUCED GRAVITY FIELDS, REPORT NO. 6
Cleto Di Giovanni and Randall M. Chambers 30 Dec. 1963 25 p refs
(Partially supported by NIH)
(NADC-MA-6305; AD-430095)

Considerable data have been collected concerning acceleration physiology from centrifuge, rocket sled, and drop tower studies but weightlessness has remained a poorly understood environment primarily because there is no way to duplicate it on earth. This report considers the various methods used to study or approximate the subgravity state, and the results and extrapolations that have been drawn from them. The cardiovascular and musculoskeletal aspects of recent bed-rest and water-immersion studies are examined, and results are compared with the data from actual space flights. Real weightlessness apparently has been an innocuous environment thus far, and the only factor of concern has been a tendency toward postural hypotension detected immediately following recovery after missions of 9 and 34 hours. As longer missions are achieved, other problems, such as muscle atrophy and excessive calcium mobilization, may appear. Author

N64-15755 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
PSYCHOLOGICAL ASPECTS OF WATER IMMERSION STUDIES Report No. 7
John C. Ferguson, and Randall M. Chambers 30 Dec. 1963 28 p refs
(NADC-MA-6328; AD-429523)

The purpose of this paper was to review the recent water immersion literature, placing special emphasis on the psychological aspects of these studies. The adequacy of water immersion as a technique for simulating weightlessness was discussed, and water immersion facilities and procedures were described. The areas of perceptual and motor performance, boredom and fatigue, sleep, orientation, and personality and emotional aspects of water immersion were selected as being of special psychological interest. Author

N64-15802 Victoria U., Wellington (N. Zealand)
THE DISTRIBUTION OF AVIDIN
Peter D. Jones and Michael H. Briggs Repr. from Life Sci., no. 11, 1962 p 621–623 refs

Results are given of experiments conducted to determine the avidin content of egg whites. Avidin proteins are present in all eggs with the possible exception of the herring gull eggs. The results are expressed in avidin units per gram. C.L.W.

N64-15803 Victoria U., Wellington (N. Zealand)
FORMS OF SOIL BIOTIN
Peter D. Jones, Venise Graham, Leah Segal, W. Jeavons Baillie, and Michael H. Briggs Repr. from Life Sci., no. 11, 1962 p 645–648 refs

Data are presented on the presence of several forms of biotin in different soils and of their distribution with depth and various soil properties, such as soil pH. R.T.K.

N64-15828 Joint Publications Research Service, Washington, D.C.
RESTORATIVE PROCESSES IN THE DUODENAL MUCOSA FOLLOWING RADIATION INJURY
I. A. Chalisov and L. B. Berlin 13 Dec. 1963 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 151, no. 6, 1963 p 1450–1452
(JPRS-22276; OTS-64-21014) OTS: $0.50

The changes in the duodenal mucosa of albino rats were investigated at intervals ranging from zero hours to 15 days following general single irradiation from a cobalt-60 source, in a dosage of 900 r for 3 hr. The presence and extent of radiation injury were determined by hematological examination. In a special series of experiments to determine the survival rate, 50% of the rats died within 11 to 14 days. The study indicated that even with severe radiation injuries the restorative processes may take place quite successfully on the tissual and organic levels. C.L.W.

N64-15829 Joint Publications Research Service, Washington, D.C.
PRESENT STATUS OF THE PROBLEM OF CANCER CHEMOTHERAPY
Ye. I. Khomchenovskiy and K. I. Karpavichus 28 Feb. 1964 83 p refs Transl. into ENGLISH from Zh. Vses. Khim. Obshch-va. (Moscow), v. 8, no. 4, 1963 p 424–448
(JPRS-23440; OTS-64-21678) OTS: $2.00

Cancer chemotherapy has been found to be effective in the treatment of several malignant tumors. Chemotherapeutic preparations are usually used clinically only in treating late stages of the disease. However, in hemoblastoses, chemotherapy can be a valuable method from the initial stages. Available statistical data show that about 50% of malignant disease cases are now undergoing treatment with chemotherapeutic preparations in combination with other methods of treatment, or independently. R.T.K.

N64-15841 National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio
PILOT REACTION TO HIGH SPEED ROTATION
James W. Useller and Joseph S. Algranti Repr. from Aerospace Med., v. 34, no. 6, Jun. 1963 p 501–504 refs Condensed version of paper presented at 11th Internatl. Astronautical Cong., Stockholm, 1960 (Previously Published as reprint; see N63-20213 20-14)
(NASA RP-133)

During rotation at rates up to 70 rpm about a resultant axis, the pilots were able to perform a complex task requiring judgment and manual dexterity with a performance error that ranged from 6.5 to 18 percent, depending on the individual evaluated. Repeated operation of a similar type rotational test showed that the pilot was able to reduce his error appreciably. He also was able to improve his technique by introducing several corrections simultaneously. Intermittent rotation at rates of 50 rpm or greater for periods longer than 1 hr could induce motion sickness symptoms. Vestibular nystagmus was encountered by all the subjects tested when the acceleration was endured for at least 10 sec. However, if the subject concentrated on a centralized area of his instrument panel, the effects were reduced. Author

N64-15843 National Aeronautics and Space Administration. Langley Research Center, Langley, Va.
LIFE SUPPORT FOR LONG-DURATION MISSIONS
Dan C. Popma Repr. from Astronautics and Aerospace Eng., Aug. 19, 1963 p 53–56
(NASA RP-135)

A discussion is presented concerning the relation of present technology to life support for manned exploration of Mars and Venus. The discussion covers a number of possible systems for the support of man for long-term missions within the solar system, and relates them to the systems currently being developed for a manned space station and for other shorter-term missions. The tradeoff of weight as a function of time for these systems is discussed. A summary is given of the problems concerning man's influence on these systems. R.T.K.

N64-15855 Boeing Co., Wichita, Kan.
VISUAL PERFORMANCE DURING WHOLE-BODY VIBRATION Technical Report No. 4
Robert J. Teare, and D. L. Parks Nov. 1963 36 p refs
(Contract Nonr 2994(00))
(D3-3512-4; AD-427254)

Eight male volunteers were tested in the vibration facility to determine the effect of whole-body vibration on the ability to read counter information. Stimuli consisted of five 5-digit counters varying in height from 0.05 to 0.2 in. (6 to 24 minutes visual angle at an average viewing distance of 28 in.) Vibration frequencies ranged from 1 to 27 cps at each of four subjective reaction levels. Both vibration frequency and severity (reaction level) significantly affected two of the five counters. The size of the counter was a factor only if it subtended less than 12 minutes of arc. The most severe area of visual deterioration was from 12 through 23 cps. This was linked to the critical flicker frequency of the eye. Author

N64-15856 National Aeronautics and Space Adminstration. Manned Spacecraft Center, Houston, Tex.
RAPID DECOMPRESSION HAZARDS AFTER PROLONGED EXPOSURE TO 50 PER CENT OXYGEN – 50 PER CENT NITROGEN ATMOSPHERE
Morris J. Damato, Francis M. Highly (Naval Air Eng. Center), Edwin Hendler, and Edward L. Michel Repr. from Aerospace Med. 1 v. 34, no. 11, Nov. 1963 p 1037–1040 refs

In rapid decompression followed by prolonged exposure to altitudes of 35,000 feet, the following procedures preceding the decompression have been found to minimize the incidence of bends: (1) breathing 100% oxygen for at least 3 hours at sea level; (2) breathing a 50% oxygen–50% nitrogen gas mixture for about 18 hours or more at an altitude equivalent of 18,000 feet; and (3) breathing 100% oxygen for 2 hours at sea level followed by breathing a 50% oxygen–50% nitrogen gas mixture for 12 hours at an altitude equivalent of 18,000 feet. During repeated exposures, recurrence of bends in the same area is very likely. The manifestation of bends may be delayed for more than 2 hours following decompression. Characteristic sensations of bends may be either localized in one area or may radiate eventually to involve more than one area simultaneously. Author

N64-15873 Aeronutronic, Newport Beach, Calif.
STUDY OF BASIC BIO-ELECTROCHEMISTRY Quarterly Engineering Progress Report, 20 Sep.-19 Dec. 1963
M. H. Boyer, R. C. Bean, Y. H. Inami, and W. C. Shepherd 19 Jan. 1964 43 p refs
(NASA Contract NASw-655)
(NASA CR-55744; U-2479) OTS: $4.60 ph, $1.49 mf

A study has been made of the electrochemical activity of a number of enzyme systems, including D-amino acid, oxidase, urease, glucose oxidase, etc. The mechanisms of electrical energy production by amino acid, oxidase, and urease have been traced in detail, and the results are included in this report. The question of direct participation of biological macromolecules or bacterial cells in oxidation–reduction processes at electrodes is also investigated. The conditions under which direct participation of biological molecules might be observable are defined on the basis of theoretical considerations. E.W.

N64-15889 Hofstra Coll., Hempstead, N.Y.
AUDITORY PAIN THRESHOLDS FOR INTERMITTENT "WHITE" NOISE
Robert Plutchik Feb. 1960 13 p refs
(Contract Nonr-2252(01))
(AD-236942)

Four subjects were asked to match the intensity of a white noise against pure tones of 1000, 2500, and 4000 cps, which were set at various known intensity levels ranging from 90 decibels to 120 decibels. A linear equation was found to approximate the matching data for all frequencies. The subjects were then required to indicate unpleasantness and pain thresholds using interrupted white noise at 3, 6, 10, and 15 pulses per second, as well as the thresholds for a pure tone at 1000 cps. The major results show: (1) Pain and unpleasantness thresholds for the 1000 cps tone are about 15 db lower than for the noise. (2) Pain and unpleasantness thresholds for interrupted pure tones are lower than for corresponding white noise. (This conclusion uses the data of a previous experiment for comparison.) (3) There seemed to be no difference in threshold as a function of pulse rates using white noise. Author

N64-15895 Union Carbide Research Inst., Tarrytown, N.Y.
THE GENERAL AND COMPARATIVE BIOLOGY OF TERRESTRIAL ORGANISMS UNDER EXPERIMENTAL STRESS CONDITIONS Quarterly Report No. 2
S. M. Siegel 31 Dec. 1963 38 p
(NASA Contract NASw-767)
(NASA CR-52635) OTS: $3.60 ph, $1.34 mf

The topics discussed include: (1) anaerobiosis in seed germination—systematic and phylogenetic aspects, (2) germination in atmospheres containing nitrogen oxides, (3) effects of CO_2 and $CO_2 + O_2$ combinations on seedling growth, (4) germination and growth in atmospheres containing volatile organic compounds, and (5) the low temperature–hydrogen interaction effect on seed germination. R.T.K.

N64-15902 Northrop Corp., Hawthorne, Calif.
INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY First Quarterly Progress Report, 1 Oct.-31 Dec. 1963
J. J. Gambino and R. G. Lindberg 1963 12 p refs
(NASA Contract NASw-812)
(NASA CR-55553; NSL-64-29-1) OTS: $1.60 ph, $0.80 mf

A series of *P. longimembris* were subjected to 1,400 r total body Co^{60} irradiation. One group was administered 100% oxygen at 3 atmospheres during the irradiation. Another was splenectomized prior to irradiation. A third group was forced to maintain its body temperature during the entire 30-day postirradiation period. Survivors occurred in all groups, suggesting that, taken singly, neither the hypoxia mechanisms or the lowered metabolic rate are responsible for the remarkable radiation resistance of *Perognathus*. Author

N64-15914 Joint Publications Research Service, Washington, D.C.
CERTAIN PROBLEMS OF THE ORGANIZATION OF NEUROPSYCHIATRIC AID

E.A. Babyan and Z. N. Serebryakova 28 Feb. 1964 9 p Transl. into ENGLISH of an article from Zh. Nervopatol. i Psikhiatr. (Moscow), v. 64, no. 1, Jan. 1964 p 137–141
(JPRS-23446; OTS-64-21680) OTS: $0.50

The problems associated with setting up neuropsychiatric dispensaries in all oblast centers and cities with a population of at least 100,000 are discussed. R.T.K.

N64-15955 London U., (Gt. Brit.) Inst. of Psychiatry
PHOSPHOPROTEIN METABOLISM IN CEREBRAL FUNCTIONING Final Technical Status Report (Fourth Quarterly), 1 Jul.–30 Sep. 1963
[1963] 9 p refs
(Contract DA-91-591-EUC-2716)
(AD-430174)

Further experiments have been carried out on the labeling of intrinsic microsomal phosphoproteins of cerebral cortex with ^{32}P, using $AT^{32}P$ as precursor, under optimum conditions for the sodium and potassium stimulated ATPase reaction. The results show clearly that a major part of the microsomal phosphoproteins cannot be an intermediate in the hydrolysis of ATP by the ATPase, but do not exclude the possibility that a very small fraction is concerned. A method has been developed for rendering soluble some 30% of the microsomal proteins described from ox-brain cerebral cortex. This soluble fraction has been labeled with $AT^{32}P$ and fractionated by ammonium sulphate precipitation, and by ion-exchange chromatography on substituted celluloses. By both procedures a wide range of phosphoproteins was found, with only small differences in specific ^{32}P-radioactivity and P-content in the various fractions obtained. Author

N64-15976 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
"IN VIVO" MEASUREMENT OF TOTAL GAS PRESSURE IN MAMMALIAN TISSUE
Michael T. Lategola Jul. 1963 8 p refs
(CARI-63-11)

An in vivo method for the quantitative estimation of total gas pressure in mammalian tissue has been established. This method utilizes a rigid-walled capsule specially constructed to be permeable to oxygen, carbon dioxide, and nitrogen (O_2, CO_2, and N_2), but negligibly permeable to water vapor. The results obtained at equilibrium, after subcutaneous implantation of this capsule, demonstrate directly that the total gas pressure in the adjacent tissue, which is represented by the intracapsular total gas pressure, is about 40 to 50 mm Hg less than the concomitant atmospheric pressure. The difference between these gas pressures is a result of the metabolic gas exchange and may, therefore, be used to detect quantitative changes in tissue gas metabolism. Author

N64-15992 Joint Publications Research Service, Washington, D.C.
EXTRACTS FROM "OCCUPATIONAL HYGIENE IN WORK WITH POLONIUM"
G. M. Parkhomenko 3 Mar. 1964 22 p refs Transl. into ENGLISH from the booklet "Gigiyena Truda Pri Rabote s Poloniyem" Moscow, 1963 p 16–22, 34–39, and 45–52
(JPRS-23499; OTS-64-21705) OTS: $0.75

The following subjects are discussed: (1) biological action of polonium; (2) maximum permissible concentrations and levels of irradiation; (3) work rules, measures of personal hygiene, and individual protective devices; and (4) therapeutic and preventive medical measures. R.T.K.

N64-15993 Walter Reed Army Inst. of Research, Washington, D.C. Behavioral Radiology Lab.
THE EFFECTS OF MASSIVE DOSES OF IONIZING RADIATION UPON CONDITIONED AVOIDANCE BEHAVIOR OF THE PRIMATE Technical Report No. 3
Joseph C. Sharp and Donald L. Daoust [1963] 31 p refs
(DASA-NWER-03.008)

Adult male primates (*Macaca mulatta*) were given massive and acute doses of whole-body irradiation to determine the irradiation effect on the performance of simple, highly motivated tasks that required periodic response. From the tests it is assumed that: complicated motor manipulations are severely attenuated by radiation; the shock-avoidance paradigm is a powerful motivator for animal experimentation in behavioral radiology; and the use of behavioral indexes is valid in the evaluation of the role of ionizing radiations in military and civil defense situations. C.L.W.

N64-15997 Atomic Energy Commission, New York, N.Y.
HEALTH AND SAFETY LABORATORY MANUAL OF STANDARD PROCEDURES
John H. Harley et al Aug. 1962 416 p refs
NYO-4700, Rev.) OTS: $5.50

This manual contains the methods that are used currently by the Analytical Branch of the Health and Safety Laboratory, U.S. Atomic Energy Commission. The manual also contains data that are useful to the radiochemist working with fallout debris. R.T.K.

N64-16002 Joint Publications Research Service, Washington, D.C.
METHODS USED IN ADMINISTRATION OF ELECTRICALLY INDUCED SLEEP
M. M. Zheltakov, Yu. K. Skripkin, and B. A. Somov 4 Mar. 1964 20 p Transl. into ENGLISH of the contents and ch. VI of the book "Elektroson i Gipnoz v Dermatologii" Moscow, Medgiz, 1963 p 99–113 and 307–308
(JPRS-23524; OTS-64-21717) OTS: $0.50

A review of the various methods used in administration of electrically induced sleep is presented. In addition a new, improved apparatus is described in which both the current strength and the frequency are regulated for every patient, i.e., every patient can be given current with a different pulse frequency (from 1 to 130 cycles). In this apparatus, a potentiometer that regulates the pulse frequency is provided for each of the four channels, and the current strength is measured in milliamperes. R.T.K.

N64-16053 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
COSMOS – EARTH
V. V. Parin 21 Jan. 1963 8 p Transl. into ENGLISH from Ogonek (Moscow), no. 17, 1961 p 26–27
(FTD-TT-62-1609/1; AD-295778)

The effect of the environment of outer space on man and plants is discussed. R.T.K.

N64-16074 Institute for Research, State College, Pa.
UTILITY, INDUCED UTILITIES AND SMALL WORLDS
Masanao Toda and Emir H. Shuford, Jr. Bedford, Mass., Decision Sci. Lab., Oct. 1963 46 p refs
(Contract AF 19(628)-2968; NSF Grant GS-114)
(Rept. 9; ESD-TDR-63-622; AD-424752)

Decision theory in its present state of development fails to provide sufficient criteria for the unique formulation of a decision problem. The resulting ambiguity may lead to quite disparate interpretations of the same decision task by different individuals. The inconsistencies found in the measurement of

the "utilities" of objects, which in reality serve as means to an end, and in the Chipman–Ellsberg–Fellner paradox may arise from differences between experimenter and subject in their formulation of the decision task. This ambiguity can be reduced either by analyzing the decision task in the largest context feasible or by introducing structural constraints on the formulation of the decision problem. Author

N64-16088 Massachusetts U., Amherst
INFORMATION PROCESSING UNDER TASK STRESS
Warren H. Teichner Bedford, Mass., Decision Sci. Lab., Nov. 1963 61 p refs
(Contract AF 19(628)-290)
(ESD-TDR-63-657; AD-430412)

This is the final report of studies of human information processing related to variables present in high-speed systems operations. Earlier reported data pertinent to the effects of informational input rates and related factors are reviewed. The report then presents experiments concerned with two other aspects of the problem: (1) the interaction of short- and long-term memories in human data handling; and (2) the effects of presented information rates on "subjective information," i.e., the amount of information in the operator's estimate of what is presented by the display. Author

N64-16089 Army Medical Research Lab., Fort Knox, Ky
PERFORMANCE DECREMENT IN VEHICLE DRIVING
Marvin J. Herbert and William E. Jaynes 12 Nov. 1963 17 p refs
(Rept.-597; AD-430226)

Long hours of driving result in a decrement of skills employed in vehicle manipulation. This loss can be measured by appropriately designed driving tests. The decrement function is not linear. Subjects driving from 0 to 7 hours showed progressive deterioration in test performance, whereas no decrement was observed after 7 hours. Author

N64-16095 Library of Congress, Washington, D.C.
BIBLIOGRAPHY OF BIOREGENERATING SYSTEMS FOR EXTRATERRESTRIAL HABITATION Technical Documentary Report [15 Aug. 1962-15 Sep. 1963]
Paul E. Spiegler Wright-Patterson AFB, Ohio, Biomedical Lab., Nov. 1963 99 p refs
(Contract AF 33(657)-62-397)
(AMRL-TDR-63-121; AD-430814) OTS: $2.50

This bibliography is a representative sampling of the world's literature covering the years 1959 to the present concerning the various aspects of extraterrestrial habitation. The 440 references deal with both the physiology and ecology of bioregenerating systems for space travel and the specific human requirements for extraterrestrial habitation. The section on the biology of bioregenerating systems contains papers on waste management and reutilization, gas-exchange mechanisms using different plants, culture techniques for producing food by utilizing tissues or plants, edibility of algae and various animals, toxicological aspects of waste and materials of construction, and environmental conditions on the moon. Papers dealing with specific human requirements include those on nutrition, food technology, and various topics of personal hygiene and sanitation. Author

N64-16098 Max-Planck-Institut für Immunbiologie, Frieburg (W. Germany)
RESEARCH ON THE PRODUCTION AND IMMUNOLOGICAL EXAMINATION OF ARTIFICIAL ANTIGENS CONTAINING KNOWN SUGARS (OR OLIGO-SACCHARIDES) AS THE DETERMINANT GROUPS, IN RELATION TO THE IMMUNOCHEMICAL ANALYSIS OF ENTEROBACTERIAL O-ANTIGENS (ENDOTOXINS) Final Technical Report, 1 Dec. 1962-30 Nov. 1963
Otto Westphal [1963] 9 p
(Contract DA-91-591-EUC-2770)
(AD-430401)

Efforts were concentrated on methods for the transformation of bacterial O-specific polysaccharide haptens into full antigens. Two methods were worked out: (1) preparation of p-aminobenzyl ethers of the polysaccharides, which were then diazotized and coupled to proteins, giving polysaccharide benzylazo proteins; and (2) the polysaccharides were allowed to react with epichlorohydrine in slightly alkaline solution resulting in cross-linking of polysaccharide units to larger (soluble or insoluble) particles. Studies were also carried out on the influence of certain substituents (after their introduction into the polysaccharides) with respect to the antigenicity of the artificial polysaccharide complexes. Special emphasis was put on the esterification of the polysaccharide component with long-chain fatty acids. R.T.K.

N64-16109 Melpar, Inc., Falls Church, Va.
RESEARCH ON DETECTION OF EXTRATERRESTRIAL LIFE BY ULTRAVIOLET SPECTROPHOTOMETRY Final Report
Jan. 1964 60 p refs
(NASA Contract NASw-571)
(NASA CR-55655) OTS: $5.60 ph, $2.00 mf

A research program was carried out to determine the feasibility of applying absorption of far ultraviolet radiation by peptides to the detection of extraterrestrial life on Mars. Experiments were carried out on a variety of amino acids, dipeptides, tripeptides, polypeptides, and proteins. It was found that all substances containing peptide bonds showed an absorption maximum in the 185 mμ to 190 mμ region. A suspension of *Staphylococcus aureus* and extracts of local soil and sand also showed an absorption in this region. Experiments with substances that might give false positive absorptions showed that many nonpeptides similarly absorb in this region. However, it was observed that hydrolysis of the peptides resulted in a decrease in absorbancy, as did hydrolysis of the extracts of soil and sand. This effect allows for the distinction between peptides and nonpeptides. The effect of pH was studied, and it was found that the carboxyl ion absorbed in this same far ultraviolet region. Acidification to a pH well below the pK of a carboxylic acid resulted in the elimination of this absorption. Author

N64-16111 Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STUDIES OF MANUAL CONTROL SYSTEMS Progress Report No. 2, 19 Jul. 1963-18 Oct. 1963
18 Oct. 1963 41 p refs
(NASA Contract NASw-668)
(NASA CR-55514) OTS: $4.60 ph, $1.43 mf

An adequate description or model for the human controller is far from being an actuality. In the single-axis, single-display situation, the models now available are probably satisfactory for a large number of problems, but these models relate to the interaction between input, controlled-element dynamics, and human-controller dynamics. They do not include interactions involving display and manipulator dynamics. Models approximating the multiaxis, multidisplay, and adaptive behavior of the human controller are primitive. A promising approach to the development of such models is based on concepts of sampled-data control systems and information theory. I.v.L.

N64-16184 Stanford Research Inst., Menlo Park, Calif.
A TRANSDUCER FOR THE CONTINUOUS EXTERNAL MEASUREMENT OF ARTERIAL BLOOD PRESSURE
G. L. Pressman and P. M. Newgard *In* IEEE New Links to New Worlds, 1963 Natl. Space Electron. Symp. [1963] 25 p refs
(See N64-16151 08-08)
(NASA Contract NAS2-515)

It was necessary that the transducer provide a continuous measure of blood pressure, that it not encumber the subject, and that it not require cannulation. An indirect measurement of blood pressure based on arterial deflection was attempted first, but was unsuccessful. In the second approach attempted, arterial deflection was restrained by the transducer, and the resultant restraining force was measured. A mathematical model of the transducer–artery system was developed and was used as a guide for the design of the experimental prototype transducers. Tests performed on these experimental transducers gave results consistent with the predictions of the model.

Author

N64-16206 France. Ministere de l'Air, Paris

A GRAPHOLOGICAL CONTRIBUTION FOR SELECTION OF MILITARY PILOTS [CONTRIBUTION GRAPHOLOGIQUE A LA SELECTION DES PILOTES MILITAIRES]

Jean Gaussin [8 Oct. 1962] 35 p In FRENCH

The contribution of graphology to the selection of military pilots is reviewed. The success of a military pilot depends essentially on the quality of his motivations, and these motivations are not easily detected even by vigorous psychological techniques. However, graphology contributes considerably in the discovery of motivations; it gives a realistic account of the pilot's aptitudes and potentialities. If graphology were concerned only with checking the results in a correlated test system, the reliability of the diagnosis would be considerably increased. The triad graphological–morphological–characterological questionnaire, for example, has proven itself in industry in hiring and promotion practices. I.v.L.

N64-16296 Joint Publications Research Service, Washington, D.C.

STUDIES ON RADIATION SICKNESS

I. B. Gurevich et al 9 Mar. 1964 32 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 9, no. 1, Jan. 1964 p 20–24, 49–52, 57–60, and 82–87

(JPRS-23566; OTS-64-21735) OTS: $1.00

CONTENTS:

1. ROENTGEN THERAPY IN THE ACUTE PERIOD OF BURN INJURY I. B. Gurevich and R. I. Murazyan p 1–8 refs

2. THE EFFECT OF Na_3Ca-DTPA (PENTACINE) ON Pu^{239} EXCRETION FROM THE HUMAN ORGANISM L. A. Plotnikova and G. D. Baysogolov p 9–13 refs

3. SOME BIOCHEMICAL INDICES WITH CHRONIC EXPOSURE OF EXPERIMENTAL ANIMALS TO LOW DOSES OF GAMMA-RADIATION S. A. Keyzer, K. V. Ivanov, N. M. Timofeyeva, and G. N. Il'yutkin p 14–20 refs

4. REVIEW OF A BOOK BY YE. F. ROMANTSEV: "CHEMICAL PROTECTION AGAINST RADIATION" A. A. Gorodetskiy and V. A. Barabay p 21–29

N64-16322 Naval Medical Research Inst., Bethesda, Md.

Quarterly Report Covering Period Oct.–Dec. 1963 [PHYSIOLOGICAL AND PSYCHOLOGICAL MECHANISMS WHICH DEFEND THE HUMAN BODY AGAINST HEAT AND COLD AND DETERMINE THE EXTENT AND EFFICIENCY OF ENERGY TRANSFORMATIONS IN THE HUMAN BODY AND IN ISOLATED BODY CONSTITUENTS AT THE MOLECULAR LEVEL]

T. H. Benzinger [1963] 13 p refs

(NASA Order R-38)

(NASA CR-55562) OTS: $1.60 ph, $0.80 mf

Descriptions are given for the mechanism of elementary biosynthesis that accounts for the consumption of molecular oxygen. Examples of the energy-transforming processes are taken from the microorganism *Nitrobacter winogradskyi*. The reactions that describe the thermodynamics of the biochemical systems are: (1) the oxidation and reduction of pyridine-nucleotide, DPN · H_2, with a nitrate system; (2) nitrate reduction in the absence of oxygen coupled with the oxidation of reduced pyridine-nucleotide; and (3) cell-respiration, which represents a combination of the two reaction branches of elementary biosynthesis. The process, cell respiration, is coupled with the mechanism of the elementary biosynthesis and the energy donor ATP, in conjunction with cytochrome oxidations. A.B.

N64-16324 California U., Los Angeles Brain Research Inst.

CORTICAL-SUBCORTICAL RELATIONSHIPS OF THE CHIMPANZEE DURING DIFFERENT PHASES OF SLEEP

J. M. Rhodes, M. R. Reite, Dan Brown, and W. R. Adey [1963] 23 p refs

(NASA Grant NsG-203-62; NASA Grant NsG-502; AF AFOSR Grant 246-63)

(NASA CR-55689) OTS: $2.60 ph, $0.89 mf

The cortical-subcortical relationships of the chimpanzee during different phases of sleep were investigated by various methods. Results indicate that: (1) The chimpanzee has an EEG similar to that of man. (2) There is considerable variability during the initial stages of sleep, with the cortex and subcortex showing varying electrical patterns until at least a medium (or spindle) stage of sleep is achieved. (3) The hippocampal–neocortical rhythms are not inversely related, as is the case in cats. (4) There may well be several stages of paradoxical sleep, with the rhinencephalon having a particularly important role. I.v.L.

N64-16325 School of Aerospace Medicine, Brooks AFB, Tex.

ECOLOGIC RELATIONSHIPS BETWEEN BACTERIA AND ALGAE IN PHOTOSYNTHETIC GAS EXCHANGERS Quarterly Status Report No. 1, 1 Aug. 1963–31 Oct. 1963

[1963] 7 p

(NASA Order R-99)

(NASA CR-55423) OTS: $1.10 ph, $0.80 mf

Summaries are presented of the following experiments: (1) isolation and identification of bacteria from algal cultures, (2) bacterial viable cell count—dry weight determinations, and (3) effect of bacterial isolates on the growth of *Chlorella pyrenoidosa*. R.T.K.

N64-16326 Pennsylvania State U., University Park

PILOT THEORETICAL STUDY OF THE EFFECT OF WEIGHTLESSNESS AND DENSELY IONIZING RADIATION ON SINGLE CELLS Final Report

Ernest C. Pollard, Warren Yiesley, Thomas Barone, and John Weare 14 Jan. 1964 16 p

(NASA Grant NsG-182-62)

(NASA CR-55656) OTS: $1.60 ph, $0.80 mf

An investigation was made of the relationship between the behavior of a living cell, and the mechanical stress set up by intermolecular forces in response to the distortion produced by gravity. Of particular concern is whether the absence of gravity will affect the behavior of a cell of a living system. Theoretical inquiry is made to uncover predictions suggesting an answer to this question. C.L.W.

N64-16327 New Mexico State U., University Park

NEW MEXICO STATE UNIVERSITY OBSERVATORY

Clyde W. Tombaugh and Bradford A. Smith Repr. from Astron. J., v. 68, no. 9, Nov. 1963 p 666–667

(NASA Grant NsG-142-61)

A new Gregorian mirror, giving an equivalent focal length of 45 feet to a 16-inch telescope, was completed, and a complete photographic darkroom for the reproduction and printing of planetary photographs was established. Photographic observations were made of Mars, Venus, Jupiter, Saturn, and of the rapidly moving asteroid, Betulia. Visual observations were made of Mars and Jupiter. C.L.W.

N64-16328 Washington U., St. Louis, Mo. Medical School
HISTOLOGICAL STUDIES ON THE INNER EARS OF SELECTED MONKEYS Final Report, Sep. 1, 1961-Dec. 31, 1963
Catherine A. Smith [1963] 6 p
(NASA Grant NsG-267-62)
(NASA CR-55517) OTS: $1.10 ph, $0.80 mf

The ears from eight squirrel monkeys treated with streptomycin sulfate, and from three normal monkeys were perfused, fixed, embedded in celloiden, cut, and stained. All the streptomycin-treated animals showed either pathology or hair cell loss in the cristae of the semicircular canals. The otolithic organs were either normal in appearance or showed minor changes. The organs of Corti showed changes ranging from outer hair cell loss to complete degeneration, limited primarily to the first turn of the cochlea. Author

N64-16330 Naval School of Aviation Medicine, Pensacola, Fla.
REDUCTION OF NYSTAGMUS AND DISORIENTATION IN HUMAN SUBJECTS Joint Research Report
Frederick E. Guedry Jr., Ashton Graybiel, and William E. Collins 19 Jun. 1962 11 p
(NASA Order R-47)
(NASA CR-55756; Rept. 69) OTS: $1.60 ph, $0.80 mf

Nystagmus, disorientation, and nausea were reduced in subjects living and moving about for several days in a slowly rotating room. The reduced nystagmus was not reinstated by assigning "arousal-tasks," which are ordinarily effective in this respect. After rotation was stopped residual effects were noted for several hours. These included compensatory nystagmus, compensatory illusory reactions, and some motion sickness. Other subjects were exposed to similar circumstances for shorter periods where only restricted head movements in a particular plane were permitted. Nystagmus, illusory phenomena, and nausea were reduced by this procedure. However, the habituation did not transfer to forms of vestibular stimulation, including head movements in an "unpracticed quadrant," that produce reactions similar in direction and plane to those repeatedly experienced during the habituation period. Residual effects from this shorter more restricted exposure were slight. Author

N64-16331 Naval School of Aviation Medicine, Pensacola, Fla.
A BRIEF VESTIBULAR DISORIENTATION TEST Joint Research Report
Charles S. Harris, Rosalie K. Ambler, and Fred E. Guedry, Jr. 1 May 1963 13 p refs
(NASA Order R-47; Proj. MR005.13-6001)
(NASA CR-55784; Rept. 82) OTS: $1.60 ph, $0.80 mf

One hundred and fourteen naval aviation cadets were evaluated on their reactions to Coriolis accelerations produced by head movements in a rotating chair. Three different measures were obtained: (1) rating by four independent raters, (2) self-ratings, and (3) a Semantic Differential Form designed to measure the meaning of the experience to the subjects. Significant correlations were obtained among the raters and also among the three different measures. Evidence was obtained for a reliability test and one possessing construct validity. Author

N64-16353 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
BIOLOGY AND FLIGHTS INTO THE COSMOS: FURTHER SEARCH OF SCIENCE
N. N. Zhukov-Verezhnikov (Acad. Med. Sci. USSR) and V. Ya. Kopyev *In its* Sci. and Life (Selected Articles) 10 Dec. 1962 p 19-30 (See N64-16351 08-01)

This report presents discussions of the following: (1) the chemical and physical effects on cells that might result from flying to closer lying planets; (2) planetary organisms and how to prevent their penetration to earth; (3) the biological conditions of long-distance flights at near-light velocities; and (4) the possibility of biologically testing the Theory of Relativity. I.v.L.

N64-16377 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.
PLUTONIUM-239: ITS DISTRIBUTION, BIOLOGICAL EFFECT AND ACCELERATED ELIMINATION
Yu. A. Belyayev et al 27 Nov. 1963 278 p refs Transl. into ENGLISH from the publ. "Plutoniy-239 Raspredeleniye, Biologicheskoye Deystviye, Uskoreniye Vyvedeniya" Moscow, Medgiz, 1962 p 1-168
(FTD-TT-63-559/1+2; AD-430440)

CONTENTS:

1. PLUTONIUM DISTRIBUTION IN RABBITS Yu. A. Belyayev, V. V. Konstantinova, and N. I. Yelkina p 1-7
2. DISTRIBUTION AND EXCRETION OF PLUTONIUM IN DOGS AT LONG INTERVALS FOLLOWING ADMINISTRATION T. N. Rysina and R. A. Yerokhin p 8-18
3. TOXICOLOGIC PROPERTIES OF SODIUM PLUTONYL TRIACETATE AND ITS DISTRIBUTION IN THE RAT BODY Yu. A. Belyayev, N. I. Yelkina, V. V. Konstantinova, and I. A. Tseveleva p 19-24
4. MICRODISTRIBUTION OF PLUTONIUM IN RABBIT AND RAT LIVER V. K. Lemberg and A. P. Nifatov p 25-38
5. HISTOAUTORADIOGRAPHY DATA ON PLUTONIUM DISTRIBUTION IN THE BONES OF RAT AND RABBIT V. K. Lemberg and Z. M. Bukhtoyarova p 39-51
6. TRANSMISSION OF PLUTONIUM TO OFFSPRING T. N. Rysina and I. A. Tseveleva p 52-57
7. CHEMICAL FORMS OF PLUTONIUM (Pu^{239}) IN THE LIVER AND SPLEEN OF THE RAT Yu. A. Belyayev p 58-69
8. PLUTONIUM CONTENT IN PROTEIN FRACTIONS OF BONE I. A. Tseveleva p 70-76
9. MINERAL AND PROTEIN METABOLISM IN BONE TISSUE OF PLUTONIUM-INJURED RATS N. I. Yelkina and I. A. Tseveleva p 77-87
10. UREA SYNTHESIS AND ARGINASE ACTIVITY IN PLUTONIUM-INJURED RATS V. V. Konstantinova p 88-91
11. CONTENT AND REGENERATION OF NUCLEIC ACIDS IN RAT LIVER FOLLOWING PLUTONIUM INJURY V. V. Konstantinova p 92-103
12. EFFECT OF PLUTONIUM ON NUCLEIC ACID METABOLISM IN THE LIVER AND BONE MARROW OF THE RABBIT R. Ye. Libinzon and V. V. Konstantinova p 104-112
13. ACTIVITY OF TISSUE PHOSPHATASES IN RATS SUFFERING FROM SUBACUTE OR CHRONIC PLUTONIUM INJURY R. E. Libinzon and V. V. Konstantinova p 113-121
14. EFFECT OF PLUTONIUM-239 ON RAT BODY Yu. I. Moskalev, L. A. Buldakov, and V. N. Strel'tsova p 122-132
15. CHANGES IN THE BLOOD SYSTEM OF RABBIT EFFECTED BY PLUTONIUM-239 V. K. Lemberg, N. A. Kushurnikova, and K. N. Klyzhuk p 133-149
16. PECULIARITIES IN THE COURSE AND OUTCOME OF RADIATION SICKNESS IN DOGS INJECTED INTRAVENOUSLY WITH THE NITRATE OF PLUTONIUM-239 L. V. Bogatov, Z. I. Kalmykova, N. P. Kudasheva, and S. A. Rogacheva p 150-172

17. PATHOLOGICAL ANATOMY OF AFFECTION WITH PLUTONIUM-239 V. N. Streltsova p. 173–193

18. MORPHOLOGICAL CHANGES IN RABBIT AND DOG LIVER INDUCED BY PLUTONIUM-239 A. P. Nifatov p 194–214

19. DYNAMIC CHANGES OF BONE TISSUE IN RABBITS POISONED WITH PLUTONIUM-239 Z. M. Bukhtoyarova p 215–229

20. EFFECT OF ION EXCHANGE RESINS AND COMPLEXONS PLUTONIUM DISTRIBUTION IN THE GASTRO-INTESTINAL TRACT Yu. A. Belyayev p 230–236

21. EFFECT OF SOME COMPLEXONS ON PLUTONIUM REMOVAL IN RATS Yu. A. Belyayev p 237–245

N64-16379 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

IN THE AIR HOVERS A CAT (WEIGHTLESSNESS EXPERIMENTS)

L. Kitayev-Smyk 11 Jun. 1963 9 p Transl. into ENGLISH from Nauka i Zhizn (Moscow), no. 4, 1963 p 35–39

(FTD-TT-63-618/1; AD-412822)

A series of experiments were conducted with various types of animals to show their behavior characteristics during weightlessness and their ability to adapt. Tested were fish, pigeons, rabbits, guinea pigs, white mice, rats, cats, and dogs. The initial reactions to the period of weightlessness are recorded along with the attempts of the animals to stabilize themselves and their final acceptance of the state. C.L.W.

N64-16383 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

MEMOIR ON THE EXTRAORDINARY DEGREES OF HEAT WHICH MAN AND ANIMALS ARE CAPABLE OF RESISTING

M. Tillet 5 Jul. 1963 25 p refs Transl. into ENGLISH from the book "Memoires de l'Academie Royale" 1764 p 186–205

(FTD-TT-63-650/1+4; AD-413585)

This report discusses experiments that appear to establish the following facts: (1) Man can resist, for a certain length of time, a heat that will appear excessive without showing any signs of indisposition. (2) Various animals can withstand a much greater heat than that which Boërhaave mentions, and suffer no untoward accident. Experiments are also cited that indicate that man can, without any risk and with perhaps marked success in the case of the curing of certain illnesses (e.g., dropsy), be exposed for a short time to violent heat. I.v.L.

N64-16396 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

THE ROLE OF BACTERIA IN THE CONVERSION OF THE CARBON PORTION AND OF THE ASPHALT RESIN COMPONENTS OF PARAFFIN-BASE PETROLEUM UNDER ANAEROBIC CONDITIONS

T. L. Simakova, N. V. Strigaleva et al 6 Feb. 1963 40 p refs Transl. into ENGLISH from Geokhim. Sb. (Moscow), no. 7 1961 p 77–97

(FTD-TT-62-1449/1+2+4; AD-298651)

Investigations were conducted to study the influence of microflora on the conversion of several components of petroleum under anaerobic conditions. Both hydrocarbon and heterogeneous substances were tested. During the experiments, the dynamics of the quantity of bacteria and the pH value were studied. On ending the experiment, the pure bacteria cultures were separated, and their physiological properties and culture characteristics were studied. The changes that took place in the hydrocarbon fractions, oils, and hydrocarbons were studied by physiochemical and optical means. The elemental composition was determined in resins and asphaltenes, and the gas formed in several experiments was analyzed. C.L.W.

N64-16398 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

95 HOURS IN COSMOS

In its Nature (Selected Articles) 16 Nov. 1962 p 6–12 (See N64-16397 08-29)

The flight of Vostok III, piloted by cosmonaut A. G. Nikolayev, lasted 95 hours, i.e., almost four diurnal periods. During this time, the spacecraft flew more than 64 times around the earth, covering a distance of more than 2.6 million km. The flight duration of Vostok IV, piloted by cosmonaut P. R. Popovich, was 71 hours. The spacecraft flew more than 48 times around the earth, covering a distance of about 2 million km. The two spacecraft were in group flight for about 71 hours, i.e., for almost three diurnal periods. Diaries of these flights are presented. I.v.L.

N64-16399 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

WE LIVED AND WORKED IN THE COSMOS

A. G. Nikolayev and P. R. Popovich *In its* Nature (Selected Articles) 16 Nov. 1962 p 17–27 (See N64-16397 08-29)

A. G. Nikolayev discusses his flight and that of Popovich in Vostok III and IV, respectively. He relates that neither he nor his fellow cosmonaut had any vestibular disorders during the entire flight, and that they ate and slept well. He speaks of their communications while in flight and of the tasks that they performed. Nikolayev reports that, from his spacecraft window, he was able to see shore lines and the outlines of cities by day, and that by night he could see the boundaries of cities and their streets. He describes the ablation of the spacecraft coating during reentry, his separation from his spacecraft, and his descent, by parachute, to earth. I.v.L.

N64-16418 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

MOTION SICKNESS: PROPHYLAXIS AND TREATMENT

Docent G. Komendantov and V. Kopanev 2 Apr. 1963 6 p Transl. into ENGLISH from Med. Gazeta (USSR), 5 Dec. 1962 p 3

(FTD-TT-63-287/1+4; AD-402444)

Motion sickness is controlled by technical improvement of transportation facilities, the establishment of an optimal microclimatic environment for passengers, and the special selection and training of transportation workers. Conditioning of the vestibular system is the best preventative for all forms of motion sickness. Many drugs have been proposed for the prevention and cure of motion sickness. These are, for the most part, drugs that lower the parasympathetic tone of the central nervous system. This group includes atropine, scopolamine, aeron, and others. Use of these drugs has proved effective in 40% to 80% of the cases observed. Drugs that lower the excitability of the central nervous system work well. These are soporifics, antihistamines, and compounds of the aminazine group. Barbital sodium gave positive results in 70% of the cases observed. Compounds from among the nervous-system stimulants, which increase the nonspecific resistance of the organism, are effectively used. Among these are vitamin B_6 and dibazol. A mixture of 0.005g of platyphylline, 0.1g of caffeine, 0.15g of potassium bromide, 0.03g of papaverine, and 0.005g of phenamine, and the triple composition of 0.2g of caffeine and 0.05g of diphasine and of dimerdrol are effective when taken 30 to 60 minutes before subjection to rolling. I.v.L.

N64-16489 Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.

HUMAN TRACKING ABILITY FOR MAXIMUM TERRAIN FOLLOWING (PROJECT DIRECT) Final Report

W. J. Ruby and R. A. Monty 31 Aug. 1963 81 p refs
(Contract N600(10)-58660)
(CAL-IH-1715-E-5; AD-431116)

Two command signals were examined—the aircraft flight vector angle and the elevation angle. Each of the signals was computed for three aircraft speeds, 0.6, 0.75, and 0.9M, over two terrains—Southern Pennsylvania and the Rocky Mountains. A group of 12 subjects was randomly assigned to each command signal. Each subject flew each combination of aircraft speed and terrain (16 combinations) on each of 3 successive days. Three measures of performance were used, namely, integrated tracking error, normalized average clearance, and normalized average offset. It was found that the interpretation of the results was a function of the particular performance measure employed. That is, whereas integrated tracking error as significantly affected by both speed and terrain, normalized average clearances were a function only of terrain, and normalized average offsets were not affected by either speed or terrain. Also, terrain following (defined as a flight path that matches the terrain profile as closely as possible) and terrain avoidance systems are discussed. I.v.L.

N64-16534 National Aeronautics and Space Administration, Washington, D.C.
HUMAN TRACKING PERFORMANCE UNDER TRANSVERSE ACCELERATIONS
L. G. Summers and A. A. Burrows (Douglas Aircraft Co.) Feb. 1964 83 p refs Previously published as NASA CR-52718; see N64-11111 02-14
(NASA Contract NASr-68)
(NASA CR-21; NASA CR-52718) OTS: $2.25

Human performance was measured for control display parameters during positive and negative transverse acceleration ("eyeballs in" and "eyeballs out"). Five subjects were given a compensatory tracking task in pitch and roll using a two-axis sidearm controller and a CRT attitude display with a moving horizon. Three acceleration levels were used, each of two-minute duration. Performance was measured by the integral of absolute error in both the pitch and roll axes. There was a decrement in performance in the pitch axis with increased acceleration, but differences in the roll axis were shown only for one analysis model of two. No differences were recorded in performance due to direction of the acceleration. Physical control characteristics, such as preload and spring constant, did not affect performance or interact with acceleration. Aircraft dynamics affected performance but did not interact with acceleration. Author

N64-16541 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
MECHANISMS OF ACTION OF THE INSECTICIDE ENDRIN
Thomas E. Emerson, Jr., Charles M. Brake, and Lerner B. Hinshaw Aug. 1963 17 p refs
(CARI-63-16)

Cardiovascular effects of endrin insecticide are obscure. Experiments to investigate these phenomena were carried out on dogs, and suggested mechanisms of action have been proposed. Results show that acute administration of endrin produces bradycaria, hypertension, copious salivation, hyperexcitability, tonic-clonic convulsions, increased body temperature, leukocytosis, hemoconcentration, and decreased blood pH. Cerebral venous pressure and cerebrospinal fluid pressure elevations are also prominent features of endrin poisoning. Although most of these effects appear to be caused by endrin acting directly on the central nervous system, some may result secondarily from altered cerebral hemodynamics. Author

N64-16543 Joint Publications Research Service, Washington, D.C.
ANTI-RADIATION AND ANTI-OXIDATION PROPERTIES OF CERTAIN POLYPHENOLS
V. A. Baraboli and B. Ya. Medovar 9 Mar. 1964 11 p refs Transl. into ENGLISH of an article from Ukr. Biokhim. Zh. (Kiev), v. 35, no. 6, 1963 p 924-929
(JPRS-23567; OTS-64-21736) OTS: $0.50

Polyphenol structures, such as gallascorbin, tannin, extract of eglantine, rutin, and other gallates, have both a protective and a therapeutic antiradiation effect. The compounds of this group also have a definite antioxidation property, because they retard the production of peroxides in the irradiation of oleic acid. Therefore, it is concluded that the antiradiation action of these polyphenols is associated not only with the P-vitamin activity but also with their antioxidation capacity. The existence of a direct dependence between the antioxidation and antiradiation properties of the investigated polyphenols has been established. E.W.

N64-16544 Joint Publications Research Service, Washington, D.C.
CHANGE IN THE RATIOS BETWEEN THE EXCRETION OF 17-HYDROXYCORTICOSTEROIDS AND 5-HYDROXYINDOLEACETIC ACID IN PILOTS
I. V. Fedorov, I. M. Khazen, and G. G. Sturua 10 Mar. 1964 10 p refs Transl. into ENGLISH of an article from Voprosy Med. Khim. (Moscow), v. 9, no. 6, 1963 p 583-587
(JPRS-23607; OTS-64-21756) OTS: $0.50

Investigated are the relations between urine excretions of 17-hydroxycorticosteroids and the product of the exchange of serotonine (5-hydroxyindoleacetic acid) of pilots in training for complex group flights. Inasmuch as the emotional stress is frequently accompanied by a sharp increase in the frequency of respiration and heart contractions (double or more), which can establish a hypocapnic state, the acidity, bicarbonates, ammonia, phosphorous, and creatinine in the urine were determined. Author

N64-16545 Joint Publications Research Service, Washington, D.C.
BIOLOGICALLY ACTIVE POLYVINYL ALCOHOL LETILAN FIBERS
L. A. Volf 10 Mar. 1964 9 p refs Transl. into ENGLISH of an article from Khim. Volokna (Leningrad), no. 6, 1963 p 16-18
(JPRS-23609; OTS-64-21757) OTS: $0.50

Fibers possessing antibacterial action can be used as is for surgical thread or can be made into bandages, gauze, adhesive tapes, etc. The fibers were treated with the preparations letilan-1 and letilan-2, and these samples were subjected to bacteriological investigation. Their relation to bacteria such as staphylococci, intestinal bacilli, Proteus, and streptococci was studied. Results showed that 1 g of fiber completely suppressed the growth of bacteria in a volume of meat broth to two liters, and the zone of growth inhibition due to 1 g of fiber on a solid medium was 18 mm for staphylococcus and 16 mm for intestinal bacillus. A study of the influence of multiple washings on the biological activity of the fiber was also made. Samples were subjected to 10 boilings and still retained their bactericidal properties. Letilan-1 and letilan-2 treated fibers also act as fungicides. E.W.

N64-16551 Tennessee U., Oak Ridge Agricultural Research Lab.
Semi-Annual Progress Report, Jan. 1-Jun. 30, 1963 [RESEARCH ACTIVITIES]

Washington, AEC Div. of Tech. Inform. Jan. 1964 122 p refs (Contract AT-40-1-GEN-242)
(ORO-614) OTS: $2.50

Research activities in the following areas are discussed: (1) clinical medicine in radiation studies; (2) the physiology of reproduction; (3) radiation pathology; (4) the physiological effects of radiation; (5) fission-product metabolism in beef cattle, dairy cattle, sheep, swine, and poultry; (6) the fission-product chemistry of soils; (7) the biochemistry of fission-product elements; and (8) radiation genetics. Also, a veterinarian's report on herd health, surgery, and the development of techniques for embryonic surgery is presented. I.v.L.

N64-16554 Georgia U., Athens School of Forestry
THE POPULATION STATUS OF THE LARGER VERTEBRATES ON THE ATOMIC ENERGY COMMISSION SAVANNAH RIVER PLANT SITE Final Report
James H. Jenkins and Ernest E. Provost Washington, AEC Div. of Tech. Inform., 15 Feb. 1964 51 p refs
(Contract AT(38-1)-224)
(TID-19562) OTS: $1.25

A survey of types of animals (mainly game and feral species) found on the plant site is summarized. P.V.E.

N64-16567 Naval School of Aviation Medicine, Pensacola, Fla.
AN INSTRUMENT FOR VCG AND SCALAR ECG MEASUREMENTS Research Report No. 2
W. Carroll Hixson and Newton W. Allebach 26 Mar. 1963 20 p refs
(AD-412814)

An instrument was developed that displays the instantaneous electrical activity of the heart in either VCG loop form or in conventional scalar time-magnitude form with direction held constant. For the scalar representation, the instrument allows the electrophysical forces of the heart in any one of twelve equally spaced axes of the three orthogonal body reference planes to be displayed on a conventional time-amplitude ECG recorder. In addition, the instrument, utilizing commercially available preamplifiers that are compatible with other research equipments in use by this activity, permits the X, Y, and Z scalar signals derived from the Frank or similar VCG lead systems to be simultaneously displayed on a high-frequency galvanometer recorder or stored for later computer analyses on a magnetic tape instrumentation recorder. Author

N64-16573 Los Alamos Scientific Lab., N. Mex.
BIOLOGICAL AND MEDICAL RESEARCH GROUP (H-4) OF THE HEALTH DIVISION Annual Report, Jul. 1962-Jun. 1963
W. H. Langham and T. L. Shipman 14 Feb. 1964 376 p refs
(Contract W-7405-ENG-48)
(LAMS-3034) OTS: $4.50

Reorientation of the biomedical research program toward molecular- and cellular-level studies continued at an accelerated rate, and activities conducted in the following areas are discussed: (1) mammalian metabolism; (2) mammalian radiobiology; (3) low-level radioactivity counting; (4) clinical investigations of cellular volumes; (5) cellular radiobiology; and (6) molecular radiobiology. I.v.L.

N64-16574 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.
THE MECHANISMS OF INTRARENAL HEMODYNAMIC CHANGES FOLLOWING ACUTE ARTERIAL OCCLUSION
Lerner B. Hinshaw, Barbara B. Page, Charles M. Brake, Thomas E. Emerson, Jr., and Frederick D. Masucci Oct. 1963 27 p refs
(CARI-63-22)

The purpose of the present study was to determine intrarenal hemodynamic changes in intact and isolated kidneys following arterial occlusion. The relative roles of metabolic, myogenic, and tissue pressure influences on the postocclusion response were evaluated. Increases in renal resistance appeared to be due in part to adrenergic agents and were enhanced by extending time of occlusion and lowering the arterial pressure. The combined effects of prevenous dilatation and diminished tissue pressure resulted in a decreased resistance following shorter periods of occlusion. Prevenous dilatation was accounted for by depressed vascular sensitivity to pressor agents and the presence of vasodilator substances. Changes in venous segment resistance were found to be of primary importance in both the autoregulatory phenomenon and the postocclusion hyperemic response to short (15 sec) occlusion periods. Author

N64-16584 Oregon State U., Corvallis Sciences Research Inst.
BIOCHEMICAL AND PHARMACOLOGICAL STUDIES OF 1,1-DIMETHYLHYDRAZINE
R. S. Mc Cutcheon, R. D. Barbour and C. H. Wang Wright-Patterson AFB, Ohio, Biomedical Lab., Dec. 1963 22 p refs
(Contract DA18-108-CML-7154; Proj. TORES)
(AMRL-TDR-63-127; AD-431216) OTS: $0.75

UDMH at doses of 20, 40, and 60 mg/kg was rapidly metabolized by the rat as evidenced by the metabolism of UDMH-C^{14} methyl groups to respiratory $C^{14}O_2$. C^{14} was also rapidly excreted into the urine after administration of UDMH-C^{14} to the rat. At low levels of UDMH intoxication, the bulk of the compound was either metabolized to respiratory $C^{14}O_2$ or excreted as either UDMH or a metabolite(s) in 4 to 6 hr after administration. Total respiratory CO_2 production by rats was only slightly inhibited during a 16-hr period after intraperitoneal administration of 40 mg/kg of UDMH. UDMH intoxication of rats at doses of 20, 40, and 60 mg/kg appeared to preferentially inhibit glucose catabolism to respiratory CO_2 via glycolysis and the pentose phosphate pathway. A C-6 decarboxylation process, such as the glucuronate pathway, appeared to be unaffected by UDMH intoxication. Author

N64-16585 Oregon State U., Corvallis Science Research Inst.
LETHALITY OF PENTABORANE-9 IN MAMMALIAN ANIMALS Technical Documentary Report, 1 Jun. 1962-31 May 1963
F. N. Dost, D. J. Reed, and C. H. Wang Wright-Patterson AFB, Ohio, Biomed. Lab., Dec. 1963 17 p refs
(Contract DA-18-108-CML-7154)
(AMRL-TDR-63-128; AD-431218) OTS: $0.50

A method of transfer and administration of pentaborane-9 to small animals was described. By use of this procedure, median lethal doses of pentaborane-9 by intraperitoneal and inhalation administration to the rat were determined to be 3.7 mg/kg and 0.42 mg/kg, respectively. An intravenous median lethal dose to the rabbit of 0.52 mg/kg was estimated. Author

N64-16640 School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGIC EFFECTS OF EXPOSURE TO INCREASED OXYGEN TENSION AT 5 P.S.I.A.
T. E. Morgan, Jr., R. G. Cutler, E. G. Shaw, F. Ulvedal, J. J. Hargreaves et al Oct. 1963 15 p refs
(SAM-TDR-63-64; AD-430518) OTS: $1.10

Data were obtained during two 14-day experiments in the USAF SAM two-man space cabin simulator relative to the physiological factors in atmosphere selection. Both experiments were conducted at a simulated altitude of 27,000 feet (258 mm Hg) and a Po_2 of 243 mm Hg. Emphasis was placed

on arterial and alveolar Po_2 and Pco_2, chest X-rays, and vital capacity, all determined at the experimental altitude and atmosphere. The atmosphere, in general, was well tolerated by all 4 tests subjects. No atelectasis was made evident by X-ray or by changes in vital capacity. Although vital capacity was reduced an average of 2.9%, this was not felt to be indicative of atelectasis. Arterial Po_2 was slightly lowered but, again, it did not indicate a significant increase in the normal physiologic shunting of blood. Author

N64-16641 Baylor U., Houston, Tex. Bioelectronics Lab.
AUTOMATIC GSR ANALYZER
Neil R. Burch, Harold E. Childers, and Robert J. Edwards, Jr. Brooks AFB, Tex., School of Aerospace Med., Nov. 1963 36 p refs
(Contract AF 41(609)-1527)
(SAM-TDR-63-74; AD-430921) OTS: $3.60

To extend the studies of GSR activity, an automatic analyzer was designed, and a prototype system was built and tested. The analyzer measures the sum of onset-to-peak amplitudes, the sum of the onset-to-peak times, and the number of GSR's per epoch. The analyzer reduces the data at a rate equal to generation of the GSR activity, and it is expected that analysis that is faster than real-time analysis can be accomplished with a tape recording system and some modification of the analyzer. With the automatic analyzer, studies can be carried out with immediate data reduction, which should aid in defining the relations between the parameters of GSR activity and the level of arousal in psychophysiologic studies. Author

N64-16642 R. F. Communications, Inc., Rochester, N.Y.
DEVELOPMENT OF A MINIATURE TELEMETRY SYSTEM
David A. Kavanagh Brooks AFB, Tex., School of Aerospace Med., Nov. 1963 16 p refs
(Contract AF 41(657)-419)
(SAM-TDR-63-80; AD-431726) OTS: $1.60

Experiments with VHF miniature transmitters submerged in physiologic saline solution to simulate their being implanted in living animals indicate that internal telemetry from small animals may be feasible at frequencies as high as 200 mc. Further study is needed before conclusions can be drawn relative to the frequency range best suited for large animals. Tests with transmitters below 20 mc held under a person's armpit indicate that the human body is essentially transparent to internal telemetry signals in that frequency range. Modulation schemes, power supplies, and encapsulants are discussed. Author

N64-16643 Northrop Corp., Hawthorne, Calif. Space Labs.
EVALUATION OF CERTAIN MARINE ALGAL FLAGELLATES FOR MASS CULTURE
Richard W. Eppley Brooks AFB, Tex., School of Aerospace Med., Nov. 1963 15 p refs
(Contract AF 41(609)-1608)
(SAM-TDR-63-91; AD-431726) OTS: $1.60

Environmental requirements are reported for maximum growth of 10 strains of marine flagellates of the group Volvocales. Three strains display growth rates above average for green algae: *Dunaliella tertiolecta, D. primolecta, and Tetraselmis tetrathele*. The algae examined display a spectrum of salinity optima, allowing selection of a strain suitable for mass culture in water of any available salt content. The optimum temperature for growth is found to vary with the salt concentration of the growth medium for *D. tertiolecta*. All strains examined so far are unusually tolerant of urea, although not all can use urea as a source of nitrogen for growth. First attempts to obtain mutants capable of utilizing bright light were unsuccessful but provided data on pigment composition and photosynthetic rates of algal cells adapted to growth in light about 1.5 times as intense as sunlight. Author

N64-16645 Chicago U., Ill. USAF Radiation Lab.
Quarterly Progress Report No. 50 [RESEARCH ON CERTAIN BIOLOGICAL AND MEDICAL ASPECTS OF ATOMIC ENERGY]
Kenneth P. Du Bois 15 Jan. 1964 133 p refs
(Contract AF 41(609)-1693)
(AD-430559)

The following research studies are summarized: (1) the effects of ionizing radiations on the biochemistry of mammalian tissues—influence of X-irradiation on the development of a thiophosphate-oxidizing enzyme system in the livers of male rats, influence of various factors on radiation-induced inhibition of the development of detoxification enzymes, and studies on the toxicity and mechanism of action of 2-mercaptoethylamine; (2) pharmacological and toxicological compounds as protective or therapeutic agents against radiation injury in experimental animals—the influence of various chemical compounds on radiation lethality in mice, therapy of radiation injury in mice with chemical agents, histopathological findings in the tissues of X-rayed mice treated with combinations of homologous bone marrow and 2-iminothiazolidine-4-carboxylic acid, and comparison and analysis of protective effectiveness of AET derivatives; and (3) the influence of exposure to low levels of gamma and fast-neutron irradiation on the life span of animals—current status of the chronic low-level fast-neutron irradiation program, and time independence of dose reduction factors in proton or X-ray irradiated mice pretreated with MEA or PAPP. P.V.E.

N64-16648 North American Aviation, Inc., Columbus, Ohio
FLIGHT SIMULATOR STUDY OF HUMAN PERFORMANCE DURING LOW-ALTITUDE, HIGH-SPEED FLIGHT
Robert L. Brugh and James G. Mc Hugh Ft. Eustis, Va., Army Transportation Res. Command, Nov. 1963 119 p refs
(Contract DA 44-177-TC-803)
(TRECOM-TR-63-52; AD-431739) OTS: $10.10

An investigation of the influence of low-altitude high-speed flight conditions on inflight operator performance of surveillance-centered tasks is reported. Six Army pilots and four Army observers "flew" approximately 278 hours on simulated three-hour missions involving five rms gust-intensity levels and two airspeeds. The flights were made in a moving-base simulator that had a total travel of approximately 12 ft, an acceleration capability of ± 6 g, a functional control system, and an associated analog computer for obtaining solutions to equations of motion of a mechanized aircraft. Data were analyzed in terms of human performance aspects of the missions. Author

N64-16667 Joint Publications Research Service, Washington, D.C.
ORGANIZATION OF WORK IN ENGINEERING PSYCHOLOGY IN THE USA
A. I. Nazarov 28 Feb. 1964 Transl. into ENGLISH of an article from Vopr. Psikhologii (Moscow), no. 5, 1963 p 176-186
(JPRS-23448; OTS-64-21682) OTS: $0.75

The aspects of engineering psychology discussed include: (1) scope and terminology; (2) trends; (3) basic stages in development; (4) problems in the organization of research; and (5) research conducted in various industrial firms in the USA. R.T.K.

N64-16668 Joint Publications Research Service, Washington, D.C.
CURRENT METHODS OF ELECTROENCEPHALOGRAPHIC ANALYSIS
V. A. Kozhevnikov and R. M. Meshcherskiy 10 Mar. 1964 281 p refs Transl. into ENGLISH of the book "Sovremennyye Metody Analiza Elektroentsefalogrammy" Moscow, 1963 p 1-328
(JPRS-23590; OTS-64-21749) OTS: $4.00

The application of various methods of electroencephalographic analysis to clinical research and in experimental neurophysiology is discussed. Both the simplest (visual analysis, application of the method of quantitative estimation of the cerebral potentials) and more complicated methods of automatic analysis (registration of envelopes, measurement of the total bioelectrical activity, frequency and correlation analysis, and methods of coherent reception) are analyzed. The necessary criteria are presented for the interpretation of artifacts of various kinds in the electroencephalogram. Special attention has been given to the utilization of the probability method in electroencephalography for the detection of weak cerebral reactions and to the prospects of using computers. Author

N64-16674 National Academy of Sciences-National Research Council, Washington, D.C. Committee on Hearing, Bioacoustics, and Biomechanics

CHABA– 1963. ANNUAL REPORT OF THE NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL COMMITTEE ON HEARING, BIOACOUSTICS, AND BIOMECHANICS, JANUARY-DECEMBER, 1963

Milton A. Whitcomb Feb. 1964 25 p refs

A summary of the activities at the meeting is given, along with abstracts of papers that were presented. Papers presented at the Symposium included the following: Operational Vibration Environments in Spacecraft, Vibration Environment During Flight at Low Altitude, Human Tolerance Limits to Extreme Vibrational Stress, Tissue Strength and Organ Displacement, Organ Displacements Studied with X-ray Cinematography, Effects of Vibration on Operator Performance, Effects of Vibration on Speech, Pilot Performance in Buffeting Environment, and The Effect of Combined Sustained Accelerations and Vibrations. A summary of CHABA working group meetings is also presented. P.V.E.

N64-16691 Clymer (A. Ben), Columbus, Ohio

TRENDS IN THE DEVELOPMENT AND APPLICATIONS OF ANALOG SIMULATIONS IN BIO-MEDICAL SYSTEMS

A. Ben Clymer and G. F. Graber (Applied Dyn., Inc.) [1963] 36 p refs

(Partially supported by Electronics Associates, Inc.)

Biosystem model identification and biosystem simulation are discussed. Identification of a mathematical model is the determination of any unknown parameters or functions in it, using experimental data as a basis. A biosystem simulation is distinguished arbitrarily from a biosystem mathematical model by requiring that a simulation be a physical embodiment of a mathematical model. However, this distinction is a matter of degree. The accomplishments in biosystem model identification and the possible uses, purposes, and benefits of and accomplishments in biosimulation are discussed. Predictions concerning future simulation developments are made. It is believed that within 5 years approximately 1,000 papers will be published per year in the areas of biosystem model identification and simulation. I.v.L.

N64-16694 Joint Publications Research Service, Washington, D.C.

FOUR EXPERIMENTAL STUDIES ON RADIATION SICKNESS THERAPY

13 Mar. 1964 38 p refs Transl. into ENGLISH of 4 articles from Med. Radiol. (Moscow), v. 8, no. 12, 1963 p 31-37, and 50-59

(JPRS-23678; OTS-64-21691) OTS: $1.00

CONTENTS:

1. EFFECTIVENESS OF EARLY USE OF ARTIFICIAL KIDNEY IN DOGS RECEIVING LETHAL DOSES OF STRONTIUM-90 M. G. Petrovnin, p 1-11 refs

2. THE EFFECT OF COMPLEX-FORMING AGENTS ON THE MAGNITUDE OF RENAL TISSUE RADIATION DOSAGE WITH ADMINISTRATION OF RADIOACTIVE SUBSTANCES L. A. Il'in, T. A. Norets, G. V. Arkhangel'skaya, and E. I. Shcherban' (RSFSR Min. of Public Health) p 12-19 refs

3. EXPERIMENTAL DATA ON INCREASED RESISTANCE TO RADIATION SICKNESS AFTER PRELIMINARY ADMINISTRATION OF TETRACYCLINES TO RATS A. M. Dumova and O. O. Chirkova (Leningrad Sci. Res. Inst. of Antibiotics) p 20-28 refs

4. INVESTIGATION OF THE POSSIBILITY OF OBTAINING IMMUNE SERA TO ALLEVIATE THE COURSE OF RADIATION SICKNESS IN EXPERIMENTAL ANIMALS V. I. Fofanov and A. T. Kravchenko p 29-35 refs

N64-16728 Federal Aviation Agency, Oklahoma City, Okla. Civil Aeromedical Research Inst.

EXPERIMENTAL EVALUATION OF WORK CAPACITY AS RELATED TO CHRONOLOGICAL AND PHYSIOLOGICAL AGING

Bruno Balke Sep. 1963 8 p refs

(CARI-63-18)

The attainment and maintenance of a high level of work capacity requires frequent exposures to sufficiently high functional demands. Within this concept, two situations under experimental scrutiny are of interest: first, physiological parameters, indicative of physical performance capacity, were intra-individually measured over the years, whereby changes of work capacity became apparent as consequence of training, environment, inactivity, disease, and retraining. Retraining restored the functional adaptability at age 56 to nearly that observed at age 20 to 30. In the second situation, an individual (age 53) with essential hypertension, a disease considered to be associated with aging processes of vascular tissue, has been studied over months with results encouraging the application of an individually devised program of regular activities for the mitigation of such condition. Author

N64-16745 IIT Research Inst., Chicago, Ill.

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, 15 Nov. 1963-15 Feb. 1964

Charles A. Hagen and Regnel Jones [1964] 16 p refs

(NASA Contract NASr-22 IITRI Proj. C 194)

(NASA CR-53106; IITRI C 194-12) OTS: $1.60 ph, $0.80 mf

Incorporation of 4.9% or 21.7% moisture into the dry simulated Martian soil modified by the addition of 1% organic medium increased the number of *B. subtilis* surviving the inoculating and flushing procedures. Lower moisture concentrations, 2.0% and 0.25%, did not have this effect. However, the death rate was greater in the tubes with 4.9 and 21.7% moisture. Thus, after 56 days of exposure there was no significant difference between the groups. Less than 0.02% of *Ps. aeruginosa* cells survived a 1-week exposure to Martian environment modified by 10% organic medium and 10% moisture. *B. cereus* spores survived the simulated Martian environment modified by 10% organic medium plus 20% moisture, but there was no apparent germination. Author

N64-16799 Ohio State U., Columbus Lab. of Aviation Psychology

TERM EXPECTATION AND UNCERTAINTY IN HUMAN DECISION BEHAVIOR

Jerry D. Tate, William C. Howell and Karl L. Wiegand (Aerospace Med. Div.) Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Nov. 1963 24 p refs

(Contract AF 33(616)-7122)

(AMRL-TDR-63-118; AD-431634) OTS: $0.75

This study was conducted to investigate the manner and degree to which a decision maker's sequence of decisions is influenced by objectives of varying remoteness (term expectation) and by informational uncertainty. The effects of these two variables on sequential decision performance were studied in a 4 × 4 factorial experiment. Decisions (predictions)

were made either at prescribed uncertainty levels or on a freely chosen basis (depending on the prevailing experimental conditions), and a range of choices varying in degree of risk and payoff was available at each uncertainty level. The same five subjects served in all conditions of the experiment. Choices were evaluated in terms of risk, expected value, and average departure from linear progression to mean winning score (DFL). The DFL analysis suggested that factors more immediate than term expectation heavily influence decisions. Author

N64-16802 University Coll., London (Gt. Brit.)
Progress Report, July 1963 [PHONETICS: STUDIES OF BRITISH, HUNGARIAN, AND GERMAN SPEECH]
D. C. Bennett et al [1963] 41 p refs
(AF EOAR Grant 62-112)
(AFCRL-64-86; AD-430704)

Contained in this report are discussions of the following: (1) a study of the formants—frequency regions of high-energy concentration corresponding to the passbands of the throat and mouth cavities—of the pure vowels of British English; (2) formant frequencies of Hungarian vowels; (3) an experimental study of the relative contributions of vowel duration and spectral form to the recognition of English and German pure vowels; (4) an investigation of the possibility that the sensation of pitch is partly dependent on a central temporal patterning of neutrally borne information about the waveforms of acoustic stimuli; (5) a long-term spectral analysis of random signals; (6) the SPYL, a combination of an instantaneous spectrograph, step analyzer, and a tape loop; (7) a spectrographic assessment of reverberation; (8) seven-volt Zener diodes as a satisfactory source of white noise over the audiofrequency spectrum; and (9) an apparatus for wow and flutter measurement, consisting of an oscillator that can be switched to function as a selective amplifier, a limiter, and a discriminator. The apparatus is to be used in conjunction with a Bruel & Kjaer level recorder in measuring the speed constancy of tape recorders. I.v.L.

N64-16805 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
MEASURING AMOUNT OF PRIOR EXPOSURE TO MEANINGFUL WORDS
John F. Wing Oct. 1963 53 p refs
(AMRL-TDR-63-94; AD-431206) OTS: $1.25

An important aspect of psychological research on verbal behavior is precise knowledge of the characteristics of the verbal stimuli being used, especially the amount of prior exposure subjects have had to the stimuli. It is impossible to determine directly just how much prior exposure subjects have had to meaningful words, such as those used in everyday communications. Therefore, some indirect measure must be employed. This report describes and compares four possible indirect measures of prior exposure that experimenters may use: frequency of usage (F); judged familiarity (*f*); meaningfulness (*m*); and degree of polarization (D_4). Reliability coefficients are given for each measure (when available), as well as the intercorrelations between the four measures. Finally, a comparison is made of the four measures against certain criteria important to research on verbal performance. Author

N64-16806 Mayo Clinic, Rochester, Minn. Mayo Foundation
DECREASES IN ARTERIAL OXYGEN SATURATION AS AN INDICATOR OF THE STRESS IMPOSED ON THE CARDIORESPIRATORY SYSTEM BY FORWARD ACCELERATION ($+G_x$) Technical Report, 23 Aug. 1960-1 Mar. 1961
Earl H. Wood, A. Clark Nolan, Hiram W. Marshall, Lucille Cronin, and William F. Sutterer Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Dec. 1963 42 p refs
(Contract AF 33(616)-7594)
(AMRL-TDR-63-104; AD-431631) OTS: $1.25

The cardiorespiratory alterations produced by $+G_x$ on a human centrifuge were studied to determine their temporal characteristics. Blood oxygen saturation was recorded by ear oximetry, and by cuvette oximetry in blood withdrawn continuously from the radial artery of eight subjects during 3 to 4 minutes at 2.2, 3.7, 5.6, and on two occasions at 6.4 $+G_x$. Observations were made when air and 99.6% oxygen were breathed by three subjects during intermittent positive pressure (air, 33 mm Hg) breathing. Thoracic roentgenograms were obtained before and 30 to 60 seconds and 5 minutes after 5.6 and 6.4 $+G_x$. In five subjects, pressures were recorded in the aorta, radial artery, right atrium, esophagus, and rectum (intra abdominal). Author

N64-16807 Mayo Clinic, Rochester, Minn. Mayo Foundation
USE OF THE HUMAN CENTRIFUGE TO STUDY CIRCULATORY, RESPIRATORY AND NEUROLOGIC PHYSIOLOGY IN NORMAL HUMAN BEINGS AND A DESCRIPTION OF AN ELECTRONIC DATA PROCESSING SYSTEM DESIGNED TO FACILITATE THESE STUDIES Technical Report, 23 Aug. 1960-1 Nov. 1961
Earl H. Wood, William F. Sutterer, Hiram W. Marshall, and A. Clark Nolan Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Dec. 1963 30 p refs
(Contract AF 33(616)-7594)
(AMRL-TDR-63-105; AD-431207) OTS: $1.00

The following topics are discussed: (1) the use of the human centrifuge as a tool in the study of physiology, particularly neurologic, respiratory, and circulatory physiology; (2) the complexity of the analytical problems concerned in these studies, which prompted the use of electronic data-processing procedures and equipment; and (3) the hardware that has been assembled and initial plans for the use of this equipment. Author

N64-16808 Mayo Clinic, Rochester, Minn. Mayo Foundation
PHOTOELECTRIC EARPIECE RECORDINGS AND OTHER PHYSIOLOGIC VARIABLES AS OBJECTIVE METHODS OF MEASURING THE INCREASE IN TOLERANCE TO HEADWARD ACCELERATION ($+G_z$) PRODUCED BY PARTIAL IMMERSION IN WATER
Earl H. Wood, Evan F. Lindberg, Charles F. Code, and E. J. Baldes Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Dec. 1963 23 p refs
(Contract AF 33(616)-7594)
(AMRL-TDR-63-106; AD-431208) OTS: $0.75

The protection against the effects of headward acceleration afforded the human by his immersion in water to the level of the xyphoid and to the third rib at the sternum has been assayed in 15 trained centrifuge subjects. Variations in ear opacity, ear opacity pulse, heart rate, respiration and reaction times to auditory and visual stimuli were recorded continuously in a series of 15 subjects during 15-second exposures to acceleration while seated in a steel tub mounted in the cockpit of the Mayo centrifuge. The level of acceleration was increased by increments of 0.5 to 1.0 $+G_z$ until complete loss of vision (blackout) was produced when the tub was empty (control) and when filled with water to the level of the xyphoid and also to the third rib at the sternum. The decrements in ear opacity associated with the various degrees of visual impairment were closely similar; however, the decrements in ear opacity pulse

and increments in heart rate were significantly less during immersion in water than when in air. Author

N64-16809 Mayo Clinic, Rochester, Minn. Mayo Foundation

TECHNICS FOR MEASUREMENT OF INTRAPLEURAL AND PERICARDIAL PRESSURES IN DOGS STUDIED WITHOUT THORACOTOMY AND METHODS FOR THEIR APPLICATION TO STUDY OF INTRATHORACIC PRESSURE RELATIONSHIPS DURING EXPOSURE TO FORWARD ACCELERATION (+G_x) Technical Report, 1 Dec. 1961-30 Mar. 1962

E. H. Wood, A. C. Nolan, D. E. Donald, A. C. Edmundowicz, and H. W. Marshall Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Dec. 1963 16 p

(Contract AF 33(657)-8899)

(AMRL-TDR-63-107; AD-431209) OTS: $0.50

Pleural pressures were recorded simultaneously from the ventral and dorsal regions of the thorax using fluid-filled catheters inserted through the chest wall via No. 16 needles using an air-tight technic. Pressures were referenced to the catheter tip levels determined by A-P and lateral roentgenograms taken prior to and after a series of 1- to 3-minute exposures of 8 anesthetized dogs to accelerations of 2, 4, and 6G_x (supine horizontal and 15° head-up and head-down positions). The negativity of intrapleural pressure in the ventral thorax was uniformly increased during exposures and the intrapleural pressure in the dorsal thorax became positive. Esophageal and pericardial pressures were similar or somewhat less negative than the intrapleural pressure at the same horizontal plane in the thorax. All dogs showed decreases in arterial oxygen saturation during exposures to 6G_x when breathing air or 99.6% oxygen. Author

N64-16810 Michigan U., Ann Arbor School of Medicine

VESTIBULAR SUPPRESSION Technical Report, 1 Mar. 1961-28 Feb. 1963

Brian F. Mc Cabe Wright-Patterson AFB, Ohio, Biophysics Lab., Nov. 1963 28 p refs

(Contract AF 33(616)-7959)

(AMRL-TDR-63-119; AD-431210) OTS: $0.75

Repeated stimulation of the vestibular endorgan of the inner ear produces a response decline, which has been termed vestibular suppression. Machinery was constructed to produce high rotary acceleration in a finely controlled manner to study this phenomenon in cats. Suppression was found to be long lasting (greater than 2 months) and to reach about 60% of original response (maximally 75%). It was most rapidly produced at just submaximal levels of stimulus (4 rps^2). Intensity function studies, nerve block studies, and increment-decrement intensity function curves not only failed to show presence of functional endorgan damage due to high rates of deceleration, but demonstrated the endorgan to be a good deal more rugged than is generally recognized. Transference of effects between the otolith organs and ampullae, using rotation and linear acceleration, was absent. The locus of suppression was shown (by stereotaxic coagulation of brain areas, with subsequent release of suppression) to be most likely in the pontine reticular formation and not in the nucleus fastigius. Author

N64-16811 Ohio State U., Columbus, Ohio Lab. of Aviation Psychology

EFFECTS OF MODIFIED TASK FEEDBACK DURING TRAINING ON PERFORMANCE OF A SIMULATED ATTITUDE CONTROL TASK AFTER THIRTY DAYS Technical Report, Sep. 1962-Aug. 1963

Robert Buckhout, James C. Naylor, and George E. Briggs Wright-Patterson AFB, Ohio, Behavioral Sci. Lab., Dec. 1963 28 p refs

(Contract AF 33(657)-10081)

(AMRL-TDR-63-125; AD-431215)

The criterion task consisted of compensatory rate tracking in three dimensions by means of "noisy" meter displays and a conventional stick with a twist dimension added. In addition, the intensity of auditory noise present varied proportionately to tracking error in four steps. Equal numbers of subjects trained for 1 or 3 weeks with either noisy or non-noisy displays and under one of two degrees of auditory feedback specificity (magnitude of steps used to relate visual noise to error score). Subjects trained with visual noise showed better performance after 30 days despite the fact that subjects trained with a noise-free display performed significantly better during training. The subjects trained for 3 weeks showed significantly better tracking performance on 30-day retention test than subjects who received only 1 week of training. Author

N64-16812 General American Transportation Corp., Niles, Ill. MRD Div.

METHOD OF HEATING FOODS DURING AEROSPACE FLIGHT Technical Report, 19 Feb. 1962-15 May 1963

P. P. Nuccio and S. J. Lis Wright-Patterson AFB, Ohio, Biomedical Lab., Dec. 1963 40 p refs

(Contract AF 33(657)-7922)

(MR-1187-60; AMRL-TDR-63-135; AD-431163) OTS: $1.25

A feasibility study of methods for heating foods during aerospace flight has shown that electrical resistance heating is the most effective technique. An internal heating probe is more efficient than external heating, but special food containers are required. A full-scale engineering model of an external heating food warmer, capable of heating available food containers, was designed, fabricated, and evaluated. This model has three separately controlled stations for mounting flexible heaters that are wrapped around the container to be heated. The system occupies a volume less than 288 $in.^3$ and weighs less than 4 lb, when provided with 6 heater assemblies. Laboratory tests verified that the system meets the requirements specified, and it can heat heat a 6-ounce can of ham and eggs from 75° to 160° F with less than 14 whr of energy. Author

N64-16813 Ohio State U., Columbus. Lab. of Aviation Psychology

LONG-TERM SKILL TRANSFER AND FEEDBACK CONDITIONS DURING TRAINING AND REHEARSAL Technical Report, Sep. 1962-Jul. 1963

James C. Naylor, George E. Briggs, and Robert Buckhout Wright-Patterson AFB, Ohio, Behavioral Sci. Lab., Dec. 1963 33 p refs

(Contract AF 33(657)-10081)

(AMRL-TDR-63-136; AD-431222) OTS: $0.75

Eight groups of subjects performed a continuous tracking and procedural task under various conditions of auditory performance feedback during training (8 days) and rehearsal (3 days). Four degrees of auditory cueing were used during training by varying (in size) the stepwise relationship between intensity of noise and amount of tracking error in three amounts plus a control condition of random noise. Two rehearsal conditions were used to complete the factorial arrangement—feedback similar to training versus random feedback. Rehearsal occurred 14 days after the completion of training, and a transfer test to the medium-noise condition was conducted 14 days following the last rehearsal session for all groups. Transfer

performance was found to be significantly related to feedback specificity during training (medium specificity was inferior to either high or low specificity), whereas the rehearsal variable had no statistical effect on performance with any performance metric. Author

N64-16831 Naples U. (Italy) Inst. of Human Physiology
ON THE PURIFICATION AND IDENTIFICATION OF A SPLENIC FACTOR WHICH PREVENTS RADIATION INJURIES Final Technical Report, 1 Jan. 1963-31 Dec. 1963
Pietro de Franciscis [1963] 13 p
(Contract DA-91-591-EUC-2785)
(AD-432125)

Research is concentrated on isolating the spleen fraction that is able to reduce X-ray mortality. A method is presented for the preparation and purification of a cell-free calf spleen extract. The action of injections of various spleen preparations was recorded for (1) isolated turtle heart and (2) mice subjected to almost lethal total body X-ray irradiation. The reticulocyte response pattern in mice following intraperitoneal treatment with various cell-free spleen extracts has been studied. Author

N64-16860 Joint Publications Research Service, Washington, D.C.
PROBLEMS OF CYBERNETICS
A. A. Lyupunov, ed. 16 Mar. 1964 614 p refs Transl. into ENGLISH from Probl. Kibernetiki (Moscow), no. 8, 1962 p 3-356
(JPRS-23700; OTS-64-21800) OTS: $7.10

CONTENTS:

N64-16902 Joint Publications Research Service, Washington, D.C.
PRIMARY AND INITIAL PROCESSES OF THE BIOLOGICAL EFFECT OF RADIATION
G M Frank, ed 27 Feb 1964 129 p refs Transl into ENGLISH of portions from "Pervichnyye i Nachal'nyye Protsessy Biologicheskogo Deystviya Radiatsii" Moscow, Publishing House of the Acad of Sci USSR, 1963 p 45-52, 157-191, 202-213, 234-242, and 271-276
(JPRS-23426, OTS-64-21670) OTS $2.75

CONTENTS

N64-16903 Joint Publications Research Service, Washington, D C

INVESTIGATION OF RADIOCHEMICAL EFFECTS IN BIOLOGICAL OBJECTS BY THE ELECTRON PARAMAGNETIC RESONANCE METHOD

L A Blyumenfel'd and A E Kalmanson *In its* Primary and Initial Processes of the Biol Effect of Radiation 27 Feb 1964 p 1 14 refs (See N64-16902 19-16) OTS $2 75

Amino acids, in the crystalline state, and protein tissues in the form of lyophically desiccated preparations, were investigated Irradiation was conducted with a Co source, and the doses were of the order of 10^6 to 10^7 r Results are (1) Irradiated dry preparation of amino acids, as a rule, yield intense EPR spectra with a width of tens and hundreds of oersteds, and with sharply pronounced hyperfine structure resulting from the interaction of unpaired electrons with the protons and nuclei of nitrogen, which are a part of the free radicals formed With a dose of the order of 10^7 r, the yield of free radicals amounts to about 10^{19} paramagnetic particles/g It can be said that approximately one free radical is formed for each act of ionization (2) Two peculiarities become obvious in the EPR spectra of irradiated native proteins and lyophilized tissues containing 60% to 80% protein The number of free radicals emerging in the event of an equal dose of gamma irradiation in the proteins and in the tissues is less by 2 to 3 orders of magnitude than in amino acids and peptides The signal does not represent the superimposition of the EPR spectra of individual amino acids and is usually a solitary narrow peak with a half-width of 2 to 6 gauss, and there is a complete lack of hyperfine structure I v L

N64-16904 Joint Publications Research Service, Washington, D.C.

THE MECHANISM SUPPRESSING CELL DIVISION UNDER THE INFLUENCE OF IONIZING RADIATION

A. V. Lebedinskiy, V. M. Mastryukova, and A. D. Strzhizhovskiy *In its* Primary and Initial Processes of the Biol. Effect of Radiation 27 Feb. 1964 p 15–31 refs (See N64-16902 09-16) OTS: $2.75

Statistical analysis is applied to the solution of the intracellular effects, synthesis, and elimination of metabolic products. This analysis is based on the determination of the possible changes of K, the rate of the cell-division process. It is assumed that there are only two causes for the inhibition of mitotic activity—blockage of the synthesis of the biochemical complexes necessary for mitotic activity, and blockage of the genetic mechanisms A theoretical curve is given describing the mitotic index of an irradiated population as a function of time and of the irradiation dose Mitotic activity, following irradiation, abates according to an exponent, the period of which equals the duration of mitosis The initial value of the mitotic index is determined by the number of cells that escaped direct injury to the genetic apparatus in mitosis The minimum value of mitotic activity is determined by the number of cells that escaped injury to both biochemical and genetic structures The recovery rate is determined by $\alpha + K$, where α is the rate of cell recovery The form of the recovery curve depends on the irradiation dose or on the degree of cell injury Also, the effects of extracellular factors on cell division are discussed I v L

N64-16905 Joint Publications Research Service, Washington, D C

BIOCHEMICAL MECHANISMS OF RADIATION-INDUCED DISTURBANCE OF CELL DIVISION

A M Kuzin *In its* Primary and Initial Processes of the Biol Effect of Radiation 27 Feb 1964 p 32-53 refs (See N64-16902 09-16) OTS $2 75

The biochemical mechanisms of the radiation-induced disturbance of cell division are reviewed Neither tyrosine nor dialyzed melanins protect DNA from depolymerization, whereas low-molecular products of the enzymatic oxidation of tyrosine completely (under experimental conditions) protect DNA from the action of radiation In addition, a certain specificity of this protection is indicated It is believed that the causal sequence of events in an irradiated cell is as follows The energy absorbed by the cytoplasm mitochondria is realized in insignificant physicochemical shifts in the state of the supramolecular structures of these organelles of the cell There is a disturbance in the coordination of the action of the enzymes that are arranged in an orderly fashion in these organelles There is an intensification of the activity of the phenol oxidases The resulting surplus products of the enzymatic oxidation of tyrosine (or of the polyphenols similar to it), which are of a quinoid and semiquinoid structure with the properties of free radicals, diffuse toward the cell nucleus, where they form unstable addition products of DNA The blocked DNA is unable to assure that the cells begin the mitotic process and results in a reduction of the mitotic index I v L

N64-16906 Joint Publications Research Service, Washington, D C

THE SIGNIFICANCE OF CELL DAMAGE IN THE RADIATION REACTION OF THE ANIMAL ORGANISM

E Ya Grayevskiy, I M Shapiro, N M Konstantinova, and N F Barakina *In its* Primary and Initial Processes of the Biol Effect of Radiation 27 Feb 1964 p 54-79 refs (See N64-16902 09-16) OTS $2 75

Cellular changes underlie the radiation syndrome in mammals Large-scale, early cell destruction occurs only in directly irradiated tissues Cell death takes place only in cases where an injured substrate is functioning It can be assumed that the specific function that effects radiation injury is the process of differentiation The late death of cells remaining after massive disintegration is the consequence of chromosomal imbalance or of the inability of a cell to accomplish division as a result of gross structural changes in the chromosomes The principal factor limiting regeneration of irradiated tissues, after exposure to doses of 700 to 3000 r, is the small number of viable cells, since most of them carry lethal chromosomal rearrangements Direct determinations of the O_2 tension in tissues have shown that a number of factors (hypothermia, neurotropic substances, hemoglobin-combining substances, and dimercapto compounds) exerts a protective effect against radiation by lowering the O_2 tension in tissues Certain protective agents (monothiols and thiourea derivatives) are very effective against radiation, but do not cause tissue hypoxia I v L

N64-16907 Joint Publications Research Service, Washington, D.C.

THE RHYTHM OF OXIDATIVE PROCESSES AND ITS DISTURBANCE BY THE EFFECT OF RADIATION

G. M. Frank and A. D. Snezhko *In its* Primary and Initial Processes of the Biol. Effect of Radiation 27 Feb. 1964 p 80–100 refs (See N64-16902 09-16) OTS: $2.75

The effect of radiation on rabbit brain tissue was among the experiments discussed concerning the effect of radiation on the oxygen balance of tissues. It was found that, concomitant with changes in the level of free oxygen in tissues after irradiation and with changes in the "oxygen assay" curve, disturbances of the rhythm in the oxygen content were also observed. The rhythm not only fluctuated but in many cases disappeared altogether within 8 to 10 minutes after termination of irradiation, in both the cortex and subcortex. Its recovery occurred in various ways. As a rule, speedier oscillations recovered in 30 minutes, whereas the depression of slow oscillations lasted for a protracted period. It was obvious that the

radiation damaged some link of the rhythmical activity associated with the oxidative processes, with an extremely rapid manifestation of the effect. The recovery of the rhythmical activity did not coincide, in time, with the recovery of the oxygen-utilization capacity. Although both processes are to some extent interrelated, this interrelation is not rigid or single valued. I.v.L.

N64-16908 Joint Publications Research Service, Washington, D C

KINETIC REGULARITIES OF PRIMARY REACTIONS AND CHEMICAL PROTECTION

B N Tarusov *In its* Primary and Initial Processes of the Biol Effect of Radiation 27 Feb 1964 p 101-115 refs (See N64-16902 09-16) OTS $2.75

Kinetic regularities of the primary reactions and chemical protection in radiation damage are reviewed. Protective agents are effective in activating the autolytic process. It was established that cysteine and β-mercaptoethylamine, when systematically injected, accelerate the development of radiation injury after internal and external irradiation of rats by radioactive substances (cesium, strontium). This acceleration was due to the chemicals' activating autolysis. There is reason to assume that the absence of protective action, and even the negative action of protective agents, takes place as a consequence of the activation of the autolytic process or its precursor. This can be regarded as a first approximation of an understanding of the kinetic regularities of primary reactions. I.v.L.

N64-16909 Joint Publications Research Service, Washington, D C

CONCLUDING REMARKS

G M. Frank *In its* Primary and Initial Processes of the Biol Effect of Radiation 27 Feb 1964 p 116-125 (See N64-16902 09-16) OTS $2.75

A discussion is presented of two lines of approach to a more rational analysis of the jumble of interrelationships that takes place in the experimental radiochemical, biochemical, and cytological (including cytochemistry) data of radiobiology. The first line of approach is a study of the circumstances that alter the character of the biological effect in the presence of radiation action, i.e., the most diverse additional condition such as the presence or absence of oxygen, temperature effects, various protective substances, etc. The comparison of the observed effects in biological experiments during exposure to radiation of a living system with those during exposure to radiation of model chemical systems must also be included, as well as a complete series of objects of gradually increasing complexity, from a molecule to a virus particle or a bacterial particle, and on to a plant or an animal cell. The second line of approach is the use of new methodological processes that permit the direct recording of primary processes. Included in this type of procedure is the method of electron paramagnetic resonance, which makes it possible to observe the emergence, as well as the character, of free radicals that appear as a result of irradiation. I.v.L.

N64-16916 National Aeronautics and Space Administration Langley Research Center, Langley Station, Va

EVALUATION OF A GRAVITY-SIMULATION TECHNIQUE FOR STUDIES OF MAN'S SELF-LOCOMOTION IN LUNAR ENVIRONMENT

Donald E Hewes and Amos A Spady, Jr Washington, NASA, Mar 1964 36 p refs

(NASA TN D-2176) OTS $1.00

A new type of gravity-simulation technique was developed, and some tests were made to evaluate the suitability of the technique by using a preliminary setup. The results of these tests indicated that the technique was useful and that man will be able to walk and run on the moon but will have difficulty in changing his position rapidly. In addition, he should be able to jump vertical distances from 12 to 14 feet when unencumbered with a spacesuit or equipment and should most likely not sustain injury in falls from these distances; he should have little difficulty in climbing stairs, ladders, and poles. A motion-picture film supplement is made available to illustrate some of the results of these tests. Author

N64-16927 European Atomic Energy Community, Brussels (Belgium)

ANATOMO-PHYSIOLOGICAL SCHEMA OF THE GASTRO-INTESTINAL TRACT, TO BE TAKEN IN ACCOUNT IN DETERMINING THE LEVELS OF RADIOACTIVE CONTAMINATION [SCHEMA ANATOMO-PHYSIOLOGIQUE DU TRACTUS GASTROINTESTINAL A PRENDRE EN CONSIDERATION POUR LE CALCUL DES NIVEAUX DE CONTAMINATION RADIOACTIVE]

Claudine Fabry (Centre d'Etudes Nucleaires de Fontenay-aux-Roses) 1963 27 p refs In FRENCH, ENGLISH summary

(Contract EURATOM 003-63-10 PSAF)

(EUR 489 f) Available from Belgian American Bank and Trust Co., N Y., account no 121 86 50 Belg Fr

Anatomical and physiological data of the gastrointestinal tract of adults and children were summarized in a standard schema, to be used in calculating the levels of radioactive contamination in the food chain. Author

N64-16945 Oak Ridge Inst of Nuclear Studies, Inc., Tenn

MEDICAL DIVISION RESEARCH REPORT FOR 1963

Gould A Andrews et al [1963] 111 p refs

(Contract AT(40-1)-GEN-33)

(ORINS-43) OTS $2.25

Activities in the following areas are reported (1) studies of radiation effects, (2) lipid metabolism and radiation, (3) amino acid metabolism and irradiation, (4) immunology, (5) metals metabolism and medical radionuclides, (6) radioisotopes in diagnosis and therapy, (7) medical instruments development, and (8) scanning and whole body counting. R T K

N64-16950 Joint Publications Research Service, Washington, D C

INTERRELATIONSHIP BETWEEN SUPER-FAINT CHEMILUMINESCENCE AND HEAT RESISTANCE OF PLANT ORGANISMS

R A Gasanov et al 18 Mar 1964 8 p refs Transl into ENGLISH from Dokl Akad Nauk SSSR, v 153, no 4, 1963 p 947-949

(JPRS-23735, OTS-64-21820) OTS $0.50

The effect of elevated temperatures on the biochemiluminescence and on the temperature maxima of biochemiluminescence of heat-resistant plants and nonheat-resistant plants and also on various wheat and barley varieties differing in heat resistance was examined. The results demonstrated that different species of the plants investigated have specific temperature maxima of biochemiluminescence. The varieties of the same species also have difinite temperature maxima of biochemiluminescence that can serve as an index of the heat resistance of the plant. Author

N64-17157 National Aeronautics and Space Administration Langley Research Center, Langley Station, Va

MEASURED TRANSFER FUNCTIONS OF PILOTS DURING TWO-AXIS TASKS WITH MOTION

Hugh P Bergeron and James J Adams Washington. NASA. Mar 1964 42 p refs
(NASA TN D-2177) OTS $1 00

Measurements of human transfer functions, made by matching an analog pilot to a human pilot, have been obtained in tests where the variables were the number of axes being controlled, and operation with and without cockpit angular motion corresponding to the indicated error The analog pilot contained three gains that were automatically adjusted to match the pilot The tests were made with a gimbal-mounted simulator in which the simulated dynamics represented an inertia system with linear damping and control $2/s(s + 1)$, where s is the Laplace transform The results show that, although a pilot operates in a manner similar to a linear mechanism with constant gains when in a fixed-base, single-axis control loop, the addition of a second axis to his task causes him to operate with time-varying gains The further addition of motion to the simulation greatly reduces the amount of time variation in the measured gains of the pilot The tests show that the measuring method promises to be a very useful means for obtaining data on human characteristics Author

N64-17167 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div
HERALD OF THE ACADEMY OF MEDICAL SCIENCES OF THE USSR (SELECTED ARTICLES) [No. 5, 1962]
16 Apr 1963 67 p Transl into ENGLISH from Vestn Akad Med Nauk SSSR (Moscow) p 24-38, 47-52, 64-68, and 93-101
(FTD-TT-62-1097/1+2 AD-402585)
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5 THE ROLE OF ANAEROBIC AND OXIDATIVE PHOSPHORYLATION PROCESSES IN THE PROTECTIVE FUNCTIONS OF THE ORGANISM S Ye Severin p 50-64 (See N64-17172 09-16)

N64-17168 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div
THE ROLE OF THE HYPOPHYSEAL-ADRENAL SYSTEM IN IMMUNOLOGICAL AND INFECTION PROCESSES
V I Ioffe and L P Kopytovskaya *In its* Herald of the Acad of Med Sci of the USSR (Selected Articles) [No 5, 1962] 16 Apr 1963 p 1-12 (See N64-17167 09-16)

Three topics are discussed (1) the role of the hypophyseal-adrenal system in the development of an allergic reaction, (2) the influence of the hypophyseal-adrenal system on sensitivity to microbial poisons, and (3) the role of the hypophyseal-adrenal system in the development and course of infection processes R T K

N64-17169 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div
DISRUPTIONS OF NATURAL IMMUNITY IN IRRADIATED ANIMALS AND METHODS OF STIMULATING IT
V L Troitskiy *In its* Herald of the Acad of Med Sci of the USSR (Selected Articles) [No 5, 1962] 16 Apr 1963 p 13-28 (See N64-17167 09-16)

Experimental results indicate the following (1) The reestablishment of hematogenesis is an important factor in the stimulation of natural immunity, which is disrupted under the action of radiation on the organism (2) Homologous transplants of bone marrow are a powerful stimulus to hematogenesis and to the reestablishment of the disrupted natural immunity of irradiated animals (3) For preventing secondary reactions in such animals, it is wise to use an immunological method based on recognition that the immunological method reaction in irradiated bone marrow chimeras proceeds in two directions, "host against transplant" and "transplant against host," and a method of inducing ectopic myelogenesis, which eliminates the problem of tissue incompatability R T K

N64-17170 Air Force Systems Command, Wright Patterson AFB, Ohio Foreign Technology Div
THE INFLUENCE OF CHEMOTHERAPEUTIC AGENTS ON THE PROTECTIVE FUNCTIONS OF THE ORGANISM
Kh Kh Planel'yes *In its* Herald of the Acad of Med Sci of the USSR (Selected Articles) [No 5, 1962] 16 Apr 1963 p 29-39 (See N64-17167 09-16)

The factors that participate in the genesis of superinfections, which develop during the antibiotic therapy of bacterial infections, are discussed These factors lead to an increase in the susceptibility of the organism to infections whose causative agents may be only slightly pathogenic and may even be the saprophytes that are always present on the surfaces of the mucous linings of man or animals The development of superinfection depends on (1) disruption of the barrier function of the epithelial coats, (2) depression of the barrier function of the regional lymph nodes, and (3) activation of the functions of the adrenal cortex, which secretes a hormone having a "proinfection" effect R T K

N64-17171 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div
STIMULATION OF THE PROTECTIVE FUNCTIONS OF THE ORGANISM WITH PHYSICAL AGENTS
A N Obrosov, F D Vasilenko, and Ye B Markovnikova *In its* Herald of the Acad of Med Sci of the USSR (Selected Articles) [No 5, 1962] 16 Apr 1963 p 40-49 (See N64-17167 09-16)

Experimental results are cited that demonstrate the intensification of adaptational and trophic processes that occur under the action of physical stimuli Experimental data are also presented that indicate the mechanism by which physical stimuli exert their action R T K

N64-17172 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div
THE ROLE OF ANAEROBIC AND OXIDATIVE PHOSPHORYLATION PROCESSES IN THE PROTECTIVE FUNCTIONS OF THE ORGANISM
S Ye Severin *In its* Herald of the Acad of Med Sci of the USSR (Selected Articles) [No 5, 1962] 16 Apr 1963 p 50-64 (See N64-17167 09-16)

The object of this paper is to show that ATP (adenosine triphosphate) plays a multifaceted role in the various functions of the organism, and that this compound is formed in the cells under two conditions anaerobic and oxidative R T K

N64-17235 Federal Aviation Agency, Oklahoma City, Okla Civil Aeromedical Research Inst
THE VISUAL PERCEPTION OF SPATIAL EXTENT
Walter C Gogel Sep 1963 13 p refs
(CARI-63-20)

An equation expressing the relation between perceived frontoparallel size and physical depth was developed and applied to frontoparallel size judgments, determined with four observers under two viewing conditions Using the same equation and an expression of the size distance invariance hypothesis, an additional equation was developed that related perceived and physical depth The additional equation, when applied to judgments of perceived depth from the same observers under the same viewing conditions produced results that were not in agreement with those expected from the size distance invariance hypothesis This is interpreted as evidence against the validity of the size distance invariance hypothesis in its usual form The results from the apparent depth judgments were applied to the problem of the nonveridicality of the perceptual bisection of depth intervals Author

N64-17236 Federal Aviation Agency, Oklahoma City, Okla Civil Aeromedical Research Inst

THE EFFECTS OF A TRANQUILIZER ON BODY TEMPERATURE

E Arnold Higgins, P F Iampietro, Thomas Adams, and D D Holmes Oct 1963 7 p refs

(CARI-63-23)

Four young adult mongrel dogs were exposed, twice untranquilized, to each of three environmental temperatures 4 4 C, 23 9 C, and 37 8 C and exposed, twice tranquilized, with 2 2 mg/kg propiopromazine hydrochloride Rectal temperatures were monitored and recorded continuously during 2-hr exposures Little difference was noted in rectal temperature response for tranquilized and untranquilized animals at 23 9° C exposure Tranquilized animals showed a greater decline in internal temperature at an environmental temperature of 4 4° C than control and showed a rise in rectal temperature during heat exposure (37 8° C) while control animals showed a decline These results indicate an impairment in both heat loss and heat conservation mechanisms in the tranquilized animals during thermal stress, but little, if any, alteration of temperature control at a nonstressful ambient temperature Author

N64-17241 Los Alamos Scientific Lab , N Mex

AN EXAMINATION OF A MODEL OF A SEARCH BY THE SENSE OF "SMELL"

M H Goldhaber 19 Feb 1964 26 p

(Contract W-7405 ENG 36)

(LAMS-3027) OTS $0 50

A scalar field is given in space It is interpreted as an intensity of a quantity like "smell," e g , density of some molecules—in the simplest case, emanating from a (stationary or moving) point source An object (a macromolecule or an insect) tries to locate the source (another molecule in a cell or a source of food) The object is moving, and its inertia of motion or flight makes it impractical to determine in each point the steepest descent and to follow the gradient The economical or practical strategy of a search is examined Some elementary results are obtained for a two-dimensional version of the problem Author

N64-17242 Joint Publications Research Service, Washington, D C

ESSAYS ON CYBERNETICS

Lev Pavlovich Teplov 6 Mar 1964 482 p refs Transl into ENGLISH of the book "Ocherki o Kibernetike" Moscow, "Moskovskiy rabochiy" Publishing House, 1963 415 p

(JPRS-23554, OTS-64-21728) OTS $6 00

The topics discussed include the following (1) cybernetics—its place in life and among sciences, (2) improbability—the mathematical measure of labor and knowledge, (3) the anatomy of thinking and an interplanetary robot, (4) automated machines, (5) feedback—the basis of automatism in nature and technology, (6) information and cybernetics, (7) information accumulation, (8) information control (9) behavior, (10) signal converters, (11) logical machines, (12) automatic computing, (13) the statistical machine, (14) the brain—a statistical system of living ion elements, (15) the complete automation, and (16) cybernetics and humanity R T K

N64-17244 Joint Publications Research Service, Washington, D C

CYBERNETICS IN BIOLOGY, MEDICINE, AND SPACE

A Smirnov et al 19 Mar 1964 46 p Transl into ENGLISH of 8 articles from Russian periodicals

(JPRS-23749, OTS-64-21829) OTS $1 25

CONTENTS

N64-17252 Federal Aviation Agency, Oklahoma City, Okla Civil Aeromedical Research Inst

CENTRAL NERVOUS SYSTEM EFFECTS OF CHRONIC EXPOSURE TO ORGANOPHOSPHATE INSECTICIDES

J Robert Dille and Paul W Smith Oct 1963 10 p refs

(CARI-63-24)

Two cases are reported in which persistent CNS changes were noted in aerial applicator pilots after chronic exposure to organophosphate insecticides The symptomatology, the basis for these symptoms and EEG changes, and their reversibility are discussed Author

N64-17267 Sandia Corp , Albuquerque, N Mex

A METHOD FOR PERFORMING A HUMAN-FACTORS RELIABILITY ANALYSIS

A D Swain Aug 1963 53 p refs

(SCR-685) OTS $1 50

A method for performing a human-factors reliability analysis of a man machine system is described The outcome of this type of analysis is a quantitative assessment of the estimated degradation of a man machine system resulting from human errors Author

N64-17312 Minnesota U , Minneapolis

THORACIC CAGE IMPEDANCE MEASUREMENTS. DYNAMIC CHARACTERISTICS OF AN IMPEDANCE PNEUMOGRAPH

Edwin Kinnen, William Kubicek, and G Turton Brooks AFB, Tex , School of Aerospace Med , Dec 1963 9 p refs

(Contract AF 41(657)-403)

(SAM-TDR-63-100, AD-430623)

An accurate calibration of an impedance pneumograph is complicated by two factors—tissue movement throughout the thorax during respiration and the mode of inspiration In either

case, the result is a variation in transthoracic electrical impedance that is not related to inspired air volume. It was found that the change of thoracic impedance as a function of inspired air volume for normal repeated inspirations had a variation of 50% at the 0.2-l level of inspiration, decreasing to 10% at the 2-l level. A significantly greater percent variation was noted for changes in the mode of subjects' breathing and between subjects. Author

N64-17351 Joint Publications Research Service, Washington, D.C.
STUDIES ON HIGHER NERVOUS ACTIVITY AND CONDITIONED REFLEXES
24 Mar. 1964. 42 p. refs. Transl. into ENGLISH of 3 articles from Zh. Vysshei Nervnoi Deyatel'nosti im. I. P. Pavlova (Moscow), v. 13, no. 6, 1963, p. 953-961, 1039-1045, and 1077-1086.
(JPRS-23833, OTS-64-21874) OTS: $1.25

CONTENTS:

1. CHANGE IN HIGHER NERVOUS ACTIVITY AND SOME VEGETATIVE REACTIONS DURING PROLONGED EXPOSURE TO CONDITIONS OF RELATIVE ADYNAMIA AND ISOLATION. N. A. Agadzhanyan, Yu. P. Bizin, G. P. Doronin, and A. G. Kuznetsov. p. 1-15. refs.
2. CONDITIONED INHIBITION IN DOGS WITH A UNILATERALLY REMOVED THALAMUS. L. N. Gavrilova. p. 16-25. refs.
3. CHANGES IN MOTOR CONDITIONED FOOD REFLEXES IN PIGEONS FOLLOWING A LESION OF THE PALEOCORTEX. N. L. Krushinskaya (Moscow U.). p. 26-39. refs.

N64-17466 Rochester U., N.Y.
A FEASIBILITY STUDY OF A NEW DEVICE TO MEASURE RADON IN THE BREATH
John B. Hursh. 13 Mar. 1964. 23 p. refs.
(Contract W-7401-ENG-49)
(UR-640)

A new device developed for measurement of thoron in the breath has been studied for its suitability to detect breath radon. Calibration curves are presented, which show that the counting rate versus time for a given radon concentration is a function of gas flow rate. If the flow rate is held constant, the counting rate is directly proportional to radon concentration at any given time after gas flow begins. If 1 pc/L radon in air at standard conditions is passed through the detector at a rate of 7 L/min, the 20-minute total net count is 570 counts, which may be compared with a 20-minute background count of 4 counts. It is concluded that the proposed system should be satisfactory to detect radium burdens in man with a lower limit of about 0.01 μc. Author

N64-17491 Electronic Associates, Inc., Princeton, N.J. Education and Training Group
BIBLIOGRAPHY OF BIO-ENGINEERING MODELS AND MODEL MATCHING METHODS FOR ANALOG AND HYBRID COMPUTERS
A. Ben Clymer. 17 Jun. 1963. 8 p. 132 refs.

This bibliography includes the following topics: (1) human operator and general model-matching methods, (2) homeostatic systems, (3) biochemical kinetic and compartmental systems, and (4) neural systems. R.T.K.

N64-17498 Walter Reed Army Inst. of Research, Washington, D.C.
CONTINUOUS OPPORTUNITY FOR REINFORCING BRAIN STIMULATION
Elliot S. Valenstein and Bernard Beer. Repr. from J. Exptl. Analysis of Behavior, v. 7, no. 2, Mar. 1964. p. 183-184. refs. (NASA Grant NsG-437)

The performance of a rat that was provided with continuous opportunity to obtain reinforcing brain stimulation over a 20-day period is described in detail. The animal averaged 29.2 responses per minute during the entire time. The testing session was terminated by experimenters, but a day-by-day analysis of behavior provided no evidence that the animal would have stopped responding. Author

N64-17508 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.
CONTROL OF A DISCRETE STOCHASTIC PROCESS AS A FUNCTION OF THE COSTS FOR MAKING CORRECTIVE ACTIONS
John P. Hornseth, Walter J. Huebner, and William H. Pearson. Dec. 1963. 19 p. refs.
(AMRL-TDR-63-111, AD-432826) OTS: $0.50

This research examines man's ability to control a discrete stochastic process. The cost (C_1) for correcting the process before it exceeded an arbitrary tolerance limit served as the experimental variable. The cost (C_2) for correcting this process after it exceeded the tolerance limit was fixed. For low C_1 costs, the human controller achieved optimum control (i.e., minimized control cost) within four 100-cycle trials. For high C_1 costs, the human controller achieved a level of control equivalent to that of the optimum controller on the first 100-cycle trial. An additional requirement to serve as a statistical sensor was imposed in controlling the process under low C_1 cost conditions. The human controller's response to this requirement was appropriate. The implications of these results to the design of discrete stochastic process controllers are discussed. Author

N64-17509 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.
EFFECT OF TRANSIENT WEIGHTLESSNESS ON BINOCULAR DEPTH PERCEPTION
Edwin H. Sasaki. Dec. 1963. 18 p. refs.
(AMRL-TDR-63-134; AD-432802) OTS: $0.75

To determine the effect of transient weightlessness on binocular depth perception, five subjects were tested under three levels of gravity—0 g, 1 g, and 2 g—produced by flying a JC-131B aircraft through appropriate maneuvers. A modified Howard–Dolman depth perception apparatus was installed in the aircraft. The experimenter set one of three rods forward or backward 1, 2, 3, 4, 5, or 6 cm from the other two rods. Each of the six distance intervals was randomly assigned to one rod position and direction of displacement. The subjects then reported for each trial whether the rods appeared to be equally distant or whether one appeared to be in front or back of the other two. Results indicated that binocular depth perception was not appreciably affected by the three different gravity conditions. Author

N64-17510 Aerospace Medical Div. Aerospace Medical Research Lab. (6570th), Wright-Patterson AFB, Ohio
THE EFFECTS OF CURVILINEAR AND DISCRETE TRANSFORMATIONS OF ERROR INFORMATION ON HUMAN TRACKING PERFORMANCE
Darwin P. Hunt. Dec. 1963. 17 p. refs. Work conducted by Dayton U. and Antioch Coll.
(Contract AF 33(616)-7863; Contract AF 33(657)-7362)
(AMRL-TDR-63-137; AD-432707) OTS: $0.50

The effects of discrete nonlinear transformations of tracking error information on the accuracy and efficiency with which the human operator can perform a compensatory tracking task were studied. Nine groups of seven subjects each were given forty 1-min trials under nine different informational display conditions. Indices of tracking accuracy and tracking efficiency were obtained by integrating absolute values of the voltage analogs of the actual tracking error and of the control stick deflections, respectively. Greater tracking accuracy was associated with (1) a linear relationship between displayed error and actual error, (2) a larger number of informational categories, and (3) practice. Generally, tracking accuracy improved in a negatively accelerated fashion as the number of informational display categoreis increased. Tracking efficiency generally increased with practice. Author

N64-17536 Joint Publications Research Service, Washington, D.C.
SELECTING SPACESHIP CREW BY PSYCHOLOGISTS
M. Novikov 25 Mar. 1964 7 p Transl. into ENGLISH from Nauka i Zhizn' (Moscow), no. 9, Sep. 1963 p 39-41
(JPRS-23853; OTS-64-21885) OTS: $0.50

The two main psychological aspects of spaceflight are discussed. These are (1) the interactions of people engaged in group activity and (2) the effect of long residence in the closed system of a spaceship. The ways in which the psychological selection of crews can help to minimize these problems are discussed. R.T.K.

N64-17539 Czechoslovak Academy of Sciences, Prague
ELECTRIC PROPERTIES OF TISSUES [ELEKTRICKE VLASTNOSTI TKANI]
Jan Kryspin, Zdenka Harantova, and Bozena Safrankova 1963 52 p refs In CZECH, ENGLISH summary
(*Its* Rozpravy v. 73, no. 10)

Described is the methodical approach used for the measurement of electric properties of tissues, centered mainly on the ohmic component of impedance, for clinical research a commercially available apparatus, Foreometer PREMA, has been used. The principle of the method is the measurement of the potential difference of tissue, either spontaneous or caused by the constant current of known intensity flowing through the tissue. The experimental approach consists in ascertaining the function voltage-time ($E = f(t)$), or voltage-current ($E = f(I)$). The importance of the geometry of the system and of the nonpolarizability of electrodes in these measurements is emphasized. In several cases, a four-electrode measurement was carried out. Given are the results of research on the electric properties of human skin, of human squamous epithelium of the cervix uteri, of the aortic wall in rabbits and of liver, kidney, and brain tissue in mice and rats. Author

N64-17550 Deutsche Versuchsanstalt fur Luft-und Raumfahrt, Bad Godesberg (W. Germany) Inst. fur Flugmedizin
HAZARDS OF MANNED SPACE FLIGHT THROUGH SUDDEN PRESSURE LOWERING [GEFAHREN DER BEMANNTEN WELTRAUMFAHRT DURCH PLOTZLICHE DRUCKERNIEDRIGUNG]
H. Hartmann [1963] 9 p Presented at the Ann. Meeting of the Wiss. Ges. fur Luft-und Raumfahrt, Munich, 8-12 Oct. 1963 In GERMAN

Hazards of manned spaceflight are reviewed from the standpoints of technical failure or micrometeorite impact, which result in a pressure drop in the space capsule along with a simultaneous disturbance in the pressure suit. It appears that in a sudden pressure drop the initial danger is air embolism. The solubility components take effect a few minutes later. However, air embolism is less hazardous than the effect of the solubility components, since the astronaut breathes only oxygen. Solubility components are discussed, along with the possibility of saving an afflicted astronaut in a large space vehicle, such as a space station. I.v.L.

N64-17555 Joint Publications Research Service, Washington, D.C.
ANTIRADIATION PROPERTIES OF GALLATES
A. A. Gorodetskiy and V. A. Baraboy 24 Mar. 1964 66 p refs Transl. into ENGLISH of chapters 1, 3, and 4 and the conclusion from the book "Protivoluchevyye Svoystva Gallatov" Kiev, 1963 p 5-12, 41-86, and 125-126
(JPRS-23834; OTS-64-21875) OTS: $1.75

The topics dicusssed are: (1) mechanisms of protection against radiation; (2) protective action of gallates during experimental acute radiation sickness; and (3) therapeutic action of gallates. The results of studies of the antiradiation, toxicological, and pharmacological properties of the gallates are summarized. R.T.K.

N64-17601 American Inst. of Biological Sciences, Washington, D.C.
AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES INTERDISCIPLINARY CONFERENCE PROGRAM
Murray D. Rosenberg (Rockefeller Inst.) [1964] 4 p 2nd Conf. on Cellular Dyn. held at Princeton, N.J., 9-12 Feb. 1964
(NASA Contract NASr-132)
(NASA CR-53290) OTS: $1.10 ph, $0.80 mf

Discussions carried on during the conference were concerned with the following topics: the physical chemistry of interfaces; the structure of membranes; interactions between cell surfaces and solid substrata; cell-cell interactions; surface active enzymatic reactions; and localization of antigens at surfaces. P.V.E.

N64-17649 Frankford Arsenal, Philadelphia, Pa.
IMPROVEMENT OF LAP BELT TIGHTENER
F. T. Pisano Feb. 1964 20 p
(FA-M64-23-1, AD-432687)

Analytical and design studies were conducted on the aircraft lap-belt-tightener mechanism. Substitution of a ball-type initial lock mechanism for the Belleville spring increased the lap-belt-tightener tension load capacity, and use of a high-strength material increased the loop load capacity. A minor configuration change in the piston locking mechanism provided more reliable operation. In the final ballistic tests, the M67 cartridges were substituted for the M73. The M67 cartridge generated the desired gas pressure in the system and operated the lap-belt-tightener within the specified limits. Author

N64-17659 Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab
DETERMINATION OF RESPIRATORY REQUIREMENTS FOR GAS MIXTURES IN MANNED SPACE CAPSULES
Edwin Hendler 12 Mar. 1964 11 p refs
(NAEC-ACEL-518; AD-432462)

Requirements for artificial atmospheres in manned space vehicles are expressed in graphic form, and take into account varying proportions of oxygen and nitrogen in the respired gaseous mixture, as well as initial pressure (before decompression) and final pressure (after decompression). Criteria used in the determination of artificial atmosphere requirements include avoidance of both hypoxia and decompression sickness due to pressure changes. Author

N64-17707 California U., Berkeley Lawrence Radiation Lab
TRYPTOPHAN SYNTHETASE MUTANTS OF YEAST: ACTION OF A SUPER-SUPPRESSOR IN RELATION TO ALLELIC MAPPING AND COMPLEMENTATION

Thomas R Manney (Ph D Thesis) 8 Jan 1964 128 p refs
(Contract W-7405-ENG-48)
(UCRL-11191) OTS $2 50

In order to construct an allelic map of the tryptophan synthetase locus (tr_5) a new method is developed This method is based on the use of X-rays to induce allelic recombination at mitosis in heteroallelic diploids The map is constructed from the slopes of X-ray dose-frequency curves Of 32 tr_5 mutants, 13 are suppressed to prototrophy by a single super-suppressor, S_d One other is changed to a different mutant phenotype by the same suppressor These suppressible mutants map along the entire length of the X-ray allelic map, with four of them being repeat mutations at a site near one end of the map There is a strong exclusion between complementation and suppressibility Only 2 of the 13 suppressible alleles gave any evidence of allelic complementation, whereas all but five of the nonsuppressible ones complemented with at least one other Author

N64-17738 Joint Publications Research Service, Washington, D C
PHYSIOLOGICAL REACTIONS OF COSMONAUTS DURING THE ACTION OF G-LOADS AND WEIGHTLESSNESS
V I Yazdovskiy, I I Kas'yan, and V I Kopanev (USSR Acad of Med Sci) 27 Mar 1964 33 p refs Transl into ENGLISH from Izv Akad Nauk SSSR, Ser Biol (Moscow), v 29, no 1, 1964 p 12-31
(JPRS-23917, OTS-64-21924) OTS $1 00

The flights by Soviet and American cosmonauts showed the possibility of man s residence under conditions of weightlessness for a period of 120 hours Monitoring systems of the health status and work capability of the cosmonauts made it possible to obtain valuable information on the nature of changes in the functional condition of the cardiovascular and respiratory systems in the course of flight During the period of putting the ship into orbit, the pulse rate increased, during the period of weightlessness, it gradually lowered It was minimal during sleep and increased again during the descent of the spaceship The time intervals of the EEG and the EKG during flight did not change substantially The respiratory rate decreased in the period of acceleration and increased slightly during orbital flight Author

N64-17766 Columbia U , N Y Biomedical Engineering Lab
METHODS FOR DETERMINING BLOOD FLOW THROUGH INTACT VESSELS OF EXPERIMENTAL ANIMALS UNDER CONDITIONS OF GRAVITATIONAL STRESS AND IN EXTRA-TERRESTRIAL SPACE CAPSULES [Progress Report] 1 Aug. 1962-31 Jul. 1963
Robert Feldstein, James M Kennedy, Louis B Lambert, Albert F Sciorra, and Robert F Shaw 1 Aug 1963 137 p refs
(NASA Grant NsG-112-61)
(NASA CR-53302, CU-3-63-NASA-112-ERL, Status Report P-3/168) OTS $10 50 ph, $4 31 mf

A 30- to 90-day orbital study of the effects of sustained space flight upon physiologic performance has been designed utilizing experimental animals (primates) as the subjects The study emphasizes complete assessment of the performance of the cardiovascular and respiratory systems Three techniques are utilized continuous measurement and telemetry of physiologic performance of critical organ systems, an inflight sensory-motor study making use of an operant conditioning schedule, and a complete inflight metabolic-balance study and preflight-postflight organ function tests Systems analysis of alternative orbital systems has been performed, and weight, power, and similar requirements are presented for recoverable vs nonrecoverable systems, battery power vs solar power, for Rhesus monkeys and chimpanzees of various numbers, and for missions of various durations Author

N64-17790 Martin Co , Denver, Colo
RESCUE AND ESCAPE SYSTEMS FROM TALL STRUCTURES (RESTS) Final report
D Lorenz, W Offik, L Blish, G Batiuk, R Sexton et al Oct 1963 320 p refs
(NASA Contract NAS10-522)
(NASA CR-53344, NASA-CR-63-109) OTS $19 75 ph, $9 80 mf

Comprehensive data are provided under the three major subdivisions of the study hazards analysis, human factors, and concept development The recommended escape system (a combination of several devices and techniques) is carefully documented with illustrations and testing data Appendixes are provided on propellants, characteristics of explosion-generated shock waves, and general data Author

N64-17805 Joint Publications Research Service, Washington, D.C.
THE MUTAGENIC AND ANTIMUTAGENIC ACTION OF SODIUM GALLATE
V. A. Baraboy and G. S. Yukova 20 Mar. 1964 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 153, no. 5, 1963 p 1193-1194
(JPRS-23787; OTS-64-21849) OTS: $0.50

Experiments were carried out on germinating seeds of Russian black horse beans (*Vicia faba*) that were exposed to the action of different concentrations of sodium gallate solutions, prior to fixation. In sodium gallate concentrations of 0.00001 γ/ml (parts per ml) and 0.0001 γ/ml, an antimutagenic effect was detected. In the former concentration, the effect was completely reliable statistically; in the latter concentration, it is possible to speak only of a tendency toward a decreased percentage of natural mutations. Sodium gallate in higher concentrations (up to 1.0 γ/ml) displays a moderately marked mutagenic action, and only in a concentration of 100 γ/ml does this effect prove to be maximal, exceeding twice the control level. An analysis was made of the nature and amount of cellular damage (formation of bridges and fragments of chromosomes). I.v.L.

N64-17806 Joint Publications Research Service, Washington, D.C.
TWO FUSION THRESHOLDS OF LIGHT STIMULI IN THE VISUAL ANALYZOR OF MAN
M. I. Venslauskas and A. M. Gutman 31 Mar. 1964 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 153, no. 5, 1963 p 1202-1203
(JPRS-23946; OTS-64-21943) OTS: $0.50

A multineuronal system is stimulated when $\sigma = \epsilon - j \geq \sigma_0$ where σ is effective stimulation, and σ_0 is its threshold value. For a difference in the two stimuli, it is necessary and sufficient that the threshold σ_0 be reached during the first stimulus, that between the first and second stimuli, σ be less than the threshold, and that the threshold be reached during the second stimulus. Experimental data obtained with five subjects are presented in a table, and show the distribution of frequency of distinction of double stimuli. E.W.

N64-17838 National Aeronautics and Space Adminstration, Washington, D C
THE MEASUREMENT OF BLOOD PRESSURE IN THE HUMAN BODY
C R Smith and W H Bickley (Clyde Williams and Co) Apr 1964 39 p refs
(NASA SP-5006) GPO $0 30

The importance of blood-pressure measurement is discussed in terms of the detection of malfunctions of the heart and diseases of the blood-carrying ducts First, an explanation is given of what, exactly, is meant by blood pressure, followed by a discussion of the history of blood-pressure measurement

Blood-pressure measurements used in the 20th century are then described, and an outline is given of NASA's role in blood-pressure monitoring research. Finally, a discussion is given in support of the development of unconventional techniques in measuring blood pressure. C.L.W.

N64-17864 Boyce Thompson Inst. for Plant Research, Inc., Yonkers, N.Y.
RESEARCH ON TISSUE CULTURES OF HIGHER PLANTS
Walter Tulecke. Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Dec. 1963. 34 p. refs
(Contract AF 33(657)-9298)
(AMRL-TDR-63-124; AD-431213)

The nutrient requirements of several plant tissue cultures, their protein content, and their ability to fix carbon dioxide were investigated. These studies were undertaken to compare higher plant tissue cultures with the alga, *Chlorella pyrenoidosa* (Indiana #26). Several plant tissue cultures could be grown on defined media, but these media were more complex than those required for *Chlorella*. The protein in the alcohol insoluble residue of *Chlorella* was 60%, and the protein in the same residue from tissue cultures was 10% to 39%. The carbon dioxide fixation of *Chlorella* exceeded the fixing capacity of the tissue cultures, but some appreciable photosynthetic activity was recorded for tomato tissue. These results are considered preliminary and are not considered indicative of the best autotrophic higher plant tissue cultures that could be obtained. Author

N64-17882 Massachusetts Inst. of Tech., Cambridge Research Lab. of Electronics
SPEECH COMMUNICATION
K. N. Stevens, M. Halle, J. B. Dennis, J. M. Heinz, A. S. House et al. *In its* Quarterly Progress Rept. No. 72 [for Period Ending Nov. 30, 1963] 15 Jan. 1964. p 211 (See N64-17876 10-01)
(NASA Grant NsG-496; Contract AF 19(628)-3325; NSF Grant G-16526, NIH Grant MH-04737-03; NIH Grant NB-04332-01)

Research activities include the development of procedures for the analysis and synthesis of speech, and the use of these procedures in the study of human-speech processes. R.T.K.

N64-17884 Massachusetts Inst. of Tech., Cambridge Research Lab. of Electronics
COMMUNICATIONS BIOPHYSICS
M. Eden, J. L. Hall, II, W. T. Peake, R. R. Pfeiffer, W. A. Rosenblith et al. *In its* Quarterly Progress Rept. No. 72 [for Period Ending Nov. 30, 1963] 15 Jan. 1964. p 223-231 refs (See N64-17876 10-01)
(NASA Grant NsG-496; NSF Grant G-16526, NIH Grant MH-04737-03)

The major research efforts have been directed toward an understanding of the communication senses, particularly the sense of hearing. Activity is concentrated in the four major areas of neuroelectric studies, psychophysical and behavioral studies, investigations of mathematical models, and research on problems in instrumentation and data processing. R.T.K.

N64-17885 Massachusetts Inst. of Tech., Cambridge Research Lab. of Electronics
NEUROPHYSIOLOGY
W. S. Mc Culloch, F. S. Axelrod, H. A. Baldwin, P. O. Bishop, M. Blum et al. *In its* Quarterly Progress Rept. No. 72 [for Period Ending Nov. 30, 1963] 15 Jan. 1964. p 233-256 refs (See N64-17876 10-01)
(NASA Grant NsG-496, NSF Grant G-16526, NIH Grant MH-04737-03, NIH Grant NB-04897-01; Contract AF 33(616)-7783)

Among the topics discussed are: (1) algorithmic theories of growth and differentiation, (2) measures on the computation speed of partial recursive functions, (3) olfaction, (4) nonlinear operator in the pupil system, (5) double oscillations in the pupil servomechanism, (6) accommodation tracking, (7) experiments on error as a function of response time in horizonal eye movements; (8) optokinetic nystagmus in man, and (9) remote on-line computer diagnosis of the clinical electrocardiogram. R.T.K.

N64-17921 Wisconsin U., Madison Mathematics Research Center
LITERATURE REVIEW OF EXPERIMENTAL DESIGN THROUGH 1949
W. T. Federer. Feb. 1964. 161 p. 1451 refs
(Contract DA-11-022-ORD-2059)
(MRC-TSR-405; AD-433913)

This review of literature in the conduct, the design, and analysis of data from experiments contains a bibliography of slightly less than 1,500 references through the year 1949. Reference is made to the several previous bibliographies in this area; since the applications and needs have been traditionally in the various fields of biology, the references are preponderantly from journals that pertain to biology. Author

N64-17924 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
THE EFFECTS OF ALCOHOL AND HYPOXIA ON THE HETEROPHORIAS
Richard L. Masters. Feb. 1964. 24 p. refs
(*Its* Aeromed. Rev. 2-64; AD-433129)

The available literature on the effects of alcohol (ethanol), and the effects of hypoxia on the phorias is reviewed. Author

N64-17926 State U. of New York at Buffalo. School of Medicine
STUDIES IN PULMONARY PHYSIOLOGY: MECHANICS, CHEMISTRY, AND CIRCULATION OF THE LUNG, VOLUME I (1959-1963)
Hermann Rahn and Leon E. Farhi. Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Oct. 1963. 285 p. refs
(Contract AF 33(616)-6823; Contract AF 33(657)-10082)
(AMRL-TDR-63-103(1); AD-426967) OTS: $4.00

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19. PERFUSION OF THE UNDERVENTILATED COMPARTMENT OF THE LUNGS IN ASTHMATIC CHILDREN M. K. Ledbetter, E. Bruck, and L. E. Farhi p 149–157 refs (See N64-17945 10-16)

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GAS STORES

24. DYNAMICS OF CHANGES IN CARBON DIOXIDE STORES L. E. Farhi and H. Rahn p 187–197 refs (See N64-17950 10-16)

25. OXYGEN STORES OF MAN H. Rahn p 198–207 refs (See N64-17951 10-16)

26. THE ROLE OF N_2 GAS IN VARIOUS BIOLOGICAL PROCESSES WITH PARTICULAR REFERENCE TO THE LUNG H. Rahn p 208–227 refs (See N64-17952 10-16)

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28. THE EFFECT OF BAROMETRIC PRESSURE ON LUNG COLLAPSE FOLLOWING TRACHEAL OCCLUSION IN RATS BREATHING PURE OXYGEN W. G. Robertson and L. E. Farhi p 233-242 refs (See N64-17954 10-16)

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30. AQUATIC GAS EXCHANGE: THEORY H. Rahn p 258–273 refs (See N64-17956 10-16)

N64-17927 State U. of New York at Buffalo School of Medicine

ABDOMINAL AND THORACIC PRESSURES AT DIFFERENT LUNG VOLUMES

Emilio Agostoni and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959–1963) Oct. 1963 p 1-6 refs (See N64-17926 10-16) OTS: $4.00

The abdominal (gastric) pressures as well as the intrathoracic pressures were recorded in man during various respiratory maneuvers, such as complete relaxation, moderate inspiratory and expiratory efforts, maximal inspiratory and expiratory efforts, and during maximal abdominal pressure efforts. Each maneuver was systematically carried out at various lung volumes. From these measurements it is possible to determine the transdiaphragmatic pressure difference and thus obtain information concerning the activity of the diaphragm during these various maneuvers. During relaxation pressure maneuvers and during moderate expiratory pressure efforts the transdiaphragmatic pressure difference is zero. During maximal inspiratory efforts the pressure is about 100 cm H_2O more positive on the abdominal side than on the thoracic side of the diaphragm regardless of the lung volume. Author

N64-17928 State U. of New York at Buffalo School of Medicine

VELOCITY OF MUSCLE SHORTENING AS A LIMITING FACTOR IN RESPIRATORY AIR FLOW

Emilio Agostoni and W. O. Fenn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959–1963) Oct. 1963 p 7-11 refs (See N64-17926 10-16) OTS: $4.00

The pressure volume relationship of the respiratory apparatus during maximum inspiration and expiration, made as quickly as possible through different resistances, has been determined. The time course of the alveolar pressure during such events has been described. The maximum work done by the respiratory muscles increases as the resistance increases and as the speed of muscle shortening decreases. The relationship between maximum work and mean velocity or, at a given volume, between alveolar pressure and instantaneous flow is nearly linear. The discrepancy between the relationship found and the hyperbolic one described by the characteristic equation of the muscles is ascribed to the geometrical and anatomical complexities of the respiratory apparatus. The results, however, show that the airflow is limited by the rate with which the muscles are able to mobilize chemical potential energy for the performance of work. Author

N64-17929 State U. of New York at Buffalo School of Medicine

ABDOMINAL MUSCLE AND DIAPHRAGM ACTIVITIES AND CAVITY PRESSURES IN PRESSURE BREATHING

Beverly Bishop *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct 1963 p 12-17 refs (See N64-17926 10-16) OTS: $4.00

The respiratory contribution of the diaphragm and external oblique abdominal muscle has been assessed by recording from the anesthetized cat the integrated electromyograms during continuous pressure breathing. As the intrapulmonary pressure is progressively reduced from 0 to -12 cm H_2O, the diaphragm becomes increasingly active until it has no silent period during the respiratory cycle. Concomitantly, any respiratory activity in the abdominal muscle is completely silenced. When the animal is subjected to pressures from 0 to $+14$ cm H_2O, the diaphragm is initially inhibited and the abdominal muscle becomes increasingly active. During negative pressure breathing, respiration is an inspiratory act, and only the thorax is subjected to stress. During positive pressure breathing, respiration is an expiratory act, and both the thorax and abdomen are subjected to the stress. Author

N64-17930 State U. of New York at Buffalo School of Medicine

REFLEX CONTROL OF THE ABDOMINAL MUSCLES DURING POSITIVE PRESSURE BREATHING

Beverly Bishop *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct 1963 p 18-33 refs (See N64-17926 10-16) OTS: $4.00

An investigation was undertaken to determine the location of receptors responsible for the active expiration of continuous positive pressure breathing and the pathways subserving this reflex. Anesthetized cats were used in the study. The cats were subjected to continuous positive pressure breathing and the diaphragm was inhibited; the abdominal muscles became active during expiration. The higher the pressure to which the animals were subjected, the more severe was the diaphragm inhibition and the greater the abdominal muscle participation. The experiments conducted in this study have demonstrated that one essential component for initiating and maintaining active expiration during continuous positive pressure breathing lies in the thorax. It was found that abdominal vagotomy or complete abdominal evisceration does not interrupt the abdominal muscle response to continuous positive pressure breathing, which can be abolished by bilateral cervical vagotomy. C.L.W.

N64-17931 State U. of New York at Buffalo School of Medicine

EFFECT OF NEGATIVE PRESSURE BREATHING ON LUNG MECHANICS AND VENOUS ADMIXTURE

Tulio Velasquez and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 34-50 refs (See N64-17926 10-16) OTS: $4.00

In a study of negative pressure breathing in anesthetized dogs, means were taken to quantitate the changes in reference to the pressure applied, to determine the factors involved, and to study the relationship between changes in respiratory compliance and those occurring in the venous admixture. In studying the changes in total respiratory compliance, a muscle relaxant was used in order to measure only the elastic forces. The studies on the venous admixture were conducted on animals ventilated with 100% O_2 to exclude effects of distribution and diffusion limitations. C.L.W.

N64-17932 State U. of New York at Buffalo School of Medicine

DETERMINATION OF ALVEOLAR CAPILLARY TEMPERATURE

A. W. T. Edwards, T. Velasquez, and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol 1 (1959-1963) Oct. 1963 p 51-57 refs (See N64-17926 10-16) OTS: $4.00

Knowledge of the solubility of most inert gases in arterial blood may be used to determine the equilibration temperature, i.e., alveolar temperature. Because the partial pressure of inert gas in arterial blood cannot be deduced from the alveolar pressure, direct determination of solubility is impractical. If a mixture of two inert gases is used, the ratio of partial pressures in the arterial blood is equal to that in the inspired gas, and the ratio of gas contents will vary with the ratio of solubility. The blood solubility ratio He/A varies by 1.34% per degree centigrade. Using an O_2-He-A inspired mixture, the following points were established in five resting subjects, fully clothed: (1) The pulmonary capillary temperature (T_{PC}) is linearly related to the rectal temperature (T_R), with a regression line equation: $T_{PC} = 37.5 + 2.4\ (T_R - 37.1)$. (2) When measurements were obtained on the same subject on different days, these measurements show that variations in T_{PC} are in the same direction as changes in T_R, but much more pronounced. Author

N64-17933 State U. of New York at Buffalo School of Medicine

ESTIMATION OF TRUE VENOUS AND ARTERIAL P_{CO_2} AND CARDIAC OUTPUT BY GAS ANALYSIS OF A SINGLE BREATH

T. S. Kim, Hermann Rahn, and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 58-73 refs (See N64-17926 10-16) OTS: $4.00

The method presented is one of the several bloodless cardiac output techniques. It entails no discomfort to the patient and requires no blood analysis. When compared to other rebreathing or reequilibration methods its advantages become apparent: no timing is required, no complex breathing maneuvers have to be performed, no special gas mixtures are needed, and the apparatus required is standard. C.L.W.

N64-17934 State U. of New York at Buffalo School of Medicine

ALVEOLAR GAS EXCHANGE DURING BREATH HOLDING WITH AIR

E. H. Lanphier and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 74-78 refs (See N64-17926 10-16) OTS: $4.00

Four normal subjects used a partial rebreathing procedure to deliver frequent alveolar gas samples during breath holding with air. In breath holding during mild exertion, O_2 uptake declined steadily, while CO_2 transfer dropped abruptly and later ceased entirely as alveolar P_{CO_2} reached a virtual plateau. Application of estimated instantaneous values of the mean exchange ratio (R) provided an indication of mixed venous blood values and permitted interpretation in terms of the changing venous-alveolar-arterial relationships. Arterial P_{CO_2} very early equaled mixed venous P_{CO_2}, and then increasingly exceeded it. The plateau of alveolar P_{CO_2} was due in part to the fall in alveolar P_{O_2} since decreasing O_2 uptake lessened the CO_2-concentrating effect of lung-volume reduction, while the P_{CO_2}-elevating effect of blood oxygenation was also diminishing. However, an important slowing of the rise in mixed venous CO_2 content and P_{CO_2} was also noted and remains unexplained. Author

N64-17935 State U. of New York at Buffalo School of Medicine

ALVEOLAR GAS EXCHANGE DURING BREATH-HOLD DIVING

E. H. Lanphier and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 79-85 refs (See N64-17926 10-16) OTS: $4.00

Use of a recompression chamber permitted simulation of breath-hold dives to 33 ft of sea water (2 atm abs). Four normal subjects made such dives during rest and mild exertion while delivering alveolar gas samples, at frequent intervals by a partial-rebreathing procedure. The course of alveolar gas exchange differed greatly from that in ordinary breath holding. Oxygen uptake remained at near normal levels until ascent owing to the maintenance of alveolar P_{O_2} by increased ambient pressure. Reversal of CO_2 transfer occurred during descent, and little CO_2 moved in the normal direction until ascent. Greater uptake of oxygen and retention of CO_2 in the body led to lower final values of both alveolar P_{O_2} and P_{CO_2} than in comparable breath holding at the surface. Hyperventilation made possible longer dives with harder work, and in these the P_{O_2} reached very low values on ascent. One subject showed a final P_{O_2} of 24 mm Hg with evidence of reversed O_2 transfer. Acute hypoxia on ascent is a likely cause of drowning in breath-hold diving. Author

N64-17936 State U. of New York at Buffalo School of Medicine

LESSONS FROM BREATH HOLDING

Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 86-93 refs (See N64-17926 10-16) OTS: $4.00

This report deals with oxygen and carbon dioxide tension through breath holding and the changes in respiratory drives with altitude acclimatization. Observations were made of subjects during the process of breath holding and of subjects at differing sea levels. Observations were also made of subjects holding their breath under water. C.L.W.

N64-17937 State U. of New York at Buffalo School of Medicine

DETERMINATION OF DISSOLVED N_2 IN BLOOD BY GAS CHROMATOGRAPHY AND (a-A)N_2 DIFFERENCE

Leon E. Farhi, A. W. T. Edwards, and T. Homma *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 94-103 refs (See N64-17926 10-16) OTS: $4.00

By combining vacuum extraction in a Van Slyke chamber and separation of the extracted gases in a gas chromatograph, it is possible to determine N_2 content of 1.5 ml of blood or other biological fluids in less than 10 min. The 95% confidence limits are 0.44% on either side of the mean of the triplicate analysis, or 2.4 mm P_{N_2} in arterial blood when breathing room air. Application of the method to the problem of arterial-alveolar N_2 difference yielded the following data: (1) N_2 solubility in whole blood at 37.3° C varied from 0.0125 to 0.0129. (2) N_2 solubility in urine is inversely related to urine specific gravity, confirming Klocke and Rahn's data. (3) Changes in arterial N_2 content were reflected in arm superficial venous blood and urine N_2 only after a considerable period of time, indicating that either of these will give an excellent indication of the mean P_{N_2} over a period of time. (4) There is no systematic difference between venous blood and urine P_{N_2}. (5) The (a-A)N_2 difference in nine normal subjects varied from 3.7 to 13.1 mm Hg. Author

N64-17938 State U. of New York at Buffalo School of Medicine

SIMPLE METHOD FOR RAPID DETERMINATION OF AN O_2 DISSOCIATION CURVE OF THE BLOOD

Pierre E. Haab, Johannes Piiper, and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 104-105 refs (See N64-17926 10-16) OTS: $4.00

A procedure has been devised for determining an O_2 dissociation curve using polarographic measurements of the blood O_2 tension. Instead of equilibrating blood samples with known O_2 tensions and measuring the resulting O_2 contents as in the classicial approach, the present method relies on calculating the oxygen content in various blood mixtures and the direct measurement of the oxygen tensions. C.L.W.

N64-17939 State U. of New York at Buffalo School of Medicine

VENTILATION-PERFUSION RELATIONSHIP

Hermann Rahn and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 106-115 refs (See N64-17926 10-16) OTS: $4.00

The lung is an organ with millions of units, each having a finite ventilation-perfusion ratio. At a ratio of about 1, the oxygen and carbon dioxide tensions are "normal" and the "total flow requirements" at their lowest. At higher or lower ratios, the flow requirements increase rapidly, and the gas tension becomes abnormal. It is important to assess how many alveoli have normal $\dot{V}_A/\dot{Q}$ ratios. It can be shown that whenever two or more units of the lung do not have the same $\dot{V}_A/\dot{Q}$ ratio a pressure difference must be established for carbon dioxide, nitrogen, and oxygen between mixed pulmonary capillary blood and expired alveolar gas. The effect of uneven distribution can be measured by using the "triple gradient" analysis in which differences between alveolar gas and arterial blood for oxygen, carbon dioxide, and nitrogen serve as the basis for the calculations. Study of the carbon dioxide difference allows the determination of alveolar air shunt, and the oxygen gradient is used for calculating the blood shunt. The nitrogen study differentiates between shunt due to blood flow through nonexchanging tissue and that due to presence of hyperperfused areas. Author

N64-17940 State U. of New York at Buffalo School of Medicine

SIMULTANEOUS MEASUREMENT OF O_2, CO_2 AND N_2 ALVEOLO-ARTERIAL GAS PRESSURE DIFFERENCES

Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 116-119 refs (See N64-17926 10-16) OTS: $4.00

Of the three possible gradients the aAD_{N_2} measures specifically the existence of overperfused alveoli. The aAD_{CO_2} can theoretically result from several causes, but in fact it is an index of the existence of overventilated alveoli. The AaD_{O_2} is not specific and can result from uneven distribution, diffusion impairment, or venous admixture. Simultaneous measurement of all the three gradients is required to obtain an adequate idea of the parameters affecting alveolar-arterial relationships. Author

N64-17941 State U. of New York at Buffalo School of Medicine

REGIONAL DIFFERENCES IN GAS EXCHANGE IN THE LUNG OF ERECT MAN

John B. West *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 120-125 refs (See N64-17926 10-16) OTS: $4.00

Measurements of regional ventilation and blood flow using radioactive CO_2 show that both increase from apex to base of the lung; the results are used to build an integrated picture of gas exchange. Ventilation-perfusion ratios at nine levels of the lung have been calculated and differences in local gas exchange deduced. In the resulting model, alveolar O_2 tension changes by more than 40 mm Hg from apex to base, while CO_2 and N_2 tensions change by about 14 and 29 mm Hg, respectively. Maximal differences in O_2 saturation of end-capillary blood are 4%, but differences in CO_2 contents of 7 vol % and pH

variations of 0.12 units occur. The O_2 uptake per unit lung volume increases eightfold down the lung while corresponding variations in CO_2 output are less than threefold. N_2 passes out of the blood in upper parts of the lung but into the blood in basal regions (net exchange is zero). Author

N64-17942 State U. of New York at Buffalo School of Medicine

TOPOGRAPHICAL DISTRIBUTION OF PERFUSION AND VENTILATION

John B. West *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 126-129 refs (See N64-17926 10-16) OTS: $4.00 (Sponsored in part by Med. Res. Council)

A discussion is given of the topographical distribution of perfusion and ventilation in the lung. The discussion covers the use of radioactive gases as a tool in measuring regional blood flow and ventilation, as well as the factor affecting the clearance rate. C.L.W.

N64-17943 State U. of New York at Buffalo School of Medicine

ACTUAL AND IDEAL O_2 AND CO_2 TENSIONS IN PULMONARY VEIN OF DOG

John B. West and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 130-139 refs (See N64-17926 10-16) OTS: $4.00

A description is given of the results of sampling pulmonary venous blood in the anesthetized dog, by direct catheterization through the left side of the heart, and comparing the gas composition of these samples with that of arterial blood and the calculated ideal values. Observations made are in disagreement with the assumption that the gas tensions of a given group of alveoli are in equilibrium with those of the capillary blood and, consequently, those of the pulmonary-vein blood draining from that area. C.L.W.

N64-17944 State U. of New York at Buffalo School of Medicine

SIMPLE METHOD FOR DETERMINATION OF PERFUSION AND VENTILATION-PERFUSION RATIO OF THE UNDERVENTILATED ELEMENTS (THE SLOW COMPARTMENT) OF THE LUNG

Robert A. Klocke and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 140-148 refs (See N64-17926 10-16) OTS: $4.00

The rate of disappearance of inert gas during washout was monitored simultaneously in the alveolar gas and in the arterial blood. This allows calculation of the relative perfusion of the hypoventilated (slow) compartment and comparison of its ventilation-perfusion ratio to that of the total respiratory system. In five normal subjects, the slow compartment received 1.8% of the total ventilation and 2.3% of the lung perfusion, and had a $\dot{V}_A/\dot{Q}$ ratio of 81% of the total. By comparison, study of an emphysematous subject showed that 10% of the alveolar ventilation went to the slow compartment, which was perfused by 33% of the pulmonary flow. The procedure requires only one analytical method and is therefore applicable on a large scale. Author

N64-17945 State U. of New York at Buffalo School of Medicine

PERFUSION OF THE UNDERVENTILATED COMPARTMENT OF THE LUNGS IN ASTHMATIC CHILDREN

Marion K. Ledbetter, Erika Bruck, and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 149-157 refs (See N64-17926 10-16) OTS: $4.00

The distribution of the pulmonary circulation was studied in four normal children and in nine children suffering from asthma. The perfusion of the underventilated compartment of the lungs was less than 2% of the total in normals and as high as 12% in the others. This is more than the fraction of the ventilation to this compartment, which has, therefore, a relatively low $\dot{V}_A/\dot{Q}$ ratio. In addition, in patients with more severe forms of the disease, there were findings that could be ascribed to the presence of a perfused, but virtually unventilated, compartment. Even patients who had been free of symptoms for as long as 9 months did not show a readjustment in perfusion of the slow compartment that would restore its ventilation-perfusion ratio to normal values. Author

N64-17946 State U. of New York at Buffalo School of Medicine

UNEQUAL DISTRIBUTION OF PULMONARY DIFFUSING CAPACITY IN THE ANESTHETIZED DOG

Johannes Piiper, Pierre Haab, and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 158-165 refs (See N64-17926 10-16) OTS: $4.00

In anesthetized dogs, the alveolar-arterial O_2 pressure difference (AaD) was measured at alveolar O_2 pressures of 45, 75, 106, 146, and 255 mm Hg. The AaD values observed could not be explained by the conventional "shunt factor," "diffusion-limitation factor," or "distribution factor." However, the experimental data could be explained on the basis of the concept of unequal distribution of pulmonary diffusing capacity, D, to perfusion,Q. A procedure for estimation of the pattern of distribution of D to Q from experimental data is described. The results were compatible with the assumption that the lung consisted of a minimum of three functional compartments characterized by different D/Q ratios. Author

N64-17947 State U. of New York at Buffalo School of Medicine

ABSORPTION OF VARIOUS INERT GASES FROM SUBCUTANEOUS GAS POCKETS IN RATS

Johannes Piiper, R. E. Canfield, and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 166-172 refs (See N64-17926 10-16) OTS: $4.00

A study was made of absorption of the inert gases, helium, argon, hydrogen, nitrogen, sulfur hexafluoride, nitrous oxide, and cyclopropane, from subcutaneous gas pockets in rats breathing oxygen. For interpretation of the data, a method of analysis was devised that permitted distinction between perfusion and diffusion as factors limiting the absorption rate. Application of this method to the experimental data leads to the conclusion that both perfusion and diffusion limitation were effective in determining the absorption rates of the inert gases, diffusion limitation being the more important factor. The blood flow responsible for the uptake of inert gas from the gas pocket, and the thickness of the tissue layer between blood and pocket gas could be crudely estimated. Author

N64-17948 State U. of New York at Buffalo School of Medicine

GAS COMPOSITION OF PRESSURIZED, PERFUSED GAS POCKETS AND THE FISH SWIM BLADDER

Johannes Piiper, H. T. Humphrey, and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 173-180 refs (See N64-17926 10-16) OTS: $4.00

The behavior of the composition of pressurized, perfused gas pockets is analyzed in theory and experimentally, with the aim of contributing to the understanding of the effect of differential absorption on the composition of the fish swim bladder

gas. The equations describing the change in the composition of pressurized, perfused gas pockets are derived and experimentally verified. If a gas pocket initially containing room air is subjected to elevated pressure and perfused with water equilibrated with room air, the concentration of the less soluble gas, nitrogen, increases during the absorption process. High partial pressures of nitrogen and argon found in swim bladders of fish living at great depths can be qualitatively explained on the basis of accumulation of these gases by preferential absorption of oxygen and carbon dioxide, in connection with certain assumptions on the mode of secretion of the gases. Author

N64-17949 State U. of New York at Buffalo School of Medicine

GAS TRANSFER ACROSS THE SKIN IN MAN

Robert A. Klocke, G. H. Gurtner, and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 181-186 refs (See N64-17926 10-16) OTS: $4.00

The rates of helium, argon, and nitrogen transport were determined in the forearm and hand of a normal subject at ambient temperatures ranging from 18° to 43° C, analysis being performed by gas chromatography. At any temperature, the ratio V_A/V_{He} was found to be equal to $(\alpha A\, P_A/\sqrt{\text{mol wt A}})/(\alpha He\, P_{He}/\sqrt{\text{mol wt He}})$, where V is the rate of gas transport, α the solubility of the gas in blood, P the pressure of the gas in the blood, and mol wt the molecular weight of the gas. This indicates that the gas transport is limited by diffusion through the skin barrier and is affected only indirectly by changes in cutaneous blood flow in individual capillaries. Gas transport is at a minimal value at temperatures below 28° C, increasing in a linear fashion with increasing temperature above 28° C. This increase in transport shows that the increase in cutaneous perfusion at elevated ambient temperatures is accompanied by the opening of additional capillaries, the resulting increase in diffusing capacity being responsible for the increase in gas transport. Author

N64-17950 State U. of New York at Buffalo School of Medicine

DYNAMICS OF CHANGES IN CARBON DIOXIDE STORES

Leon E. Farhi and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 187-197 refs (See N64-17926 10-16) OTS: $4.00

The wide scatter in reported CO_2 storage capacity of the body must reside in a factor or factors that have not sufficiently been taken into account. In order to determine what these factors may be, data for the CO_2 storage capacity of various organs and their perfusion were collected. Using these data, an electronic analog was constructed. By simulating various procedures and varying the parameters, several experimental conditions were reproduced. Since most of the CO_2 storage capacity resides in the muscle, perfusion of the muscle mass will determine the rate at which this storage capacity may be brought into play. At rest, reequilibration is always a lengthy process, requiring several hours. Author

N64-17951 State U. of New York at Buffalo School of Medicine

OXYGEN STORES OF MAN

Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 198-207 refs (See N64-17926 10-16) OTS: $4.00

Under conditions of prolonged apnea, the body calls upon the oxygen stores of the blood and the lung. The relative contribution of these two sources depends upon the absolute size of the lung O_2 stores. The latter can be greatly altered by (1) size of lung volume, (2) fraction of O_2, and (3) barometric pressure. Various examples are discussed. It would appear that the length of a maximal voluntary apnea is to a large extent controlled by the size of O_2 stores. Author

N64-17952 State U. of New York at Buffalo School of Medicine

THE ROLE OF N_2 GAS IN VARIOUS BIOLOGICAL PROCESSES WITH PARTICULAR REFERENCE TO THE LUNG

Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 208-227 refs (See N64-17926 10-16) OTS: $4.00

The role that N_2 molecules play in the human body is explored. The discussion covers the origin of the earth's atmosphere. N_2 gas pockets in the body, and life without inert gases. A review is given of the N_2 cycles in the body. The lung as a nitrogen concentrator or dilutor, the skin-lung cycle, and the N_2 cycle are included in the discussion. The arterial-alveolar gradient was studied, and a method is given for the determination of arterial N_2 pressure. C.L.W.

N64-17953 State U. of New York at Buffalo School of Medicine

SURVIVAL OF MICE IN ABSENCE OF INERT GAS

L. Mac Hattie and Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 229-232 refs (See N64-17926 10-16) OTS: $4.00

Mice were maintained for 51 days in an atmosphere of oxygen at total pressure of 197 mm Hg. This provides a normal inspired O_2 tension. CO_2 and N_2 pressures in the ambient atmosphere did not exceed 5 mm Hg. Under these conditions, animals usually did not encounter any difficulties. Several litters were born, and in one case young were conceived, born, and raised in virtual absence of inert gas. However, in several cases animals died within 48 hours after being subjected to this environment. Once past this period, only mechanical failure of the apparatus terminated these experiments. It is suggested that pulmonary atelectasis was responsible for these early deaths. Author

N64-17954 State U. of New York at Buffalo School of Medicine

THE EFFECT OF BAROMETRIC PRESSURE ON LUNG COLLAPSE FOLLOWING TRACHEAL OCCLUSION IN RATS BREATHING PURE OXYGEN

William G. Robertson and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 233-242 refs (See N64-17926 10-16) OTS: $4.00

Gas resorption from rats' lungs after O_2 breathing, followed by tracheal obstruction, has been studied quantitatively. The theoretical equations governing the collapse of the lungs have been derived, and there is good agreement between predicted and determined values. In addition to the O_2 uptake, the rate of lung collapse is also affected to some degree by the alveolar P_{CO_2} at the time of occlusion and to a very large extent by the ambient pressure. The time required for complete lung collapse varies linearly with ambient pressure—a theoretical T = 0 value corresponding to a pressure of 90 mm Hg—under which conditions, the normal water vapor and CO_2 would account for all the pressure in the alveoli. Author

N64-17955 State U. of New York at Buffalo School of Medicine

GASEOUS ENVIRONMENT AND ATELECTASIS

Hermann Rahn and Leon E. Farhi *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 243-257 refs (See N64-17926 10-16) OTS: $4.00

This report discusses man's environment and the resulting effects when this environment is inadequate or is not available. The discussion covers the effects of pressure per second, the effect of the absence of N_2 on metabolic functions, the effect of the absence of N_2 on pulmonary function, the types of atelectasis, the rates of absorption atelectasis, and the procedures for testing atelectasis. C.L.W.

N64-17956 State U. of New York at Buffalo. School of Medicine

AQUATIC GAS EXCHANGE: THEORY

Hermann Rahn *In its* Studies in Pulmonary Physiol.: Mech., Chem., and Circulation of the Lung, Vol. 1 (1959-1963) Oct. 1963 p 258-273 refs (See N64-17926 10-16) OTS: $4.00

Equations are presented that describe the gas exchange of aquatic organisms in terms of the simultaneous O_2 and CO_2 pressures, exchange ratio, metabolic rate, and gill ventilation. These equations may be compared directly with those of air breathers and emphasize the differences in the limit that each medium imposes upon the gas exchange. To maintain comparable O_2 tensions in a gill and an alveolus, the gill ventilation must exceed the alveolar ventilation 25 to 30 fold depending upon the temperature. This relatively high gill ventilation reduces the gill arterial CO_2 tension to values less than 2 mm Hg, because CO_2 is carried with nearly equal efficiency in water as in air. With the knowledge of the O_2 and CO_2 dissociation curves, the whole gas exchange of fish can be described on one single O_2-CO_2 diagram from the point of the inspired gas tensions to that found in the venous blood of the tissues. Author

N64-17958 School of Aerospace Medicine, Brooks AFB, Tex.

URINE EVACUATING SYSTEM FOR USE IN FULL-PRESSURE SUITS

Sidney T. Lewis and Leonard Harris Mar. 1964 9 p
(SAM-TDR-64-13; AD-433079)

A urine elimination system was designed and tested for use with full-pressure suits. This device utilizes differential pressures as the main principle, causing the urine flow. The device was used on 19 flights in the low-pressure chamber at altitudes varying from sea level to 75,000 ft without one failure. With minor modifications this device can be used on any spacesuit and is a practical, comfortable, economical means of removing urine from the suit. Author

N64-17963 School of Aerospace Medicine, Brooks AFB, Tex.

SIMULATION WITH CARBON PARTICLES OF BACTERIAL INVASION OF HUMAN GINGIVAL TISSUES

William A. Gibson and Ira L. Shannon Feb. 1964 8 p refs
(SAM-TDR-64-4; AD-433105)

Carbon particles as a suspension of lamp-black powder in physiologic saline were used to simulate the size range and concentration of bacteria as they occur in the gingival sulcus. Gingival strip biopsies were taken from 24 systemically healthy, young adult males with minimal gingival inflammation. For 12 of the subjects, a thorough tooth scaling was performed in the presence of the carbon particles whereas the remaining 12 subjects, serving as controls, received no dental treatment of any type. In the unscaled group, no carbon particles were found in the underlying connective tissue, indicating that the biopsy procedure and tissue processing did not produce artifacts. Carbon particles were found, however, in the underlying connective tissues of all subjects in the scaled group. The distribution of the carbon particles was identical to the distribution of bacteria reported in previous histologic studies purporting to demonstrate active bacterial invasion of human gingiva. Author

N64-17973 Joint Publications Research Service, Washington, D.C.

SOME PROBLEMS OF THE MACROMOLECULAR STRUCTURE OF RIBONUCLEIC ACIDS

7 Apr 1964 18 p refs Transl. into ENGLISH of excerpts from the book "Nekotoriye Probl. Makromolekul. Struktury Ribonukleinovykh Kislot", Moscow, Publ. House of the Acad. of Sci. USSR, 1963
(JPRS-24068, OTS-64-31007) OTS: $0.50

Research that led to the isolation of RNA is reviewed. It was found that RNA from TMV (tobacco mosaic virus), as well as from other viruses of the ribonucleoprotein type, have a similar molecular weight, about $2 \cdot 10^6$. Ribosomal RNA was found to have a molecular weight of 10^6. Studies to determine the sedimentation coefficients of RNA components are compared. A table presents the sedimentation coefficients and molecular weights of high-polymer RNA from TMV, *E. coli*, hare, and pea. The molecular-weight determinations of the soluble and informational RNA fractions are also discussed. Studies of the chain configurations of ribosomal RNA consider the spiral sections and the internal ribosomal packing of chains. The relationship of the RNA macrostructure to the biological functions of molecules is still incompletely understood. E.K.R.

N64-17976 Joint Publications Research Service, Washington, D.C.

INTERPRETATION OF NUCLEOTIDE SEQUENCE IN CONVEYING RIBONUCLEIC ACIDS

V. G. Tumanyan and L. L. Kiselev 8 Apr. 1964 13 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 8, no. 2, 1963 p 147-153
(JPRS-24086, OTS-64-31015) OTS: $0.50

A method is described for the reconstruction (determination) of initial nucleotide sequence in T-RNA following splitting by specific methods (enzymes and chemical agents). It is shown that, in general (without restricting the nature of the sequence), the use of four fission methods (specific for each of the four nucleotides) does not permit reconstruction of the initial sequence. In the case of certain statistical sequences, as well as for certain nonstatistical sequences, decoding may be achieved by using three or even two fission methods. Author

N64-17977 Joint Publications Research Service, Washington, D.C.

THE DOSE RATE OF PENETRATING ELECTRONS OF THE OUTER BELT

Ye. Ye. Kovalev and A. V. Larichev 8 Apr. 1964 7 p refs Transl. into ENGLISH of an excerpt from Vopr. Dozimetr. i Zashchit. ot Izluch. (Moscow), no. 2, 1963 p 105-108
(JPRS-24099, OTS-64-31025) OTS: $0.50

The absorbed dose rate of electrons with energies from $E_{0,min}$ to $E_{0,max}$ behind shielding of thickness d may be determined approximately by the formula

$$P_e(d) = 0.8 \times 10^{-8} \int_{E_{0\,min}}^{E_{0\,max}} N(E_0) \cdot E_0 / R(E_0)\ e^{-\mu(E_0)d} \cdot dE_0.$$

where $R(E_0)$ is the mean free path of an electron with energy E_0 in biological tissue, g cm^2. $\mu(E_0)$ 0.693. $\Delta(E_0)$ is the attenuation factor for electrons with energy E_0. $\Delta(E_0)$ is the half-value layer in the shielding material. Computations of the dose contribution from components of the outer-belt electron spectrum show that the electron dose rate drops very rapidly with increased thickness of the shielding. Computations of dose rate for different thicknesses of shielding show that, with small thicknesses (d 1.0 g cm^2), the principal contribution to the radiation dose is made by hard electrons, with thicknesses of d 1.0 g cm^2, the principal contribution to the dose is made by brehmsstrahlung. Author

N64-17993 National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

A PILOTED SIMULATOR STUDY OF LONGITUDINAL HANDLING QUALITIES OF SUPERSONIC TRANSPORTS IN THE LANDING MANEUVER

Richard S. Bray Washington, D.C., NASA, Apr 1964 33 p refs

(NASA TN D-2251) OTS: $0.75

A piloted simulator incorporating simulated visual cues in the landing maneuver was used in an exploratory study of several parameters pertinent to the stability and control characteristics of supersonic transports. The result of pilots' assessments of speed-thrust instability in the landing approach, which is associated with the lift-drag characteristics of a low-aspect-ratio delta wing, indicated that the condition would not be tolerable for normal operation of a transport aircraft, but would be acceptable for emergency operation. Low values of static longitudinal stability were accepted, however, neutral static stability was considered tolerable only in an emergency condition. Measurements of landing touchdown performance parameters from simulated landings indicated that no severe longitudinal control difficulties were apparent in the flare and touchdown maneuver over the limited flight conditions represented in the tests and for the range of variables considered. Author

N64-18041 Whirlpool Corp., St. Joseph, Mich.

HUMAN WASTE COLLECTION AND STORAGE DURING AEROSPACE FLIGHT Technical Documentary Report, 1 Jun. 1962-20 May 1963

Norman G. Roth, John J. Symons, Dave Cohen, and Robert B. Wheaton Wright-Patterson AFB, Ohio, Biomedical Lab., Feb. 1964 78 p refs

(Contract AF 33(657)-9131)

(AMRL-TDR-64-3; AD-433574)

An evaluation of techniques for human waste receiving, collection, and storage during an aerospace mission, with the crewman wearing, or not wearing, a pressure protective garment is presented. Laboratory models, utilizing the most promising techniques, were designed, fabricated, and evaluated. A centrifugal urinal, powered by a hand-wound spring motor, was developed for urine collection. A disinfectant dispenser operable in zero gravity and a spherical bladder-equipped urine storage tank with means for addition of disinfectant were developed. A flexible plastic in-suit urinal was fabricated, with means for discharging collected urine into the centrifugal urinal. A flexible plastic collector for fecal matter, held in place by a body harness and containing a disinfectant for stabilization purposes, was developed, as was a storage box for containment of used collectors. Author

N64-18056 Brandeis U., Waltham, Mass.

NEW APPROACHES TO BACTERIAL TAXONOMY

J. Marmur, S. Falkow (Walter Reed Army Inst. of Res., Washington D.C.), and M. Mandel (Massachusetts U., Amherst) Repr. from Ann. Rev. Microbiol., v. 17, 1963 p 329-372 refs

(NASA Grant NsG-375)

This review considers some of the new findings in bacterial genetics and biological polymers that may ultimately have a bearing on the classification of microorganisms. The remainder of the paper, after a short introduction, is divided into three sections: "Genetic Transfer," "Informational Macromolecules," and "Summary." An extensive list of the references cited is appended. The section entitled "Genetic Transfer" includes these topics: "Transformation," "Transduction," "Conjugation," "Phage Conversion," "Sex-duction," and "Genetic Transfer in Nature." The section on "Informational Macromolecules" includes "Deoxyribonucleic Acid," "Ribonucleic Acid," and "Proteins." In the "Summary," the author states a general lack of conflict between the reported findings and the existing bacterial classifications, and suggests a utility for these findings in sharpening the guidelines for taxonomists. D.E.W.

N64-18062 Massachusetts Inst. of Tech., Cambridge Research Lab. of Electronics

BINAURAL INTERACTION IN THE ACCESSORY SUPERIOR OLIVARY NUCLEUS OF THE CAT – AN ELECTROPHYSIOLOGICAL STUDY OF SINGLE NEURONS

Joseph L. Hall, II (Ph. D. Thesis) 22 Jan. 1964 88 p refs

(Contract DA-36-039-SC-78108; Grant DA-SIG-36-039-61-G14; NSF Grant-16526; NIH Grant MH-04737-03)

(MIT-TR-416; AD-430953)

In an effort to understand the neural encoding of binaurally presented stimuli, clicks were presented through earphones to the two ears of Dial-anesthetized cats. The electrical response activity of single nerve cells in the accessory nucleus of the superior olive was studied. Stimulus parameters investigated include interaural time difference, interaural intensity difference, and average intensity. A model by which judgments of image localization are obtained on the basis of patterns of activity in the accessory nuclei is suggested. In the model, the position of the fused virtual image is determined by a comparison of the amount of response activity in the left and right accessory nuclei. Incorporation of empirical data into the model yields predictions that are in quantitative agreement with results of human psychophysics. The model predicts that the virtual image should be localized toward the side receiving more intense or prior stimulation. Author

N64-18084 Joint Publications Research Service, Washington, D.C.

HISTOCHEMICAL AND ULTRASTRUCTURAL CHANGES OF RECEPTOR CELLS OF THE UTRICLE UNDER CONDITIONS OF AN ALTERED GRAVITATION FIELD

Ya. A. Vinnikov, O. G. Gazenko, L. K. Titova, I. V. Osipova, and A. A. Bronshteyn 24 Mar. 1964 10 p refs Transl. into ENGLISH from Doklady Akad. Nauk SSSR (Moscow), v. 153, no. 2, 1963 p 450-453

(JPRS-23837; OTS-64-21877) OTS: $0.50

Histochemical and electron-microscopic studies of the gravity receptor cells of the utricle of guinea pigs, subjected to radial acceleration, are reported. The guinea pigs were sacrificed after one, two, or three 3-minute rotation sessions in the dorsum-chest position, at a radial acceleration of 10 g, with 5-minute intervals between sessions. The changes observed indicate that ribonucleic acid (RNA), in the form of ribosomes, filters through the nuclear membrane into the cytoplasm, where the RNA granules induce the formation of an endoplasmic net around themselves. This egress of RNA from the nucleus is shown to be associated with intensification of the protein-synthesis processes in the cytoplasm as a result of increased protein expenditure during acceleration. The direction of the nucleolar RNA egress was found to coincide with the direction of the vector of the gravitational field. M.P.G.

N64-18085 Joint Publications Research Service, Washington, D.C.

CHANGES IN CERTAIN PHYSICO-CHEMICAL PROPERTIES OF CEREBRAL PROTEINS UNDER EXCITATION OF NERVOUS ACTIVITY

Ye. F. Ivanenko and V. P. Dunayeva 9 Apr. 1964 12 p refs Transl. into ENGLISH from Ukr. Biokhim. Zh. (Kiev), v. 36 no. 1, Jan. 1964 p 72-79

(JPRS-24119; OTS-64-31035) OTS: $0.50

During the first and second convulsive attacks caused by camphor, the sorption activity of the brain tissue insignificantly increases in comparison with the control. Under these conditions, there is a rise in the degree of swelling for the brain colloids, and the amount of water in the brain increases. In comparison with the norm, there is virtually no change in the amount of the SH-groups in the summary proteins, the alcohol number, and the viscosity of the brain colloids. A trend is noted towards a reduction in the solubility of the brain proteins in the IEZ during the convulsive attacks caused by camphor. Author

N64-18094 Los Alamos Scientific Lab., N. Mex.
HEALTH PHYSICS BIBLIOGRAPHY ON TRITIUM
Donald A. Mc Kown, comp. 25 Mar. 1964 84 p refs
(Contract W-7405-ENG-36)
(LAMS-2946) OTS: $2.25

A list of 87 papers with abstracts is given. The papers were selected to cover those aspects of the subject that would be of interest to monitoring and health physics personnel involved in radiation protection work. A few bibliographies are listed. Author

N64-18096 Joint Publications Research Service, Washington, D.C.
EFFECT OF INJECTION OF BONE MARROW CELLS UPON MORPHOLOGICAL MANIFESTATIONS OF EXPERIMENTAL INFLUENZA IN IRRADIATED ANIMALS
N. A. Maksimovich and O. P. Lebedeva 6 Apr. 1964 11 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 153, no. 4, 1963 p 950-953
(JPRS-24056; OTS-64-31000) OTS: $0.50

An investigation was made of the morphological reaction of the internal organs of mice, principally of the lungs, in response to therapy with bone marrow. These mice had been subjected to general irradiation with X-rays and infected with influenza. The morphological changes in influenza of irradiated animals differed sharply from those present in ordinary experimental influenza. In addition to damage to the epithelium of the bronchi, an interstitial reaction is characteristic, and is accompanied by perivascular and peribronchial infiltration and the presence of leukocytes in the serous exudate. In irradiated animals, the hemorrhagic component predominated and occupied a leading place in all stages of the experimental influenza infection. The administration, once or twice, of bone marrow, noticeably changed the morphology of the influenza process. This process then became similar to that in nonirradiated animals, acquiring all traits characteristic for experimental influenza. The only difference was that cell disintegration, both in the lumen of the bronchi and in the exudate filling the alveoli, was more pronounced than in the influenza of nonirradiated mice. R.T.K.

N64-18114 Joint Publications Research Service, Washington, D.C.
CHANGES IN THE STRONTIUM-90 CONTENT OF FOOD PRODUCTS AFTER COOKING
Z. V. Dubrovina and O. M. Belova 10 Apr. 1964 7 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 2, Feb. 1964 p 40-43
(JPRS-24139, OTS-64-31050) OTS: $0.50

The passage into broth of strontium-90 from bones, meat, potatoes, and cabbage with various modes of cooking was studied. It was found that the amount of strontium-90 passing into broth from bones constituted only a fraction of 1 percent, while in the instance of meat it was 50% to 60% and in that of potatoes and cabbage it was 20%. The duration of thermal treatment and the changes in the pH level had no effect on passage of radioactivity from product to solution. The addition of calcium and magnesium salts tended to increase strontium-90 passage into the broth. Seven times more strontium-90 was removed from peeled potato than from potato cooked in the jacket. Author

N64-18115 Joint Publications Research Services, Washington, D.C.
CHEMISTRY OF BRAIN FUNCTION
N. I. Grashchenkov 10 Apr. 1964 13 p Transl. into ENGLISH from Priroda (Moscow), v. 53, no. 2, 1964 p 10-17
(JPRS-24151; OTS-64-31060) OTS: $0.50

Mediators of neural excitation, such as acetylcholine, are discussed, not only as transmitters of nerve impulses but also as humoral regulators of physiological processes in the body. The relation of these chemical mediators and other chemical substances detectable in various brain formations to the functional state of the brain is presented. The evidence that the presence of these substances in different concentrations in different portions of the brain has a definite relationship to the specific functional properties of these formations is given. The determination of the biological activity of the blood, in particular, the ratio between the sympathomimetic and parasympathomimetic metabolites, is proposed as the most adequate method for studying the autonomic nervous system under experimental and clinical conditions. R.T.K.

N64-18138 Joint Publications Research Service, Washington, D.C.
THE NATURE OF ELECTRON PARAMAGNETIC RESONANCE SPECTRA OF AMINO ACIDS AND PROTEINS SUBJECTED TO THE ACTION OF GAMMA RADIATION AND LIGHT
M. K. Pulatova and O. A. Azizova 1 Apr. 1964 11 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 9, no. 1, 1964 p 33-39
(JPRS-23983, OTS-64-21960) OTS: $0.50

The paramagnetic centers of γ-irradiated sulfur-containing amino acids and polypeptides at 77° K represent free radicals with localization of the unpaired electron on a sulfur atom. The hyperfine structure of the EPR spectra of such compounds is determined by the influence of the hydrogen nuclei closely situated to the sulfur atom. At room temperature a free radical is formed: $R\text{-}(S\ldots S)^{+}-R$, common to cystine, cysteine, and glutathione. The illumination of γ-irradiated sulfur-containing amino acids and glutathione at 77° K leads to a considerable reduction of the number of radicals responsible for the cystine EPR signal. The EPR spectrum of γ-irradiated protein at 77° K represents the sum of two signals: singlet and triplet. The latter signal is due to the sulfur-containing amino acid radical. Illumination of γ-irradiated proteins produces an increase in the cystine EPR signal at 77° K. Author

N64-18148 Defence Standards Labs., Maribyrnong (Australia)
FUNGAL GROWTHS IN AVIATION FUEL SYSTEMS, PART 4: FUNGI IN AVIATION FUEL SYSTEMS IN AUSTRALIA AND THE FAR EAST
G. F. Hazzard Oct. 1963 55 p refs
(Rept. 252)

This report includes detailed surveys of fungal occurrence in aircraft utilizing integral fuel tanks and in Australian and Far Eastern airfield fueling systems. The predominant fungus is identified as *Cladosporium resinae* Lindau (de Vries). Observations are made on its growth under various conditions and on the appearance of fungal contamination in aircraft and ground systems. The report then describes methods by which the fungal contamination of fuels can be reduced without the use of biocidal additives and concludes with a summary of the much improved situation in Australian fuel systems. Author

N64-18206 Joint Publications Research Service, Washington, D.C.
POSTRADIATION RESTORATION OF YEAST CELLS IRRADIATED UNDER AEROBIC AND ANAEROBIC CONDITIONS
V. S. Barsukov et al. 31 Mar. 1964 7 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 153, no. 5, 1963 p 1199-1201
(JPRS-23945; OTS-64-21942) OTS: $0.50

The presence of oxygen during irradiation of radiosensitive cells was found to result in an increase in the degree of injury to the mass cytoplasmic structures of the cell responsible for restoration. The restoration rate was found to decrease. R.T.K.

N64-18318 Joint Publications Research Service, Washington, D C

THE POSSIBILITY OF INTERTRYPTOPHAN MIGRATION OF ENERGY IN PROTEIN SYSTEMS

S V Konev et al 2 Apr 1964 8 p refs Transl into ENGLISH from Biofizika (Moscow), v 9, no 1 1964 p 124-127 (JPRS-23991, OTS-64-21962) OTS $0.50

The migration of energy between tryptophan radicals brought close together in the protein macromolecule, to the distance characteristic of concentrated tryptophan glycerine solution of the order of 10^{-1} M, was investigated To supplement this investigation, the polarization fluorescence spectra of human-serum albumin and of pepsin, both in solution and in a film, were studied Aqueous solutions of albumin and pepsin were used The spectral curves show that even in solid films, where any possibility of rotational motions both of the entire macromolecule as a whole, and of its individual units, is eliminated, the degree of polarization of the pepsin is significantly reduced in comparison with free tryptophan over the entire range of the spectrum At the same time, the degree of polarization of the luminescence of proteins in the film and solution are close This gives evidence against the possibility of the migration of energy between tryptophan radicals belonging to neighboring macromolecules in the film Similar principles were also obtained for albumin I.v.L

N64-18328 Joint Publications Research Service, Washington, D C

RECENT STUDIES ON NUCLEIC ACIDS

7 Apr 1964 23 p refs Transl into ENGLISH from Biofizika (Moscow) v 8, no 1, 1963 p 19-27, 124, and 140-141 (JPRS-24070, OTS-64-31008) OTS $0.75

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N64-18329 Joint Publications Research Service, Washington, D C

SOME PHYSICO-CHEMICAL ASPECTS OF SINGLE-STRAND DESOXYRIBONUCLEIC ACID (DNA)

N I Ryabchenko, D M Spitkovskiy, and P I Tseytlin *In its* Recent Studies on Nucleic Acids 7 Apr 1964 p 1-14 refs (See N64-18328 10-16) OTS: $0.75

The physicochemical properties of s-DNA isolated from thymus n-DNA are discussed It is shown that single-strand DNA has been isolated, and that it can be differentiated from two-strand native and denatured structures Production of the single-strand structure was determined by degradation kinetics, in the presence of distinctly pronounced tests of flexibility, thermally conditioned increases in viscosity, and corresponding drops in molecular weight P V E

N64-18330 Joint Publications Research Service, Washington, D C

RIBONUCLEIC ACID (RNA) — TRANSMITTER AND KEY TO HEREDITARY INFORMATION

V G Tumanyan, N G Yesipova, and N S Andreyeva *In its* Recent Studies on Nucleic Acids 7 Apr 1964 p 15-16 (See N64-18328 10-16) OTS: $0.75

The modern diagram (code) of protein biosynthesis presupposes a specificity of function of nucleic acids participating in the biosynthesis, this specificity may be related only to the structural peculiarities of their molecules It has been shown that the configuration of such polymeric molecules is thermodynamically stable in solution and, consequently, is determined by a succession of bases It is known that soluble RNA is characterized by a very high degree of spiralization Ribosomal RNA is also characterized by spirals to a considerable extent It is obvious that those areas of informational RNA that contain code triplets must not be spiralized, at least not on the ribosome in the process of biosynthesis It can be assumed that the nature of succession of nucleotides in the information of RNA causes absence of spiralization in the areas containing key triplets Therefore, there must be fewer GC pairs (more stable) in the code than UA pairs, thus, the U and A content must be different from that normally assumed in the code, these being the ones most frequently encountered in the nucleotides P V E

N64-18331 Joint Publications Research Service, Washington, D.C.

ON THE PROBLEM OF THE QUASIMONOSPIRAL STATE OF DESOXYRIBONUCLEIC ACID (DNA) WITHIN THE MAKE-UP OF DESOXYRIBONUCLEOPROTEIN (DNP) (ON THE MECHANISM OF DNA REDUPLICATION)

D. M. Spitkovskiy *In its* Recent Studies on Nucleic Acids 7 Apr. 1964 p 17-20 refs (See N64-18328 10-16) OTS: $0.75

The DNP insolubility hinders investigation of its physicochemical parameters, under most interesting conditions from the biological point of view. As a result, the usual physicochemical investigations (light dispersion, viscosity, ultracentrifugation, hypochromic effect, etc.) have to be conducted either in water or in one-mole NaCl, with the assumption that DNP properties have been adequately investigated under physiological conditions. One of the possible methods of investigation of DNP in the condensed phase, in the presence of the physiological ionic strength of the environment, is the study of structural-mechanical properties of oriented DNP formations. From experimental data, it is concluded that one of the functions of DNP protein is apparently to break down hydrogen bonds between bases in DNA, and to transform the latter into a quasi-monospiral state without special mechanisms (enzymes, etc.). P.V.E.

N64-18334 Joint Publications Research Service, Washington, D.C.

THE EFFECT OF RADIATION INACTIVATION OF NUCLEI ON THE SYNTHESIS OF INFORMATIONAL RIBONUCLEIC ACID IN EMBRYOS OF FISH (MISGURNUS FOSSILIS)

N.V. Belitsina et al 31 Mar. 1964 8 p refs Transl. into ENGLISH from Dokl. Akad. Nauk (Moscow), v. 153, no. 5, 1963 p 1204-1206

(JPRS-23944, OTS-64-21941) OTS: $0.50

Irradiation causes complete cessation of DNA synthesis. However, the synthesis of high-molecular-weight mRNA is not discontinued at all, and evidently, is not even decreased Thus, as the formation of high-molecular-weight mRNA is not impaired and nuclear morphogenetic activity is not depressed as a result of the effect of the dosage of irradiation used (50 kr), then it is obvious that synthesis of high-molecular-weight mRNA in the nucleus is not identical with the morphogenetic function of the nucleus This agrees completely with the conclusion previously made on the basis of a study of mRNA synthesis in different phases of development It can be believed that high-molecular-weight mRNA, appearing as a typical rapidly exchanging fraction of RNA in animal cells, carries out quite different functions, not having a direct connection with the process itself, of the transmission of genetic information from nucleus to cytoplasm. I v L

N64-18348 Rochester U., N.Y.
STRONTIUM-90 TOXICITY IN RAT EMBRYO
B. J. Hopkins, G. W. Casarett, L. W. Tuttle, and R. C. Baxter
21 Feb. 1964 20 p refs
(Contract W-7401-ENG-49)
(UR-639)

Gestating rats were injected intravenously with doses of 191 microcuries or 382 microcuries of strontium-90 on the 2nd, 10th, and 17th days postconception. Examination of implantation sites on the 20th day postconception showed that the injection of strontium-90 on day 2 postconception caused a significant increase in fetal mortality and growth retardation, greater in degree after the larger dose, and that injection of strontium-90 on the 10th postconception day retarded growth and increased mortality (slightly) only after the larger dose. The maternal hematocrit was lowered significantly at both dose levels following strontium-90 injection on either the 2nd or 10th day postconception, and this effect was greater in those injected on day 2 postconception. The hematocrit of fetuses of strontium-injected rats was decreased slightly, but not significantly. There was an increased daily cumulative mortality in offspring of strontium-treated rats during the first week of life, but this was no longer evident by one month of age. Author

N64-18398 Joint Publications Research Service, Washington, D.C.
SURGICAL TREATMENT OF THERMAL BURNS
V. D. Bratus' 30 Mar. 1964 59 p Transl. into ENGLISH from the book "Khirurgicheskoye Lecheniye Termicheskikh Ozhogov" Kiev, 1963 p 3, 5-11, 231-250, 337-346, and 383
(JPRS-23933, OTS-64-21935) OTS: $1.50

A thorough study of burn patients during their entire illness made it possible to confirm that pathological changes, as well as protective compensatory processes in the organism, develop according to definite states. Each stage of the disease has its own, most-characteristic changes. Observations have shown that the probability of clinical manifestation of these stages of burn disease depends not only on the seriousness of the burn, reactivity of the organism, age, and concomitant diseases, but also to a considerable extent, on the effectiveness of employed therapy. Therapy that has been found to be effective during the various stages of burn disease is discussed. The results of a search for proteolytic enzymes capable of rapid and selective lysis of necrotized tissues of the skin are discussed. Certain enzymes of the digestive glands, as well as numerous enzymes grown from mold fungi and anaerobic microorganisms, were used. The most active filtrates from the isolated purified enzyme possessed no proteolytic action of sufficient strength for use instead of surgery. R.T.K.

N64-18400 Joint Publications Research Service, Washington, D.C.
ELECTRIC STIMULATION OF THE HEART
S. S. Grigorov et al. 8 Apr. 1964 7 p refs Transl. into ENGLISH from Klin. Med. (USSR), v. 43, no. 2, Feb. 1964 p 124-126
(JPRS-24083, OTS-64-31013) OTS: $0.50

A patient was clinically diagnosed as having total atrioventricular block with Morgan-Adams-Stokes seizures. The patient was treated effectively with electrical stimulation of the heart. R.T.K.

N64-18409 Rochester U., N.Y.
THE EFFECT OF INHALED RADON ON THE SURVIVAL, BODY WEIGHT AND HEMOGRAM OF THE MOUSE FOLLOWING MULTIPLE EXPOSURES
Donald A. Morken 27 Mar. 1964 74 p refs
(Contract W-7401-ENG-49)
(UR-624)

Mice exposed to daughter-free radon atmospheres by inhalation in one or several exposures exhibited a life-span shortening proportional to total accumulated dose. One-half of the lethality injury produced was repaired within a period of 2 weeks, and the extent of repair was independent of the dose fractionation. These mice demonstrated a weight loss proportional to total accumulated dose, independent of the dose fractionation. The blood picture evidenced injury proportional to dose fractions, when separated by 2 weeks, and rapid recovery. The red blood cell count was permanently depressed by a fixed amount following the first exposure, regardless of dose, and was not further influenced by subsequent doses. Author

N64-18410 Joint Publications Research Service, Washington, D.C.
EFFECTS OF SOME CHEMICAL AGENTS ON LIVING MATTER
6 Apr. 1964 13 p refs Transl. into ENGLISH of 2 articles from Dokl. Akad. Nauk SSSR (Moscow), v. 152, no. 3, 1963 p 737-743
(JPRS-24050, OTS-64-21994) OTS: $0.50

CONTENTS:

1. THE EFFECT OF ACRYLAMIDE AND ITS HYDROGENATED DERIVATIVE ON IRRADIATED BIOLOGICAL SYSTEMS Yu. P. Kozlov and T. N. Kalabykha p 1-4 refs (See N64-18411 10-16)
2. THE EFFECT OF HEAVY WATER ON DNA AND PROTEIN PROPERTIES V. V. Grechko et al. p 5-10 refs (See N64-18412 10-16)

N64-18411 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF ACRYLAMIDE AND ITS HYDROGENATED DERIVATIVE ON IRRADIATED BIOLOGICAL SYSTEMS
Yu. P. Kozlov and T. N. Kalabykha *In its* Effects of Some Chemical Agents on Living Matter p 1-4 refs (See N64-18410 10-16)

The influence of aqueous solutions of acrylamide and its hydrogenated derivative, amide of propionic acid, on the degree of grafting of polymers on irradiated wheat seeds, on the survival rate of irradiated diploid yeast cells, and on the degree of hemolysis of irradiated human erythrocytes was investigated. It was found that, in all cases, the introduction of acrylamide into the biological systems led to inhibitions in these systems of the free-radical states arising from irradiation, whereas the introduction of the hydrogenated derivative had a completely opposite effect. E.W.

N64-18412 Joint Publications Research Service, Washington, D.C.
THE EFFECT OF HEAVY WATER ON DNA AND PROTEIN PROPERTIES
V. V. Grechko, R. N. Maslova, L. S. Shkarenkova, Ye. I. Silina, and Ya. M. Varshavskiy *In its* Effects of Some Chemical Agents on Living Matter p 5-10 refs (See N64-18410 10-16)

A study was made of heat and acid-base denaturization of DNA in H_2O and D_2O solutions. The effect of D_2O on the reaction of antigens with antibodies was also investigated. E.W.

N64-18421 Naval School of Aviation Medicine, Pensacola, Fla.
EFFECTS OF EXPOSURE TO CONTINUOUS ROTATION ON NYSTAGMUS PHASE SHIFT
Jorma I. Niven and W. Carroll Hixson 7 Oct. 1963 20 p refs
(NASA Order R-47)
(NASA CR-53618, Rept. 87) OTS: $1.60 ph

The effect of 12 days' continuous exposure to constant rotation at 10 rpm on the steady-state response of the oculovestibular system to sinusoidal angular acceleration was evaluated from corneoretinal potential recordings obtained at rotation frequencies of 0.025 to 0.20 cps with equal magnitudes of peak velocity. Values of the damping stiffness ratio of the cupula endolymph system, estimated from nystagmus phase shift at 0.025 cps, were found to be consistent with those obtained by conventional cupulometry and were not significantly affected by the stress of the rotating environment.
Author

N64-18490 Rocketdyne, Canoga Park, Calif.
SOURCES OF INFORMATION IN HUMAN FACTORS ENGINEERING, INCLUDING ASSOCIATED AREAS IN SYSTEM SAFETY, MAINTAINABILITY, PERSONNEL SUBSYSTEM, LIFE SCIENCES, QUALITY ASSURANCE, AND RELIABILITY ENGINEERING
George A. Peters and Frank S. Hall. 15 Jan. 1964. 83 p. refs. (RH-3398B)

A comprehensive listing of regulatory and guidance documents pertaining to human-factors engineering and to areas of technical overlap or interdependence is presented. The references are divided into the following groups: (1) regulatory and guidance documents—a listing of documents that specifies what should be done by human-factors activities, including various regulations, specifications, standards, manuals, instructions, and programs requirements that attempt to define the character of the contractors human-factors functions; (2) descriptive publications—a sampling of government agency reports that attempt to describe how various functions might be accomplished, review the state-of-the-art in a given area, present new methods, or list basic data that might be useful in human-factors analysis; (3) illustrative reports—a cross section of contractually required or data submittal reports, representative of what was actually accomplished, how it was done, and the type of organization or approach that was utilized; and (4) reference sources—a guide on where to go for technical information in the field of human-factors engineering.
P.V.E.

N64-18517 Joint Publications Research Service, Washington, D.C.
BIOPHYSICAL STUDIES OF AMINO ACIDS AND PROTEINS
6 Apr. 1964. 18 p. refs. Transl. into ENGLISH of selected articles from Biofizika (Moscow), v. 8, no. 5, 1963, p. 536-542, 556-560
(JPRS-24046; OTS-64-21990) OTS: $0.50

CONTENTS:

1. ON THE PROBLEM OF CORRELATION AMONG NEIGHBORING AMINO ACID RADICALS IN PROTEIN MOLECULES. V. Yu. Urbakh. p. 1-9. refs. (See N64-18518 11-16)

2. PECULIARITIES OF THE ELECTRON PARAMAGNETIC RESONANCE SPECTRA OF AMINO ACIDS AND PROTEINS UNDER THE ACTION OF ULTRAVIOLET LIGHT. O. A. Azizova. p. 10-15. refs. (See N64-18519 11-16)

N64-18518 Joint Publications Research Service, Washington, D.C.
ON THE PROBLEM OF CORRELATION AMONG NEIGHBORING AMINO ACID RADICALS IN PROTEIN MOLECULES
V. Yu. Urbakh. *In its* Biophys. Studies of Amino Acids and Proteins. 6 Apr. 1964. p. 1-9. refs. (See N64-18517 11-16)

The degree of correlation of the amino acid radicals in a polypeptide chain can serve as one of the indices for characterizing the structure of protein molecules. The correlation problem deals with whether forbidden combinations of neighboring radicals exist, whether some combinations are observed more frequently than others, etc. Moreover, correlation can exist in principle not only among neighboring radicals, but also among farther removed radicals. This report evaluates quantitatively the degree of correlation of the radicals and isolates the portion of correlation that is due to correlation among neighboring radicals. This is accomplished by using the methods of information theory, as well as by using the analogy between the sequences of amino radicals in proteins and the sequence of letters in a text.
I.v.L.

N64-18519 Joint Publications Research Service, Washington, D.C.
PECULIARITIES OF THE ELECTRON PARAMAGNETIC RESONANCE SPECTRA OF AMINO ACIDS AND PROTEINS UNDER THE ACTION OF ULTRAVIOLET LIGHT
O. A. Azizova. *In its* Biophys. Studies of Amino Acids and Proteins. 6 Apr. 1964. p. 10-15. refs. (See N64-18517 11-16)

The EPR spectra of UV-irradiated sulfur-containing amino acids were measured. A mechanism was proposed to explain the appearance and transformation of the radicals during UV irradiation. The EPR spectra of UV-irradiated aromatic amino acids were studied. EPR spectra of various proteins, irradiated by UV, were taken; the kinetics of the change of the EPR signals of the proteins as a function of the temperature was studied.
Author

N64-18520 Joint Publications Research Service, Washington, D.C.
STUDIES IN BLOOD TRANSFUSION
9 Apr. 1964. 43 p. refs. Transl. into ENGLISH of 4 articles from Probl. Gematol. i Perelio. Krovi (Moscow), v. 10, no. 2, Feb. 1964. p. 37-55
(JPRS-24118; OTS-64-31034) OTS: $1.25

CONTENTS:

1. PLASMA PROTEIN FRACTIONS FOLLOWING REPLACEMENT OF LOST BLOOD WITH POLYGLUCIN. V. B. Kozinér and N. D. Papush. p. 1-12. refs. (See N64-18521 11-16)

2. ANTICOAGULANT EFFECT IN INFUSIONS OF THE PROTEIN BLOOD SUBSTITUTE BK-8. D. G. Petrov and B. T. Savkiv. p. 13-21. refs. (See N64-18522 11-16)

3. HISTOCHEMICAL AND FUNCTIONAL STUDY OF RETICULOENDOTHELIAL SYSTEM IN EXPERIMENTAL ANIMALS FOLLOWING THE INFUSION OF BLOOD EXPANDER SOLUTION OF POLYVINOL. Z. A. Chaplygina and V. P. Teodorovich. p. 22-32. refs. (See N64-18523 11-16)

4. CHARACTERISTICS OF THE AMINO ACID COMPOSITION OF THE PROTEIN HYDROLYZATE "TsOLIPK". A. M. Kharat'yan and K. Yu. Yuldoaskev. p. 33-40. refs. (See N64-18524 11-16)

N64-18521 Joint Publications Research Service, Washington, D.C.
PLASMA PROTEIN FRACTIONS FOLLOWING REPLACEMENT OF LOST BLOOD WITH POLYGLUCIN
V. B. Koziner and N. D. Papush (Inst. of Hematology and Blood Transfusion). *In its* Studies in Blood Transfusion. 9 Apr. 1964. p. 1-12. refs. (See N64-18520 11-16) OTS: $1.25

Plasma protein fractions following the replacement of lost blood, from exsanguinated dogs, with polyglucin were studied. These protein fractions were albumin, alpha$_1$-globulin, alpha$_2$-globulin, alpha$_3$-globulin, beta$_1$-globulin, beta$_2$-globulin and fibrinogen, and gamma-globulin. The concentration of these plasma proteins, in percentages, after blood loss and infusion of polyglucin as well as infusion of physiological solution are

presented in tabular form. It was shown that the general progress of the restoration of plasma proteins and the infusion of polyglucin has the same character as in the event of blood loss treated only with physiological solution. Consequently, polyglucin does not disturb the natural progress of the restoration of plasma proteins and their fractions following the loss of blood. I.v.L.

N64-18522 Joint Publications Research Service, Washington, D.C.
ANTICOAGULANT EFFECT IN INFUSIONS OF THE PROTEIN BLOOD SUBSTITUTE BK-8
D. G. Petrov and B. T. Savkiv (L'vov Sci. Res. Inst.) *In its* Studies in Blood Transfusion 9 Apr. 1964 p 13-21 refs (See N64-18520 11-16) OTS: $1.25

A clinical study was conducted of the anticoagulant effect of infusions of the protein blood substitute BK-8. Results indicate that: (1) The retardation of blood clotting that follows the infusion of BK-8 is associated with disturbances in the formation of thromboplastin, both quantitatively and qualitatively. (2) Infusions of BK-8 should not be given more often than once every 3 to 4 days in a dose not exceeding 500 to 750 ml. (3) The use of BK-8 has some point, perhaps, in the case of patients with a tendency toward thrombopoiesis. (4) The BK-8 infusion must not be given if a tendency toward hemophilia is present. Also, a peculiar kind of hemorrhagic diathesis that developed in a patient as a result of repeated infusion of BK-8 is discussed. I.v.L.

N64-18523 Joint Publications Research Service, Washington, D.C.
HISTOCHEMICAL AND FUNCTIONAL STUDY OF RETICULOENDOTHELIAL SYSTEM IN EXPERIMENTAL ANIMALS FOLLOWING THE INFUSION OF BLOOD EXPANDER SOLUTION OF POLYVINOL
Z. A. Chaplygina and V. P. Teodorovich (Leningrad Sci. Res. Inst.) *In its* Studies in Blood Transfusion 9 Apr. 1964 p 22-32 refs (See N64-18520 11-16) OTS: $1.25

A solution of polyvinyl alcohol was administered to rats and dogs. The animals were sacrificed at various times thereafter, and their liver, kidney, and spleen tissues were examined. A histochemical study of these tissues showed the inclusion of polyvinyl alcohol in the reticuloendothelial cells, and that this inclusion does not inhibit the phagocytic activity of the reticuloendothelium system. I.v.L.

N64-18524 Joint Publications Research Service, Washington, D.C.
CHARACTERISTICS OF THE AMINO ACID COMPOSITION OF THE PROTEIN HYDROLYZATE "TsOLIPK"
A. M. Kharat'yan and K. Yu. Yuldashev (Tashkent Med. Inst.) *In its* Studies in Blood Transfusion 9 Apr. 1964 p 33-40 refs (See N64-18520 11-16) OTS: $1.25

The amino acid composition of the protein hydrolyzate TsOLIPK was investigated by means of two-dimensional chromatograms. The amino acids were quantitated, using the Bode method, on one-dimensional chromatograms after repeated passage of the solvent (n-butanol–water–acetic acid). For chromatographic analysis, the TsOLIPK was taken in the form in which it is administered to patients, as well as after additional complete hydrolysis. The following amino acids were detected in the free form: glycine, cystine, aspartic and glutamic acids, serine, threonine, alanine, tyrosine, valine, phenylalanine, proline, and a joint spot of leucine and isolucine. Also, methionine sulfone (from methionine) was detected. In addition, five to six spots belonging to the peptides were identified. Some of these spots coincided with the position of lysine, arginine, and histidine, which impeded the identification of these acids and their quantitative determination in the incomplete hydrolyzate. Methionine and tryptophan were not separated as separate spots. The mean concentration of the individual amino acids (in mg%) in the hydrolyzate following complete hydrolysis is presented. This qualitative analysis shows that the TsOLIPK contains all the amino acids indispensable to man, which explains its good nutritive properties. I.v.L.

N64-18581 Air Force Cambridge Research Labs., Bedford, Mass. Microwave Physics Labs.
NONLINEAR OSCILLATIONS AND ELECTROENCEPHALOGRAPHY
Edmond M. Dewan Aug. 1963 23 p refs
(AFCRL-63-364; AD-421980)

It has been found that almost all of the well-known phenomena of nonlinear oscillations have counterparts in the macroscopic neuroelectric behavior of the human brain. Examples of such correspondences are: (1) soft limit cycles—"spontaneous" oscillatory brain activity; (2) hard limit cycles involving inertial nonlinearities—initiation of epileptic after-discharges by local electrical stimulation of the cortex; (3) nonlinear entrainment—hypersynchrony, photic driving of brain rhythms; (4) oscillation hysteresis—paradoxical duration of certain after-discharges, (5) variation of the parameter μ in van der Pol's equation $\ddot{x} - \mu(1 - x^2)\dot{x} + x = 0$—evolution of epileptic after-discharge from high-frequency waves into low-frequency relaxation oscillations and a connection between exhaustion and epileptic foci, and (6) asynchronous actions—blocking of the "alpha rhythm," "facilitation" and excitation and suppression activity associated with attention. These correspondences permit the construction of a very suggestive phenomenological theory to explain electroencephalographic data in terms of nonlinear stability, which in turn reveals unsuspected relationships in the data and suggests new experiments. Author

N64-18588 Massachusetts Inst. of Tech., Cambridge Research Lab. of Electronics
SIGNAL DETECTION BY HUMAN OBSERVERS Final Report
John A. Swets and David M. Green Bedford, Mass., Electron. Systems Div., Oct. 1963 49 p refs
(Contract AF 19(604)-1728, Contract AF 19(604)-7459)
(ESD-TDR-64-174, AD-434825)

Theoretical and experimental studies of tasks in which the detection response was based on a sequence of observations, rather than on a single observer's response, were conducted. The application of decision theory permits separation of the effects of variation in the observer's response criterion from those of variation in his sensitivity. It was demonstrated that the sensitivity index of the theory is invariant over several different psychophysical procedures. It was also demonstrated that the effects of practice on sensitivity are small and of short duration, and that the effect on sensitivity of attempts to vary motivation is practically nonexistent. By an examination of the consistency of the observer's detection responses to the same signal, the relative importance of external and internal determinants of the response was determined. Much of the research effort was devoted to the problem of frequency analysis, or pitch perception. Investigations were also made of color vision, of the effects of signal uncertainty, of intensity discrimination, and of internally generated noise. Abstracts are included of the papers that have been published as a result of these investigations. R.T.K.

N64-18599 Aerospace Medical Div. Aerospace Medical Research Labs (6570th), Wright-Patterson AFB, Ohio
ESTIMATING MANNING REQUIREMENTS FOR ADVANCED SYSTEMS: A SURVEY OF THE DEFENSE INDUSTRY
Donald B. Haines and Sidney Gael Nov. 1963 31 p refs
(AMRL-TDR-63-110, AD-432483) OTS: $1.00

The survey was part of a long-range program of research aimed at the identification and quantification of manning requirements for advanced weapon systems. A five item, open-ended questionnaire was sent to human-factors specialists in key defense industries. Five different approaches to estimating manning were reported; the most popular was the use of task analysis or some combination of task analysis with variations of the other approaches. Other methods were: expert estimation, historical comparison, sovereign factors, and mathematical models. The most frequently cited guides were USAF publications, but a wide variety of other texts, handbooks, and technical publications were also reported. Respondent experience ranged over the major weapon systems, subsystems, and control networks. The report concludes with suggestions for the characteristics of a method acceptable to industry. Author

N64-18600 Foote Mineral Co., Exton, Pa. Research and Engineering Center

A STUDY OF THE APPLICATION OF LITHIUM CHEMICALS TO AIR REGENERATION TECHNIQUES IN MANNED, SEALED ENVIRONMENTS **Technical Documentary Report, Jun. 1962–Jan. 1963**

Meyer M. Markowitz and Eugene W. Dezmelyk Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs., Feb. 1964 208 p refs

(Contract AF 33(657)-9124)

(AMRL-TDR-64-1; AD-435815) OTS: $3.50

A thermochemically self-propagating oxygen-generating composition was formulated of 84.82% (by weight) lithium perchlorate oxidant, 10.94% manganese metal powder fuel, and 4.24% lithium peroxide chlorine suppressant additive after an extensive study of lithium perchlorate–fuel interactions. The average available oxygen content from the combustion of this composition is 49.2% (by weight). At a compacted density of 2.32 grams/cc., the oxygen content of the mixture is equivalent to that of an equal volume of liquid oxygen at its boiling point of −183° C. Engineering design and development of prototype equipment to supply the oxygen requirement for 1 man-day and to absorb the carbon dioxide output for 1 man-day were successfully completed by fabrication and testing of a lithium perchlorate-based oxygen generator and a lithium peroxide-based carbon dioxide absorption unit. Author

N64-18629 Northrop Corp., Hawthorne, Calif. Space Labs.

MODEL ASTRONAUT RADIATION DOSE DISTRIBUTION ANALYSIS

R. E. Fortney and G. E. Duckworth Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs., Feb. 1964 27 p refs

(Contract AF 33(657)-11010)

(AMRL-TDR-64-9; NSL-63-172; AD-435734)

The basis of the mathematical formulation for determining the dose distribution is presented. Particles of the ambient environment were assumed to impinge isotropically on the Apollo Command Module (CM). The radiation was attenuated through a typical vehicle wall thickness, and mean dose rates at various depths in a model astronaut were calculated. Four depths were investigated, each having approximately 175 points at which the dose was calculated. Two spectra was considered—one for Van Allen protons and the other representing solar flare protons. The results are presented in graphical form, giving dose versus depth in the model astronaut. Author

N64-18632 ARO, Inc., Arnold Air Force Station, Tenn.

VON KARMAN GAS DYNAMICS FACILITY, TECHNICAL DEVELOPMENTS

J. Lukasiewicz Arnold Eng. Develop. Center, 1964 83 p refs

(AD-435787)

The following are discussed: (1) aerodynamics—analytical studies, supersonic and hypersonic flows, aerodynamic controls, and boundary-layer control at supersonic speeds; (2) hypervelocity impact—formation of craters, and target rear-surface fracture resulting from high-speed impact; and (3) experimental techniques—supersonic and hypersonic tunnels, the development of hotshot-type wind tunnels, low-density facility, hypervelocity ranges, and instrumentation. R.T.K.

N64-18650 New York Medical Coll., N.Y.

THE EAR OF THE CHIMPANZEE

E. L. House, B. Pansky, M. S. Jacobs, and B. M. Wagner Holloman AFB, N. Mex., 6571st Aeromedical Res. Lab., Jan. 1964 347 p refs

(Contract AF 29(600)-3022)

(ARL-TDR-64-1; AD-434758)

The gross and microscopic anatomy of the petrous portion of the chimpanzee temporal bone, with particular emphasis on the histology of the middle and inner ears, is described. This description is supplemented by multiple gross and microscopic photographs of the more crucial anatomical landmarks. Photographs of a wax-plate reconstruction of a chimpanzee petrous bone exhibiting anatomical relationships within the inner and middle ears are included. Author

N64-18665 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

OVERLOADING AND WAY OF INCREASE OF ENDURANCE OF ORGANISM

V. Stepantsov and G. Khlebnikov 17 Apr. 1963 13 p refs Transl. into ENGLISH from Aviats. i Kosmonav. (Moscow), no. 1, 1963 p 44–48

(FTD-MT-63-20/1; AD-434948)

The effects of positive transverse and longitudinal loadings on aircraft pilots and astronauts are discussed. Effective means for increasing the ability to endure the influence of positive overloadings are the centrifuge, acrobatics, gymnastics, and "passive" training on the special revolving table. Negative overloadings are also discussed. I.v.L.

N64-18672 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

ACTION OF GIBBERELLIC ACID ON PROTOCOCCALES

V. V. Pinevich, N. N. Verzilin, and V. E. Vaileva 12 Nov. 1963 13 p refs Transl. into ENGLISH from Nauchn. Dok. Vysshey Shkoly, Biol. Nauki (Moscow), no. 3, 1961 p 151–154

(FTD-MT-63-49; AD-434937)

The effect of indolyl acetic acid (IAA) and indolyl butyric acid (IBA) on *Chlorella pyrenoidosa* was studied. Growth stimulators were applied in concentrations of 10^{-4}, 10^{-3}, 10^{-2}, 10^{-1}, and 10^{0} milligrams/liter of suspension. It was found that the IAA and IBA in concentration of 10^{-2} and 10^{-3} milligrams/liter intensify the division of cells, but lower the accumulation of dry substance. At the IAA and IBA concentration of 10^{0} milligrams/liter of suspension, there is a suppression of cell division, but the size of the cells increases. A series of experiments were also conducted in order to ascertain the effect of gibberellic acid (GA) on the growth of *Chlorella pyrenoidosa*. Under the influence of GA in concentrations of 10^{-2} and 10^{-1} milligrams/liter, the quantity of *Chlorella pyrenoidosa* and the total harvest of water plants are increased. R.T.K.

N64-18734 Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

THE ADAPTIVE DYNAMIC RESPONSE CHARACTERISTICS OF THE HUMAN OPERATOR IN SIMPLE MANUAL CONTROL

Laurence R. Young, David M. Green, Jerome I. Elkind, and Jennifer A. Kelly Washington, NASA, Apr. 1964 104 p refs (NASA Contract NASw-185)
(NASA TN D-2255) OTS: $2.50

This report describes an experimental investigation of human adaptive control following sudden changes in gain or polarity of the controlled element in a closed-loop tracking task. The experiments used primarily simple position control to determine lower bounds on the adaptation process. Random inputs were tracked under pursuit and compensatory single-axis displays. Times necessary for adaptation to changes in simple tracking conditions are quite small. Human operator control adaptation generally occurs in 0.4 to 0.8 sec following a controlled element change, and the resulting error is usually reduced to its asymptotic level in 1 to 3 sec following transition. Author

N64-18773 Boeing Co., Seattle, Wash.
EFFECTS OF SIMULATED AEROSPACE SYSTEM ENVIRONMENTS ON THE GROWTH OF SELECTED ANGIOSPERMS
Technical Documentary Report, Jun. 1962-Jun. 1963
G. M. Christensen et al Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs. (6570th), Dec. 1963 65 p refs
(Contract AF 33(657)-8341)
(AMRL-TDR-63-131; AD-434684) OTS: $1.75

A series of detailed studies were performed to evaluate the growth of selected angiosperms on substrates composed of the effluent from waste disposal processes and to measure growth and photosynthesis under a variety of atmospheres and lighting conditions. The plants used most extensively were *Brassica chinensis* (Chinese cabbage), *Amaranthus gangeticus* (Tampala), and *Chicorium endiva* (endive). Some preliminary experimentation was also performed using *Beta vulgaris cicla* (Swiss chard) and two other members of the genus *Brassica*, kale and collards. The results indicate that growth on effluents of biological waste disposal processes will be satisfactory only upon supplementation, further treatment, or adaptation to the effluent. Growth under narrow-band fluorescent lamps, or under combinations of several colored lights, in no case approached that observed under light sources that were specifically designed to promote plant growth. Author

N64-18785 Texas Christian U., Fort Worth, Tex.
PREDICTION OF AIR FORCE ADAPTABILITY OF BASIC AIRMEN REFERRED FOR PSYCHIATRIC EVALUATION
S. B. Sells Lackland AFB, Tex., Personnel Res. Lab. (6570th), Sep. 1963 67 p refs
(Contract AF 41(657)-4111)
(PRL-TDR-63-23; AD-426768)

Data from enlistment records, basic training, and clinic referral were collected and analyzed to identify predictors of success within the psychiatric referral group. Keying 24 items from clinical records resulted in scores that correlated 0.55 with the criterion of Air Force success. Regression equations were derived to show increased efficiency of prediction from adding the mental hygiene data to other predictors of success. Distributions of the mental hygiene scores illustrate possible use of a cutting score for early identification of mental hygiene referrals not likely to successfully complete an Air Force tour. Author

N64-18789 Iowa State U., Iowa City
WATER RECOVERY BY FREEZE DRYING USING MICROWAVE ENERGY
A. F. Vetter and Karl Kammermeyer Wright-Patterson AFB, Ohio, 6570th Aerospace Med. Res. Lab., Dec. 1963 66 p refs
(Contract AF 33(657)-9263)
(AMRL-TDR-63-130; AD-434801) OTS: $1.75

The recovery of water from urine by the freeze-drying process, using a microwave energy source, is investigated. Chemical and biological contaminants are well below the standards established by the U.S. Public Health Service. Taste and odor of the reclaimed water are satisfactory for drinking purposes without additional treatment. Various foam and sponge materials for use in zero-gravity environments were tested. Yield rate studies were performed, using such variables as power input, geometrical configuration, use of sponge and foam materials, and comparison of prefrozen and vacuum-frozen samples. A suggested apparatus design is presented, and space and power requirements are discussed. Author

N64-18796 Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE HUMAN OPERATOR AS A MONITOR AND CONTROLLER OF MULTI-DEGREE OF FREEDOM SYSTEMS
John W. Senders [1963] 27 p refs Presented at the 4th Natl. Symp. on Human Factors in Electronics, IEEE Men, Machines, and Systems, Wash., D.C. 2-3 May 1963

This report sets forth a model that attempts to predict the relation between the kind and rate of information displayed on any display and the frequency and duration of samples made of that display. The approach utilizes the notion that it is possible to quantify the attentional demand or work load placed on the monitor or controller by each source of information in a complex man-machine system. The attentional demand can be calculated on the basis of the bandwidth and required precision of readout of the signal presented by an information source. It can be measured by the frequency and duration of fixations on an information source. The results of theoretical calculations compare favorably with experimental results. Author

N64-18826 Air Force Systems Command, Wright-Patterson AFB, Ohio
INFORMATION PROCESSING BY LIVING ORGANISMS AND MACHINES. 1963 BIONICS SYMPOSIUM
Mar. 1964 360 p refs Symp. held at Dayton, Ohio, 19-21 Mar. 1964 Sponsored jointly by Aeron. Systems Div. and Aerospace Med. Div.
(ASD-TDR-63-946; AD-435982)

CONTENTS:

N64-18827 Minnesota U., Minneapolis
SIGNALS ASSIMILABLE BY LIVING ORGANISMS AND BY MACHINES
Otto H. Schmitt *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 5-12 (See N64-18826 11-16)

The following aspects of bionics are discussed: the biological goals, the mathematics, the computer hardware used, electronics in medicine, and manpower and education in bioengineering. R.T.K.

N64-18828 Illinois U., Urbana
SYSTEMS AND INFORMATION
W. Ross Ashby *In* AF Systems Command, Inform. Process. by Living Organisms and Machines 1963 Bionics Symp. Mar. 1964 p 13-18 refs (See N64-18826 11-16)

The elementary principles of bionics are described in terms of the logic of mechanisms. This logic is developed according to the algebraic method proposed by Bourbaki. Information theory is discussed. It is defined as being a method for retaining some knowledge of cause-effect relations when the causes and their effects become so numerous that detailed knowledge of each pair is abandoned; an overall check is retained so that the number of causes is sufficient to account for the number of effects. Complex systems and the theory and logic of simplification are also discussed. R.T.K.

N64-18829 Massachusetts Inst. of Tech., Cambridge, Mass.
OBSERVATIONS ON COLOR VISION
Jerome Y. Lettvin *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 20-31 refs (See N64-18826 11-16)
(Contract AF 33(616)-7783; NSF Grant 16526; NIH Grant NB-01865-05; NIH Grant MH-04737-03)

The aperture mode of color perception is discussed. It uses a trichromatic method for matching colors. The theory of color vision that is suggested is that all of the cones bear all of the pigments but in different ways. Arguments are presented in support of this theory. The disadvantages inherent in the theory are also discussed. R.T.K.

N64-18830 Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE USE OF ANATOMICAL AND PHYSIOLOGICAL EVIDENCE IN THEORY CONSTRUCTION
William D. Neff *In* AF Systems Command Inform. Process. by Living Organisms and Machines 1963 Bionics Symp. Mar. 1964 p 32 Abstract only (See N64-18826 11-16)

In the formulation of theories of information processing in sensory systems or theories of sensory discrimination, selected bands of the total spectrum of data are typically utilized. A brief review of evidence bearing upon one sensory system, the auditory system, is given. An attempt is made to ascertain whether researchers in theory construction make use of and organize the total accumulation of information, or whether they devise superficial models and select only those pieces of evidence that support a particular idea. Author

N64-18831 Erlangen U. (W. Germany) Inst. of Physiology
TUNING BETWEEN CENTRAL AUDITORY PATHWAYS AND THE EAR
Wolf D. Keidel *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 33-60 refs (See N64-18826 11-16)

A modern physiological concept is presented of the sensory optimizing system of the CNS (central nervous system). The latter performs the function of selecting the information reaching the threshold of consciousness. The "optimizing function" of the human CNS is effected by: (1) the modulation of the "specific information" by the "unspecific" passing the reticular formation of the brain stem; and (2) the descending fiber systems that selectively attenuate the "specific information", depending on both intensity and frequency in the auditory channel that attenuate on every level of the sensory pathway. Also discussed is the special tuning system responsible for the synergism of frequency (pitch) discrimination and periodicity analysis. R.T.K.

N64-18832 College de France, Paris
GLIAL CONTROL OF NEURONAL ACTIVITY
Leo E. Lipetz (Ohio State U.) *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 61-87 refs (See N64-18826 11-16)
(PHS Grant B-1408)

The concept that the activity of neurons is both passively and actively modified by the surrounding glial and other nonneuronal cells is supported, but not conclusively demonstrated, by recent and previously unreported experiments. The evidence makes such nonneuronal control seem very likely in the vertebrate retina. In particular, the nonneuronal horizontal cells of the retina were found to summate and transmit changes in their membrane potentials (the L-response type of S-potential) over distances many times the span of a single such cell. Potential changes can affect the neuronal transmission of excitation from the photoreceptors to the ganglion cells, and may be a basis for a mechanism accounting for the low-luminance portion of light adaptation and for certain retinal functions of spatial summation and movement detection. Author

N64-18833 Massachusetts Inst. of Tech., Cambridge
HOW THE LOCATION OF A STIMULUS IS CORRECTLY SIGNALLED TO THE CENTRAL NERVOUS SYSTEM

Karl Kornacker and Patrick D. Wall *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 89-92 refs (See N64-18826 11-16)
(NIH Grant NB-01865-05)

Experimental results gained from studying amphibians are presented to support the fact that most of the highly refined information operations performed by the central nervous system become worthless if the precisely ordered connections between the peripheral sense organs and the central nervous system are disorganized. R.T.K.

N64-18834 California U., Berkeley
LIMITS OF GENETIC CONTROL
H. J. Bremermann *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 93-104 refs (See N64-18826 11-16)
(Contract Nonr-222(85))

In simple cases the amount of information required for control of behavior and specification of structure can be estimated. If unconstrained, n stimulus-response pairs require $n(\log_2 n/e)$ bits (for large n). Linguistic notions and their denotations may be considered as unconstrained stimulus-response pairs. A language of 1,200 words constitutes about 10^4 bits. This number is of the order of magnitude of the number of genes in human somatic cells. If each gene has two different states (alleles), then each gene represents at most one bit of information. If a language and its understanding are to be innate, then its information content must not exceed the information capacity of the genes. Hence an innate language cannot contain more than about 1,200 words. Similarly, the structure of the human brain must be to some degree random or repetitive. The genes cannot specify each individual interconnection between neurons. Antibody formation must be an adaptive process, otherwise the antigen-antibody pairs are constrained. Author

N64-18835 Chicago U., Ill. Committee on Mathematical Biology
MATHEMATICAL MODELS OF NEURAL ACTIVITY
H. D. Landahl *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 105-123 refs (See N64-18826 11-16)
(AF AFOSR Grant 62-117)

A brief review is presented of a mathematical representation of neural activity, together with some applications. This mathematical model of neural elements is used to describe psychological situations. R.T.K.

N64-18836 Santa Rita Technology, Inc., Menlo Park, Calif. Bioacoustics Lab. Inc.
LIMITS TO ANIMAL DISCRIMINATION AND RECOGNITION IN A NOISE-FREE EXTERNAL ENVIRONMENT
John L. Stewart *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 124-159 refs (See N64-18826 11-16)

One- and two-dimensional sensory mechanisms, corresponding to one patch and a line array, respectively, of sensory cells are analyzed. A fundamental stimulus conversion law to average neural pulse rate is employed to explain several phenomena in psychophysics. A theory for neural noise is developed that is shown to specify the limits to animal discrimination and to explain certain observed neural mechanisms. Concepts of optimum detection are employed to specify the ideal animal recognition sensory schema as limited by constraints associated with unavoidable neural noise. Actual animal mechanisms appear to follow the ideal. Certain aspects of Gestalt psychology are also evidenced. The general theory provides quantitative insight into artificial animal recognition and information-handling systems and indicates the extent to which the capability of a mechanical device can equal or exceed that of its living counterpart. Explicit design considerations for implementation of the ideal artificial animal system are provided. Author

N64-18837 Illinois U., Urbana
MOLECULAR BIONICS
Heinz Von Foerster *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 161-190 refs (See N64-18826 11-16)
(Contract AF 33(657)-10659; AF AFOSR Grant 7-63)

Three features of macromolecular structures are discussed in order to provide clues to the behavior of aggregates of such molecules in living matter. These features are: (1) storage of information, (2) manipulation of information (computation), and (3) manipulation of information associated with energy transfer. R.T.K.

N64-18838 Case Inst. of Tech., Cleveland, Ohio. Systems Research Center
MULTI-LEVEL HEURISTIC AND PROBLEM SOLVING
Mihajlo D. Mesarović *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 192-205 refs (See N64-18826 11-16)

It has been suggested that simulation of biologic systems and, in particular, brainlike mechanisms should not be based on a loosely structured network, but rather that a multilevel, multigoal structuring of the systems is preferable, if not mandatory, for proper understanding of the behavior. The principal characteristic of the proposed multilevel approach is the simultaneous operation (parallel computation) of the units on the same as well as on different levels. This is essential for the proper coordination action of the higher level units. In particular, the application of the multilevel approach to the heuristic theorem proving is considered. Author

N64-18839 Massachusetts Inst. of Tech., Cambridge
REALIZABILITY OF INDUCTIVE LOGIC
M. C. Goodall *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 206-226 refs (See N64-18826 11-16)
(Contract AF 33(616)-7783; NIH Grant NB-01865-05)

The basic model is a two-way communication system in which observer O transmits axioms A, interprets received message S' by rules, R, of a Post normal logic. O's strategy is to generate (applying R to A) derivations S that minimize d(S,S'), subject (among other things) to R being Turing universal. This implies that (A,R:S') are analogs of complementary observables and interaction potential in quantum mechanics. Author

N64-18841 System Research, Ltd., Richmond, (Gt. Brit.)
SELF-ORGANISING SYSTEMS INVOLVED IN HUMAN LEARNING AND PERFORMANCE
Gordon Pask *In* AF Systems Command Inform. Process. by Living Organisms and Machines. 1963 Bionics Symp. Mar. 1964 p 247-338 refs (See N64-18826 11-16)
(Contract AF 61(052)-402; Contract AF 61(052)-640)

Discussed is the coupled system formed when one or more human beings interact with an adaptive machine. Systems of this kind are examined in connection with teaching (the adaptive machine has the role of an instructor, programed to teach a skill), with testing (the adaptive machine is programed to perform a sequence of experiments that yield maximum information about a chosen aspect of human behavior) and with coding, when the adaptive machine is an aid to performance and

cooperates with the man. The adaptive machine, as part of its job in stabilizing the coupled system, builds up a cybernetic or bionic "model" of the man with which it interacts; this coupled man-machine system is a self-organizing system. Bionic models are described and compared. Metalinguistic descriptions of coupled systems are constructed. The basic logical requirements for a theoretical framework are discussed. Author

N64-18868 Naval Research Lab., Washington, D.C.
THE PRESENT STATUS OF CHEMICAL RESEARCH IN ATMOSPHERE PURIFICATION AND CONTROL ON NUCLEAR-POWERED SUBMARINES Third Annual Progress Report
H. W. Carhart and V. R. Piatt, ed. 31 Dec. 1963 69 p refs
(NRL-6053; AD-435518)

Emphasis is, at present, being devoted almost exclusively to nuclear-powered submarines. Considerable progress has been made in the major efforts of developing: (1) the sulfate-cycle system for the electrolytic generation of oxygen from water and the absorption of carbon dioxide; (2) additives to decrease the degradation of monoethanolamine (MEA) in the CO_2 scrubber; and (3) improved methods of sampling and analysis of atmospheres. Other topics covered include the use of algae for oxygen production and carbon dioxide absorption, an assessment of CO_2 removal systems, and catalytic combustion studies using hopcalite. Author

N64-18874 Utah U., Salt Lake City. Utah Coll. of Medicine
EFFECT OF ACCLIMATIZATION TO 2° C ON HOST SUSCEPTIBILITY TO KLEBSIELLA PNEUMONIAE CHALLENGE
S. Marcus, F. Miya, and L. J. Phelps Ft. Wainwright, Alaska, Arctic Aeromedical Lab., Sep. 1963 11 p refs
(Contract AF 41(657)-311)
(AAL-TDR-63-9; AD-434114)

Adult albino mice were exposed to 2° C in groups for varying time periods prior to challenge intraperitoneally with 1 LD_{50} of *Klebsiella pneumoniae*. Animals exposed to the low temperature for up to five days prior to challenge showed no significant differences in mortality from the controls. Statistically significant survival ratios were obtained if the mice were exposed to cold for more than five days prior to challenge. No deaths were observed in comparable specifically immunized groups of animals. Author

N64-18886 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
TRANSIENT CHANGES IN ARTERIAL LACTIC ACID OF DOGS AT 21,000 FEET
Stephen M. Cain and James E. Dunn II Mar. 1964 10 p refs
(SAM-TDR-64-2; AD-434870)

After a 3-hour control period at ground level, unanesthetized dogs were exposed for 8 hours to 21,000 feet simulated altitude (P_B = 335 mm Hg). Arterial blood samples were drawn frequently from a Teflon T-cannula surgically placed in a carotid artery 1 or 2 days prior to the experiment. Lactic and pyruvic acid concentrations, P_{CO_2}, P_{O_2}, and pH were measured. At altitude, the average arterial P_{O_2} was 32 mm Hg. P_{CO_2} was 24 mm Hg. The pH was 7.50. All control values fell in normal ranges. Although the magnitude of changes differed among animals, arterial lactic acid reached a peak value within the first 2 hours at altitude, gradually declining thereafter, and, in most animals, it closely approached the control value during the eighth hour at altitude. Excess lactate changed in a similar manner (with no concomitant relief of arterial hypoxia and hypocapnia). The decline in lactic acid remains unexplained. Author

N64-18906 Texas Christian U., Fort Worth
PREDICTION OF AIR FORCE ADAPTABILITY OF BASIC AIRMEN REFERRED FOR MENTAL HYGIENE CLINIC EVALUATION Final Technical Report
S. B. Sells and Douglas J. Mace 30 Jun. 1963 74 p refs
(Contract AF 41(657)-4111)
(AD-436571) OTS: $7.60

This report presents the results of an investigation related to the reduction of waste through improvement in the accuracy of performance prediction of Air Force duties of a category of personnel having, as a whole, a poor prognosis for useful service (77% failure). This category consists of airmen in basic training referred by training officers or others for Mental Hygiene Clinic Evaluation as a result of low peer ratings, deviant behavior, or unsatisfactory performance in the basic program. The discussed new key for predicting adaptability was developed, using data-retrieval methods. A 180-item code, sampling 102 objectively recorded and 72 subjective items, was used to analyze data for 4,042 airmen referred for evaluation during basic training. Of these items, 24 (in addition to age and education), which discriminated postbasic pass vs postbasic fail, were selected as the mental hygiene file key. I.v.L.

N64-18917 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
ENDOCRINE AND METABOLIC EFFECTS OF SHORT-DURATION HYPEROXIA
Henry B. Hale, Edgar W. Williams, John E. Anderson, and James P. Ellis, Jr. Feb. 1964 9 p refs
(SAM-TDR-64-6; AD-434424)

This investigation was concerned with the effects of breathing 100% oxygen (by mask) at 1 atm ambient pressure for 4 hr on sympathoadrenal, adrenocortical, and metabolic functions in healthy human subjects. Control determinations were made on the same subjects on a separate occasion by having the subjects breathe room air (by mask). Sympathoadrenal activity was appraised by means of urinary epinephrine and norepinephrine determinations; adrenocortical activity was appraised by means of plasma cortisol and urinary 17-hydroxycorticosteroid determinations; metabolic appraisal was made by means of urinary creatinine, urea, uric acid, phosphate, potassium, and sodium. Evidence of hyperoxia-induced adrenocortical and sympathoadrenal depression was found, with plasma cortisol concentration, as well as catecholamine excretion, falling below the control levels. Urine volume also was relatively low, as were urinary sodium and phosphate values. Mask discomfort was shown to be an obscuring factor, since it acted oppositely to hyperoxia in many respects. Author

N64-18918 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
CONSTRUCTION AND USE OF A SIMPLE, SELF-GUIDING CATHETER FOR RIGHT HEART AND PULMONARY ARTERY IMPLANTATION
William P. Fife Feb. 1964 7 p refs
(SAM-TDR-64-10; AD-434425)

A catheter has been developed that can be easily and rapidly implanted in the right heart or pulmonary artery. Fabricated from Tygon tubing, the catheter contains a thin section located 2 cm from the distal end. This results in a tip that follows the bloodstream without special manipulation. During implantation, its position is monitored by the use of a pressure transducer, thus eliminating the need for fluoroscopy. Since the catheter is self-guiding, it may be implanted with ease from such distal locations as the femoral vein. It can be used to inject substances directly into the heart or pulmonary artery, or to withdraw blood samples. It also can be used to make pressure recordings of high quality from these areas. Author

N64-18932 Industrial Biology Research and Testing Labs., Inc., Philadelphia, Pa.
CUTANEOUS TOXICITY EVALUATION OF AIR FORCE DEVELOPMENT MATERIALS – VI Technical Documentary Report No. 6, Oct. 1962-Jan. 1964
Morris V. Shelanski Wright-Patterson AFB, Ohio, Aerospace Med. Res. Lab., Feb. 1964 16 p refs
(Contract AF 33(657)-8900)
(AMRL-TDR-64-13; AD-435776) OTS: $0.50

Ten Air Force development materials were studied via the patch test method on laboratory animals to determine the primary irritant effect, gross sensitization index, and gross percutaneous toxicity of these materials. The patch test studies with rabbits indicated that three of the materials showed very mild primary irritant action. None of the materials produced any sensitization or gross systemic poisoning. Dermal reactions on rabbits were so mild that testing on humans was not precluded. The materials were, therefore, tested on human volunteers by the Shelanski repeated-insult patch test. Results of this test indicated that all of the materials were safe to use on contact with human skin. Author

N64-18937 Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
THE EFFECTS OF TRANSIENT WEIGHTLESSNESS ON BRIGHTNESS DISCRIMINATION Technical Documentary Report, Apr. 1963-Aug. 1963
William J. White Wright-Patterson AFB, Ohio, AMRL, Mar. 1964 21 p refs
(Contract AF 33(657)-11600)
(CAL-VH-8137-E; AMRL-TDR-64-12; AD-435544) OTS: $0.75

Contrast thresholds of six semisupine, visually adapted subjects were obtained under short (10 to 15 sec) periods of weightlessness and under 1-g control conditions. The target, viewed binocularly, subtended 1.5° and the background 2.6°. Three background-luminance levels were used—0.03, 0.28, and 30.0 ft-L. The contrast required to detect the target was slightly, but consistently, lower under the weightless condition than under the 1-g control condition. Under the weightless condition, the contrast required to detect the target averaged 12.56% at 0.03 ft-L background luminance, 6.4% at 0.28 ft-L background luminance, and 3.99% at 30.0 ft-L background luminance. The corresponding contrasts required under the control 1-g condition averaged 15.14%, 7.05%, and 4.45%, respectively. Author

N64-18966 Joint Publications Research Service, Washington, D.C.
PHYSIOLOGICAL MECHANISMS OF THE HUMAN ORGANISM AND METHODS OF STUDYING THEM
14 Apr. 1964 38 p refs Transl. into ENGLISH of 4 articles from Vopr. Kurortol. Fizioterapii i Lecheb. Fiz. Kul't. (Moscow) no. 6, 1963 p 481-487, p 510-526
(JPRS-24183; OTS-64-31072) OTS: $1.00

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1. PHYSIOLOGICAL MECHANISMS OF ACCLIMATIZATION AND HABITUATION OF THE HUMAN ORGANISM TO COLD A. D. Slonim p 1-10 refs
2. THE UTILIZATION OF HEAT-EMISSION MEASUREMENTS DURING SUDDEN COOLING, FOR EVALUATION OF THE CONDITION OF THERMOREGULATING MECHANISMS G. D. Latyshev p 11-20
3. HEAT EXCHANGE OF MAN IN AN AQUEOUS MEDIUM G. B. Smolyanskiy p 21-27 refs
4. UTILIZATION OF PROPER VALUES FOR ESTIMATION OF THE FUNCTIONAL CONDITION OF AN ORGANISM V. F. Shubin p 28-35 refs

N64-18967 Joint Publications Research Service, Washington, D.C.
X-RAY INJURIES
V. M. Stepanov and F. S. Golubkova 14 Apr. 1964 5 p refs Transl. into ENGLISH from Vestn. Khirurg. (Leningrad), v. 92, no. 2, Feb. 1964 p 132-133
(JPRS-24185; OTS-64-31074) OTS: $0.50

A brief discussion on the need for increased control in the use of X-irradiation during medical treatment of injuries is presented. P.V.E.

N64-18968 Joint Publications Research Service, Washington, D.C.
A STUDY OF THE MICROFLORA OF GAMMA-IRRADIATED PRODUCTS
F. S. Apt et al 14 Apr. 1964 8 p Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 33, no. 1, Jan.-Feb. 1964 p 167-171
(JPRS-24187; OTS-64-31076) OTS: $0.50

The residual microflora of edible products—meat, fish, and green peas—irradiated with gamma radiation at doses from 600 to 1,500 kilorads are chiefly the coccal forms and yeasts. Cocci and yeast have been isolated from spoilage-bulged cans containing irradiated products. Under the effect of irradiation, some of the spontaneous product microflora change their morphological and biochemical properties. Author

N64-18969 Joint Publications Research Service, Washington, D.C.
DATA ON ACCUMULATION COEFFICIENTS OF P^{32}, S^{35}, Sr^{90}, Y^{91}, Cs^{137} AND Ce^{144} IN MARINE ORGANISMS
G. G. Polikarpov 16 Apr. 1964 28 p refs Transl. into ENGLISH from Tr. Sevastopol'sk. Biol. St. Akad. Nauk SSSR (Moscow), v. 14, 1961 p 314-328
(JPRS-24227; OTS-64-31088) OTS: $0.75

Data on the following are presented: the accumulation coefficients of six fission and controlled radioisotopes in different plants and animals of the Black Sea; the absence, within a wide range, of a relationship between these coefficients and the concentration of an isotope in an aqueous medium; the values of the accumulation coefficients under conditions when the isotope is introduced once and its concentration is constantly maintained at the same level; and changes in the accumulation coefficients of the most important fission products during detritus formation. It is felt that these results indicate that the Black Sea does not meet the requirements called for in an international site for the burial and neutralization of high-activity wastes from the atomic industry. R.T.K.

N64-18972 Joint Publications Research Service, Washington, D.C.
STUDIES OF PHYSIOLOGICAL REACTIONS TO IRRADIATION AND OTHER FACTORS, AND THE USE OF BIOTELEMETRY
22 Apr. 1964 52 p refs Transl. into ENGLISH of 7 articles from Byull. Eksptl. Biol. i Med (Moscow), no. 2, 1964 p 29-40, 93-101, 104-107, and 117-121
(JPRS-24301; OTS-64-31131) OTS: $1.50

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2. DYNAMICS OF WHITE BLOOD RESPONSE TO IRRADIATION I. K. Petrovich and Yu. I. Moskalev p 9-16 refs
3. EFFECT OF SINGLE LOCAL IRRADIATION ON THE PERIPHERAL BLOOD VESSELS AND THEIR REACTION TO THE ADMINISTRATION OF ADRENALIN O. V. Mikhaylova p 17-22 refs

4. CHANGES IN THE IMMUNOLOGICAL CONDITION OF THE ORGANISM DURING THE ACTION OF CARCINOGENIC CHEMICAL AGENTS D. D. Shapiro and I. Ya. Getmants p 23-29 refs

5. EFFECT OF ULTRA-HIGH FREQUENCY MAGNETIC FIELD ON THE ELECTRIC ACTIVITY OF THE NEURONALLY ISOLATED CEREBRAL CORTEX BAND Yu. A. Kholodov p 30-36 refs

6. POSSIBILITY OF FORMATION OF ANTI-ANTIBODIES AND THEIR EFFECT ON THE SURVIVAL TIME OF SKIN HOMOTRANSPLANTS L. M. Okuneva p 37-42 refs

7. TRANSISTORIZED DEVICE FOR RADIOTELEMETRIC RECORDING OF THE FREQUENCY OF CARDIAC CONTRACTIONS, RESPIRATION AND MOVEMENTS R. V. Unzhin and V. V. Rozenblat p 43-49 refs

N64-18973 Joint Publications Research Service, Washington, D.C.

MAN PROVES TRAINABLE FOR 100-HOUR ORBITS AND LONGER

V. V. Parin 22 Apr. 1964 6 p Transl. into ENGLISH from Sov. Krasnyy Krest (Moscow), v. 13, no. 2, 1963 p 20-21

(JPRS-24308; OTS-64-31133) OTS: $0.50

The following medical and biological conclusions are drawn on the basis of evidence from the flights of Soviet cosmonauts: A physically healthy man, given the required training, can satisfactorily tolerate weightlessness for a period of 100 hr. The extended experience of weightlessness does not give rise to appreciable variations in the cosmonaut's physiological functions during the diurnal period. These results are felt to indicate that flights lasting for hundreds of hours can be accomplished by cosmonauts who have had the proper training. R.T.K.

N64-18975 Joint Publications Research Service, Washington, D.C.

PHOTOSYNTHESIZING BACTERIA

Ye. N. Kondrat'yeva 23 Apr. 1964 143 p refs Transl. into ENGLISH of the foreword, chapters 1-5, and the bibliog. from the publ. "Fotosinteziruyuschiye Bakterii" Moscow, 1963 p 3-111 and 265-274

(JPRS-24319; OTS-64-31140) OTS: $2.75

This report deals with purple sulfur, purple nonsulfur, and green sulfur photosynthesizing bacteria. The following topics are discussed: (1) the distribution and role of photosynthesizing bacteria in nature; (2) methods of isolating and cultivating these bacteria; and (3) the morphology, chemical composition, and pigments of the bacteria. I.v.L.

N64-18976 Joint Publications Research Service, Washington, D.C.

PATHOGENESIS AND TREATMENT OF BURN SICKNESS

G. D. Vilyavin and O. V. Shumova 24 Apr. 1964 61 p refs Transl. into ENGLISH of portions of book "Patogenez i Lesheniye Ozhogovoy Bolezni" Moscow, 1963 p 3-34, 229-253, and 275-276

(JPRS-24338; OTS-64-31145) OTS: $1.50

The pathogenetic mechanisms in the development of burn sickness were investigated for the purpose of developing the most rational methods of treating burn patients. Included in the procedure were the following investigations: (1) an extended study of patients with regard to laboratory-clinical hematological investigations, and biochemical analyses; (2) the role of infection in the pathogenesis and clinical course of burn sickness; (3) the reflex vascular reactions by the plethysmographic method; (4) morphological and neurohistological research on the peripheral and central nervous system as well as on the condition of synapses in extensive burns, and (5) hemodynamics and the permeability of capillaries at the site of lesions, in individual organs and in the central nervous system, using the vital microscopy method. The overall treatment of burn sickness and burn shock that was developed includes: (1) sparing the traumatic method of initial treatment; (2) procaine hydrochloride block and dressings of an oily-balsamic emulsion that remains in place for a prolonged period; (3) medicine-induced sleep; (4) local hypothermia; (5) the extensive use of skin autoplasty and homoplasty; and (6) the use of blood transfusions in all stages. Simultaneous with this treatment, modern effective methods of etiotropic, replacement, and stimulant therapy; plasma and blood-substitute transfusions; multivitamins; high-caloric diets rich in protein and vitamins; and antibiotics of different spectrum action were used. I.v.L.

N64-18978 Joint Publications Research Service, Washington, D.C.

METACHROMATIC REACTION OF NUCLEIC ACIDS (DNA AND RNA), NATIVE AND IRRADIATED BY ULTRASOUND

F. I. Braginskaya and I. Ye. El'piner 27 Apr. 1964 24 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 9, no. 1, 1964 p 40-47

(JPRS-24353; OTS-64-31159) OTS: $0.75

As a result of treatment with ultrasound a degradation of nucleic acids occurs in the presence of oxygen or argon, accompanied by a destruction of nitrogen bases. When DNA is irradiated in the presence of argon, derivatives of nitrogen bases arise that fluoresce blue in the ultraviolet. DNA, while interacting with toluidine blue, displaces the absorption peak of this dye toward longer wavelengths. A similar shift of the dye peak was observed when toluidine blue interacts with RNA at sufficiently high ratios of nucleic acid. With a decline in the relative concentration, RNA produces a displacement of the dye peak toward shorter wavelengths. When solutions of DNA and RNA were irradiated in the presence of oxygen and argon, there appeared to be a disruption of the helical structure of nucleic acids with a subsequent oxidation of nitrogen bases. Results of the thermal denaturation of DNA and RNA are also presented. R.T.K.

N64-18980 Joint Publications Research Service, Washington, D.C.

THE STUDY OF BIRD FLIGHT

V. E. Yakobi 27 Apr. 1964 12 p refs Transl. into ENGLISH from Biofizika (Moscow), v. 9, no. 1, 1964 p 118-121

(JPRS-24357; OTS-64-31161) OTS: $0.50

The experiments have demonstrated the possibility of utilization of the aerodynamical vane and silk-thread methods to study directly the airflow direction on a wing of a flying bird. Using this method, it was established that the vortexes are moving away from the wing of a flying bird in the upper and lower points of the wing stroke, which confirms the physical hypothesis laid down by V. V. Golubev as a basis of his flapping-wing theory. The direction of air fluxes about the wing surface corresponds to the direction of barbs of the flapping and covering feathers on the lower and upper surfaces of the wing. Author

N64-18987 Bureau of Mines, College Park, Md.

LEACHING COPPER SULFIDE MINERALS WITH SELECTED AUTOTROPIC BACTERIA

Joseph A. Sutton and John D. Corrick 1964 27 p refs

(BMRI-6423)

The microbial dissolution of iron and copper from sulfide minerals pyrite, chalcopyrite, chalcocite, covellite, and bornite

is described. Chemical criteria to evaluate microorganism activity on these minerals were changes in pH, ferric iron produced, and oxygen consumption. When a ferrous sulfate nutrient solution was percolated over small portions of copper sulfide minerals for 56 days, the iron-oxidizing bacteria *Ferrobacillus ferrooxidans and Thiobacillus ferroxidans* brought about the dissolution of 23.7% of the copper from chalcocite, 56.3% of the copper from covellite, and 29.8% of the copper from bornite by the microbial production of ferric sulfate, which reacted with these minerals. Pure strains of the iron-oxidizing bacteria act as catalysts to the ferrous iron being oxidized by the oxygen of a system containing pyrite and chalcopyrite. When a nutrient solution was percolated over pyrite for 70 days, the ferric iron produced by the iron-oxidizing bacteria was 112 to 120 times greater than that produced atmospherically.

Author

N64-19002 National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.

PILOTING PERFORMANCE DURING THE BOOST OF THE X-15 AIRPLANE TO HIGH ALTITUDE

Euclid C. Holleman Washington, NASA, Apr. 1964 56 p refs (NASA TN D-2289) OTS: $1.50

During the altitude-buildup program with the X-15 airplane, flights were made in which the boost-climbout phase was similar to the launch of the initial stage of multistage vehicles. The pilot's performance is analyzed in an attempt to more clearly define his capability to control the boost phase of flight. Airplane attitude and overall performance were controlled by the pilot within the accuracy of the displays provided. Although the engine failed to light on the first attempt on two flights and some of the displays failed on several other flights, the pilot was able to successfully complete the flight plans. As a result of physiological factors or extreme motivation, however, on several missions the pilots made corrections they felt were necessary, but which resulted in deviations from the flight plan. The boost acceleration had no effect on the piloting control task, although two of the pilots had difficulty shutting down the engine because of the X-15 throttle location.

Author

N64-19015 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MEASUREMENT OF THE HEARTBEAT OF BIRD EMBRYOS WITH A MICRO-METEORITE TRANSDUCER Technology Utilization Report

Vernon L. Rogallo Washington, NASA, Apr. 1964 16 p (NASA-SP-5007) OTS: $0.50

A new ultrasensitive momentum transducer has been successfully adapted as a ballistocardiograph to measure the heart beat of avian embryos. Experiments have demonstrated that life can be detected as early as 4 days in the incubation period and monitored to maturity without damage to the avian embryo. Changes in heart-beat rate and intensity resulting from temperature changes, or other external stimuli, were readily detected by the instrument. The technique appears to open new avenues of investigation for application in such areas as vaccine production and drug research.

Author

N64-19035 Atomic Energy Commission, Washington, D.C. Div. of Technical Information

THE EFFECTS OF RADIATION AND RADIOISOTOPES ON THE LIFE PROCESSES. AN ANNOTATED BIBLIOGRAPHY, BOOK I

Charlie M. Pierce, comp. Sep. 1963 744 p refs (TID-3098, Book 1) OTS: $15.00 for books 1-3

A total of 11,944 annotated references to report and published literature concerning the effects of radiation on biological systems is presented. The references are primarily categorized by type of organism. An author and a permuted title subject index are provided.

Author

N64-19036 Atomic Energy Commission, Washington, D.C. Div. of Technical Information

THE EFFECTS OF RADIATION AND RADIOISOTOPES ON THE LIFE PROCESSES. AN ANNOTATED BIBLIOGRAPHY, BOOK 2

Charlie M. Pierce, comp. Sep. 1963 751 p refs For abstract see N64-19035 11-16 (TID-3098, Book 2) OTS: $15.00 for books 1-3

N64-19059 Joint Publications Research Service, Washington, D.C.

REPORTS ON BIOCHEMISTRY FROM THE UKRAINIAN SSR

13 Apr. 1964 45 p refs Transl. into ENGLISH of 3 articles from Ukr. Biokhim. Zh. (Kiev), v. 36, no. 1, 1964 p 14-20, 22-31, 132-155 (JPRS-24164; OTS-64-31065) OTS: $1.25

CONTENTS:

1. INCORPORATION OF RADIOMETHIONINE IN THE PROTEIN FRACTIONS OF BLOOD SERUM UNDER THE EFFECT OF X-RAY IRRADIATION AND THIOPHOSPHAMIDE I. V. Savitskiy and V. G. Zelinskiy p 1-8 refs

2. RUPTURE OF DISULFIDE BONDS OF FIBRINOGEN BY CYSTEINE A. K. Khomenko and V. A. Belitser p 9-18 refs

3. SYNTHESIS AND TRANSFORMATION OF AMINO ACIDS AND OTHER ORGANIC COMPOUNDS BY THE EFFECT OF RADIATION AND OTHER TYPES OF ENERGY M. A. Kolomiychenko p 19-42 refs

N64-19086 Hiroshima U. (Japan) School of Medicine

MECHANISMS OF SMOOTH MUSCLE RELAXATION THROUGH THE ANODAL CURRENT STIMULATION Final Report No. 2, 15 Jun. 1962-14 Jun. 1963

Hiroshi Irisawa Washington, Army Res. and Develop. Group (9852), 1963 36 p refs (Contract DA-92-557-FEC-34980) AD-409502)

Action potential of the ureter smooth muscle shows a slow plateau phase, which indicates that a single cell is responsible for the plateau formation. The effect of repetitive stimulation on this muscle was studied, and it was found that the refractory period of the ureter smooth muscle cell was very long compared to other smooth muscles. The effect of sodium deficiency on the pattern of action potential has also been studied, and the results indicated that the action potential of the smooth muscle of the ureter can be satisfactorily explained from the basis of sodium hypothesis. Continuation of the histological works has been made on the fine structure of the invertebrate muscle. The conduction of excitation in the stomatopod heart is definitely different from that of the mammalian smooth muscles, where muscle-to-muscle conduction can be considered.

Author

N64-19091 Brookhaven National Lab., Upton, N.Y.

COBALT-60 BULK GRAIN IRRADIATOR Study Report

B. Manowitz, O. A. Kuhl, and L. Galanter 30 Jun. 1963 71 p Prepared by Vitro Eng. Co. for Brookhaven (Contract AT(30-2)-GEN-16) (BNL 810(T-312)) OTS: $1.50

This is a study to conceive, evaluate, review, and estimate costs for a number of suitable designs for a cobalt-60 bulk grain irradiator, select a preferred type, and establish required criteria for future detail design and construction of the selected

concept. Three irradiator concepts are described. The irradiators are sized to function as a pilot plant in an agricultural experiment station. Particular attention is given to scale-up capability, so that the same performance characteristics can be obtained for commercial utilization, without penalty to the usefulness of the irradiator as an experimental tool. A single concept, designated as the continuous-grid source concept and approved by USDA, was selected because of its high efficiency, exceptional versatility, acceptable cost, ease of maintenance, good reliability, and inherent simplicity. Author

N64-19097 California U., Livermore. Lawrence Radiation Lab.
CALCULATION OF RADIOACTIVE IODINE CONCENTRATIONS IN MILK AND HUMAN THYROID AS A RESULT OF NUCLEAR EXPLOSIONS
Ralph A. James. 14 Feb. 1964. 23 p. refs
(Contract W-7405-ENG-48)
(UCRL-7716) OTS: $0.50

The production and distribution of radioactive iodine by nuclear explosions are discussed. Equations and graphs are presented by which the levels of I^{131} and I^{133} corresponding to the Federal Radiation Council (FRC) guide can be determined. The fallout level, intake by cows, concentration in milk, and content of the human thyroid are considered. The maximum concentration in milk as the result of a single event corresponding to the FRC guide is approximately 2,800 picocuries (pCi) per liter. Author

N64-19101 Radio Corp. of America, Camden, N.J.
A QUEUING MODEL FOR DETERMINING SYSTEM MANNING AND RELATED SUPPORT REQUIREMENTS Technical Documentary Report, Jun. 1962-Dec. 1963
H. R. Barton, R. E. Purvis, J. E. Stuart, and W. K. Mallory. Wright-Patterson AFB, Ohio. Aerospace Med. Res. Labs., Jan. 1964. 166 p. refs
(Contract AF 33(657)-9439)
(AMRL-TDR-64-21; AD-434803)

The method presented begins with an analysis of hardware functions and develops human requirements in terms of operational needs and service rates. Manning and skill requirements are integrated over such factors as desired operational readiness, schedules of mission frequency, various environmental demands, maintenance concepts and procedures, and training requirements. Two mathematical techniques, queuing theory and linear programing, are used to compute manning requirements and training needs. In practice, failed systems or units pile up in lines waiting for service, or else men are incompletely utilized. Queuing tables permit tradeoffs between men, skill levels, sparing levels, and downtime with given values for operational readiness. The Simplex algorithm permits tradeoffs and optimal determination of training needs for given policies of phaseover and training cost. Author

N64-19150 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A PITFALL OF LOW SPECIFIC ACTIVITY RADIOACTIVE THYMIDINE
Robert B. Painter and Ronald E. Rasmussen. Repr. from Nature, v. 201, no. 4917, 25 Jan. 1963. 3 p. refs

The effect of low-specific-activity radioactive thymidine (tritiated thymidine) on the observation of the results of the action of X-irradiation on the synthesis of DNA in cultured mammalian cells was investigated. Results indicate that thymidine masks some of the effects of X-irradiation on the DNA synthesizing system by detracting from the part of rate depression contributed by the steep component of the X-ray dose-response curve. However, guanine labeled with carbon-14, a low-specific-activity radioactive substance, apparently does not affect DNA synthesis rate. These results illustrate that radioisotopic compounds of low specific activity must be checked to assure that the necessarily high concentrations of metabolites are not affecting the system under study. I.v.L.

N64-19151 Florida State U., Tallahassee. Inst. for Space Biosciences
ABIOTIC PRODUCTION OF PRIMITIVE PROTEIN AND FORMED MICROPARTICLES
Sidney W. Fox and Shuhei Yuyama. Repr. from the Ann. N.Y. Acad. Sci., v. 108, article 2, 29 Jun. 1963. p. 487-494. refs
Presented in part at the Symp. on Extraterrestrial Biochem. and Biol., Am. Assoc. for the Advancement of Sci. Meeting, Denver, 27 Dec. 1961. Previously published as a preprint paper; see N62-15697 15-16
(NASA Grant NsG-173-62; NIH Grant C-3971(04))

Thermal copolymerization of simple combinations of amino acids can be effected simultaneously. This copolymerization is aided by phosphoric acid, polyphosphoric acid, or adenosine triphosphate. The polyamino acids obtained are referred to as protenoids because of molecular weight and qualitative composition, but they have many properties in common with proteins. Two of the most interesting properties of these acids are those of catalytic activity and morphogenicity. The catalytically active powerful macromolecules are formed under almost dry conditions by heating, and this activity is later lost also by heating, but the loss occurs in aqueous solution. The kind of morphogenicity depends upon intrusion of water into the system. The fact that intrusion of water is required for the formation of spherules demands a relative absence of water from the system before the macromolecules are organized into supramolecular entities. These entities are of interest as precell models. They and their derivatives are of interest also for their morphological similarity to some microfossils and to formed elements found in meteorites. I.v.L.

N64-19152 Atomic Energy Commission, Washington, D.C.
DETERMINATION OF PRECURSOR ORDER AND PARTICULAR WEIGHTING FUNCTIONS FROM KINETIC DATA
James S. Beck (Minn. U.) and Aldo Rescigno (Calif. U.). Repr. from J. Theoret. Biol. v. 6, 1964. p. 1-12. refs
(NASA Order R-104)

The analysis of kinetic data from biochemical and physiological tracer experiments has been advanced theoretically and practically by the interpretation of the output data as point values of a function resulting from the convolution (the integral operation $\int_0^t f(r)g(t-r)dr$) of the input function with an unknown weighting function. This weighting function characterizes the system; most notably, it indicates the number of compartments or precursor order in certain classes of systems. A simple method of determining precursor order from data relating input and output to time is presented. An artificial example and data from a biochemical experiment are analyzed with these relations. The problem of selecting a limit is discussed and related to the general characteristics of models and synthesis of models. Author

N64-19184 Dynamic Science Corp., South Pasadena, Calif.
HUMAN BLOOD IN THE SPACE ENVIRONMENT — IN VITRO STUDIES IN EARTH ORBIT
Curtis E. Miller, Allan L. Louderback, and John B. Opfell. Los Angeles, Calif., SSD, Jan. 1964. 83 p. refs
(Contract AF 04(695)-93)
(SSD-TDR-64-1; AD-434086)

The effect of space environment on human blood was investigated in vitro, using blood in acid-citrate-dextrose solution. Special thermal-insulation units to hold the blood

specimens were designed, and were flown as part of a recoverable earth-orbiting satellite. Diffusion through the red-cell membrane, glucose metabolism, antigen and immunological properties, and plasma-protein composition were the blood properties studied. Critical factors were temperature and acceleration-vibration during launch and recovery. Temperature was controlled by a thermal-insulation system. Acceleration-vibration had no significant effect through experiments using a human centrifuge to simulate launch acceleration and vibration. The results of three flights showed that there was no significant effect of the space environment on the blood properties studied, except that the rate of diffusion of potassium from the red-blood cell to the plasma may be lower in the space environment than on the earth's surface, and the distribution of the plasma proteins appears to be affected by the space environment, particularly the beta-globulin fraction of the proteins. Author

N64-19213 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

WORLD WITHOUT GRAVITY

23 Apr. 1963. 6 p. Transl. into ENGLISH from the Russian newspaper, Izvestiya, 1 Sep. 1962. 4 p.

(FTD-TT-63-300/1+4, AD-415642)

The principles behind weightlessness are discussed, and some examples of what will occur in space are given (e.g., the action of a liquid in a glass, boiling water, etc.). P.V.E.

N64-19220 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE BIOLOGICAL ACTION OF HIGH ENERGY FAST NEUTRONS AND PROTONS

Yu. I. Moskalev, I. K. Petrovich, and V. N. Strel'tsova. 23 Jan. 1964. 31 p. refs. Transl. into ENGLISH from the Symp. proc. "Biol. Deistviye Bystrykh Neytronov i Protonov Vysokikh Energiy" (USSR), 7-11 Oct. 1963. p 1-33.

(FTD-TT-63-1049/1+2+4, AD-433529)

The results are presented of experiments which compared the effect of fast neutrons and protons on life span, peripheral blood, incidence, and rate of appearance of tumors in rats and their dependence on dose and period of observation. In general it was found that, in cases of comparatively low levels of radiation, neoplasms of the endocrine glands, sexual organs, and mammary glands primarily occur in both females and males. With an increase in the level of radiation, the incidence of tumors on the gastrointestinal tract, sarcoma of the subcutaneous tissue, tumors of the kidneys, etc., increased in the rats, along with neoplasms of the endocrine organs. It was found that the type of radiation dose did not substantially affect the qualitative characteristics of the tumor spectrum (i.e., in animals irradiated with fast neutrons and protons, the tumors of the same type occur). It is noted, however, that on irradiation with neutrons, neoplasms occur at smaller doses of radiation (approximately 3 to 5 times). P.V.E.

N64-19236 Atomic Energy Commission, Washington, D.C. Div. of Technical Information

THE EFFECTS OF RADIATION AND RADIOISOTOPES ON THE LIFE PROCESSES, AN ANNOTATED BIBLIOGRAPHY (INDEX)

Charlie M. Pierce, comp. Sep. 1963. 352 p. refs.

(TID-3098(Index)) OTS: $15.00 for books 1-3

This volume is an author and a permuted title subject index. Author

N64-19296 European Atomic Energy Community, Brussels (Belgium)

BONE MARROW TRANSPLANTATION AFTER WHOLE-BODY IRRADIATION. AN EXPERIMENTAL STUDY IN THE RAT

H. Balner (Ph. D. Thesis, Amsterdam U.). 1963. 127 p. refs. Work done in conjunction with Toegepast Natuurw. Onderzoek.

(Contract EURATOM 004-59-12 BIAN)

(EUR-484e) Available from Belgian Am. Bank and Trust Co., N.Y., acc. no. 121.86. 150 Belg. Fr.

Rats were treated with homologous bone marrow following high sublethal and lethal radiation doses. The majority of the animals survived beyond 4 weeks after irradiation with a functioning donor-type hemopoietic tissue. There was no evidence of a so-called "median-lethal-dose-effect" (MLD-effect). Secondary disease occurred during the second and third month following irradiation and homologous bone-marrow therapy. Morbidity and mortality were variable but generally rather low, respectively about 30% and 15%. The clinical and pathological findings were reminiscent of those described for mice with secondary disease except that colitis and diarrhea were not observed. Author

N64-19311 Kansas U., Lawrence

FERREDOXIN OF CLOSTRIDIUM THERMOSACCHAROLYTICUM

Martin Wilder, R. C. Valentine, and J. M. Akagi (Rockefeller Inst.). Repr. from J. Bacteriol., v. 86, no. 4, Oct. 1963. p 861-865. refs.

(NASA Grant NsG-298-62, PHS Grant E-4672)

The isolation of ferredoxin from the thermophilic anaerobe *C. thermosaccharolyticum* was investigated. By utilizing the phosphoroclastic and the hydrogenase systems of this organism, it was found that the ferredoxin that was isolated was similar to those already mentioned in the literature. The present experiments with the hydrogenase of *C. thermosaccharolyticum* support the view that the enzyme functions in close proximity with ferredoxin in the formation of molecular hydrogen. R.T.K.

N64-19313 Cedars of Lebanon Hospital, Los Angeles, Calif. Inst. for Medical Research

A TECHNIQUE FOR TESTING HEART FUNCTION BY ANALYSIS OF ITS VIBRATION SPECTRUM

Clarence M. Agress and Palmer R. Mc Innis (Telecomputing Services, Inc.). 21 Feb. 1964. 141 p. refs.

(NASA Grant NsG-289-62)

(NASA CR-53813) OTS: $11.00 ph

Investigations cover: (1) the physical principles and physiology underlying the transfer of cardiac vibrational energy to the chest wall; (2) the development of instrumentation and techniques required for heart-vibration-data recording; (3) the interpretation of cardiac vibrational energy; and (4) the development and implementation of semiautomatic methods for the measurement and computation of heart-function data. It was found that the vibrational waves recorded from the chest wall showed a high degree of correlation with hemodynamic events. It was shown that measurement of the phases of isometric contraction, ejection, systole, and diastole could be obtained from the precordial vibration tracing with an accuracy as good as that realized with direct cardiac catheterization. Further, comparisons of these phase intervals, under stress procedures, in human and animal subjects showed significant changes that served to differentiate the normal from the cardiac-injured subject. These changes correlated well with other physiologic parameters during maximum stress. R.L.K.

N64-19393 Naval Research Lab., Washington, D.C. Chemistry Div.

SUBMARINE ATMOSPHERE STUDIES ABOARD USS SCULPIN

M. E. Umstead, W. D. Smith, and J. E. Johnson. 27 Feb. 1964 27 p refs

(NRL-6074; AD-433896)

Studies of the organic contaminants in the atmosphere of U.S.S. Sculpin were made during a submerged cruise. Detailed analyses were made of the concentrations of methane, Freon-12, and total hydrocarbons by means of a backflush gas chromatograph of new design. The effectiveness of the CO/H_2 burners and main carbon bed as removal agents for organic contaminants was included in the studies. The CO/H_2 burners satisfactorily burned organic contaminants at temperatures as low as 500° F. The active carbon in the main filter bed removed the higher hydrocarbons, but was not effective for removing lower hydrocarbons and Freon-12. Experimental data obtained on shipboard indicated that the rate of generation of organic vapor contaminants was about 1.5 lb daily. Author

N64-19407 Naval Research Lab., Washington, D.C. Chemistry Div.

NUCLEAR SUBMARINE ATMOSPHERE. PART 2 - DEVELOPMENT OF A TOTAL HYDROCARBON ANALYZER

J. E. Johnson, M. E. Umstead, and W. D. Smith. 30 Jan. 1964 8 p refs

(NRL-6064; AD-431141)

An instrument was developed for the shipboard monitoring of total hydrocarbons in nuclear submarine atmospheres. In addition to hydrocarbons, the instrument also measures methane and Freon-12 and, with a slight modification in operating procedure, Freon-11. The system is based on a chromatographic technique coupled with a highly sensitive flame-ionization detector. An air sample is injected into a chromatographic column and chromatographed in the usual manner until the methane and Freon-12 peaks emerge. At this point, the flow of carrier gas is reversed and the higher hydrocarbons are backflushed from the column through the detector as a single peak. The area under the backflushed peak provides a measure of the total hydrocarbon content of the atmosphere. The principles on which the instrument is based were successfully tested at sea aboard the U.S.S. Sculpin. Author

N64-19437 Joint Publications Research Service, Washington, D.C.

BIOPHYSICAL STUDIES ON POLYMERS, NUCLEIC ACIDS AND BRAIN NEURONS

21 Apr. 1964 40 p refs Transl. into ENGLISH of 3 articles from Biofizika (Moscow), v. 8, no. 3, 1963 p 288-293, 294-300, 387-393

(JPRS-24261; OTS-64-31105) OTS: $1.00

CONTENTS:

1. THE THEORY OF SPIRAL-TO-BALL TRANSITIONS IN BIOPOLYMERS B. A. Fedorov, T. M. Birshteyn, and O. B. Ptitsyn p 1-11 refs (See N64-19438 12-07)

2. OPTICAL PROPERTIES AND MOLECULAR STRUCTURE OF NUCLEIC ACIDS AND THEIR COMPONENTS B. I. Sukhorukov, Yu. Sh. Moshkovskiy, T. M. Birshteyn, and V. N. Lystsov p 12-23 refs (See N64-19439 12-16)

3. APPLICATION OF MATHEMATICAL METHODS FOR INVESTIGATION OF IMPULSE ACTIVITY OF CENTRAL NEURONS OF THE BRAIN N. N. Preobrazhenskiy and N. V. Yarovitskiy p 24-37 refs (See N64-19440 12-16)

N64-19439 Joint Publications Research Service, Washington, D.C.

OPTICAL PROPERTIES AND MOLECULAR STRUCTURE OF NUCLEIC ACIDS AND THEIR COMPONENTS

B. I. Sukhorukov, Yu. Sh. Moshkovskiy, T. M. Birshteyn, and V. N. Lystsov *In its* Biophys. Studies on Polymers, Nucleic Acids, and Brain Neurons 21 Apr. 1964 p 12-23 refs (See N64-19437 12-16) OTS: $1.00

Temperature melting curves of DNA have been investigated in a wide range of pH values in both the acid and the alkaline regions. The T_{mp}-to-pH relationship, which may be explained by ionization processes of nucleotide bases, has been obtained. The phase diagram of the spiral-to-ball transition in relation to T and pH has been constructed. Enthalpy and entropy of the coupling of a pair of nucleotide residues ΔH = 10 to 11 kcal/mole and ΔS = 30 cal/mole · deg have been found on the basis of the T_{mp}-to-pH relationship. Effective enthalpy and effective entropy of the spiral-to-ball transition have been determined, and it was found that in the region of neutral pH the average number of nucleotide pairs breaking simultaneously amounts to ~10 and increases with the transition to the extreme values of pH. Author

N64-19440 Joint Publications Research Service, Washington, D.C.

APPLICATION OF MATHEMATICAL METHODS FOR INVESTIGATION OF IMPULSE ACTIVITY OF CENTRAL NEURONS OF THE BRAIN

N. N. Preobrazhenskiy and N. V. Yarovitskiy *In its* Biophys. Studies on Polymers, Nucleic Acids, and Brain Neurons 21 Apr. 1964 p 24-37 refs (See N64-19437 12-16) OTS: $1.00

An attempt was made to develop a mathematical method for the analysis of the impulse activity of central neurons. Investigation of the activity of the reticular neurons of a cat with chlorazol narcosis served as the material for mathematical analysis. The method that is proposed makes it possible to find the general forms of the cell's responses to action, to find the number of the degrees-of-freedom of the response, and to calculate the values of these parameters. R.T.K.

N64-19465 California U., Berkeley. Lawrence Radiation Lab.

A SEARCH FOR PHOTOINDUCED POLARIZABILITY CHANGES IN PHOTOSYNTHETIC AND MODEL SYSTEMS

Terry Trosper and Kenneth Sauer *In its* Bio-Organic Chem. Quart. Rept. 20 Jan. 1964 p 6-10 refs (See N64-19463 12-01) OTS: $0.75

Possible changes in electronic polarizability alpha at optical frequencies were investigated by following light-scattering changes in a suspension of the sample. A suspension of bacterial chromatophore aggregates was studied. Lead sulfide and cadmium sulfide suspensions were chosen as model systems. In each case, filter systems were selected. The small change observed in the experiment with chromatophore aggregates cannot be considered significant because of lack of adequate controls and repetition. Again, the fraction of excited particles in the suspensions was also too small to cause any noticeable effect. A.W.

N64-19470 California U., Berkeley. Lawrence Radiation Lab.

INHIBITOR STUDIES ON THE CARBON-REDUCTION CYCLE IN CHLORELLA

Edwin S. Gould, J. A. Bassham, and Martha Kirk *In its* Bio-Organic Chem. Quart. Rept. 20 Jan. 1964 p 20-22 refs (See N64-19463 12-01) OTS: $0.75

This study showed that carbonyl cyanide *m*-chlorophenylhydrazone (CCCP) strongly inhibits photophosphorylation but is without effect on triphosphopyridine nucleotide (TPN) reduction in spinach chloroplasts. The 2,4-dichlorophenyl dimethylurea (DCMU), by analogy with the known action of its monochloro analog, blocks the transfer of electrons from water and stops the reduction of $NADP^+$ to NADPH in the absence of added electron donors. A.W.

N64-19471 California U., Berkeley. Lawrence Radiation Lab.
STUDIES ON THE QUINONE COMPOSITION OF CHLORELLA PYRENOIDOSA
Hartmut K. Lichtenthaler *In its* Bio-Organic Chem. Quart. Rept. 20 Jan. 1964 p 23-27 refs (See N64-19463 12-01) OTS: $0.75

Results indicate the presence of five principal quinones, probably two plastoquinones, two unidentified quinones associated with an ergosterol derivative, and a quinone from the vitamin-K type that is not, as in higher plants, vitamin K_1. It is also indicated that 6-hour photosynthesis is sufficient to produce labeled quinones from 14_{CO_2}. A.W.

N64-19491 Joint Publications Research Service, Washington, D.C.
NEW PSYCHOPHARMACOLOGICAL PREPARATIONS
V. V. Zakusovof 5 May 1964 31 p refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), v. 27, no. 1, Jan.-Feb. 1964 p 107-121
(JPRS-24475; OTS-64-31205) OTS: $0.75

New drugs of value in the treatment of psychic disturbances are listed and discussed. These psychopharmacological preparations are divided into: (1) tranquilizers; (2) psychostimulants; (3) psychosomimetics; and (4) antidepressants. Chemical structures of more than 50 such preparations are given and evaluated as to efficacy in specific disorders. A.W.

N64-19495 Maryland U., College Park
ON THE VARIABILITY IN THE ACTIVITY OF THE PHOTOSYNTHETIC MECHANISMS
Constantine Sorokin Repr. from "Photosynthesis Mechanisms In Green Plants," NAS-NRC Publ. 1145, 1963 p 742-750 refs
(NASA Grant NsG-70-60)

The effect of shifts in the age composition in a batch of cells under investigation, and of the changes in the size of the active part of metabolic mechanism in each particular cell (as affected by metabolic turnover) is considered in this annotated bibliography. R.L.K.

N64-19544 Kansas U., Lawrence
MUTATIONAL SYNERGISM BETWEEN RADIATIONS AND METHYLATED PURINES IN ESCHERICHIA COLI
Ira N. Doneson and Delbert M. Shankel Repr. from J. Bacteriol., v. 87, n. 1, Jan. 1964 p 61-67 refs
(NASA Grant NsG-298-62; NSF Grant 18073)

A synergistic mutational effect was demonstrated between low doses of ultraviolet light and the methylated purines caffeine, theophylline, and theobromine. Caffeine produced the greatest effect and theobromine the least effect. The magnitude of the synergism was inversely related to the ultraviolet dosage. A large percentage of the synergistic effect could be "photoprevented" by exposure of the ultraviolet-treated cells to white light prior to exposure to the analogs. The consequence of the combined treatment occurred only when the chemical treatment followed the ultraviolet treatment. Synchronous growth studies indicated that a particular growth stage of the organisms was most susceptible to the synergistic effect. The mutation studied was that of *Escherichia coli* B/r to high-level streptomycin resistance. Author

N64-19556 Northwestern Technological Inst., Evanston, Ill.
GROSS CHEMICAL CHANGES OF HUMAN WASTE UNDERGOING THERMAL DECOMPOSITION
J. E. Quon, W. O. Pipes, and J. A. Logan Fort Wainwright, Alaska, Arctic Aeromed. Lab., Oct. 1963 11 p
(Contract AF 41(657)-383)
(Tech. Note 62-13; AD-434081)

Solubility and carbon content of the residue after ignition at 400° C were determined for different rates of air supply to the volatilization chamber. Information on the relationship between residual weight and oxygen supply and between residual carbon and oxygen supply was obtained with the volatilization chamber operated in two stages with respect to temperature, and the carbon content of the ash was determined after each stage. Carbon monoxide and carbon dioxide analyses of the volatilization chamber effluent were made, using an Orsat apparatus. A series of experiments to determine if the solid residue remaining after the volatilization of human wastes contained nutrients adequate for algal growth were undertaken. Samples of the residue and supplemental nutrients were added to distilled water to make up a culture medium for algal growth. The media made up in this manner were dispensed into flasks and inoculated with *Chlorella*. Cell counts were made on the cultures at two different times after inoculation to determine if any growth was occurring. R.L.K.

N64-19557 New Hampshire U., Durham
INTUBATION OF THE ABNORMAL AORTA OF THE ALASKAN GROUND SQUIRREL
J. P. Schmidt and T. G. Metcalf Fort Wainwright, Alaska, Arctic Aeromed. Lab., Oct. 1963 5 p refs
(Contract AF 41(657)-350)
(Tech. Note 63-2; AD-434083)

A technique for abdominal aortic intubation of Alaskan ground squirrels is described. A total of 23 squirrels have been intubated without impairment of their normal functions. P.V.E.

N64-19577 Marquardt Corp., Van Nuys, Calif.
STUDY OF MARBAC EXTRATERRESTRIAL LIFE DETECTION CONCEPT Fifth Monthly Letter Report, 1 Mar.-31 Mar. 1964
E. E. Sweeney and G. E. Ellis [1964] 14 p
(NASA Contract NASw-810)
(NASA CR-53734) OTS: $1.60 ph

Bacterial growth, primarily cell division, was studied with relation to oxidation-reduction potential change. Relatively large inocula were used (e.g., 10^7 organisms/milliliter). The rate of change in potential generally correlated with increase in cell numbers; the rate of change of potential reached its maximum at approximately the time the cell growth reached its maximum rate. Correlation among viable counts (plating), Coulter counts, and turbidimetric readings indicated that, with large bacterial concentrations, each method could be useful in redox investigation. Author

N64-19584 Esso Research and Engineering Co., Linden, N.J.
EVIDENCE IN METEORITES OF FORMER LIFE: THE ORGANIC COMPOUNDS IN CARBONACEOUS CHONDRITES ARE SIMILAR TO THOSE FOUND IN MARINE SEDIMENTS

W. G. Meinschein, Bartholomew Nagy, and Douglas J. Hennessy (Fordham U.) Repr. from Ann. N.Y. Acad. Sci., v. 108, Art. 2, 29 Jun. 1963, p 553-579 refs
(NASA Contract NASw-508)

Aromatic hydrocarbons have been identified as common constituents of meteoritic and terrestrial sedimental extracts. Saturated hydrocarbons isolated from the Murray and Orgueil carbonaceous chondrites have infrared spectra, molecular weight ranges, and cracking patterns in the mass spectrometer that resemble those of sedimental saturated hydrocarbons. The relative amounts of hydrocarbons and nonhydrocarbons, the infrared spectra of the nonhydrocarbons, and the free sulfur contents of the benzene extracts of the Orgueil and terrestrial marine sediments are similar. Except for the relative simplicity of the aromatic fraction from the Orgueil fragment, analyses of both the Orgueil and Murray extracts fall within the range of compositional variations observed in terrestrial sediment extracts of plant and animal hydrocarbons. Author

N64-19670 Air Force Systems Command, Bedford, Mass. Electronic Systems Div.
SHORT-TERM MEMORY: NON-EQUIVALENCE OF QUERY AND MESSAGE ITEMS
James D. Baker and Walter E. Organist Feb. 1964 24 p refs
(Contract AF 19(604)-5958)
(ESD-TDR-64-254; AD-437917)

This study was designed to discover whether query and message items are equivalent in their effect on short-term memory in situations where a person is required to process a sequence of messages while concurrently processing queries about them. It was assumed that recall is consistently degraded as the number of items interpolated between a message and its subsequent query increases. The results showed that interpolated queries degrade recall significantly more than do messages. Author

N64-19768 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BIOLOGICAL RHYTHMS AND ASTRONAUTICS
Yu. Fedotov and Ye. Yudin 3 Mar. 1964 8 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), no. 212, (11817), 8 Sep. 1962 p 6
(FTD-TT-64-26/1; AD-433610)

Biological diurnal periodicity is apparently maintained in space flight, for the flight lengths achieved to date, and in animal experiments that attempted to produce new biological rhythms by changing the environmental rhythm. But changing the biological rhythm is possible, as in the case of tamed wild animals, along with physical and chemical media changes. In order to maintain the astronauts' capacity for work, use is made of light, color, sound, and musical stimulation. R.L.K.

N64-19783 Joint Publications Research Service, Washington, D.C.
EVALUATION OF THE FLEXIBILITY OF DNA MOLECULES BY MEANS OF LIGHT SCATTERING AT LARGE ANGLES
O. B. Ptitsyn and B. A. Fedorov *In its* Study of DNA Mol. Flexibility and Continuous Models of Excitable Media 20 Apr. 1964 p 1-10 refs (See N64-19782 12-01) OTS: $0.75

A method has been suggested for the estimation of the flexibility of semirigid molecules (specifically, the molecules of natural DNA) by light scattering. This method is based on the processing of data at large scattering angles. The method consists of the determination of the line segment cut off by the asymptote of the curve P^{-1} [sin(θ/2)], the magnitude of which does not depend, in practice, on the model of the chain (worm-shaped or zig-zag-shaped) and is determined by the flexibility of the molecule (by the value of the persistent length). The processing of published experimental data on light scattering of natural DNA molecules by this method leads to the values of the persistent length of 270 ± 50 A that are close to the value of 360 A obtained from the data on sedimentation. Author

N64-19799 Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg, W. Germany. Inst. für Flugmedizin
THE BEHAVIOR OF EOSINOPHILIC BLOOD CELLS UNDER DIFFERENT TESTS IN THE SAME INDIVIDUAL [DAS VERHALTEN DER EOSINOPHILEN BLUTZELLEN UNTER VERSCHIEDENEN BELASTUNGEN BEI GLEICHEN INDIVIDUEN]
Marlies Tippelmann Porz-Wahn, W. Germany, DVLR Wiss. Berichtswesen, Mar. 1964 73 p refs In GERMAN
(DVL-310)

The nonspecific defense reactions of organisms to oxygen deficiency stress and the question of a correlation between the effect of these reactions on the pituitary-adrenal cortex system are discussed. This effect was measured by the decrease in eosinophile leucocytes. The degree of oxygen deficiency tolerance was determined with the help of the ball test in a low-pressure chamber. Students with an average age of 23 were classified according to classes A and B by routine oxygen-deficiency stress tests. Group A had the more rapid drop in efficiency and an early onset of regulatory breakdown. Group B had a better tolerance and an asymptotic efficiency drop. Group A showed a larger decrease in eosinophiles than did group B. Also, group B showed a subsequent rise in the eosinophile count within a predetermined time, whereas group A did not. Apparently, under equal stress, a stonger activation of the pituitary-adrenal cortex system occurred in group A than in group B. It is indicated that the stronger reactions of group A were due to a higher sensitivity to stress, since the pituitary-adrenal cortex system of both groups were functioning equally well. I.v.L.

N64-19815 Illinois U., Urbana
A TAXONOMY OF LEARNING TASK CHARACTERISTICS
Technical Documentary Report, Sep. 1958-Jun. 1962
Lawrence M. Stolurow Wright-Patterson AFB, Ohio, AMRL, Jan. 1964 213 p refs
(Contract AF 33(616)-5965)
(AMRL-TDR-64-2; AD-433199)

Efficient training requires selective use of research findings from basic studies of learning. Decisions about the use of particular principles of learning are constantly required in the development of new training materials, systems, devices, and aids. Consequently, there is a critical need for a system of classifying learning tasks to permit training specialists to make efficient use of principles of learning. This report is designed to assist a training specialist in the design and development of effective training programs for USAF. A system for classifying learning tasks is presented. The research and analytical procedures are summarized along with the findings produced by experimenting with the system. Author

N64-19822 School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Med. Div.
DETERMINATION OF THE SOLUBILITY OF NITROGEN IN WATER AND EXTRACTED HUMAN FAT
Kenneth G. Ikels Feb. 1964 12 p refs
(SAM-TDR-64-1; AD-434426)

A gas chromatographic technique in conjunction with a modified Van Slyke apparatus is described for the determination of the Bunsen absorption coefficient for nitrogen in extracted human and dog fats, olive oil, and water. Essentially, the method consists of a double extraction of a sample that

has been equilibrated at a stated temperature with a known gas. The liberated gas or gases are then separated and quantified by gas chromatography. The observed Bunsen absorption coefficient for nitrogen in water agrees closely with one of the two sets available in the International Critical Tables at 37.6° C. The present method may also be regarded as accurate for the nitrogen solubility in fats and oils. Author

N64-19825 Florida State U., Tallahassee. Inst. for Space Biosciences

DYNAMIC PHENOMENA IN MICROSPHERES FROM THERMAL PROTEINOID

Sidney W. Fox and Shuhei Yuyama. Repr. from Comp. Biochem. Physiol., v. 11, 1964 p 317-321 refs

(NASA Grant NsG-173-62; NIH Grant C-3971)

(*Its* Contrib. 15)

Time lapse photomicrographic evidence is presented for the occurrence in self-organized supramacromolecular units of optical disappearance of interior material to leave outer boundary or membrane, Brownian motion within the unit, appearance of septa that divide the units. These phenomena occur in a suspension of particles formed from thermal polyamino acid. The dynamic phenomena are triggered by an increase in pH with phosphate-citrate buffer. The formed units and the phenomena they display arise from the material formed in an experimental continuum, and thus provide a model for how some precellular phenomena might have arisen spontaneously. Author

N64-19865 Rochester U., N.Y. Radiation Chemistry and Toxicology Div.

THE DILUTION TEST AS A MEASURE OF RENAL FUNCTION IN NIOBIUM POISONED RATS

William L. Downs and Jonathan H. Harwood III. 6 May 1964 21 p refs

(Contract W-7401-ENG-49)

(UR-646)

Control, female, albino rats given a water load of 50 ml/kg, excreted 50 percent of this load as urine within 94 ± 11 minutes ($T_{EU_{50}}$). The administration of a single intraperitoneal dose ranging from 10 to 30 mg Nb/kg resulted in 2- to 4-fold increases in the $T_{EU_{50}}$ value 24 hr after the niobium was injected. When niobium was complexed with ascorbic acid prior to injection, the $T_{EU_{50}}$ value was within control limits. However, rats given a single intraperitoneal dose of niobium and then given 3 doses of ascorbic acid at intervals of 1, 3, and 6 hrs showed $T_{EU_{50}}$ values that were not markedly different from those observed in rats given niobium only. Increased $T_{EU_{50}}$ values were observed in rats given single intraperitoneal doses of uranyl nitrate (1.2 to 2.4 mg U/kg), mercuric chloride (2.0 mg Hg/kg), and sodium tripolyphosphate (480 mg/kg). Author

N64-19877 Army Biological Labs., Fort Detrick, Md.

METHODS FOR THE BACTERIOLOGICAL INVESTIGATIONS OF UPPER LAYERS OF THE ATMOSPHERE

Ya. G. Kishko. Jun 1963 7 p refs Transl. into ENGLISH from Lab. Delo (Moscow), v. 5, 1959 p 37-39 Presented at the All-Union Conf., Inst. of Gen. and Communal Hygiene, Moscow, 26 May 1958

(AD-428703)

A device, suitable for collecting air samples from an airplane, that consists of a collector, a cassette, and an airflow meter is discussed. The intake section is located on the outside of the airplane, and air is drawn through, by the movement of the plane, to a culture medium in a Petri dish, seeding it with microorganisms. Up to 0.5 cubic meters is filtered in 3 to 6 minutes. To prevent freezing at high altitudes, a thin layer of sterilized MC-10 oil was used to cover the surface of the culture medium; the number of microorganisms growing under this condition was always higher than when the surface was not so covered. R.L.K.

N64-19892 General Dynamics/Fort Worth, Tex.

MECHANICAL TECHNIQUES FOR KILLING, REMOVING, OR CONTROLLING MICROORGANISMS IN HYDROCARBON FUELS Technical Documentary Report, 1 Jul. 1962-Aug. 1963

H. P. Owen, M. T. Carroll, H. G. Hedrick, T. W. Albrecht, and D. J. Pritchard. Wright-Patterson AFB, Ohio, Aero Propulsion Lab., Dec. 1963 145 p refs

(Contract AF 33(657)-9181)

(ASD-TDR-63-242; AD-428866)

The objective of this program was to examine all known mechanical techniques for killing, removing, or controlling microorganisms found in hydrocarbon fuels. In Phase I, a theoretical analysis of 18 mechanical techniques is presented. The microorganisms included bacteria and fungi that live in water, in a water-fuel interface, and within the hydrocarbon fuel. A group of 20 microorganisms, representative of those found in aircraft fuel tanks and fuel storage tanks, were selected for use in the various experiments. Phase II gives a complete evaluation on using radiofrequency (RF) irradiation and ultrafine mechanical filters. The sterility of treated fuel samples was established, the effect of each technique on the fuel and fuel additive properties determined, and the effect of the treated fuel on fuel tank sealants and O-rings investigated. Design criteria to aid in the eventual development of prototype items were prepared. Author

N64-19909 California U., Los Angeles. Biotechnology Lab.

HUMAN TRACKING. SENSORY MOTOR CONTROL. MYOELECTRIC CONTROL STUDIES Progress Report

John Lyman. 15 Sep. 1963 39 p

(Contract N123(60530)23558A. Grant OVR-RD-1201M)

(Eng. Dept. Rept. 63-57; AD-428192)

The following are discussed: (1) research on the performance of human operators of tracking systems—performance evaluation of variables of the optical system on the Naval Ordnance Test Station tracking simulator and multiman tracking studies; (2) research on sensory motor control—research on arm prostheses sensory motor control problems and analyses of prosthesis-amputee systems; and (3) myoelectric control studies—research on patterns of myoelectric activity during selected arm and truck motions. R.T.K.

N64-19919 System Development Corp., Santa Monica, Calif. Special Development Dept.

METHODS OF THE MANUAL ANALYSIS OF MULTI-SOURCE, CONTINUOUSLY RECORDED BIOMEDICAL DATA

J. Wilson Nance. 30 Jun. 1963 75 p refs

(Contract AF 19(628)-1648)

(TM-1210/000/01; AD-428600)

Application is made of electronic digital computers to the screening and analysis of biomedical data, by an examination of the analytic logic employed by the clinical diagnostician. A tremendous advantage can be given to the clinician in providing him with a computer program that will do mass screening operations on continuously recorded data. The data will be taken from physiological measurements of electrocardiograph, ballistocardiograph, phonocardiograph, electroencephalograph, electrooculograph, pneumograph, and galvanic-skin-response instruments. A.L.B.

N64-19921 Rochester U., N.Y.

A PRELIMINARY STUDY OF BEHAVIORAL EFFECTS IN PIGEONS EXPOSED TO MERCURY VAPOR AT A CONCENTRATION OF 0.1 MG/M^3

R. P. Beliles, R. S. Clark, P. R. Belluscio, C. L. Yuile, and L. J. Leach 27 Apr. 1964 10 p refs

(Contract W-7405-ENG-49)

(UR-ENG-49-7) OTS: $0.50

Three male Carneaux pigeons (1 control, 2 experimental) were trained to a multiple FR-60 FI-15 schedule of reinforcement. After relative behavioral stability was obtained, the experimental animals were exposed 6 hours a day for 20 weeks to mercury vapor at a concentration level of 0.1 mg/m^3. No behavioral, histological, or gross signs of mercurialism were noted. Author

N64-19922 Advisory Group for Aeronautical Research and Development, Paris (France)

MEDICAL INDOCTRINATION FOR FLYERS. AN AEROMEDICAL HANDBOOK FOR AIRCREWS

1963 118 p

(AGARD-411, Amend.)

Medical indoctrination is given to aircrews by discussing physiological and psychological facts pertaining to the human body during flight. Among the subjects covered are vision, atmospheric characteristics, decompression sickness, altitude effects on sinuses, hypoxia, noise, g-effects, and other useful aeromedical information. The material is based entirely on a Royal Canadian Air Force pamphlet entitled "Fit to Fly," (No. 69). G.D.B.

N64-19955 Massachusetts Inst. of Tech., Cambridge Engineering Projects Lab.

FUNCTIONAL EXTENSION OF THE HUMAN HANDS Progress Report, 1 Apr. 1963-30 Sep. 1963

Thomas B. Sheridan 10 Jan. 1964 7 p refs

(NASA Grant NsG-107-61)

(NASA CR-53879; SA-8649-4) OTS: $1.10 ph

Two experiments were performed in an application of the statistical theory of nonlinear control systems developed by N. Wiener and Y. W. Lee to characterize the human operator in a simple tracking loop. Results of the first experiment—an example of the inherent nonlinearities of the closed-loop human operated system—indicated that low order nonlinearities do not account for any substantial part of the linear remnant. The second experiment examined the ability of the operator, placed in a loop with a nonlinear process, to adapt to it. With the given inputs, however, minimum mean-squared-error would be achieved by a linear system; therefore, assuming the operator adapted a mean-square-error criterion, it would appear that he should adopt the inverse of the nonlinear process. Results showed some tendency to compensate for nonlinearity, but were not sufficiently definitive to infer the degree of inverseness of the operator's characteristics. A.W.

N64-19965 Federation of American Societies for Experimental Biology, Washington, D.C.

A STUDY OF THE BIOMEDICAL PROBLEMS RELATED TO THE REQUIREMENTS OF TROOPS AT TERRESTRIAL ALTITUDES OF 10,000 FEET OR ABOVE

Wendell H. Griffith et al. 15 Oct. 1963 26 p

(Contract DA-49-092-ARO-9)

(AD-428100)

These committee reports discuss the following: (1) a definition of the problem, (2) factors related to the impairment of performance at high elevations, (3) factors related to the improvement of performance at high elevations by prior conditioning at sea level and at moderate elevations; (4) factors related to the improvement of performance at high elevations by preselection of altitude-tolerant individuals; (5) solution of the problem of impairment of performance at high elevations, (6) conclusions; and (7) recommendations. A.W.

IAA ENTRIES

A64-13978
INVESTIGATION OF THE BIOLOGICAL EFFECTS OF COSMIC RADIATION UNDER CONDITIONS OF SPACE FLIGHT.
N. M. Sisakian, V. V. Antipov, P. P. Saksonov, and V. I. Iazdovskii (Academy of Sciences, Moscow, USSR).
International Astronautical Congress, 14th, Paris, France, Sept. 25-Oct. 1, 1963, Paper. 11 p. 22 refs.

Presentation of results of radiobiological investigations conducted on Seven Soviet spaceships. In order to study the harmful effects of cosmic radiation, objects were used having different radiosensitivity, and tests were made on changes in physiological functions and hereditary structures of cells. Experiments were conducted on mammals (dogs, mice, rats, guinea pigs), fruit flies, plants, seeds of higher plants (wheat, peas, onions, pine, beans, radishes, carrots), Tradescantia microspores, culture of chlorella algae on different nutrient media; and numerous biological and cytological objects at the tissue, cellular, subcellular and molecular levels. Analysis of the test results shows that, under the influence of cosmic radiation, combined with other flight factors, disturbances appear in the hereditary structures of different biological organisms, which have a small but statistically significant value. At the same time, it has been established that cosmic radiation caused no permanent changes in the vital funotions of man and other mammals.

A64-13994
DISC DISEASE IN FLYING PERSONNEL.
Paul W. Myers (USAF Hospital, Lackland AFB, Tex.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 65-68. 15 refs.

A large series of disk operations, all performed or supervised by a single surgeon in one Air Force hospital, is reviewed. Results following surgery were better than those reported previously, even with cervical disks added. Motivation, a common factor in flyers, is believed to be the catalyst. A symptom-free patient after surgery without deficit can be returned to flying duties at the end of 90 days. Duty may be performed in any and all aircraft effectively. This holds true whether or not interbody fusion has been done.

A64-13995
THE COVER TEST IN THE AVIATION EYE MOTILITY EXAMINATION.
W. L. Erdbrink (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 58-62.

The subjective testing techniques of eye motility employed in the aeromedical examination (Maddox rod and prisms, and machine-type testing devices) are unsatisfactory for differentiation of a heterophoria and a heterotropia at distances important for control of aircraft. The objective evaluation of muscle balance is based on the cover test and the accurate measuring of heterophoria using prisms. The objective differentiation between a phoria and tropia utilizes a cover-uncover test. Detailed descriptions are presented of the alternate cover test, prism cover test, and cover-uncover test which can supplement the present aviation ocular motility examination. The testing of the binocular eye movements in the cardinal positions of gaze completes the objective motility evaluation. A series of case reports is given illustrating some of the heterophoria problems encountered in aviation.

A64-13996
SURVIVAL FOLLOWING CONTROLLED AIRCRAFT CRASHES.
Emmert C. Lentz (USAF, Life Sciences Group, Norton AFB, Calif.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 53-57.

Some of the more significant data pertaining to survival and/or injury following controlled crashes are presented. The addition of the H-43B helicopter as a crash rescue vehicle to the U.S. Air Force inventory appears to have advantages when it is on the fire-after-crash scene sufficiently early. A pilot's risk of being uninjured but entrapped is remote but could happen. The same impact and decelerative forces that rupture multiple fuel tanks and set the scene for early engulfment in flames are likely to produce major and even fatal injuries. The large number of vertebral compression fractures indicates that the restraint of the shoulder straps' inertial reels may not be fully meeting the design requirements.

A64-13997
COMPLETE EMERGENCY LIFE SUSTAINING SYSTEM FOR SPACECRAFT.
Henry W. Seeler (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 35, Jan. 1964, p. 37-40.

The proposed independent four-part emergency life sustaining system for spacecraft consists of: (1) an astronaut's uniform with a built-in pressure protective system, (2) a controlled pressure breathing rescue regulator, (3) a separate chlorate oxygen-generating system, and (4) a one-man combined compression tube and airlock. This system has been designed, partially fabricated, and appears worthy of further development.

A64-13999
EFFECTS OF ELECTRIC FIELDS AND NEGATIVE ION CONCENTRATIONS ON TEST PILOTS.
C. I. Barron and J. J. Dreher (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).
Aerbspace Medicine, vol. 35, Jan. 1964, p. 20-23.
Contract No. AF 18(600)-1921.

Beneficial effects of an atmosphere containing negative ions or ions plus electric fields in amelioration of the effects of stress or fatigue were explored. The study utilized ten healthy, non-fatigued male pilots who were exposed to single field and ionic conditions for relatively short periods of time and performed a series of psychomotor tests of varying sensitivity. The results were inconclusive with respect to the above hypothesis. Lowered initial level of performance, different ion-field levels, and more sensitive tests may clarify any effects of atmospheric ion concentration on performance which were not apparent in this study.

A64-14000
ANALYSIS OF INDUCED DISORIENTATION IN PRIMATES.
Leonard A. Cohen (Albert Einstein Medical Center, Dept. of Physiology, Philadelphia, Pa.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 16-20. 12 refs.
NIMH Grant No. MY5823; NSF Grant No. G-18955.

Ten Macaca nemestrina monkeys were investigated for their orientation ability by recording their performance qualitatively and measuring it quantitatively in terms of climbing time in four experimental situations which required orientation ability. These were climbing up and down ladders and up and down pegs. Performance of all subjects when administered d-lysergic acid diethylamide (LSD), n-ethyl-3-piperidyl cyclopentyl phenyl glycolate hydrochloride (Ditran), or 1-(1-phenyl-cyclohexyl) piperidine monohydrochloride (Serny1) was significantly poorer than normal and this plus qualitative observation made it clear that these drugs produce a definite spatial disorientation without necessarily inactivating the subjects. It is concluded therefore that these drugs are a valid useful laboratory tool for producing disorientation in primates and merit further study in order to not only elucidate their mechanism and site of action but also to gain further insight into the basic physiology of body orientation and disorientation.

A64-14002
IMPACT TOLERANCE OF GUINEA PIGS RELATED TO ORIENTATION AND CONTAINMENT.
C. F. Lombard, Perry Close, F. C. Thiede, and F. Larmie (Northrop Corp., Northrop Space Laboratories, Hawthorne, Calif.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 1-6. 6 refs.

This investigation indicates that accelerations applied to guinea pigs at representative angles using selected methods of support and restraint at exposures of 53 to 99 g peaks for 3 to 4 milliseconds duration at 6,620 to 15,230 g/second onset are: (1) survivable when applied transversely to the animal when in a uniform restraint device or a broad strap harness with a head restraint; (2) frequently productive of serious or fatal injuries when applied longitudinal to long axis of animal's body, or at 45 degree angles, although the frequency of injury is greater in the former than in the latter positions; and (3) invariably productive of delayed reaction and death

when applied in a ventral to dorsal direction without head restraint. Areas of serious to fatal injuries are the spinal vertebral column, central nervous system, the respiratory system, and the liver.

A64-14012
COLOR CODING AND VISUAL SEPARABILITY IN INFORMATION DISPLAYS.
Sidney L. Smith (MITRE Corp., Bedford, Mass.).
Journal of Applied Psychology, vol. 47, Dec. 1963, p. 358-364.
6 refs.
Contract No. AF 19(628)2390.

Twelve experimental subjects performed both visual search and class counting tasks, viewing displays containing 20, 60, or 100 items. Each item consisted of a vector, letter, and 3-digit number grouped together, and was presented as white-on-black in some displays, or in 1 of 5 colors. The color code was redundant with the 5 class-designator letters that were used. Average search and counting time, and counting errors, increased with increasing display density (number of items). None of these measures varied significantly among the 5 different target classes (colors). Addition of the redundant color code resulted in an average time reduction of 65% in the visual search task and 69% in the counting task, with a reduction of 76% in counting errors.

A64-14013
HUMAN TRACKING PERFORMANCE UNDER TRANSVERSE ACCELERATIONS.
Leland G. Summers (Space Technology Laboratories, Inc., Redondo Beach, Calif.).
Journal of Engineering Psychology, vol. 2, Oct. 1963, p. 131-138.
11 refs.
Contract No. NASr-68.

Human performance was measured for control parameters during front-to-back and back-to-front transverse ("eyeballs in" and "eyeballs out") accelerations. Five subjects were given a compensatory tracking task in pitch and roll using a two-axis side arm controller and a cathode ray tube attitude display with a moving horizon. Static, 4 g and 6 g acceleration levels were used, each of a two-minute duration. The following conclusions were drawn: (1) Significant differences in motor performance were observed when the motor movements were in the same plane as the acceleration forces. (2) There appeared to be no difference in performance between the EBI direction of acceleration and the EBO direction. (3) Subjective evaluation by the use of pilot-rating scales did not appear as sensitive as measured error scores, and it might lead to erroneous conclusions under acceleration. (4) There was no interaction between acceleration and vehicle dynamics or control gain values used in these experiments.

A64-14014
EMERGENCY EGRESS OXYGEN REQUIREMENTS.
R. L. Carter and W. P. Bagley (North American Aviation, Inc., Columbus, Ohio).
Aerospace Medicine, vol. 35, Jan. 1964, p. 35-37.

A method is presented for determining the amount of oxygen used by an airman while breathing at constantly changing pressures. This method enables rapid and accurate calculations of oxygen requirements during descent following an emergency egress. Standard laws expressing pressure and density relationships with altitude are used. Above an altitude of 35,300 feet the isothermal law is assumed to hold. Below this altitude a polytropic type of pressure change is employed. A complete derivation of the method using these basic equations is given. Results are presented in the form of two charts which will give the volume of oxygen consumed during descent between altitudes of 45,000 feet and 15,000 feet.

A64-14092
RESUME OF PRESENT KNOWLEDGE OF MAN'S ABILITY TO MEET THE SPACE ENVIRONMENT.
Stanley C. White and Charles A. Berry (NASA, Manned Spacecraft Center, Houston, Tex.).
Aerospace Medicine, vol. 35, Jan. 1964, p. 43-48.

Data acquired during manned space flights by the United States and the Soviet Union are reviewed. The following are included: (1) psychological and clinical findings, (2) man support equipment, (3) food and water handling system, and (4) problem areas of man meeting the space environment: weightlessness, orientation, isolation and break-off, radiation, and astronaut recycle time.

A64-14118
THE ROLE OF THE PHYSICIAN IN SPACE MEDICINE.
David H. Stoddard (NASA, Office of Manned Space Flight, Div. of Space Medicine, Washington, D. C.).
Journal of Occupational Medicine, vol. 5, Nov. 1963, p. 516-519.

Every day, man's progressively augmented technical ability enables him to produce environments which exceed the physiological tolerance of the human organism. He can also transport himself to an unacceptable environment such as space. It becomes of paramount importance, therefore, that physicians participate fully in preventive medicine and engineering programs designed to protect the human being rather than restricting their interests and talents to the treatment of injuries or disease sustained in these hostile environments.

A64-14152
PHOTOELECTRIC ECOSYSTEM.
Neal E. Armstrong and Howard T. Odum (Texas, University, Institute of Marine Science, Port Aransas, Tex.).
Science, vol. 143, Jan. 17, 1964, p. 256-258.
NSF Grant No. G13160.

Description of a living membrane in which the self-maintaining aspect of an ecological system (ecosystem), the electrochemical potentials of photosynthetic drive, and the dependency of organic and inorganic substances are combined. The natural, self-maintaining photoelectric cell, composed of a blue-green algal mat and bacteria as a layered ecosystem was isolated from a shallow marine bay. In daytime the open-circuit potential across the ecological membrane was about 0.43 v. The efficiency of conversion of light energy to organic potential energy before maintenance was 1.62%. and to external electrical energy at optimum power loading was 0.016%, a flow analogous to a consumer population.

A64-14332
CONTROL, REPLENISHMENT, AND STABILITY OF LIFE SUPPORT SYSTEMS.
Henry Davis and Robert Novosad (Martin Marietta Corp., Martin Co., Denver, Colo.).
(American Institute of Aeronautics and Astronautics, Summer Meeting, Los Angeles, Calif., June 17-20, 1963, Paper 63-65.)
Journal of Spacecraft and Rockets, vol. 1, Jan.-Feb. 1964, p. 96-103.

Outline of the mathematical scheme for the analysis of an ecological system consisting of a space cabin, crew, and life support system. The analysis, in addition to determining resupply requirements, will result in: a calculation of the output required of the various system components - i.e., a preliminary design; a formulation of the control problem from which optimal control functions can be found; and a means of evaluating the time to put the system into operation and the time required to bring it back into balance in the event of a mishap. A simple, open-end system is first used in formulating the model to illustrate the basic concepts. The model is then applied to a system that uses electrolysis of lithium carbonate to regenerate oxygen. Stability and weight-power functions are developed for this system.

A64-14341
ATMOSPHERIC TOXICANTS IN MANNED SPACE STATIONS.
Tom Weber (Beckman Instruments, Inc., Space Engineering Dept., Bioastronautics, Fullerton, Calif.).
(American Institute of Aeronautics and Astronautics, Summer Meeting, Los Angeles, Calif., June 17-20, 1963, Paper 63-258.)
Journal of Spacecraft and Rockets, vol. 1, Jan.-Feb. 1964, p. 122, 123.
[For abstract see Accession no. A63-18795 17-16]

A64-14354
VARIABLE FEEDBACK EXPERIMENTS TESTING A SAMPLED DATA MODEL FOR EYE TRACKING MOVEMENTS.
L. R. Young (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.) and L. Stark (Massachusetts Institute of Technology, Electronic Systems Laboratory and Biology Dept., Neurology Section, Cambridge, Mass.).

IEEE Transactions on Human Factors in Electronics, vol. HFE-4, Sept. 1963, p. 38-51. 9 refs.
Contract No. AF 49(638).

Theoretical and experimental development of a useful mathematical model for the biological control system which enables a target to be followed by the eye. The development of the model for tracking unpredictable target motions is based on recognition of the separate function of the saccadic and pursuit systems, and the necessity for describing them in terms of discrete rather than continuous control loops. The model adequately describes eye movements following pulses, steps, ramps, and parabolas of target motion. The general characteristics of experimental frequency responses are predicted by the model. An important test of the model's plausibility is its ability to predict accurately the results of new experiments involving tracking under different conditions of effective visual feedback. The model is shown to predict adequately the experimental results for transient responses under open-loop conditions, step responses at a variety of feedback levels, and the limits within which feedback could be varied and system stability maintained.

A64-14461

BIOLOGICAL CONTAMINATION OF MARS. II - COLD AND ARIDITY AS CONSTRAINTS ON THE SURVIVAL OF TERRESTRIAL MICROORGANISMS IN SIMULATED MARTIAN ENVIRONMENTS.

E. Packer, S. Scher, and C. Sagan (California, University, Space Sciences Laboratory, Berkeley, Calif.).

Icarus, vol. 2, Nov. 1963, p. 293-316. 174 refs.
Grant No. NsG-126-61.

Description of recent studies of the survival of terrestrial microorganisms under simulated Martian conditions along with the review of previous work on low temperature and aridity as constraints on microbial survival and growth. The nature and the uncertainties in our understanding of the physical environment of Mars are specified. Preliminary results of these experiments are presented, and data on microorganisms surviving these simulated conditions are given in tabular form. A conclusion is drawn that if a random sample of terrestrial soil microorganism is transported to Mars, a sizable fraction will almost certainly survive. The effects of this contamination are examined and discussed. Scrupulous sterilization of Mars entry vehicles is suggested.

A64-14781

HYDROCARBONS IN TERRESTRIAL SAMPLES AND THE ORGUEIL METEORITE.

Warren G. Meinschein (Esso Research and Engineering Co., Linden, N. J.).

Space Science Reviews, vol. 2, Nov. 1963, p. 653-679. 78 refs.
Contract No. NASw 508.

Review of analyses of carbonaceous materials found in meteorites. The Alais, Orgueil, Tonk, and Ivuna meteorites resemble in their carbon, free sulfur, and nonmetamorphosed mineral contents, densities, and general appearances certain terrestrial sediments rich in organic substances. Structural and isotopic determinations of carbon compounds in the Orgueil chondrite indicate that these compounds are primarily indigenous. Physically and chemically, the extractable benzene carbonaceous materials in the Orgueil and certain terrestrial sediments near the surface are similar. Mass spectrometric analyses of the alkanes from an Orgueil fragment and from terrestrial sediments and organisms are statistically indistinguishable at the 95% confidence level. Theoretical considerations and experimental data are presented, and these are used to evaluate the possibility of employing hydrocarbons as biological indicators. Based on the production and preservation of organic substances in terrestrial environments, alkanes in the Alais, Orgueil, Tonk, and Ivuna carbonaceous chondrite groups could best retain the evidence of organisms that may have lived on a parent body of meteorites.

A64-14966

THE LOCUS CONCEPT AND ITS APPLICATION TO NEURAL ANALOGS.

E. R. Lewis (General Precision, Inc., Information Systems Group, Research and Systems Center, Glendale, Calif.).

IEEE Transactions on Bio-Medical Electronics, vol. BME-10, Oct. 1963, p. 130-137. 26 refs.
Contract No. AF 49(638)-1021.

Outline of a new approach to analog simulation and study of the neuron. This approach is based on recent physiological evidence which indicates that the individual nerve cell is functionally much more complex than the classical view of a synaptic region coupled directly to a spike or impulse-generating region. At least two different intermediate regions have been found. One provides a reliable low-frequency timing or pacemaker function; the other provides nonlinear amplification of both the synaptic and the pacemaker potentials. In addition, the synaptic regions have been found to provide a large variety of complicated interneural transfer functions. In the view presently held by many physiologists, the spatial distribution of these functionally distinct regions within a single neuron would determine its information-processing capabilities. The behavior of each of the functionally distinct regions of the neuron is discussed. Simple transistor circuits which may be used to simulate individual regions are also described. Groups of these circuits may be connected to form analogs of the entire neuron or any part thereof. Special emphasis is placed here on the synaptic functions, with only a cursory discussion being given for the other regions. It is hoped that networks of the type described will be of considerable use in future studies of the information processing capabilities of single nerve cells.

A64-14990

THE UTILIZATION OF HUMAN CAPABILITIES FOR THE SCIENTIFIC EXPLORATION OF SPACE.

H. W. Rose and W. W. Kellogg (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Physical Sciences Laboratory, Space Medicine Research, Palo Alto, Calif.).

IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, TOKYO, JAPAN, AUGUST 27-31, 1962, 4th, PROCEEDINGS.
Edited by Tamiya Nomura.
Tokyo, Japan and Rutland, Vt., Japan Publications Trading Co., 1963, p. 77-84.

Discussion of the subdivision of tasks in space flight systems between man and machines, as well as of the location of man within space systems, with general limitation to space flights with a scientific purpose. The discussion is mainly intended to point out tools for the evaluation of man and machine in the context of space systems. Briefly described is the USAF Thor-Agena scientific satellite program. It is stated that, in the context of human participation in space exploration, there are two aspects to reliability. Reliability of systems without manned vehicles will determine the number of vehicles which must be purchased to perform a given task adequately, and hence the cost. Reliability of systems without manned vehicles will determine the expected safety of such vehicles for manned occupancy. It is noted that man-rating of vehicular systems requires that a certain reliability threshold be exceeded before men may use the craft. In addition to the usual unmanned functions, any vehicle used by men from the surface of another planet or the Moon must perform an additional launch, a re-entry into a 65-km corridor within the Earth's atmosphere, and a landing. It is noted that the Scientific Satellite system still had an expected value for launch, orbit, and return of about 50% after three years of experience. The opportunity for man to add to the reliable operation of a vehicle by on-board repairs is based upon the expectation of a non-vital type of failure. This does appear to be a particularly high-probability expectation.

A64-14991

ON THE CEREBRAL FUNCTIONS UNDER COLD STRESS AND ITS RELATION WITH THE METABOLIC REACTIONS.

Hisashi Saiki (Tokyo Jikei University, School of Medicine, Aeromedical Laboratory, Tokyo, Japan).

IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, TOKYO, JAPAN, AUGUST 27-31, 1962, 4th, PROCEEDINGS.
Edited by Tamiya Nomura.
Tokyo, Japan and Rutland, Vt., Japan Publications Trading Co., 1963, p. 92-99. 5 refs.

Consideration of the effect of cold stress on cerebral functions, and relationship of the latter with metabolic reactions. An investigation was made to determine whether thiamine-HCl can control the regulation of particular metabolic functions of the body. Discussed are flicker value, EEG, and inorganic substance excretion in the urine. The tests showed that the diminished functionality

of the brain was arrested as a result of the action of thiamine-HCl. Regarding the relation with metabolism, the most apparent relationship was found in sodium excretion in the urine. The excretion increased in proportion to the accumulation of the cold stimulus. The potassium content of urine increased under cold stress and it seemed not to be affected by the administration of thiamine-HCl.

A64-14992
THE CEREBRAL ACTIVITY OF RABBITS IN LOW PRESSURE.
F. Motobayashi, G. Mitarai, and S. Ando (Nagoya University, Research Institute of Environmental Medicine, Nagoya, Japan).
IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, TOKYO, JAPAN, AUGUST 27-31, 1962, 4th, PROCEEDINGS.
Edited by Tamiya Nomura.
Tokyo, Japan and Rutland, Vt., Japan Publications Trading Co., 1963, p. 100-107.

Discussion of the problem of acclimatization and other effects at low pressures on the basis of experiments carried out with rabbits whose EEGs, hippocampal discharges, and evoked potentials of the visual cortex had been studied. The EEGs under low-pressure conditions are divided into four stages of different altitude. The effects of adaptation or acclimatization were studied by measuring the retino-cortical time. Four different cases were produced to illustrate the different stages of adaptation: (1) unadapted (death under low pressure); (2) two-peak type (one under low pressure and second at returning time); (3) one-peak type (only at returning); and (4) no-peak type (complete adaptation or acclimatization - curve almost constant).

A64-14993
THE EFFECT OF VIBRATION ON THE VISUAL ACUITY.
Masamitsu Oshima (JASDF, Aeromedical Laboratory, Tokyo, Japan).
IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, TOKYO, JAPAN, AUGUST 27-31, 1962, 4th, PROCEEDINGS.
Edited by Tamiya Nomura.
Tokyo, Japan and Rutland, Vt., Japan Publications Trading Co., 1963, p. 108-111.

Investigation of the action of vibration on visual acuity. The results show that: (1) the declination of visual acuity becomes greater, the greater the frequency; (2) the declination of visual acuity becomes greater, the greater the amplitude; (3) the greater the frequency, the greater the difference of declination of visual acuity between each amplitude; and (4) the declination of visual acuity is not linearly related to amplitude. Shown in figures are the relations between the declination of visual acuity and the vibration of the eyeball. It is noted that the declination of visual acuity is estimated to be controlled by the force of vibration of the eyeball.

A64-14994
SOLAR IRRADIANCE UP TO 100 KILOMETERS AND RELATED PROBLEMS OF EYE PROTECTION.
Ingeborg Schmidt (Indiana University, Div. of Optometry, Bloomington, Ind.).
IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, TOKYO, JAPAN, AUGUST 27-31, 1962, 4th, PROCEEDINGS.
Edited by Tamiya Nomura.
Tokyo, Japan and Rutland, Vt., Japan Publications Trading Co., 1963, p. 112-126. 32 refs.

Investigation of the amount of incident solar energy up to 100 kilometers of altitude for the design of appropriate protective measures for the eye. The effect of solar radiation upon the eye is briefly reviewed and computations of direct solar radiation and atmospheric transmittance at different altitudes are presented. Indirect and total solar radiation are discussed, and conclusions are drawn regarding the protection of the eyes of air travelers. The results show that intense solar radiation may affect the outer eye, especially the cornea, the conjunctive and the outer skin of the lids. The decisive quantity is the irradiance of the ultraviolet portion of the solar spectrum. Solar radiation traversing the eye media and forming an image on the retina can cause a retinal burn. The decisive quantity is the retinal irradiance. The threshold energies harmful to the human eye are not exactly known. Protection from the invisible portion of the solar spectrum can be obtained by using windows or helmet visors which are opaque to these radiations. Different possibilities are discussed for protection of the eyes from intense sunlight at high altitudes.

A64-14995
MAMMALS MAINTAINED IN A HOT ENVIRONMENT BY ARTIFICIAL COOLING.
Roy E. Bundy, Edwin E. Andrews, Donald I. Jones, and Robert H. Levine (Fairleigh Dickinson University, School of Dentistry, Teaneck, N. J.).
IN: INTERNATIONAL SYMPOSIUM ON SPACE TECHNOLOGY AND SCIENCE, TOKYO, JAPAN, AUGUST 27-31, 1962, 4th, PROCEEDINGS.
Edited by Tamiya Nomura.
Tokyo, Japan and Rutland, Vt., Japan Publications Trading Co., 1963, p. 127-133. 5 refs.

Investigation of possible mechanisms, including the artificial direct cooling of the body, for the protection against hyperthermia of astronauts and pilots in high-speed aircraft. The problem of cooling by artificial means was investigated from the standpoint of maintaining normal range temperatures in a hot environment. This was done by circulating cold water through a heat exchanger placed on the neck of rats and humans. All the experimental data are presented in the form of graphs, which include runs with and without the attached artificial cooling device. Rats provided with an artificial cooling device were able to maintain body temperature within normal range for periods up to 2 hours and within an ambient terminal temperature of 100°C. There is no sweating mechanism in the rat. Under these conditions, the heat gain in the control rat exceeded heat loss by normal physiological mechanism. The normal body temperature of a human subject in a hot environment with an artificial cooling device of hollow metal externally placed around the neck, was maintained for a longer period of time than the temperature of subjects without such a cooling device.

A64-15168
VISUAL SEARCH PERFORMANCE IN A MOVING STRUCTURED FIELD.
Ronald A. Erickson (U.S. Naval Ordnance Test Station, Aviation Ordnance Dept., China Lake, Calif.).
Optical Society of America, Journal, vol. 54, Mar. 1964, p. 399-405. 13 refs.

Measurement of the performance of 16 male observers who searched for an incomplete ring (Landolt C) among a number of solid rings in a square, moving field. Search performance deteriorated as velocity or object density was increased; a target was more likely to be detected the closer it was to the center of the field; there was no significant correlation between the age of the observer and his search performance; there was significant correlation between foveal visual acuity and search performance in the moving field. The performance of the same observers on a previous series of tests is compared to their performance on the present tests. A hypothesis concerning the role of peripheral and foveal vision in searching for targets is advanced.

A64-15170
VISUAL PERCEPTION OF SPATIAL EXTENT.
Walter C. Gogel (Civil Aeromedical Research Institute, Oklahoma City, Okla.).
Optical Society of America, Journal, vol. 54, Mar. 1964, p. 411-416. 10 refs.

Study concerned with the manner in which perceived depth and perceived frontoparallel size varied with physical distance and hence with each other. An equation expressing the relation between perceived size and physical depth was developed and applied to size judgments determined with four observers under two viewing conditions. By use of that equation and an expression of the size-distance invariance hypothesis, an additional equation was developed which related perceived and physical depth. The additional equation, when applied to judgments of perceived depth from the same observers under the same viewing conditions, produced results not in agreement with those expected from the size-distance invariance hypothesis. This is interpreted as evidence against the validity of the size-distance invariance hypothesis in its usual form. The data from the apparent depth judgments also were applied to the problem of the discrepancies in results that have been found in experiments on the perceptual bisection of depth intervals.

A64-15204
MOON OPERATIONS HERE ON EARTH.
Donald E. Hewes and Amos A. Spady, Jr. (NASA, Lunar Landing Research Facility, Langley Research Center, Hampton, Va.).
Astronautics and Aeronautics, vol. 2, Feb. 1964, p. 24-29.

Discussion of a technique for simulating a partial gravity for unlimited periods while allowing freedom of movement over considerable distances. A subject is supported by overhead cables so that he may walk upon a very steep inclined plane. The support system is designed to minimize the effects of gravity on the subject so that he is almost weightless and experiences primarily the normal frictional forces associated with the wall. The plane may be tilted to simulate any gravity that is less than the Earth's. Load carrying, vertical jumping, and climbing tests were conducted. The addition of light loads to the subject did not hamper his movements and actually proved to be an aid in walking. Under lunar gravity conditions, tests indicated that a man is capable of jumping up to 14 ft off the surface of the Moon. Tests of stairs, ladders, and poles indicated that vertical ascent and descent were most easily achieved by employing the hands only.

A64-15474
VIGILANCE: THE IMPORTANCE OF THE ELICITED OBSERVING RATE.
Harry J. Jerison and Ronald M. Pickett (Antioch College, Behavior Research Laboratory, Yellow Springs, Ohio).
Science, vol. 143, Feb. 28, 1964, p. 970, 971. 8 refs.

Investigation of observing regularly repeated events. It is found that the rate at which events are presented dramatically affects the observation performance of the subjects, with a lower event rate being conducive to greater accuracy. Observing was elicited by a series of regularly repeated events that occasionally became signals. It is considered that the experiment supports a decision-theory approach to observing behavior.

A64-15475
THE NONPREVALENCE OF HUMANOIDS.
George Gaylord Simpson (Harvard University, Museum of Comparative Zoology, Cambridge, Mass.).
Science, vol. 143, Feb. 21, 1964, p. 769-775. 25 refs.

Development of the theory that extra-terrestrial life is a hypothesis the validity of which is based on negative assumptions, and which leads to speculation entirely free of earthly realities. The possibility of a non-carbon-based biology is admitted with the observation that no tangible evidence for it exists. The questions of the origin of life and its possible existence outside the solar system are reviewed, with an examination of the subsequent evolution of postulated life forms. Both the course followed by evolution and its processes clearly show that evolution is not repeatable. Communications with other possible solar systems are considered so unlikely as to be impossible. It is suggested that expenditure on the further study of terrestrial life would be more fruitful than that for exploration of the possibility of nonterrene life.

A64-15629
THE RADIOBIOLOGICAL-EFFECTIVENESS PROBLEM FOR ACUTE AND CHRONICAL EXPOSURE IN THE RADIOBIOLOGICAL RESEARCH IN SPACE MEDICINE [DAS PROBLEM DES RBW BEI AKUTER UND CHRONISCHER STRAHLENBELASTUNG IN DER RADIOBIOLOGISCHEN FORSCHUNG DER RAUMFAHRTMEDIZIN].
E. H. Graul (Philipps-Universität, Abteilung für Strahlenbiologie und Isotopenforschung, Marburg, Germany).
Raumfahrtforschung, vol. 8, Jan.-Mar. 1964, p. 1-9. In German.

Discussion of the radiobiological problem of evaluating the effect of ionizing radiation upon a human organism during orbital and space missions. It is shown that the effect of ionizing radiation on living tissue depends not only on the amount of energy absorbed, but also on other factors, such as the differential distribution in the ionization pattern, and the concentration of O_2 in the tissue. The term "roentgen equivalent man" ("rem"), commonly accepted as a biological measure of a dose, is composed of two factors: (1) the amount of energy absorbed in "rad" (roentgen absorbed dose), and (2) the relative biological efficiency (RBE), or relative efficiency for a biological object. The radiobiological significance of both RBE and rem is discussed in terms of the effect of highly accelerated nuclei, in particular of heavy primary particles.

A64-15953
HUMAN FACTORS IN DESIGN OF RELIABLE SYSTEMS.
Alan D. Swain (Sandia Corp., Reliability Dept., Albuquerque, N.M.).
IN: NATIONAL SYMPOSIUM ON RELIABILITY AND QUALITY CONTROL, 10TH, WASHINGTON, D.C., JANUARY 7-9, 1964, PROCEEDINGS.
New York, Institute of Electrical and Electronics Engineers, 1964, p. 250-259. 9 refs.

Discussion of methods for the reduction of human errors in the designing of more reliable systems. The design engineer must be made to realize that human errors result not so much from the faults of the human operator as from the poorly designed equipment that he must use at his task. Criteria for the design of equipment and procedures are established.

A64-16090
MASKER LEVEL AND NOISE-SIGNAL DETECTION.
Richard A. Campbell (U.S. Navy, Electronics Laboratory, San Diego, Calif.).
Acoustical Society of America, Journal, vol. 36, Mar. 1964, p. 570-575. 13 refs.

Evaluation of threshold signal-to-noise ratios for a filtered thermal-noise signal presented in an independent thermal-noise masker. The parameters of primary interest were the sensation level of the masking noise and the center frequency and bandwidth of the signal noise. It was found that the threshold-signal to noise ratios were not constant once the masker was well above threshold. Rather, the obtained masked thresholds revealed an interaction between signal frequency and masker level. This interaction would appear to be related to the numbers of eighth-nerve fibers with thresholds at different stimulus levels. This relationship is interpreted as indicating that, below about 60 db sensation level, differential-intensity information may be conveyed primarily by changes in the number of eighth-nerve units activated. At higher stimulus levels, differential-intensity information would seem to be conveyed by a different group of neurons primarily by changes in the rate of their firing.

A64-16091
NOTE ON BINAURAL MASKING-LEVEL DIFFERENCES AT HIGH FREQUENCIES.
N. I. Durlach (Massachusetts Institute of Technology, Research Laboratory of Electronics, Center for Communications Sciences, Cambridge, Mass.).
Acoustical Society of America, Journal, vol. 36, Mar. 1964, p. 576-581. 15 refs.
Army-USAF-Navy-supported research; Grants NSF No. G-16526; NIH No. MH-04737-03; No. NsG-496.

Development of a quantitative "black-box" model for use in interpreting certain data on binaural masking-level differences at high frequencies. The basic idea of this model is that these differences are the result of variations in the extent to which the envelopes of the signals presented to the two ears of the listener are unequal.

A64-16118
TAKING ADVANTAGE OF MAN'S VISION IN SPACE.
William B. Clark, Floyd M. Morris, and James F. Culver (USAF, School of Aerospace Medicine, Clinical Sciences Laboratory, Ophthalmology Dept., Brooks AFB, Tex.).
Space/Aeronautics, vol. 41, Mar. 1964, p. 99, 101.

Assessment of the visual potentialities of man in space. The use of clues, intellect, and experience makes possible a visual capability beyond that measurable by psychophysical studies. It is considered that concentration of training can lead to further achievements of visual skill.

A64-16191
HYDROMECHANICAL METHOD TO INCREASE EFFICIENCY OF ALGAL PHOTOSYNTHESIS.
R. L. Miller, A. G. Fredrickson, A. H. Brown, and H. M. Tsuchiya (Minnesota, University, Minneapolis, Minn.).
I & EC - Industrial and Engineering Chemistry, Process Design and Development, vol. 3, Apr. 1964, p. 134-143. 25 refs.
Grant No. NsG 79-60.

Experimental investigation to determine the feasibility of a method for increasing the efficiency with which dense algal cultures utilize light. The method employs a photosynthetic gas exchanger designed to take advantage of the flashing light effect, which subjects an algal cell suspension to a time-dependent pattern of light and dark. Suspensions of the cells were placed in the annular space between two concentric cylinders; the inner cylinder was rotated and the outer cylinder was fixed. The resulting Taylor vortices and the inhomogeneous light field in dense suspensions provided the controlled time-dependent pattern of light and dark. The results indicate that the rate of photosynthesis increases with increasing rotor speed, and that flashing light effects, rather than enhanced mass transfer rates, cause the observed increase. Highest efficiencies were found at high suspension densities, low incident light intensity, and high rotor speeds.

A64-16199
EXPERIMENTS IN TACTILE COMMUNICATION.
Joseph Hirsch, Jerome H. Shafer, and Ailon Eitan (Technion - Israel Institute of Technology, Haifa, Israel).
(Israel Annual Conference on Aviation and Astronautics, 6th, Tel Aviv and Haifa, Israel, Feb. 24, 25, 1964, Proceedings.)
Israel Journal of Technology, vol. 2, no. 1, 1964, p. 41-45; Appendix, p. 46. 11 refs.

Description of experiments conducted on a basic tactile communication system in which coded vibratory tactile stimuli are sent and received by five fingers. On the limited basis of four test subjects and three different length codes, it was found that the learning time equals the number of letters in the code raised to the 1.7 power. This indicates the importance of maintaining a small number of signals in a code. An undamped vibrotactile transducer was developed and further development led to the combining of a sender-receiver in a single unit. The tactile communication system was plugged into the existing telephone lines. During the test experiments, attenuation of the tactile vibrations and noise during sending and receiving were found to be negligible through the telephone exchange.

A64-16287
GUANINE - FORMATION DURING THE THERMAL POLYMERIZATION OF AMINO ACIDS.
Cyril Ponnamperuma, Richard S. Young, Elaine F. Munoz, and Barbara K. McCaw (NASA, Exobiology Div., Ames Research Center, Moffett Field, Calif.).
Science, vol. 143, Mar. 27, 1964, p. 1449, 1450. 7 refs.

Experimental investigation to determine whether certain nucleic acids could be formed during the thermal polymerization of amino acids. This would provide a possible abiological pathway for the synthesis of purines and pyrimidines. The proteinoid was prepared according to the method of Fox. Thin-layer chromatography and paper chromatography were used for the analysis. Guanine was detected, which is thought to be a significant result in terms of chemical evolution. A possible mechanism for the formation of guanine is briefly considered.

A64-16313
PHYSIOLOGICAL RESPONSES OF MAN IN ORBIT.
B. A. Gooden.
Spaceflight, vol. 6, Mar. 1964, p. 63-66. 19 refs.

General discussion of the effects of the orbital environment on specific functional systems of the human organism. The effects on the following systems are delineated: the nervous, muscular, cardiovascular, skeletal, digestive, excretory, and respiratory systems. Emphasized are the effects of weightlessness and ionizing radiation.

A64-16388
ADVANTAGES WHICH ACCRUE FOR ASTRONAUTICS FROM THE UTILIZATION OF SOUND RECEPTION BY WAY OF BONE CONDUCTANCE [KORZYŚCI DLA ASTRONAUTYKI, PŁYNĄCE Z WYKORZYSTANIA SŁYSZENIA NA DRODZE PRZEWODNICTWA KOSTNEGO].
J. Nowicki.
Astronautyka, vol. 6, Dec. 1963, p. 21-23. In Polish.

Audiographic study showing that simultaneous utilization of sound reception by way of air and bone conductance would result in lower amplification requirements for radio signals and, thus, in lower noise levels in space communications. Minimization of receivers through the use of bone vibrators is also noted.

A64-16438
SOME HUMAN FACTORS AND LIMITATIONS.
G. Bennett (British Overseas Airways Corp., London, England).
IN: INTERNATIONAL FEDERATION OF AIR LINE PILOTS ASSOCIATIONS (IFALPA), SYMPOSIUM ON SUPERSONIC TRANSPORT, LONDON, ENGLAND, NOVEMBER 12-14, 1963, REPORT.
London, IFALPA, 1964, vol. 2, p. 181-185; Discussion, p. 195-203.

Discussion of the principles of human engineering, anatomical, physiological, and psychological, to be applied from the initial design stages of a supersonic transport (SST). The most important of these factors are summarized for Mach 2.2-3 aircraft operating between 60,000 and 75,000 ft. Considered are pressurization, air conditioning, ionizing radiation, man-machine relationship, noise, accelerations and disorientation, crashworthiness, and crew operating problems. It is noted that, if the optimum man-machine relationship is achieved, and the aircraft are not operated where facilities are inadequate, crew operating problems are likely to be less than at present. The high block speed means that it will frequently be possible to operate sectors of up to about 3,500 miles on an out-and-return basis during a single duty day. This will alleviate the problem of disturbance of the body's natural 24-hour rhythm by changes of local time for these cases; however, on longer East/West routes, the considerable local time change produced in a single duty day will aggravate the problem which already exists.

A64-16475
LIFE IN SPACE.
A. A. Imshenetskii.
(Akademiia Nauk SSSR, Vestnik, no. 9, 1963, p. 23-29.)
NLL Translations Bulletin, vol. 6, Jan. 1964, p. 28-43.

Discussion of the possibility of life in space and of the problem of transmission to other planets of live bacteria from the Earth. Cosmic rockets and spacecraft leaving the Earth now receive special sterilization to prevent accidental transfer of bacteria. Considered are the microbiological analysis of meteorites; methods for the discovery of life at great altitudes, on other planets, and in cosmic space; and nephelometric, manometric, and pH measurements. It is noted that exobiological investigations cannot be limited to the search for microorganisms. Of no less interest are chemical investigations capable of explaining the "evolutions" of various chemical substances related to the origin of life. The exploratory investigations involve the dispatching to the planets of various automatically operated instruments of chemical analysis. Particularly important will be the search on the planets for forms of life more primitive than the microorganisms found on Earth. The discovery of pre-cellular forms of life is not only an important, but also an extremely difficult problem, and before attempting to solve it, fuller information will be required on the distribution of the various chemical elements on the planet and planetary environmental conditions. It is stated that the attempts to discover the existence of pre-cellular formations must precede the search for microorganisms.

A64-16478
MAN AS AN ELEMENT OF THE FLIGHT CONTROL SYSTEM [DER MENSCH ALS ELEMENT DES FLUGFÜHRUNGSSYSTEMS].
R. Bernotat (Berlin, Technische Universität, Institut für Flugführung und Luftverkehr, Berlin, Germany).
Luftfahrttechnik Raumfahrttechnik, vol. 10, Mar. 1964, p. 66-68. 5 refs. In German.

Discussion of human engineering in the development of aircraft and space-vehicle control systems as a means of task optimization. Functional relations between man and machine are derived from an analysis of the task and functions of the human pilot in the overall control. The optimization of a control system with respect to efficiency and reliability is discussed in terms of man-machine adaptability.

A64-16643
BIOLOGISTICS FOR A MANNED SPACE STATION BASED ON THE METABOLIC APPROACH.

William L. S. Wu and Mahmoud M. Yakut (General Dynamics Corp. General Dynamics/Astronautics, Life Sciences Section, San Diego, Calif.).
(American Institute of Aeronautics and Astronautics, Summer Meeting, Los Angeles, Calif., June 17-20, 1963, Preprint 63-164.)
Journal of Spacecraft and Rockets, vol. 1, Mar.-Apr. 1964, p. 204-209. 9 refs.
[For abstract see Accession no. A63-19638 18-16]

A64-16652
MEASURED VARIATIONS IN THE TRANSFER FUNCTION OF A HUMAN PILOT.
James J. Adams and Hugh P. Bergeron (NASA, Space Mechanics Div., Langley Research Center, Hampton, Va.).
(American Institute of Aeronautics and Astronautics and USAF, Vehicle Design and Propulsion Meeting, Dayton, Ohio, Nov. 4-6, 1963, Proceedings, p. 60-64.)
Journal of Aircraft, vol. 1, Mar.-Apr. 1964, p. 77-81.
[For abstract see Accession no. A63-25759 24-14]

A64-16710
SEARCHING A VISUAL DISPLAY IN INTERMITTENT NOISE.
Muriel M. Woodhead (Medical Research Council, Applied Psychology Research Unit, Cambridge, England).
Journal of Sound and Vibration, vol. 1, Apr. 1964, p. 157-161. 6 refs.

Experimental investigation of the possible effects of auditory distraction upon an observer performing the visual task of monitoring a display. Random numbers were presented at the rate of five per second. A circle around any number was an instruction to the observer to cross off repetitions of that number, and the instruction was changed to a new number whenever another circle appeared. There were three auditory conditions: brief bursts of noise at 110 db sound pressure level (SPL), bursts at 70 db SPL, and always quiet. The first two conditions were alternative experimental controls. The number of errors for a 15-minute period of monitoring was the same under all three conditions, but monitoring was less efficient in the 1/2-minute following a burst at 110 db compared with a similar period under either of the other two conditions. The error which occurred most often in loud noise was failure to notice the circles. It is felt that the noise increased the observer's general level of activity, enlarging differences which the need to monitor two unequally occurring features of the display, circles and numbers, had already established.

A64-16711
SUBJECTIVE MEASUREMENTS OF THE RELATIVE ANNOYANCE OF SIMULATED SONIC BANGS AND AIRCRAFT NOISE.
D. E. Broadbent (Medical Research Council, Applied Psychology Unit, Cambridge, England) and D. W. Robinson (National Physical Laboratory, Teddington, Middx., England).
Journal of Sound and Vibration, vol. 1, Apr. 1964, p. 162-174.

Presentation of subjective estimates of the relative annoyance produced by simulated sonic booms and other aircraft sounds. Experiments were conducted on seventy-nine subjects where the object was to estimate the relative annoyance of the sound of a jet aircraft, a piston-engine aircraft, and sonic booms, each of which was reproduced electronically at various levels. A sound typical of that received inside a building was chosen for the level of the sonic boom. The results are generally consistent with those of earlier experiments using different scaling techniques, and in the cases of the jet and piston aircraft sound, they substantiate the accepted method of calculating perceived noise levels. The increment necessary to double annoyance is about 13 PNdb (perceived noise level) for aircraft sounds. The rate of increase of annoyance with level is greater for the case of sonic booms, being about 10 db for doubling of annoyance. By relating the reproduced noise levels to their original values, it is concluded that, within certain experimental limits, the upper limit of acceptable sonic booms inside buildings is about 1.9 lb/ft^2 initial pressure rise measured in the open at ground level. This figure is based on the value of 110 PNdb for conventional aircraft sounds.

A64-16846
CHANGES IN THE ELECTROENCEPHALOGRAM OF A HUMAN SUBJECT IN CONDITIONS OF PROLONGED ISOLATION [IZMENENIE V ELEKTROENTSEFALOGRAMME CHELOVEKA, DLITEL'NO NAKHODIASHCHEGOSIA V USLOVIAKH IZOLIATSII].
V. I. Miasnikov.
Kosmicheskie Issledovaniia, vol. 2, Jan.-Feb. 1964, p. 154-161. 18 refs. In Russian.

Presentation of the dynamics of basic EEG parameters (such as the frequency, and amplitude of alpha-rhythm), and its response to the absence of a light stimulator during prolonged confinement for various activity schedules over 24-hour periods. For an habitual activity schedule, the experiments showed a decrease in amplitude of the alpha-rhythm of the initial EEG curve without a change in frequency, while for off-normal schedules the decrease in alpha-rhythm amplitude was accompanied by the appearance of slow diffusion waves and an exultation of the alpha-rhythm resulting from the stimulator. The observed changes in bioelectric activity indicate changes in the cerebral cortex under the test conditions.

A64-17074
NEW TYPES OF CHROMOSOME ABERRATIONS INDUCED IN MICROSPORES OF TRADESCANTIA PALUDOSA BY SOME SPACE-FLIGHT FACTORS ON SATELLITE SPACE-SHIPS.
N. L. Delone, P. R. Popovich, V. V. Antipov, and V. G. Vysotskii.
(Akademiia Nauk SSSR, Doklady, vol. 152, Oct. 11, 1963, p. 1227-1230.)
Soviet Physics - Doklady, vol. 8, Apr. 1964, p. 1015-1019. 14 refs. Translation.
[For abstract see Accession no. A64-11351 03-16]

A64-17093
COMMUNICATION OF SPEECH SOUNDS BY A TACTUAL VOCODER.
J. M. Pickett (USAF, Office of Aerospace Research, Cambridge Research Laboratories, Hanscom Field, Bedford, Mass.) and B. Horenstein Pickett (National Institute of Mental Health, Bethesda, Md.).
Journal of Speech and Hearing Research, vol. 6, Sept. 1963, p. 207-222. 22 refs.

Experimental investigation of tactual speech perception by means of a frequency-analyzing vocoder. The vocoder presented a running frequency analysis of speech mapped into a spatial array of tactual vibrations which were applied to the fingers of the receiving subject. Ten vibrators were used, one for each finger. The position of a vibrator represented a given frequency region of speech energy; the total range covered was 210 to 7,700 cps; all the vibrations had a frequency of 300 cps; the vibration amplitudes represented the energy distribution over the various frequencies. Discrimination and identification tests were performed with various sets of test vowels; consonant discrimination tests were performed with certain consonants including those that might be difficult to lipread. It is stated that performance with vowels appeared to be related to formant structure and duration as measured on the test vowels, and to tactual masking effects. Consonant discrimination was good between stops and continuants; consonant features of nasality, voicing, and affrication were also discriminated to some extent. It is concluded that the skin offers certain capacities for transmitting speech information which may be used to complement speech communication where only an impoverished speech signal is normally received.

A64-17321
WATER RECLAMATION SUBSYSTEMS FOR A SPACE STATION.
H. Wallman and J. A. Steele (General Dynamics Corp., Electric Boat Div., Groton, Conn.).
American Institute of Chemical Engineers, Symposium on Aerospace Life Support, National Meeting, 53rd, Pittsburgh, Pa., May 17-20, 1964, Preprint 8c. 23 p. 14 refs.
Members, $0.50.
Contract No. NAS1-2208.

Presentation of a study of systems designed to recycle dehumidification water and wash water in a space station. A conventional unit operations approach is employed in the analysis of the various systems. Some of the problems encountered are: low flow rates, the necessity of weight minimization, low power allowances, operation under weightless conditions, and high reliability requirements. Two systems using activated carbon, ion exchange resin, and a fine-pore filter are selected for testing. The dehumidification water subsystem produced potable water from air-conditioning condensate obtained from a space simulator. The wash water subsystem treated used wash water so that it could again be employed

for the same purpose. Chemical, bacterial, and organoleptic results, based on the requirements of a 1-year mission, are presented.

A64-17598
INVESTIGATION OF AN OBSERVER'S ERROR IN ESTIMATING BY EYE FRACTIONS OF A SCALE GRADUATION.
I. D. Fainerman.
(Izmeritel'naia Tekhnika, Oct. 1963, p. 21-23.)
Measurement Techniques, Mar. 1964, p. 832-834. 5 refs. Translation.
[For abstract see Accession no. A64-13081 06-14]

A64-17621
USE OF VISUAL PERFORMANCE DATA IN VISIBILITY PREDICTION.
John H. Taylor (California, University, Scripps Institution of Oceanography, Visibility Laboratory, San Diego, Calif.).
Applied Optics, vol. 3, May 1964, p. 562-569.

Examination of certain visual performance data and the techniques used in applying these data to visibility-prediction problems. An example of visual performance data applied to a problem in meteorology is included.

A64-17622
OCULAR BEHAVIOR IN VISUAL SEARCH.
Carroll T. White (U.S. Navy, Electronics Laboratory, San Diego, Calif.).
Applied Optics, vol. 3, May 1964, p. 569, 570.

Brief discussion of the characteristics of the eyes' activity in various visual search situations, and the relevance of these to the general problem of visibility. In particular, the nature of the eyes' fixations and their spatial distribution over the field being scanned are considered. It is concluded that the physical characteristics of the field of search can influence the observer's pattern of search.

A64-17625
OBJECT CLASSIFICATION.
James L. Harris (California, University, Scripps Institution of Oceanography, Visibility Laboratory, San Diego, Calif.).
Applied Optics, vol. 3, May 1964, p. 587-591.

Description of techniques by which the infinite number of possible object patterns can be reduced to a practical number commensurate with the overall precision requirements of a visibility calculation. It is noted that the classification operation in itself makes visibility calculations become cumulative in the sense that some new object, when classified, may have a set of classification numbers for which many calculations have been made previously. It is also indicated that the ability to specify a complex object pattern by a set of numbers is a first important step toward the complete solution of visibility problems by means of high-speed digital computers.

A64-17626
VISUAL SEARCH.
Jacqueline I. Gordon (California, University, Scripps Institution of Oceanography, Visibility Laboratory, San Diego, Calif.).
Applied Optics, vol. 3, May 1964, p. 591-596.

Description of the manner in which visual search calculations are performed, with particular attention to the visual detection lobe and sample visual search calculation. It is shown that all visual search calculations begin with the combination of object, background, atmospheric, and visual properties to determine the detectability of the object for all object positions and viewing geometries which are defined by the search task. The visual detection lobe is a convenient means for displaying the results of these multiple inputs. By constructing visual detection lobes for a large number of fixational possibilities, various search strategies can be assumed and the cumulative detection probability calculated for each point in time throughout the period during which the search is conducted.

A64-17959
SPACE MEDICINE EXPERIENCE IN MANNED SPACE FLIGHT AND APPLICATIONS TO APOLLO.
Charles A. Berry (NASA, Manned Spacecraft Center, Houston, Tex.).
American Astronautical Society, Annual Meeting, 10th, New York, N.Y., May 4-7, 1964, Preprint 64-12. 14 p.

Review of the space medicine experience in manned spaceflight extending to 34 hours, noting new exposures posed by the Apollo missions. First, the medical portion of the selection, training, and maintenance programs is discussed, together with waste disposal and nutrition techniques and in-flight monitoring of various physiological parameters. Various problems associated with the Apollo program and potential missions of 14 days duration are then considered, such as the presence of a multiple crew, medical supplies, and personal hygiene. It is noted that the main differences in the Apollo mission involve extended time periods in the spaceflight environment and the increased number in the crew. The one other new venture is the lunar surface activity devoid of any spacecraft protection. It is concluded that in spite of these activities, man will show himself capable of accepting the stresses involved and performing at a high level of proficiency.

A64-17999
INTEGRATION OF ENERGY AT THRESHOLD WITH GRADUAL RISE-FALL TONE PIPS.
Peter J. Dallos and Wayne O. Olsen (Northwestern University, Auditory Research Laboratory, Evanston, Ill.).
Acoustical Society of America, Journal, vol. 36, Apr. 1964, p. 743-751. 10 refs.
National Institutes of Health, Public Health Service Grants No. B-1310; No. 5T1 NB-5329-03.

Investigation of short-tone thresholds, using an array of ten stimuli so chosen as to provide a wide range of parameter variations It is shown that the average data can be well approximated by a function $(I - I_0)T = k$, where I is the stimulus intensity at threshold, I_0 and k are constants, and T is the equivalent stimulus duration. This equivalent duration is derived for gradually rising and falling tone pips, and is shown to be computable as $T = 2r/3 + P$, where r is the rise-fall time, and P is the peak time. The above model is shown to predict individual thresholds with considerably greater accuracy than other alternative descriptions. The theoretical implications of the model are the existence of a definite lower limit of stimulus intensity (I_0), below which the stimulus power does not contribute toward threshold recognition, and to the constancy of the effective utilizable energy at threshold (k). It is found that k does not vary by more than 0.5 db from stimulus to stimulus.

A64-18000
EFFECT OF MONAURAL FATIGUE UPON PITCH MATCHING AND DISCRIMINATION.
D. N. Elliott, J. Sheposh, and L. Frazier (Wayne State University, Dept. of Psychology, Auditory Research Laboratory, Detroit, Mich.).
Acoustical Society of America, Journal, vol. 36, Apr. 1964, p. 752-756.
National Institutes of Health Grant No. NB-02803-03.

Application of binaural pitch-matching data at several frequencies to the determination of the effect of moderate poststimulatory fatigue upon the ear's tuning. The effect of the fatigue upon pitch discrimination is also measured. Upward shifts in pitch are observed at pure-tone fatiguing stimuli (TTS) of 20 db at both 2800 and 5600 cps. However, only the results obtained at frequencies below 4000 cps definitely support the upward shift in pitch reported by Davis and by Ruedi; the statistical evidence that such a shift - or the reverse shift reported by Ruedi - occurs at frequencies above 4000 cps must be considered unreliable because of the inconsistency of binaural pitch-matches at such frequencies.

A64-18001
STIMULUS-ORIENTED APPROACH TO DETECTION.
Lloyd A. Jeffress (Texas, University, Defense Research Laboratory and Dept. of Psychology, Austin, Tex.).
Acoustical Society of America, Journal, vol. 36, Apr. 1964, p. 766-774. 24 refs.
Contract No. NObsr-72627.

Discussion of the problem of detecting a tonal signal in a background of Gaussian noise through an examination of the statistics of the stimulus. In this approach, a Fourier-series band-limited noise is postulated. To make the statistics more manageable, an ideal rectangular filter and a sinusoidal signal centered in the filter band

are assumed. The filter bandwidth is narrow relative to the central frequency. Following the filter is an envelope "detector" (in the sense of radio engineering), with a time constant appropriate to the filter bandwidth. This, in turn, is followed by some kind of criterion device, the "threshold" of classical psychophysics. Distribution curves for amplitude (envelope), drawn for noise and for noise plus signal provide the basis for determining the proportion of area (probabilities) lying above various criterion levels. Probability pairs for these levels furnish the coordinates of points generating receiver-operating characteristic (ROC) curves which, because of the skewness of the distributions, show a slight curvature when plotted on normal-normal paper. This curvature, concave downwards, is shown to provide a better fit to detection data from rating-scale experiments than do the straight lines obtained from normal curves. The concept of effective bandwidth is introduced, and provides a single parameter for use in fitting detection data.

LC ENTRIES

A64-80194
EVIDENCE FOR A PHYSIOLOGICAL EXPLANATION OF THE WATERFALL PHENOMENON AND FIGURAL AFTER-EFFECTS.
H. B. Barlow and R. M. Hill (Calif. U., School of Optometry, Berkeley).
Nature, vol. 200, Dec. 28, 1963, p. 1345–1397. 6 refs.

The electrical activity of single directionally-selective units of the rabbit's retina was recorded during visual stimulation by irregular patterns moving in the preferred direction. When the pattern was stationary, the unit showed an irregular maintained discharge. Motion in the preferred direction at an angular velocity of 15°/sec produced an immediate increase in impulse frequency to about 60/sec, followed by a decline to about 25/sec during the first 15–20 sec of stimulation. Cessation of motion after 57 sec resulted in an abrupt decrease below the maintained level preceding the stimulus, with recovery to the initial level occurring in the next 30 sec. Motion in the opposite direction had no effect on impulse frequency. It is suggested that the visual aftereffects of motion stimulation may result from the reduction of maintained discharge following stimulation in units sensitive to motion in one direction, while the maintained discharge of units sensitive to another direction of motion remains at the normal level.

A64-80195
CENTRAL AND PERIPHERAL FACTORS IN THE PRODUCTION OF CIRCULATORY CHANGES IN HYPERTHERMIA [ZENTRALE UND PERIPHERE FAKTOREN BEI DER AUSLOSUNG VON KREISLAUFVERANDERUNGEN IN HYPERTHERMIE].
K. Arnold, D. Grusnick, and F. Ulmer (William G. Kerckhoff-Inst., Bad Nauheim, Germany).
Pflügers Archiv für die gesamte Physiologie, vol. 278, 1964, p. 487–499. 19 refs. In German.

Changes in circulatory and respiratory parameters were measured in anesthetized dogs subjected to heating of the head or whole body to a temperature of 42° C. Whole-body hyperthermia produced by external heating and blood warming resulted in a marked decrease in peripheral vascular resistance, and in significant increases in cardiac index and heart frequency. Respiratory frequency increased sharply above 40° C. Warming of the head alone produced small decreases in peripheral vascular resistance and in the cardiac index. Heart frequency was unchanged, and tachypnea occurred at 41.5° C. Heart stroke volume and arterial blood pressure decreased only slightly in both groups. It is concluded that the circulatory changes associated with hyperthermia originate chiefly in the body periphery rather than in the brain.

A64-80196
TETRAETHYLLEAD INTOXICATION.
Lester W. Sanders (Cincinnati U., Coll. of Med., Cincinnati, Ohio).
Archives of Environmental Health, vol. 8, Feb. 1964, p. 270–277.

The signs and symptoms of tetraethyllead intoxication are not specific or definitive enough to allow for a reasonably certain diagnosis without a sound history of adequate exposure or valid evidence of the absorption of dangerous quantities of this compound of lead. The results of determinations of the concentration of lead in the urine (and in the blood) are never available immediately, and frequently are available only in a matter of days. Therefore, a thorough knowledge of the possibilities of exposure is of the utmost importance in establishing a diagnosis. Areas of distribution of the compound and circumstances that may lead to the absorption of sufficient quantities to produce illness are presented and discussed. A description of tetraethyllead poisoning is given, as well as the symptoms, signs, and factors that lead to its diagnosis.

A64-80197
BURIAL IN SPACE.
T. Charles Helvey (Inter-Am. Inst. for Space Sci. Educ., Tampa, Fla.)
Discovery, vol. 25, Feb. 1964, p. 16–17.

A discussion is presented on the occurrence of death during spaceflight and the possible psychological effects on the crew members. The ritual of burial would be of great importance, and the aspects concerning disposal of the body are discussed. It is proposed that the bodies be put in individual pressurized coffins. The coffin would then be ejected from the spacecraft and propelled into the sun. This technique could also serve for the disposal of other waste materials. Other disposal methods are briefly mentioned. A design for an inflatable coffin is given, and a drawing of it is shown.

A64-80198
ESCAPE FROM THE AIR AND FROM THE SEA.
Eloise Engle.
New York, John Day Co., 256 p. 51 refs.

A history of the development of escape systems for air, sea, and space voyagers is presented. Parachutes and parachuting, ejection seats, rocket-powered seats, and escape capsules are included. Background research and testing of these systems, including the role of the many men engaged in these activities are given. A bibliography and combined subject and author index are also included. Although the book is written in a popular vein, it contains valuable historical data not collected anywhere else.

A64-80199
FOOD FOR SPACE FEEDING.
Food Engineering, vol. 36, Feb. 1964, p. 62–64.

A number of problems related to space flight feeding are briefly surveyed, including packaging, dispensing, and preparation of food. Menus for space feeding have been worked out by Libby, McNeill, and Libby in connection with the experiments simulating orbital space flight conducted by General Electric. Freeze-dried foods were preferred to the squeeze bottle-type foods. Experiences with high-altitude feeding tests have established some likes and dislikes that may influence space menus. Speculations about extended space flights envision use of dehydrates plus recycling of water, and complete closed bioecological regenerating systems.

A64-80200
URINARY ADRENALINE AND NORADRENALINE RESPONSE TO SIMULATED WEIGHTLESS STATE.
McC. Goodall, Michael McCally, and Duane E. Graveline (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio; and Tenn. U., Knoxville).
American Journal of Physiology, vol. 206, Feb. 1964, p. 431–436. 45 refs.
Contract No. AF 33(657)-10627.

Sixteen normal subjects were placed in a simulated weightless state, i.e., water immersion. After 6 hours of immersion, urine samples were collected and bio-assayed for adrenaline and noradrenaline. The excretion of adrenaline was moderately increased ($P < 0.15 > 0.10$), possibly related to the anxiety associated with the immersion. The excretion of noradrenaline was significantly ($P < 0.01$) reduced during immersion. Six subjects were also studied during passive vertical tilt following the immersion. The increase in pulse rate and decrease in pulse pressure were significantly greater than those observed during a control tilt. The results of these experiments indicate that the decrease in orthostatic tolerance following a simulated weightless state is probably related to a decrease in sympathetic nerve activity, which in turn is reflected by a decline in the urinary output of the sympathetic neurohormone noradrenaline.

A64-80201
MONITORING READILY DETECTED AUDITORY SIGNALS AND DETECTION OF OBSCURE VISUAL SIGNALS.
John R. Binford (Louisville U., Louisville, Ky.) and Michel Loeb (Army Med. Res. Lab., Fort Knox, Ky.)
Perceptual and Motor Skills, vol. 17, Dec. 1963, p. 735–746. 21 refs.

Twenty-four subjects were required to detect infrequently and randomly occurring visual and auditory signals under six different schedules. Auditory signals were relatively easy to detect; visual signals were relatively difficult to detect. Missed detections of visual signals increased with time on task for each condition. Latency of response to visual signals increased progressively for all conditions except the one with no auditory signals (control condition). Latency was least for this control condition but decreased monotonically with the number of auditory signals in other conditions. Visual missed responses were intermediate in frequency for the control conditions and apparently decreased monotonically as a function of the ratio of auditory to visual signals in the other conditions. Latency was higher for conditions with more visual signals, but no such simple relationship is apparent for missed detections.

A64-80202
HANDEDNESS AND DIFFERENTIAL PERCEPTION OF VERBAL STIMULI IN LEFT AND RIGHT VISUAL FIELDS.
H. Goodglass and M. Barton (Veterans Admin. Hosp., Boston, Mass.)
Perceptual and Motor Skills, vol. 17, Dec. 1963, p. 851–854. 14 refs.

This study investigated the role of cerebral dominance in the consistent finding of lower tachistoscopic thresholds in the right than in the left field for alphabetic stimuli. Eight left- and twelve right-handed subjects were presented with 3-letter words, printed vertically, through a monocular tachistoscope, displaced to left or right by 2°6′. Significantly lower thresholds in the right field were found for both groups and for both eyes. The finding does not support the hypothesis that visual stimuli arriving in the major cerebral hemisphere are more readily perceived as language.

A64-80203
MAINTENANCE OF VIGILANCE IN AN AUDITORY MONITORING TASK.
J. S. Kidd and Angelo Micocci (Ohio State U., Columbus).
Journal of Applied Psychology, vol. 48, Feb. 1964, p. 13–15.
Contract No. AF 33(616)-6166.

Four levels of critical signal frequency and three levels of task complexity were compared for their effect on vigilance in an auditory monitoring task. Proportionate omission errors increased as the frequency of signals decreased, as expected. However, complexity (defined as the number of categories of critical signals) had an unexpected effect in that relatively poor performance occurred with increased complexity. The results were interpreted as suggesting caution in the use of artificial signals as a means to overcome loss of vigilance in monitoring tasks.

A64-80204
SHORT EXPOSURE INHALATION TOXICITY OF PENTABORANE IN ANIMALS.
Francis W. Weir, Van M. Seabaugh, Millard M. Mershon, David G. Burke, and Maurice H. Weeks (U.S. Army Chem. Res. and Develop. Labs. Toxicol. Div., Edgewood Arsenal, Md.)
Toxicology and Applied Pharmacology, vol. 6, Jan. 1964, p. 121–131.
12 refs.
Research supported by Aeron. Systems Div., Wright-Patterson AFB, Ohio.

Studies are reported on the responses of rodents and dogs to pentaborane vapor from single and multiple short inhalation exposures and from cutaneous exposures. The concentrations causing death in 50% of rats and mice for single 5-, 30-, and 60-minute exposure periods were: for rats, 66.6, 31.2, 15.2, and 10.4 ppm, respectively; for mice, 40.5, 18.6, 10.6, and 7.8 ppm, respectively. Single exposures of dogs for 5-, 15-, and 60-minute periods to 26, 12, and 3 ppm, respectively, produces borderline signs of toxicity. Daily repeated exposures at approximately these levels caused convulsions, apprehensiveness, scleral injection, and miosis after the second exposure. Single exposures at 9.3, 5.0, and 1.4 ppm for 5-, 15-, and 60-minute periods produced no detectable effects with the techniques employed. However, repeated daily exposure for 5 days to these levels caused irritability, mitosis, and increased response time in a conditioned avoidance reponse test. An accumulation of toxic effects from inhalation of 2.5 ppm of pentaborane vapor was seen in dogs exposed by inhalation after rest intervals of up to 96 hours. Two daily exposures caused severe signs of toxicity; increasing the exposure interval from 24 to 96 hours delayed the onset of signs. Dogs exposed cutaneously for single 2-, 4-, and 6-hour periods to 580, 550, and 710 ppm of B_5H_9, respectively, showed minimal or no signs of toxicity.

A64-80205
ADAPTATIONS AT BIRTH. SOME ANALOGIES TO SPACE TRAVEL.
Mary Ellen Avery (Johns Hopkins Hosp., Baltimore, Md.)
Journal of the American Medical Women's Association, vol. 19, Feb. 1964, p. 121–124; discussion by Hubertus Strughold, p. 124–126.

Relationships among problems at birth and those existing in space exploration are discussed. Studies of the effects of increased g on the cardiorespiratory system, weightlessness, oxygen toxicity, sensory deprivation, and techniques of monitoring vital signs are included. It is suggested that space researchers can learn much from the fetus and that obstetric and pediatric investigators can benefit greatly from space research. In the discussion, H. Strughold, Chief Scientist, U.S. Air Force Aerospace Medicine Division, Brooks Air Force Base, Texas, agrees with the author that there are some analogies between life in the uterine capsule and in the space capsule. He emphasizes that studies in space medicine or "bioastronautics" have a tremendous impact upon medicine in general with regard to theoretical concepts, research methods, and instrumentation. In addition he discusses the day–night cycle, weightlessness, and instrumentation as they relate to the fetus and medicine in general.

A64-80206
EFFECT OF HYPOXIA ON SIMULTANEOUS VISUAL CONTRAST.
William Z. Bridges and Hansjoerg Kolder (Emory U., Dept. of Physiol., Atlanta, Ga.)
Investigative Ophthalmology, vol. 3, Feb. 1964, p. 119–124. 23 refs.
Natl. Council to Combat Blindness, Inc., N.Y.C. supported research.

The effect of hypoxia on simultaneous visual contrast was studied in seven test subjects. The contrast sensitivity was quantitated in luminance units and recorded every 10 seconds. Hypoxia was induced by having the subject breathe 10% oxygen and 90% nitrogen for 15 minutes. The contrast sensitivity began to decrease shortly after transition to 10% oxygen and continued to decrease throughout the hypoxia period. Furthermore, the contrast sensitivity decreased markedly during the posthypoxia period and failed to return to the prehypoxia level within 10 minutes. It is concluded that inhibitory processes responsible for visual contrast phenomena are sensitive to hypoxia and are especially affected during the posthypoxia period. The effect persists much longer than the reduction of the oxygen partial pressure in the blood.

A64-80207
CHANGES IN ARTERIAL PRESSURE DURING PHYSICAL EXERCISE.
E. H. Rubinstein, M. B. Brasiavsky, and F. E. von der Walde (Buenos Aires U., Inst. de Investigaciones Médicas, Calle Viamonte, Buenos Aires, Arg.)
Acta Physiologica Latino Americana, vol. 13, 1963, p. 130–137. 15 refs.

The blood pressure and heart rate responses to treadmill exercise were studied in a group of trained young males. The changes could be separated into initial, steady, and recovery phases. The results at different exercise levels are discussed. Hemodynamic and nervous mechanisms explaining the response patterns for each phase are suggested.

A64-80208
ALGAE AS FOOD FOR SPACE TRAVEL: A REVIEW.
Richard P. Casey and Joseph A. Lubitz (Gen. Dyn./Elec. Boat, Res. and Develop. Dept., Groton, Conn.)
Food Technology, vol. 17, Nov. 1963, p. 48–56. 69 refs.
Contract No. NASW-95.

The feasibility of using algae either as a food or as a food supplement during space travel is reviewed. Included are the following: historical background, space logistics, nutritional value of algae, experiments with animals, algal toxicity, psychological aspects, and foods other than algae for the astronaut.

A64-80209
COMPUTER SIMULATION OF THE HYDRODYNAMICS OF THE CARDIOVASCULAR SYSTEM.
John Mc Leod
(International Conference on Medical Electronics, 5th, Liege, Belgium, Jul. 22–26, 1963.) Simulation, vol. 2, Mar. 1964, p. 33–37.

A technique permitting analysis and synthesis of complex physical and physiological systems, not amenable to the usual mathematical approaches, is presented. It is based on an electrical analogy which can be found for most types of both systems. The method is illustrated by showing how it can be applied to certain aspects (strength and rate of ventricle contraction, characteristics of heart valves, elasticity and resistance to blood flow of blood vessels and capillary beds, blood volume and distribution) of the cardiovascular system. Some details of the analog computer mechanization of the simulation are described. Models involving the interaction of the respiratory and circulatory systems have been constructed by the author and models for the study of the regulatory mechanism of the body are well within the capability of the method shown.

A64-80210
BIBLIOGRAPHY ON COMPUTERS IN THE LIFE SCIENCES.
Simulation, vol. 2, Mar. 1964, p. 38–41.

This is a bibliography including articles, monographs, and books on the use of computers in investigations of various aspects of the life sciences. The period covered begins with the year 1952 and concludes with 1963. The entries, without abstracts, are arranged alphabetically by author.

A64-80211
PERSONALITY AND GROUP DECISIONS INVOLVING RISK.
Y. Rim (Technion–Israel Inst. of Technol., Haifa, Israel).
Psychological Record, vol. 14, Jan. 1964, p. 37–45. 6 refs.

The recent finding that group decisions are more risky than individual decisions was confirmed. Risk-taking behavior, both individually and as group behavior, was significantly related to scores on the neuroticism and extroversion scales (Eysenck's Short Questionnaire for the Measurement of Two Dimensions of Personality). High scorers on the latter dimension were more ready to select risks in the initial scores than the other subjects. Shifts in the risk-taking direction are a function of a group process, whereby the high scorers on neuroticism do not shift, the average scorers shift most, and the low scorers are intermediate. Extroversion scores exhibited the same relation to risk-taking behavior; high and low scorers shifted little or not at all, and the average scorers shifted most. Subjects scoring high on neuroticism were the least influential; subjects scoring average on neuroticism were the most influenced. Personality traits may be useful in predicting individual risk-taking behavior as well as the interaction of group processes with the risk-taking behavior of group members.

A64-80212
ADAPTIVE ASPECTS OF ACTIVITY RHYTHMS IN BATS.
George DeCoursey and Patricia J. DeCoursey (Zoophysiological Inst., Tübingen U., Tübingen, W. Germany).
Biological Bulletin, vol. 126, Feb. 1964, p. 14–27. 28 refs.
NIH Public Health Fellowship No. BF–11, 999.

Bats living under laboratory or field conditions manifested precise nocturnal activity rhythms. Light-sampling at the light-to-dark transition was apparently the chief means of synchronizing an endogenous, non-24-hour activity rhythm to the daily light cycle.

A64-80213
SPACE MEDICINE IN THE MANNED SPACE FLIGHT PROGRAM.
George M. Knauf (NASA, Office of Manned Space Flight, Wash., D.C.) (World Medical Assembly, 17th, New York, N.Y., Oct. 14, 1963.) Military Medicine, vol. 129, Mar. 1964, p. 199–204.

Activities of the Directorate of Space Medicine in the Office of Manned Space Flight are discussed. Its comprehensive program has two broad objectives: (1) developing, testing, and evaluating biomedical components and systems needed to insure a safe and effective manned space flight; and (2) providing operational medical support for manned space-flight missions. Responsibilities for the first objective are for the most part assigned to the Crew Systems Division at the Manned Spacecraft Center in Houston, Texas. They include developing systems for the control of spacecraft environment, providing personal equipment (e.g., pressure suits and survival gear) for crew members, evolving means to protect astronauts from radiation hazards, determining requirements for life support in all phases of the space mission, and providing physiological instrumentation and medical analysis of crew performance. The second objective is the mission of the Medical Operations group at the Manned Spacecraft Center. This group engages in a medical program, which plays an important part in the execution of each manned space-flight mission. Prescribing medical qualifications of astronaut applicants, giving medical examinations to those applicants selected to be astronauts, and providing the required medical training and comprehensive medical program to insure the continuing physical fitness of the astronaut-candidates to engage in scheduled flights are among the duties of the group. When an astronaut-candidate has been selected to participate in a specific mission, medical flight preparations begin in earnest and activity does not cease until any physiological effect from exposure to the space environment has been determined.

A64-80214
VISUAL PERCEPTION OF MOVEMENT.
T. C. D. Whiteside (R.A.F. Inst. of Aviation Med., Farnborough, Eng.)
Annals of the Royal College of Surgeons of England, vol. 33, Nov. 1963, p. 267–281. 23 refs.

Visual perception of motion is considered in terms of movement in the visual field; and movement of the visual field. The former encompasses a discussion of the Phi movement, saccadic movement of the eyes; light threshold during the saccade; retinal inhibition; threshold for visual perception of movement with respect to horizontal or vertical axis and background texture; learning and inferred movement. Movement of the visual field is associated closely with the interplay between the extraocular muscles and neural transmission of information. Oculogyral, oculogravic, and autokinetic illusions are considered separately because of their special interest to aviation medicine. Serious practical considerations of these illusions arise in connection with collision hazards in the air or at attempted rendezvous of spacecraft.

A64-80215
A PRELIMINARY REPORT OF KAYAK-ANGST AMONG THE ESKIMO OF WEST GREENLAND: A STUDY IN SENSORY DEPRIVATION.
Zachary Gussow (La. State U., School of Med., Dept. of Psychiat. and Neurology, New Orleans).
(Am. Anthropological Assoc., Annual Meeting, Nov. 1961.) International Journal of Social Psychiatry, vol. 9, Winter 1963, p. 18–26. 22 refs.

Sensory deprivation experiences and isolation phenomena are a culturally typical, integral part of the life of the adult male Eskimo of West Greenland. Severe sensory deprivation reactions expressed in kayak phobia are documented in an analysis of 13 out of 60 medically examined cases of kayak-angst. Specifically, in the absence of external reference points, the hunter immobile in the kayak develops a lowering of the level of consciousness. The psycho-physiological disequilibrium that follows, although not unique to the Eskimo, is outstanding in its severity, particularly, in view of their familiarity with the experience and repeated exposure to it. The only alternative to the unremitting anxiety and other symptoms is drowning or giving up hunting. Certain cultural factors are viewed as exacerbating the condition.

A64-80216
TREATMENT OF SEVERE DECOMPRESSION SICKNESS IN AVIATORS.
P. Cannon and T. R. Gould (Roy. Naval Air Med. School, Hillhead, Hants, England).
British Medical Journal, vol. 1, Feb. 1, 1964, p. 278–282. 30 refs.

Four cases of postdecompression collapse syndrome are described in aviators who were exposed to a simulated altitude of 37,000 ft in a decompression chamber. The factors which predispose to the development of this condition are discussed. In all four cases compression to pressures greater than atmospheric produced immediate relief, and theories of the etiology of postdecompression collapse are discussed in relation to this effect. The success of compression in these four cases and in two cases treated elsewhere suggests that this form of treatment should be generally adopted for these cases, and a scheme of treatment is outlined.

A64-80217
THE RESPONSE OF THE OTOLITH ORGANS TO TILT.
Morgan E. Wing (USAF School of Aerospace Med., E. N. T. Dept., Vestibular Lab., Brooks AFB, Tex.)
Acta Oto-Laryngologica, vol. 56, Aug. 1963, p. 537–545. 10 refs.

Action potentials and their changes in response to tilt were recorded from 60 units in the vestibular ganglion, presumably supplying the otolith organs of 10 cats. The action potentials in all units were infrequent and irregular after position was maintained for some time. The majority of the units showed no response to any change in position. In most cases, of those which exhibited a response, the responses were delayed an average of 40 seconds. The evidence presented supports the view that the utricle and saccule may be vestigial organs, or at least do not function meaningfully in the orientation of the cat with respect to the gravitational field.

A64-80218
THE NATURE OF THE NERVE CELL CHANGES IN THE HIPPOCAMPUS FOLLOWING ANOXIA.
B. G. B. Lucas and Dorothy H. Strangeways (U. Coll. Hosp. Med. School, Surgical Unit, London, Eng.; and Queen's U., Physiol. Dept., Belfast, N. Ireland).
Journal of Pathology and Bacteriology, vol. 86, Oct. 1963, p. 283–291. 7 refs.

After exposure to anoxia induced in various ways, a proportion of guinea pigs shows cellular changes in the hippocampus that alter with time. The maximum histological damage is seen about the fourth day, after which some nerve cells disappear and are replaced by glial tissue, while others gradually resume a more normal appearance. Comparison of these alterations with descriptions of the well-known classical changes shows that most of the latter are not separate entities, but different stages of one continuing change. Chronic cell change is seen during the early days and can be anoxic; if so, it may proceed to the ischemic change, which may lead to the homogenizing change. It seems that if only the cytoplasm is acidophilic (the ischemic change) it is possible for the cell to recover, but if the nucleus also is acidophilic (the homogenizing change) destruction is likely. Finally, there is cell loss and gliosis.

A64-80219
EXPERIMENTAL CEREBRAL ANOXIA.
B. G. B. Lucas and Dorothy H. Strangeways (U. Coll. Hosp. Med. School, Surgical Unit, London, Eng.; and Queen's U., Physiol. Dept., Belfast, N. Ireland).
Journal of Pathology and Bacteriology, vol. 86, Oct. 1963, p. 273–281. 5 refs.

Guinea pigs were subjected to various types of anoxia, namely by exposure to nitrogen, nitrous oxide, thiopentone, cyanide, and cerebral ischemia, in an attempt to produce brain cell damage. The latter could be produced only if the results were near lethal. Milder, repeated doses, particularly if spread over long periods, did not produce any significant alterations. The damage, which was the same irrespective of the agent, although it did vary in degree, was characterized by cell degeneration, which showed itself as a loss of Nissl granules, acidophilia and, later, complete nerve cell loss and replacement by glial tissue. In the earlier cell degenerative stage, spaces were seen around the nerve cells; these were not present in brains from animals killed a longer time after insult. The hippocampus appeared to be the most sensitive part of the brain, followed by the thalamus, cerebellum, and cerebral cortex. A general impression was obtained that alterations in nerve cell structure found during the first week were not necessarily incompatible with the recovery of the cell.

A64-80220
SOME MEASURES OF ELECTRODERMAL ACTIVITY AND THEIR RELATIONSHIPS AS AFFECTED BY VARIED TEMPERATURES.
Torkel Scholander (Ky. U., Dept. of Psychiat., Lexington).
Journal of Psychosomatic Research, vol. 7, Oct. 1963, p. 151–158. 21 refs.

Prestimulus skin resistance, electrodermal response amplitude (EDRA), and spontaneous fluctuations of the electrodermal activity were recorded during high, medium, and low room temperatures. A strong electric shock and weak tone randomly mixed were used as the two stimuli. Intraindividual comparisons yielded significant differences among the three experimental conditions. Prestimulus skin resistance and the EDRA's were mostly higher, whereas spontaneous fluctuations were fewer during cold than during warm temperature. EDRA's were significantly higher to the shock stimulus

than to the tone stimulus during cold and medium temperature but not during warm temperature. During extremely low skin resistance the relationship between the responses evoked by the two stimuli was often reversed. The correlations between the measures varied extensively from one session to another, with the exception of the correlation between the basal skin resistance and the EDRA's during shock. Correlation from the tone data showed a clear-cut decrease from warm to cold temperature. A graphical illustration of all the EDRA's and numbers of spontaneous fluctuations during successive groups of prestimulus skin resistances indicates that the relationships between the measures may be affected by the strength of the stimulus, the range of the prestimulus values, and, possibly, the general level of activation.

A64-80221
OXYGEN CONSUMPTION UNDER NORMAL AND UNDER INCREASED ATMOSPHERIC PRESSURE [HET GEBRUIK VAN ZUURSTOF BIJ NORMALE EN BIJ VERHOOGDE ATMOSFERISCHE DRUK].
N. G. Meijne and I. Boerema (Chirurgische Universiteitskliniek, Wilhelmina-Gasthuis, Amsterdam, Neth.)
Nederlands Tijdschrift voor Geneeskunde, vol. 107, Aug. 17, 1963, p. 1473–1479. 38 refs. In Dutch, English summary.

Prolonged inhalation of oxygen in concentrations of more than 60% at normal atmospheric pressure results in pulmonary changes within 3 to 7 days. Pure-oxygen breathing at higher atmospheric pressures causes neurological changes that eventually culminate in convulsions. The period during which oxygen is tolerated varies considerably. Usually, it is approximately 2 hours at 3 atmospheres, although there are occasionally earlier symptoms of oxygen intoxication. A lowered CO_2 tension in the blood exerts a protective effect. The cause of oxygen intoxication is not known; however, it may be associated with the inhibition of several enzymes sensitive to oxygen.

A64-80222
THE ASSESSMENT OF MAXIMAL OXYGEN INTAKE.
Jerry L. Newton (Ind. U., Dept. of Anat. and Physiol., Bloomington).
Journal of Sports Medicine and Physical Fitness, vol. 3, Jun.–Sep. 1963, p. 164–169. 13 refs.
Contract No. FA-2049

The following methods of measuring maximum oxygen intake were assessed to determine which one is best adaptable to men varying widely in age and physical fitness: (1) the Balke test (with modifications), (2) the Cureton "all-out run," (3) a treadmill test with rate and grade adjusted to the capacity of the individual, and (4) the bicycle ergometer test with brake-load adjusted to the capacity of the individual. Methods of carrying out each test are described. Of the four methods employed for assessing physical fitness, either the Balke test or the standard treadmill run gave the highest values for oxygen consumption. Lactic acid concentrations and respiratory quotients were lowest in the Balke test, indicating that less work was done anaerobically than with the other three methods. In addition, the Balke test uses a constant speed and an increasing grade, allowing a light starting load suitable for old and for unfit subjects and gradually working up the maximum work rate with little dependence on anaerobic metabolism and the accumulation of lactic acid.

A64-80223
THE RELATION OF CARDIOVASCULAR DISEASE AND DISORDER TO AIRCRAFT ACCIDENTS.
J. R. Jackson.
Medical Services Journal, Canada, vol. 19, Dec. 1963, p. 869–880. 22 refs.

Aircraft accidents are reviewed for the cases in which illness had either incapacitated or caused the death of the pilot or copilot. The findings in these investigations confirm the position of coronary arteriosclerosis as the leading cause of sudden disability in aircrew. Lesions of the cardiovascular system were implicated in 23 of the 32 cases of known or suspected death or disability. In 21 of these cases the pathological diagnosis was coronary arteriosclerosis or its complications. Acute interstitial myocarditis and "idiopathic" hypertrophy of the heart were the only other cardiac lesions demonstrated at autopsy. In four cases death occurred without any etiologically significant alteration in morphology. Diffuse or focal myocardial inflammation was an additional finding in six of the 46 deaths reviewed. The only other lesions discovered and suspected were epilepsy, renal calculi, perforated gastric ulcer, and respiratory allergy.

A64-80224
A DAY WITH CF-104 PILOTS: A MEDICAL APPROACH TO THE HUMAN ELEMENT IN A MAN-MACHINE-ENVIRONMENT COMPLEX.
L. N. Howlett (RCAF Station, Cold Lake, Alberta, Canada).
Medical Services Journal, Canada, vol. 19, Dec. 1963, p. 918–922.

A flight surgeon's study of the medical management of CF-104 aircraft pilots at the Royal Canadian Air Force Station, Cold Lake, Alberta, is outlined. His approach stresses the in situ evaluation of men, their vehicles, training, and daily activity. The role of the flight surgeon is viewed as not only the traditional one of a doctor but also that of consultant, investigator, teacher, student, and liaison officer. The scope of his activities is described.

A64-80225
A REVIEW OF THE HIGH-ALTITUDE SELECTION TEST, 1961–1962.
T. R. Gould
Journal of the Royal Naval Medical Service, vol. 49, Spring 1963, p. 93–96.

A review of the Royal Naval High-Altitude Selection Test and a discussion of its use in 1961 and 1962 are presented. Bearing in mind the predisposing factors of age and, possibly, overweight, it is still impossible to predict any one subject's susceptibility to decompression sickness. Although the problem still remains, the test does help to eliminate any subject who is likely to suffer from the severer forms of decompression sickness at altitude.

A64-80226
THE ENVIRONMENT OF A SPACE CAPSULE.
Kenneth R. Coburn.
(Joint Symposium by Royal Naval Medical School and Royal Naval Air Medical School on Current Underwater and Aviation Medical Problems, Nov. 28 and 29, 1962.) Journal of the Royal Medical Naval Service, vol. 49, Spring 1963, p. 67–73. 2 refs.

The manned capsule of an orbiting vehicle must provide the occupant with means to sustain life under the hostile environment to which he will be subjected. The stresses that comprise the environment are of five types: (1) high-g loading under launch, reentry, and impact; (2) low atmospheric pressure at high altitude; (3) weightlessness while in orbit; (4) cosmic radiation at apogee; and (5) high temperatures produced by aerodynamic heating during the reentry phase of flight. Procedures and methods taken to provide adequate protection for astronauts against each of these stresses are described and discussed. Although the present space capsule cannot be described as either luxurious or commodious, it nevertheless is comfortable and life-sustaining for the present periods of use. Planned interplanetary flights of long duration must necessarily look to the possibilities of closed environmental systems using microorganisms and green plants as sources of food and oxygen and systems for carbon dioxide removal and waste disposal.

A64-80227
MEDICAL PROBLEMS CONCERNING SPACE FLIGHT. IX. THE TRAINING AND THE SELECTION OF THE ASTRONAUT [MEDISCHE YRAAGSTUKKEN IN VERBAND MET DE RUIMTEVAART. IX. DE OPLEIDING EN DE SELECTIE VAN DE RUIMTEVAARDER].
J. Jongbloed.
Nederlands Tijdschrift voor Geneeskunde, vol. 107, Jul. 13, 1963, p. 1278–1280. In Dutch.

The selection and training of astronauts evolved by the Russians and Americans are reviewed with respect to the basic requirements, general academic instruction, space flight physiology, exposure to simulated space stresses including isolation, and training in space-flight maneuvers. Special preparations taken before orbiting the astronaut are described. Monitoring of the vital physiological parameters of the astronaut from earth is underlined. With the advent of longer space flights the age of future astronauts will become of great importance, possibly introducing the field of "astrogerontology." Adaptation to long-term weightlessness and disturbed diurnal periodicity may result in new problems upon the return to earth's gravity. Special arrangements may be needed for modification of the sleep–wakefulness cycle under space-flight conditions because of the lesser fatigue and need for sleep. Certain other work–rest cycles are suggested as more feasible in space flight.

A64-80228
ELECTROCARDIOGRAPHIC CHANGES DURING WORK AND PROLONGED EFFORT.
Fernand R. Plas.
Journal of Sports Medicine and Physical Fitness, vol. 3, Jun.–Sep. 1963, p. 131–135; discussion by Joseph B. Wolffe (Valley Forge Medical Center and Heart Hospital, Norristown, Pa.), p. 135–136.

Changes in the electrocardiogram: (1) during static effort, (2) during dynamic effort, and (3) during and after prolonged effort are described. The changes range in duration from a few seconds following static effort to several weeks after prolonged strenuous effort such as the Tour de France or 6-day cycling. The static effort pattern can be attributed to a more ventral position of the heart while the chest is in a state of inspiration. This can be demonstrated by the Flack test. The present concept of cardiology would attribute the long-lasting changes of 6-day cycling to ischemic heart disease. The author, however, does not agree with this point of view since none of the cyclists examined complained of precordial pain or any other discomfort.

Instead, he attributes the changes to dysmetabolism, possibly enzymatic in nature. In the discussion, Dr. Joseph B. Wolffe calls this work an excellent, timely, and valuable study because it emphasizes that so-called abnormal electrocardiographic findings are not pathognomonic of heart disease in the absence of a pertinent history or clinical findings.

A64-80229
REACTION TIME UNDER THREE VIEWING CONDITIONS: BINOCULAR, DOMINANT EYE, AND NONDOMINANT EYE.
Patricia Kelsey Minucci and Mary M. Connors (U.S. Naval Med. Res. Lab., Groton, Conn.)
Journal of Experimental Psychology, vol. 67, Mar. 1964, p. 268–275. 23 refs.

Reaction times for 10 observers were measured at 4 photopic intensity levels: 7.13, 8.06, 9.10, and 10.18 log $\mu\mu$L, under binocular, dominant-eye, and nondominant-eye viewing conditions. Reaction time was found to be a negatively accelerated, decreasing function of increased light intensity. There was a constant relationship between the binocular reaction time and the average monocular reaction time for each observer. Equivalent brightnesses under each viewing condition were calculated on the basis of speed of reaction. The resulting curves suggest that binocular reaction times are faster than would be expected from the data of the dominant and the nondominant eye, even assuming complete summation.

A64-80230
ATMOSPHERIC MONITORING OF TOXIC LEVELS OF MISSILE PROPELLANTS.
John T. Nakamura (Rocket Res. Lab., Edwards, Calif.) and Kenneth E. Ball (Mine Safety Appliances Co., Pittsburgh, Pa.)
American Industrial Hygiene Association Journal, vol. 25, Jan.–Feb. 1964, p. 77–80.

The Chemical and Materials Section of the Rocket Research Laboratories, Edwards Air Force Base, is responsible for hazard appraisal of various storable liquid propellants. Evaluating the toxic hazards posed by spills or inadvertent releases has been curtailed by a lack of suitable instrumentation and by the shortcomings of applying laboratory wet chemical techniques to field experiments. Under contract to Edwards Air Force Base, the Mine Safety Appliances Company developed an instrument suitable for continuous monitoring for toxic levels of NO_2, dimethylhydrazine, B_5H_9, N_2H_4, F_2, and ClF_3. Based on spill test data, realistic performance specifications are suggested for any continuous toxic-hazard monitoring equipment for missile facilities.

A64-80231
CURRENT OBJECTIVES IN BIOASTRONAUTICS AND AEROSPACE MEDICINE.
Benjamin A. Strickland, Jr. (Headquarters, Air Force Systems Command, Andrews AFB, Wash., D.C.)
Military Medicine, vol. 129, Jan. 1964, p. 33–37.

Descriptions of early and present participation of the U.S. Air Force in the national space program are presented, following attempts to define bioastronautics. Air Force contributions to the National Aeronautics and Space Administration programs, simulation of space hazards (e.g., rapid accelerations and decelerations, weightlessness, thermal extremes, etc.), and pioneer accomplishments are included. Continuous problems in aerospace medicine include the following: (1) effects of drugs on flying personnel; (2) recycling expired carbon dioxide into oxygen; (3) recycling liquid- and solid-waste products; (4) protection against flash blindness and retinal burns; (5) radiation protection; and (6) protection from toxic materials.

A64-80232
ACID-BASE BALANCE AND BLOOD AND URINE ELECTROLYTES OF MAN DURING ACCLIMATIZATION TO CO_2.
K. E. Schaefer, G. Nichols, Jr., and C. R. Carey (U.S. Naval Submarine Base, Med. Res. Lab., Groton, Conn.)
Journal of Applied Physiology, vol. 19, Jan. 1964, p. 48–58. 39 refs.

Twenty subjects were exposed to 1.5% CO_2 for 42 days with control periods before and after the exposure. A slight uncompensated respiratory acidosis was present during the first 23 days, followed by a compensated respiratory acidosis. Deacclimatization was incomplete, even after 4 weeks of recovery on air. Arterial CO_2 tension increased 5 mm Hg during exposure and remained at this elevated level during the first 9 days of recovery on air. In chronic respiratory acidosis the concentration of chloride in the red cells and in plasma remained practically normal, indicating that the chloride shift does not operate. Cation exchange was observed under these conditions. Sodium increased, and potassium showed an approximately equivalent decrease. Sodium and potassium balance studies indicated that only sodium exhibits a pattern paralleling the two phases of acid-base balance regulation, retention being following by increased excretion. Body weight was maintained throughout the experiment in spite of a 24% to 30% reduction in food intake.

A64-80233
WHIPLASH INJURY: A GREATER LESION COMPLEX.
Harold I. Magoun
Journal of the American Osteopathic Association, vol. 63, Feb. 1964, p. 524–535. 33 refs.

The etiology, mechanism of action, symptoms, pathology, diagnosis, prevention, and treatment of whiplash injuries are presented. Whiplash injuries, so called because of the manner in which the injury is sustained and not from the result produced, involve all of the body, not just the cervical area. A few of them are complicated by fracture or other severe traumatic tissue dissolution, requiring surgical or orthopedic attention. The vast majority of cases respond well to complete structural attention not just to the neck, but to the pelvis, entire spine, and cranium. No neck injury will return to normal if the occiput above and the spine and the sacrum below remain uncorrected. Body metabolism will not resume proper function if the fascia remains restricted and the internal respiration continues to be stagnated.

A64-80234
MECHANISM OF MOTION SICKNESS IN THE CAT.
Brian F. Mc Cabe (Mich. U., Kresge Hearing Res. Inst., Ann Arbor) and Kent Gillingham.
Archives of Otolaryngology, vol. 79, Feb. 1964, p. 182–187. 9 refs.
USAF and Office of USA Surgeon General–supported research.

The otolith apparatus rather than the semicircular canals seems responsible for motion sickness in the cat. Even massive semicircular canal stimulation failed to produce motion sickness, in spite of the additional otolithic stimulus that very high deceleration rates impose. After axial rotation, deceleration rates of up to 6 revolutions/sec^2 failed to produce evidence of functional damage to the ampullar end organ. Its ability to withstand rates of over 2,000 rps^2 indicates this structure is a good deal more rugged than is generally recognized.

A64-80235
CHANGES IN HIGHER NERVOUS ACTIVITY AND IN SOME VEGETATIVE REACTIONS DURING A PROLONGED STAY IN RELATIVE ADYNAMIA AND ISOLATION (IZMENENIE VYSSHEI NERVNOI DEIATEL'NOSTI I NEKOTORYKH VEGETATIVNYKH REAKTSII PRI DLITEL'NOM PREBYVANII V USLOVIIAKH OTNOSITEL'NOI ADINAMII I IZOLIATSII).
N. A. Agadzhanian, Iu. P. Bizin, G. P. Doronin, and A. G. Kuznetsov.
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 13, Nov.–Dec. 1963, p. 953–962. 11 refs. In Russian.

A study of human subjects during a prolonged stay (up to 60 days) in relative adynamia and isolation showed that changes in the physiological reactions of the body under such conditions are characterized by a wavelike, cyclic, and phasal course during different periods of the investigation. The most pronounced changes were found in the conditioned motor responses. By the end of the study, the heart rate was increased and the respiratory rate, on the contrary, decreased. The arterial blood pressure and the blood saturation with oxygen were also decreased. Restoration of the physiological reactions after a physical load set is much later in the second part of the experiment than in the first few days. Typical of the examined persons was a decrease in their mental working capacity and in the development of a pronounced fatigue. These changes during isolation are presumed to be due to the reduced excitability of the central nervous system. The suggested prophylaxis is a rational work-rest regimen that emphasizes systematic specified physical exercises.

A64-80236
LOCAL CHANGES IN HUMAN EEG IN RESPONSE TO TACTILE STIMULATION COMBINED WITH SOUND (LOKAL'NYE IZMENENIIA V EEG CHELOVEKA NA TAKTIL'NOE RAZDRAZHENIE PRI SOCHETANII EGO SO ZVUKOM).
S. N. Raeva (Acad, of Med. Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti., vol. 13, Nov.–Dec. 1963, p. 963–971. 24 refs. In Russian.

Multiple presentation of tactile stimuli produces local changes in the human electroencephalogram (EEG) in the form of a local depression of the initial rhythm, or of its exaltation in the sensorimotor area of the contralateral hemisphere, as well as a nonspecific response on the vertex. Similar local EEG changes in the cortical projection zone of the hand may be obtained by means of conditioning in response to an acoustic signal after its multiple pairing with tactile reinforcement. These local EEG reactions undergo changes during conditioning expressed in a succession of various electrographic local manifestations (depression, irritation, exaltation). Often such reactions are accompanied by a nonspecific response that, in the course of conditioning, also undergoes change: at first it is pronounced in both hemispheres and then mostly in the contralateral, "active" hemisphere. These facts

are considered as a manifestation of the dynamics of changes in the functional state of the corresponding cortical structures during conditioning and with the formation of a cortical focus with enhanced excitability.

A64-80237
CHANGES OF ELECTRICAL ACTIVITY IN VARIOUS AREAS OF THE CEREBRAL CORTEX DURING PERFORMANCE OF MUSCULAR WORK [IZMENENIE ELEKTRICHESKOI AKTIVNOSTI V RAZLICHNYKH OBLASTIAKH KORY MOZGA VO VREMIA VYPOLNENIIA MYSHECHNOI RABOTY].
M. P. Ivanova (Central Res. Inst. of Phys. Culture, Physiol. Lab., Moscow, USSR).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 13, Nov.–Dec. 1963, p. 972–979 18 refs. In Russian.

Records were made of EEG changes in various areas of the cerebral cortex during muscular work. The depression of the basic rhythms accompanied by increased waves of the beta rhythm is of different duration in various cortical areas. It is more prolonged in the sensorimotor area than in the occipital area, and more prolonged in the cerebral hemisphere contralateral to the working hand than in the ipsilateral hemisphere. As the muscular work is repeated, the alpha rhythm of the visual cortex may be completely restored, whereas the rhythm of the motor area remains depressed. Desynchronization of the alpha rhythm reoccurs with sensory differentiation or with a change in work intensity.

A64-80238
LIFE ON OTHER PLANETS? [LEBEN AUF ANDEREN STERNEN?]
Joachim Herrmann.
Gütersloh, Germany, C. Bertelsmann Verlag, 1963, 190 p. In German.

This is a popular review of man's endeavor to satisfy his curiosity about his extraterrestrial environment. The author covers the historical background, speculations on extraterrestrial life, origin of life, environment on other planets, the moon, other galaxies, space travel in the future, current status of space flight, etc. Hazards of space flight are discussed in some detail, e.g., weightlessness, cosmic radiation, cabin atmosphere, need for repairs in space, extreme loneliness, etc. Projecting into the future suggests the planning of cities on the Moon or Mars, space travel across galaxies, photon rockets, etc.

A64-80239
HEAD MOVEMENTS OF THE VESTIBULAR ORIGIN AND THE REGULATORY FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM.
Sadao Utsumi, Hiroshi Shindo, Teizo Mukai, and Yasuteru Yamanaka (Nara Med. Coll., Dept. of Otorhinolaryngology, Nara, Japan).
Acta Oto-Laryngologica, Supplementum 179, 1963, p. 25–31. 6 refs.

An electronystagmographic study was made of the changes in head movements and of the behavior of various neck muscles in rabbits, caused by unilateral vestibular stimuli. Head deviation to the side of the nonstimulated ear is associated with immediate increase in the tone of the perivertebral neck muscles of the same side. In head nystagmus the most important role is played by the bilateral superficial neck muscles, which alternate in their action. The head movements of vestibular origin are inhibited by a marked rise in the tone of the superficial neck muscles on the side of the stimulated ear. This inhibition is controlled by the cerebellum.

A64-80240
VESTIBULAR INFLUENCE ON THE GAMMA EFFERENT MOTOR SYSTEM OBSERVED BY ANGULAR ACCELERATION.
Genkishi Totsuka, Mutsuro Suzuki (Juntendo U., School of Med., Dept. of Otorhinolaryngology, Tokyo, Japan), and Kisou Kubota (Tokyo U., Inst. of Brain Res., Section of Neurophysiol., Tokyo, Japan).
Acta Oto-Laryngologica, Supplementum 179, 1963, p. 18–24. 9 refs.

Vestibular influence on the muscle spindle activity was studied in decerebrated cats by recording single spindle discharges of the ankle flexors and extensors of both sides. Vestibular stimulation was supplied by constant angular acceleration and cupulometric stimulation. Two different types of vestibular influence were observed in frequency of spindle discharge of the limb muscle. One was nonreciprocal facilitatory and the other was reciprocal. These responses were the same as those elicited by oscillatory rotation. The reciprocal-type responses predominated, especially in the decerebrated cat. The mechanism of vestibular control of muscle tone is discussed.

A64-80241
SOME OBSERVATIONS ON THE NEURONAL MECHANISM OF OPTOKINETIC NYSTAGMUS.
Naoshige Maruyama, Akio Watanabe, Tadashi Kawasaki, Junichiro Koizumi, Takashi Higuchi, and Masanori Morimoto (Niigata U., School of Med., Brain Res. Inst. and Dept. of Otolaryngology, Niigata, Japan).
Acta Oto-Laryngologica, Supplementum 179, 1963, p. 7–17. 15 refs.

Neuronal activity of the oculomotor nucleus and the optic nerve was recorded in rabbits during optokinetic nystagmus. Response of single optic nerve fibers to a shifting stripe was also measured. During nystagmus activity the optic nerve showed very little change from the normal condition; however, in a few individuals there was a high-frequency discharge when the eye got ahead of the stripe. When the stripe shifted directions, individual fibers reacted in different ways. The response pattern was not dependent on any one specific direction. Activity of the oculomotor nucleus increased or decreased during rotation of the stripe until it reached a specific rate, which was continued to the beginning of nystagmus. The discharge rate to the ocular muscle decreased to a minimum just before the quick phase and increased gradually during the slow phase of nystagmus. Eye movement during the slow phase was accelerated toward the nasal side when optic nerve discharges from the temporal side of the fovea were increased; it was decelerated when discharges originating from the nasal side of the fovea were increased.

A64-80242
THE OTOLITHIC REACTION ON NYSTAGMUS BY CALORIC STIMULATION.
Kenjiro Owada and Kiyoko Okubo (Keio U. School of Med., Dept. of Otorhinolaryngology, Tokyo, Japan).
Acta Oto-Laryngologica, Supplementum 179, 1963, p. 1–6. 8 refs.

Experiments with rabbits suggested that the otolithic organ does not produce nystagmus by external stimulation alone, but maintains a certain regulatory function on the nystagmus. Head movement and caloric stimulation were applied to animals in which a spontaneous nystagmus was induced by resecting the ampullar nerve. Nystagmographic recordings of these animals demonstrated changes in frequency of the nystagmus, indicating reaction of the otoliths. It is concluded that the utricle and saccule respond to caloric stimulation and are inhibitory toward the nystagmus in both directions; however, their mode of action is antagonistic.

A64-80243
NEURO-PHYSIOLOGICAL AND PSYCHOLOGICAL FACTORS IN AIRCRAFT ACCIDENTS.
P. M. Van Wulfften Palthe.
Psychiatria Neurologia Neurochirurgia, vol. 66, p. 473–479.

Human factors in causing (or avoiding) aircraft accidents are nearly always combined with other elements of a nonhuman character. Among neurophysiological conditions emotional fainting and emotional overbreathing are studied, as well as the influence of photic stimulation on the mood. Difficulty in deaccommodating when there are no clues in the far-off visual field may lead to midair collision. Psychologically, excess of conflicting stimuli can lead to sham death (Totstellakinesia) or to overactivity (motion storm). Absence of (exogenous) stimuli input is a stress of a peculiar kind. Spells of changed consciousness constitute a hazard in cases of sensory and motor deprivation in isolation, not only in flying or orbiting, but also in some terrestrial conditions.

A64-80244
THE INFLUENCE OF POSITION UPON THE EYE-MOVEMENTS PROVOKED BY LINEAR ACCELERATIONS.
L. B. W. Jongkees and A. J. Philipszoon.
Acta Oto-Laryngologica, vol. 56, Mar.–Apr. 1963, p. 414–419; discussion (in German), p. 419–420. 7 refs.

Rabbits were subjected on a parallel swing to linear accelerations of changing direction. An electronystagmograph was used to indicate compensatory eye movements under an eye cover. In the normal position these movements were smaller than in the reversed position. If the rabbit was placed in a lateral position, the swinging elicited a clear nystagmus, particularly in the lower eye. The same response was noted in human subjects when they were asked to fixate their eyes to the left or right. Partial labyrinthectomy did not abolish the nystagmus. The authors consider the response to be an additional proof of the vestibular function of the otolith organs, whereby the stimulation is derived from the effect of shearing forces on the saccular and utricular otoliths.

A64-80245
THE PHYSIOLOGY OF TRAINING THE FUNCTIONAL DEVELOPMENT OF THE LABYRINTHINE FUNCTION THROUGH THE DAILY REPETITION OF ROTARY, CENTRIFUGAL, SEE-SAW AND PENDULUM-LIKE MOTIONS.
Tadashi Fukuda, Takashi Tokita (Gifu Med. School, Dept. of Otolaryngology, Gifu, Japan), Manabi Hinoki, and Masaaki Kitahara (Iwate Med. School, Dept. of Otolaryngology, Morioka, Japan).
Acta Oto-Laryngologica, vol. 56, Mar.–Apr. 1963, p. 239–249; discussion, p. 249–250.

This is a description of a film that illustrates the decline of postrotatory nystagmus after repeated daily rotation in animals and human subjects. A new concept of the equilibrium function is established according to which repeated rotations induce a new labyrinthine reflex of a higher order involving reflex movements of the head, neck, trunk, and tail of chickens. This "kinetic" labyrinthine reflex is established after repeated rotation, as well as after

centrifugal, seesaw, and pendulum-like motions. Repeated rotation is conceived as "training" of the labyrinthine function. A decline of the duration of postrotatory nystagmus was also observed in people with trained vestibular function (dancers, athletes) and in a group of boys during daily training with rotation. In the latter group the decrease of postrotatory nystagmus was accompanied by improvement in various sports, and improvement of equilibrium and motor functions.

A64-80246
ON THE METABOLITE CONTENT OF THE LUNG AND ITS ALTERATION IN ABSOLUTE OXYGEN WANT [UBER DEN METABOLITGEHALT DER LUNGE UND SEINE VERANDERUNG IM ABSOLUTEN SAUERSTOFFMANGEL].
G. Jacobs (Köln U., Inst. für Normale und Pathol. Physiol., Cologne, Germany).
Zeitschrift für die gesamte experimentelle Medizin, vol. 137, 1963, p. 12–16. 11 refs. In German.

Rabbit lungs were analyzed with respect to their normal content of adenosine triphosphate, adenosine diphosphate, adenosine monophosphate, glucose, glycogen, inorganic phosphates, and phosphocreatine. During 45 minutes of anoxia, ATP, glycogen, and glucose contents decreased, while the ADP, AMP, lactic acid, and inorganic phosphate contents increased. The rabbit lung does not contain phosphocreatine.

A64-80247
ON THE OXYGEN DIFFUSION IN THE LUNG OF HEALTHY MAN: THE OXYGEN DIFFUSION CAPACITY AND OTHER BLOOD-GAS ANALYTICAL DATA [UBER DIE SAUERSTOFFDIFFUSION IN DER LUNGE DES GESUNDEN MENSCHEN: DIE O_2-DIFFUSIONSKAPAZITAT UND ANDERE BLUTGASANALYTISCHE DATEN].
E. Doll, K. Kröpelin, and H. Reindell (Medizinische Universitätsklinik, Freiburg i. Br., Germany).
Zeitschrift für die gesamte experimentelle Medizin, vol. 137, 1963, p. 27–46. 56 refs. In German.

The oxygen-diffusing capacity of the lungs was determined in 20 healthy adults. The values obtained for the oxygen-diffusing capacity, alveolar-capillary oxygen-pressure difference, and alveolar-end-capillary oxygen-pressure gradient during breathing of a hypoxic mixture are at variance with those reported in literature. Possible reasons for this discrepancy are discussed. In addition, blood analyses during respiration with air, with a hypoxic mixture, and with a hyperoxic mixture yielded values for arterial oxygen partial pressure, arterial carbon dioxide partial pressure, arterial pH, alveolar oxygen partial pressure, alveolar-arterial oxygen pressure difference, and their components. The behavior of respiratory minute volume, inspiratory capacity, respiratory rate, arterial carbon dioxide partial pressure, pH, and oxygen uptake showed no significant changes while these gas mixtures were breathed.

A64-80248
THE INFLUENCE OF VITAMIN C ADMINISTRATION ON THE MECHANICAL EFFICIENCY OF THE HUMAN ORGANISM.
A. Hoogerwerf and A. W. J. H. Hoitink (Free U., Physiol. Lab., Amsterdam, Netherlands).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 20, 1963, p. 164–172. 7 refs.

The resting metabolism of 30 subjects was measured by continuously recording respiratory exchanges before, during, and after exercise on the bicycle ergometer. Vitamin C content of the blood was determined before the exercise. The increase in metabolism and the mechanical efficiency were calculated. Vitamin C was then administered to one group of the subjects, and placebo tablets were given to the other group. This procedure was repeated. The results showed that extra administration of vitamin C, causing the recipients to be saturated with the vitamin, decreases the excess metabolism of work and increases the mechanical efficiency.

A64-80249
OXYGEN UPTAKE AND BLOOD LACTATE RELATIONSHIP IN SUBJECTS OF VASTLY DIFFERENT SOMATOTYPE.
Benjamin Ricci (Milan U., Lab. of Physiol., Milan, Italy).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 20, 1963, p. 173–177. 14 refs.

The relationship between oxygen uptake and blood lactate was studied in two male nonathletic subjects of similar age and height but of vastly different somatotype. The obese subject (weight 109 kg; 30% body fat) exhibited a lower level of efficiency during work on a motor-driven treadmill (12 km/hr, grade + 4%) than the lean subject (weight 60 kg; 14% body fat).

A64-80250
THE VESTIBULAR CORIOLIS EFFECT DURING ADDITIONAL LINEAR ACCELERATION [DER VESTIBULARE CORIOLIS-EFFEKT BEI ZUSATZLICHER LINEARBESCHLEUNIGUNG].
H. Bornschein and G. Schubert (Wien U., Physiol. Inst., Vienna, Austria).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 20, 1963, p. 178–189. 20 refs.

Coriolis nystagmus was evoked in nine subjects by symmetrical head movements (60° amplitude, around the horizontal sagittal axis) during constant rotation (180°/sec around the vertical axis). Continuous electronystagmographic recordings were made of the intensity of nystagmus; its direction was measured by means of the vector electronystagmogram. The responses elicited by centric versus eccentric rotation were compared. In the latter case the individual is subjected also to linear acceleration force of 1 g in the horizontal direction. This additional force does not influence the direction of the Coriolis nystagmus, but lowers its amplitude and frequency. The weakening influence observed is thought to be due to the inhibitory effect of additional stimulation from linear acceleration on the labyrinthine stimulus. The question is raised whether or not weightlessness will intensify the Coriolis nystagmus.

A64-80251
PHYSIOLOGICAL CHARACTERISTICS OF THE "STEP" EXERCISE.
E. Rovelli and P. Aghiemo (Milan U., Inst. of Human Physiol., Milan, Italy).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 20, 1963, p. 190–194. 15 refs.

The energy cost of the step test was calculated using different bench heights and stepping frequencies to investigate whether this kind of exercise is suitable for determining the maximum oxygen consumption. For every bench height the energy cost of the exercise, as calculated from the oxygen consumption, increases linearly with step cycle frequency and does not reach a steady-state condition even when the maximum values are attained for both variables. The efficiency of this exercise is lower than that of uphill and downhill walking.

A64-80252
SEASONAL VARIATIONS OF BLOOD PLASMA VOLUMES IN HEALTHY MEN.
J. A. Paloheimo (Wihuri Res. Inst., Helsinki, Finland).
Scandinavian Journal of Clinical and Laboratory Investigation, vol. 15, 1963, p. 563–568. 31 refs.

Blood and plasma volumes of two groups of men, 44 policemen and 35 convicts, were determined bimonthly during one year. A significant seasonal variability of the volumes was noted. The changes were of nearly the same magnitude in the two groups. It is suggested that this phenomenon is caused principally by the seasonal fluctuation in environmental temperature and is part of the acclimatization of the cardiovascular system of man to cyclic climatic variations.

A64-80253
AN APPLICATION OF STRAIN-GAGE-TYPE INSTRUMENTS TO THE ANALYSIS OF THE EQUILIBRIUM FUNCTION IN HUMAN SUBJECTS AND ANIMALS.
Manabi Hinoki and Masaaki Kitahara (Iwate Med. Coll., Dept. of Otorhinolaryngology, Morioka, Japan).
Acta Oto-Laryngologica, Suppl. 179, 1963, p. 110–121. 8 refs.

The principles and characteristics of strain-gage-type instruments are discussed. A detailed description is presented of an unbonded strain-gage-type accelerometer and a bonded strain-gage-type accelerometer constructed for precision recording of body movements in human or animal subjects under various conditions, e.g., labyrinthine or visual stimulation. A successful analysis of the equilibrium function in man and animals has been accomplished by means of these instruments in combination with either electronystagmograph or electroencephalograph.

A64-80254
STUDIES ON THE CORRELATION BETWEEN VESTIBULAR FUNCTION TEST AND AUTONOMIC NERVOUS SYSTEM.
Toshio Shiraiwa, I. Watanabe, and Y. Ueki (Tokyo Med. Coll., Dept. of Otolaryngology, Tokyo, Japan).
Acta Oto-Laryngologica, Suppl. 179, p. 103–109. 14 refs.

Fifty healthy adult men and women with proven normal hearing ability and equilibrium function were classified clinically into two groups, i. e. those with stable and those with unstable autonomic nervous systems. The majority in the latter group exhibited parasympathetic lability. Postrotatory nystagmus was elicited by the Bárány method in both of these groups. The results indicate that its latency is a useful diagnostic test of vestibular function only in persons with stable autonomic nervous system and with the application of a weak rotatory stimulus.

A64-80255
QUANTITATIVE OBSERVATION OF VESTIBULAR REACTIONS IN THE REVOLVING ROOM.

Yutaka Tsuiki, Shuichi Katagiri, Jiro Hozawa, Miyuki Kakuta, Masami Usami, and Kazuko Sato (Tohoku U. School of Med., Dept. of Oto-Rhino-Laryngol., Sendai, Japan).
Acta Oto-Laryngologica, Suppl. 179, 1963, p. 96–102. 8 refs.

An especially constructed revolving room was employed for investigation of the quantitative interaction between angular acceleration and labyrinthine function. The subject stood in the center of the room with his head bent 30° forward and his eyes open. The following responses to rotatory and postrotatory stimulation were registered simultaneously: nystagmus, turning sensation as signaled by the subject, changes in respiration, and head movements. Differences in the latency of reactions were shown in the subjects with normal and abnormal autonomic nervous function, and in people with vestibular training, e.g., ballet dancers. This technique is suitable for the diagnosis of vertigo, motion sickness, and for testing of flight fitness.

N64-80256
ON THE FUNCTION OF THE OTOLITHORGANS.
Hiroshi Sasaki, Masatoshi Yamagata, Tetsujiro Watanabe, Ken-ichi Ogino, Masao Ito, and Shun-ichi Otahara (Tottori U. Med. School, Dept. of Oto-Rhino-Laryngol., Yonago, Japan).
Acta Oto-Laryngologica, Suppl. 179, 1963, p. 42–55. 20 refs.

Otolith function was investigated in a series of experiments on animals and humans with linear accelerations applied in different directions. The strongest reaction was elicited by linear acceleration directed perpendicularly to the macular surface of the saccule and utricle. The saccule and utricle augment each other and play a role in the formation of kinetic and positional reflexes. The otolith organs respond to both pressure and traction; therefore it is presumed that linear acceleration and gravitational acceleration are perceived peripherally, but that the stimulus is integrated with other peripheral information at the level of the central nervous system and with the proper response produced.

A64-80257
ON THE SECONDARY PHASE OF NYSTAGMUS.
Masanori Morimoto, Kanemasa Mizukoshi, Tsutomu Otani, Shigeru Ikeda, Yu Katsumi, Tsuneo Sasaki, and Yoshio Koike (Niigata U., School of Med., Dept of Otolaryngol., Niigata, Japan).
Acta Oto-Laryngologica, Suppl. 179, 1963, p. 32–41. 10 refs.

The secondary phase of vestibular and optokinetic nystagmus was explored in normal human subjects and in rabbits. The secondary phase of nystagmus can be elicited easily even with rather weak stimuli such as those used clinically regardless of whether caloric or optokinetic stimuli are employed. If it cannot be observed, it is because of extinction due to inhibitory factors such as visual inputs or unknown effects. The secondary phase of nystagmus is organized by primitive tracts in the brain stem and is constantly influenced and controlled by the higher vestibular and optokinetic nystagmus tracts, such as the cerebrum or cerebellum. In some cases in rabbits the optokinetic nystagmus is transformed into eye movements resembling the so-called "nystagmus clonus" or "firing," which become completely independent of the original stimuli in regard to the frequency of beats. The presence of this phenomenon supplies counter-evidence opposing Bárány's theory on the genesis of optokinetic nystagmus.

A64-80258
MONITORING CERTAIN DYNAMIC ASPECTS OF THE CRANIAL BLOOD POOL.
W. H. Oldendorf (Los Angeles Veterans Admin. Center and Calif. U. Med. Center, Los Angeles, Calif.)
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 65–72.
Public Health Service Grant PHS-G-B-2575.

A technique for measuring cranial blood flow accurately and atraumatically is presented. It involves the use of a sharply demarcated bolus of isotope (I^{131}-labeled hippuric acid) propelled centrally toward the heart from an antecubital venipuncture. The densest part of the bolus is used as a reference point, which is measured from entrance to exit from the brain pool. The first derivative of the isotope content of the brain shows a positive peak when the densest part of the bolus is entering the pool and a negative peak when it is leaving. The interval between these peaks is the mean transit time. Extremely low doses of the isotope are used with achievement of realistic values in health and disease. The mean circulation time ranges between 7 and 10 sec in normals, becoming longer with increasing age and with brain vessel disease.

A64-80259
COMPUTATION OF BLOOD FLOW VELOCITY FROM THE PRESSURE PULSE COMPARED WITH DIRECT MEASUREMENT BY THE ULTRASONIC FLOWMETER.
Robert L. Van Citters and G. Octo Barnett.
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 79–86. 11 refs.
Grants NIH-H-716; NIH-H-4531.

Aortic blood flow velocity computed from the first time derivative of the pressure pulse was compared with simultaneous direct measurements by the ultrasonic flowmeter. Healthy ambulatory dogs were studied during spontaneous activity, drug infusion, and a variety of other experimental procedures, which induced wide changes in blood pressure and flow. The magnitude and direction of the changes in the computed velocity were not always consistent with those in measured flow. A close correspondence could be achieved between individual wave forms of measured and computed flow when the dog was at rest. However, if the magnitude of the coefficients of the computation were kept constant, large discrepancies appeared upon administration of drugs or during most experimental procedures. The baseline of computed flow velocity during diastole was unstable, and under many conditions a spurious exaggeration of the end-systolic retrograde flow was recorded. These factors introduce serious error into the integration of computed velocity to obtain stroke volume and cardiac output.

A64-80260
PHOTO RECORDING ELECTROMYOGRAPH — A UNIQUE METHOD OF PHYSIOLOGICAL INSTRUMENTATION.
A. Karchak, T. R. Allen, J. Perry, and C. Dail (Rancho Los Amigos Hosp., Downey, Calif.)
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 111–115. 6 refs.
Grant NIH-RG-9421.

This paper describes a method of recording physiological phenomena and a simultaneous visual representation of the subject. Records are acquired by means of a movie camera and optical assembly that provides image projection from a cathode ray screen and from external objects simultaneously to the camera aperture. A detailed discussion of the technical problems and solutions encountered in hardware design, along with sampling analysis, is presented. Future value of this method of instrumentation is projected, based on past and current usage of photo-recording techniques.

A64-80261
PRELIMINARY OBSERVATIONS OF SOME PHYSIOLOGICAL CHARACTERISTICS OF THE PIG-TAILED MONKEY, MACACA NEMESTRINA.
Nello Pace, Julius T. Hansen, Donald F. Rahlmann, Norman J. Barnstein, and Mott D. Cannon (Calif. U., Dept. of Physiol., Berkeley).
Aerospace Medicine, vol. 35, Feb. 1964, p. 118–121.
Grant No. NsG-170-61.

The young adult, male, pig-tailed monkey, Macaca nemestrina, was proposed as a possible subject for studies of the long-term effects of zero gravity in connection with the NASA Biosatellite Program. Information on the basic physiological characteristics of this species of primate is scanty, and is insufficient for design and estimation of weight requirements of a suitable life-support system. Data in this connection from the following areas have been obtained: (1) general characteristics, (2) energy metabolism, (3) water balance, (4) feces production, (5) rectal temperature, (6) hematology, (7) hemodynamics, and (8) anthropoidimetry. From the foregoing data, those of importance in the design of a life-support system capable of maintaining one of these animals in the weight range of 8 to 12 kg are presented in tabular form. These data are preliminary and serve only to establish correct orders of magnitude of life-support-system parameters for biosatellite planning purposes.

A64-80262
SUSTAINING LIFE IN SPACE—A NEW APPROACH.
Leonard H. Bongers (Martin Co., Res. Dept., Baltimore, Md.)
Aerospace Medicine, vol. 35, Feb. 1964, p. 139–144. 7 refs.

A chemosynthetic gas exchange system is presented that differs from the photosynthetic one by splitting water directly by electrolysis rather than by light and by achieving biosynthetic reduction of CO_2 and removal of hydrogen by Hydrogenomonas cultures instead of algal ones. In this gas exchange system, oxygen is evolved (available for human respiration), and hydrogen, aided by ATP formed in a partial recombustion, reduces CO_2 to organic matter. A comparison of the chemosynthetic and the photosynthetic regenerative systems revealed that the two processes are entirely analogous. In both the rates of O_2 released/CO_2 taken up are close to unity, matching human respiration. Moreover, in both cases, organic material essentially suited for human food is produced. The use of a chemosynthetically closed ecology calls for a power input of about 1 kw per man. It is expected that the power requirement could be rather independent of the suspension density. Volume-wise, 20 liters of suspension per man would be sufficient if the laboratory results can be duplicated with large exchangers. If these indications are borne out, the possibility of using such a closed ecology can be considered for trips of longer than a few months. Use of mixed chemosynthetic and photosynthetic cultures as a regenerative system for closed environments requires further investigation.

A64-80263
ACOUSTIC TRAUMA.
E. D. Dalziel Dickson.
Journal of Laryngology and Otology, vol. 77, Nov. 1963, p. 913–925. 14 refs.

A discussion is presented on acoustic trauma and deals specifically with five important thresholds concerned with noise injury. These are (1) the threshold that is equivalent to zero-hearing level, (2) the threshold that interferes with sleep, (3) the threshold that interferes with verbal communication, (4) the threshold of hearing damage risk, and (5) the threshold of pain. Various sources of noise including gunfire and aircraft engines are discussed in relation to these noise thresholds and hearing loss. Clinical observations on the effect of noise are reported and related to threshold shifts and occupational deafness. Some hearing impairment will result from exposure to a noise intensity of 90 db. It is stressed that only if the temporary threshold shift is prolonged may it be an indication of the susceptibility of the individual to noise.

A64-80264
BAROTRAUMATISM OF TRAVELERS (LE BAROTRAUMATISME DES TOURISTES).
J. Despons.
(Société de Médecine et de Chirurgie, Meeting of Dec. 4, 1962.) Journal de Médecine de Bordeaux et du Sud-Ouest, vol. 140, Jul. 1963, p. 1119–1123.

Among the suggested causes of sinusitis and otitis is the rapid obstruction of the ostia of the paranasal sinuses or the Eustachian tubes, which isolates the respiratory and ear passages and produces a pressure differential during ambient pressure changes. The condition has usually been observed in aviators, but the use of pressurized aircraft has eliminated the hazard of sudden pressure changes in commercial air travel.

A64-80265
SEALED ENVIRONMENTS IN RELATION TO HEALTH AND DISEASE.
John H. Schulte (Dept. of the Navy, Bureau of Medicine and Surgery, Wash., D.C.)
Archives of Environmental Health, vol. 8, Mar. 1964, p. 438–452. 27 refs.

The general health aspects of life in a sealed environment are related primarily to habitability and atmospheric control. The control of the atmosphere involves: (1) some means to provide the continual addition of oxygen in sufficient quantity to support life and preserve health, and (2) methods to effect the continuous removal of carbon dioxide, carbon monoxide, and other atmospheric contaminants to prevent them from gradually increasing to concentrations that could produce illness. The habitability of a sealed environment is maintained within a comfortable and healthful range by the addition and removal of heat and water vapor. The needs and methods for controlling the atmospheric constituents, temperature, humidity, and radiation exposure in a sealed environment are projected to future space vehicles.

A64-80266
JOB ANALYSIS IN THE UNITED STATES AIR FORCE.
Joseph E. Morsh (Aerospace Med. Div., 6570th Personnel Res. Lab., Lackland AFB, Tex.)
Personnel Psychology, vol. 17, Spring 1964, p. 7–17. 13 refs.

This is a review of job analysis methods showing the greatest potential for systematic collection, quantification, and organization of information about Air Force jobs. Brief descriptions are presented of the following methods: questionnaire, check list, individual interview, observation interview, group interview technical conference, daily diary, work participation, and critical incident. The new method developed for the Air Force that combines features of the check list with those of the open-ended questionnaire and the observation interview, is explained in detail.

A64-80267
THE EFFECTS OF SENSORY DEPRIVATION AND SOCIAL ISOLATION ON THE PERFORMANCE OF AN UNSTRUCTURED COGNITIVE TASK.
Peter Suedfeld, Robert J. Grissom, and Jack Vernon (Princeton U., Princeton, N.J.)
American Journal of Psychology, vol. 77, Mar. 1964, p. 111–115. 8 refs.
Contract No. DA-49-007-MO-671.

An open-ended projective technique was employed to evaluate cognitive impairment as a result of social isolation and severe sensory deprivation. After 24 hours of confinement, 10 isolated and sensorily deprived subjects showed a significant decrease in the length of stories generated in response to verbal descriptions of a Thematic-Apperception-Test type scene; 10 isolated but not sensorily deprived subjects showed significant increases in story length; while 10 control subjects showed no significant changes. All groups evidenced a decrease in speech rate, but only the isolated-deprived group changed significantly.

A64-80268
RAPID DECOMPRESSIONS UP TO 60,000 FEET WEARING THE STANDARD OXYGEN MASK.
Richard W. Bancroft and David G. Simmons (USAF School of Aerospace Medicine, Aerospace Med. Div., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Mar. 1964, p. 203–211. 20 refs.

Seven decompressions with five subjects were carried out from 25,000 ft to altitudes above 50,000 ft using only the standard pressure-demand oxygen mask (MBU-5/P) and D-2 regulator. The results indicate that the rapid decompressions up to 60,000 ft can be tolerated. Such decompressions, however, should still be considered potentially dangerous and possibly approaching marginal limits for the continuous maintenance of consciousness. For fast decompressions above 60,000 ft, the combined effects of high breathing pressures on the cardiovascular system, severe hypoxia, and the possibility of water vapor evolvement within the heart and vascular system will all tend to create a combination of severe decompression stresses where a delayed reaction time of even a few seconds could be the difference between successful encapsulation or failure. For these reasons, the successful use of the emergency capsule at extreme altitudes will depend mostly on rigorous indoctrination and training for those who may have to use this escape equipment.

A64-80269
AN EXAMINATION OF CERTAIN AIRCREW MEDICAL SELECTION STANDARDS IN NATO NATIONS.
E. A. Lauscher (Ger. Air Force Med. Serv., Inst. of Aerospace Med., Ger.)
Aerospace Medicine, vol. 35, Mar. 1964, p. 212–220. 28 refs.

Current methods of clinical, physiological, and psychological examination at the initial selection of aviation candidates are evaluated with particular reference to similarities and differences among nations. In general, these methods allow a good evaluation of the present state of health of the candidate but do not yield more than a vague long-term prognosis. Recommendations are made for standardization of test methods, selection criteria, inclusion of new tests, reorganization of psychiatric and psychological examinations under a common medical direction, and the development of prognostic psychological success criteria for flying careers. Similarly, a uniform high level of professional standards of the selection teams is still to be desired.

A64-80270
BIOLOGICAL EFFECT OF STRESS FOLLOWING IONIZING RADIATION.
J. J. Gambino, L. R. Bennett, M. S. Billings, and B. G. Lamson (Calif. U., School of Med., Dept. of Biophys. and Nucl. Med., Los Angeles).
Aerospace Medicine, vol. 35, Mar. 1964, p. 220–224. 41 refs.
(Contracts AF 41(657)-275; AT(04-1)-GEN-12)

The long-term effects of daily brief periods of cold exposure administered after clinical recovery from acute radiation sickness were observed in 500 r totally irradiated, 500 r adrenal-irradiated, and nonirradiated rats. One half of the survivors of the two irradiated groups and one half of the nonirradiated control group were subjected to about 0°C temperature 3 hours daily until death. Among the late effects produced by 500 r total body irradiation were reduced longevity; retarded growth; cataracts; accelerated onset of skin ulcers, graying, enlarged mammary glands and palpable tumors; and increased incidence of palpable tumors. In contrast, a 500 r dose administered locally to the adrenals produced no significant effects. Cold exposure, administered as a mild stressing agent, had no effects significant at the 1% level on the normal course of any radiation-produced pathology. No observable pathological conditions were precipitated in adrenal-irradiated animals as a result of the cold treatment.

A64-80271
EFFECT OF MINIMAL DEHYDRATION ON ORTHOSTATIC TOLERANCE FOLLOWING SHORT-TERM BED REST.
C. Di Giovanni, Jr., and N. C. Birkhead (Lankenau Hosp., Div. of Research, Philadelphia, Pa.)
Aerospace Medicine, vol. 35, Mar. 1964, p. 225–228. 10 refs.
(USPHS Fellowship No. MPD-18, 119)

A healthy subject was exposed to 48-hour bed rest periods under conditions of comfortable temperature and fluid ad libitum, comfortable temperature and restricted fluid, heat, and fluid ad libitum, and a 26-hour period of heat combined with restriction of fluid. Minimal dehydration was achieved. Seventy-degree tilt was tolerated for 10 minutes following all bed-rest periods, except the 26-hour period of combined heat and dehydration at the end of which presyncope developed by the eighth minute of tilt. This study suggests the need for well-controlled, multiple stress studies to maximize potential application to manned space flight.

A64-80272
PSYCHOLOGICAL AND PHYSIOLOGICAL RESPONSES TO RAISED BODY TEMPERATURE.
R. T. Wilkinson, R. H. Fox, R. Goldsmith, I. F. G. Hampton, and H. E. Lewis

(Natl. Inst. for Med. Res., Div. of Human Physiol., London, Engl; and Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Engl.)
Journal of Applied Physiology, vol. 19, Mar. 1964, p. 287–291. 11 refs.

The performance of 12 male volunteers in an adding test and in a test requiring prolonged vigilance was measured at normal body temperature and while temperature was maintained at 37.3°, 37.9°, and 38.5°C. Each subject was measured at each level of body temperature on four occasions. Both the extent and the direction of the effect on performance varied with: (1) the task being carried out; and (2) the degree of temperature elevation. Compared with performance at normal temperatures, the ability to add was impaired, and vigilance was improved at 38.5°C. At 37.3°C, on the other hand, smaller changes reflected, in general, an improvement in adding and an impairment of vigilance. As a result of the repeated sessions of controlled hyperthermia, the subjects became heat acclimatized, but there was no corresponding improvement in performance at raised body temperature, indicating the absence of short-term adaptation of the central-nervous-system functions tested to repeated elevations of body temperature.

A64-80273
AEROSPACE MEDICAL SURVEILLANCE OF THE TITAN II.
Robert N. Reiner and John J. Mc Cambridge (Headquarters Fifteenth AF, Office of the Surgeon, March AFB, Calif.)
Aerospace Medicine, vol. 35, Mar. 1964, p. 233–238.

Air Force medical service surveillance of the development of an operational capability for the Titan II weapon system is discussed. This system uses storable propellants, aerozine-50, the fuel, a mixture of hydrazine and unsymmetrical dimethylhydrazine (UDMH), and nitrogen tetroxide as the oxidizer. Of these compounds, nitrogen tetroxide is the most serious hazard. The toxic hazard associated with exposure to aerozine-50 is due mainly to the UDMH compound. The maximum allowable concentration for nitrogen tetroxide has been set at 2.5 parts per million; however, higher concentrations of the vapor can normally be tolerated for relatively short periods of time. The threshold limit of UDMH is 0.5 part per million and for hydrazine, 1.0 part per million. Procedures for personnel selection, treatment, and protection are described. Methods by which medical service personnel become familiar with the Titan II weapon system are also described.

A64-80274
MEANING AND VALUE OF ELECTROENCEPHALOGRAPHY IN AERONAUTICAL MEDICINE.
C. Blanc, E. Lafontaine, and R. Laplane (Compagn. Air France, Central Med. Serv., Paris, France).
Aerospace Medicine, vol. 35, Mar. 1964, p. 249–256. 25 refs.

Outstanding results of ten years' experience covering 8,000 electroencephalographic (EEG) recordings made on subjects belonging to the Air France cabin staff are described. The criteria of the conventional EEG tracings were analyzed by the use of a longitudinal classification distinguishing the evolutive tracings and the stationary tracings. In about 100 monographic studies spread out over a period of several years, evolutive correlations appear between the psychoaffective and psychophysiological factors and the electrical disturbances. Major EEG anomalies (generalized paroxysms, left temporal foci, photo sensitivity) are transitorily observed in the course of anxiety neurosis, neurotic depressions, and psychosomatic syndromes. The extent of disorders of the sleep function is shown in the genesis of occasional disturbances in EEG tracings with normal subjects. Certain electric patterns observed on recruitment tracings seem to have an anticipatory value, a predictive significance necessitating an exploration of the personality by a psychiatric examination. The importance of the EEG with subjects presenting antecedents of cranial traumatisms without clinical aftereffects is also stressed.

A64-80275
DESIGN OF THE BIOS I RECOVERY VEHICLE.
Vincent C. DeLiberato (Gen. Elec. Co., Re-entry System Dept., Philadelphia, Pa.)
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 214–220.

The development of the BIOS I (Biological Investigation of Space) deep-space recovery vehicle is described, including the spacecraft system, its experimental mission, design, development, and two flights of November 1961. This vehicle was designed to (1) evaluate effects of space radiation on biological specimens, (2) obtain more accurate records of radiation as a function of altitude than had been obtained at another time from the Nuclear Emulsion Recovery Vehicle I (NERV), (3) perform a micrometeoroid impact experiment, and (4) study biological effects of near-zero gravity.

A64-80276
PHYSIOLOGIC STUDIES OF PULMONARY EDEMA AT HIGH ALTITUDE.
Herbert N. Hultgren, Cesar E. Lopez, Einar Lundberg, and Harry Miller (Stanford U. School of Med., Dept. of Med., Palo Alto, Calif.; and Cerro de Pasco Corp., Chulec General Hosp., La Oroya, Peru).
Circulation, vol. 29, Mar. 1964, p. 393–408. 11 refs. Monterey and San Mateo County Heart Associations-supported research.
(Grant PHS-G-H 2583; Surgeon-General's Office Grant No. DA-49-193-MD-2274).

Cardiac catheterization studies were performed in four patients during acute pulmonary edema at an elevation of 12,300 ft in the central Peruvian Andes. Pulmonary hypertension, low cardiac output, arterial unsaturation, and low normal pulmonary artery wedge pressures were observed. Oxygen breathing was accompanied by a prompt, marked fall in pulmonary artery pressure, indicating the presence of anoxic pulmonary arteriolar constriction. Similar studies were carried out in four subjects after recovery from pulmonary edema. One 9-year-old boy had persisting pulmonary hypertension. An abnormal rise in pulmonary artery pressure during induced hypoxia was observed in three of the four patients. It is concluded that pulmonary edema at high altitude is a unique form produced by hypoxia under certain conditions of exposure. Severe pulmonary hypertension due to anoxic arteriolar constriction is present. There is no evidence that pulmonary venous constriction and cardiac failure are causative mechanisms.

A64-80277
THE PROBLEM OF RELATIVE BIOLOGICAL EFFECTIVENESS IN ACUTE AND CHRONIC RADIATION STRESS IN THE RADIOBIOLOGICAL STUDY OF SPACE MEDICINE. II. [DAS PROBLEM DES RBW BEI AKUTER UND CHRONISCHER STRAHLENBELASTUNG IN DER RADIOBIOLOGISCHEN FORSCHUNG DER RAUMFAHRTMEDIZIN. II].
E. H. Graul (Philipps-U., Abteilung für Strahlenbiologie und Isotopenforschung, Marburg/Lahn, Germany).
Raumfahrtforschung, vol. 8, Jan.–Mar. 1964, p. 1–9. In German.

The effect of ionizing radiation on living tissue depends not only on the amount of energy absorbed, but also on a number of other factors, e.g., differential distribution in the ionization pattern and concentration of O_2 in the tissue. In contrast to "r," "rep," or "rad," the value "rem" (roentgen equivalent man) has already taken the character of a biological dose value determined by two factors: (1) the amount of energy absorbed in "rad" and (2) the RBE (relative biological effectiveness). The radiobiological significance of RBE research and of "rem" is discussed in regard to the effect of highly accelerated nuclei, especially the heavy primary particles. In the radiobiology of space travel the concept of "rem" becomes problematical or even irrelevant in the case of thin-down hits from these heavy primaries.

A64-80278
OPHTHALMOLOGIC PROBLEMS CAUSED BY THE ENVIRONMENT DURING SPACE FLIGHT [LES PROBLEMES OPHTALMOLOGIQUES POSES PAR L'ENVIRONNMENT AU COURS DU VOL SPATIAL].
A. Mercier and G. Perdriel.
Revue de Médecine Aeronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 493–496. In French.

A discussion is presented of the potential sources of visual disturbance in space flight. Factors considered are acceleration, vibration, disorientation, weightlessness, glare, radiation, oxygenation, pressure, temperature, humidity, toxic gases, cabin illumination, and psychological factors. Analysis of the experiences of Russian and American astronauts indicates that the visual problems of space flight can be overcome by the proper selection and training of space pilots and appropriate design of cabin installations.

A64-80279
ELECTROMYOGRAPHIC BEHAVIOR OF THE RESPIRATORY MUSCLES IN MAN DURING TRANSVERSE ACCELERATIONS [COMPORTEMENT ELECTROMYOGRAPHIQUE DES MUSCLES RESPIRATOIRES AU COURS DES ACCELERATIONS TRANSVERSES CHEZ L'HOMME].
P. Varène, Ph. Richard, and Ch. Jacquemin.
Revue de Médecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 497–499. 13 refs. In French.

Measurements of electromyographic activity in the diaphragm, neck, abdominal muscles, and intercostal muscles were made during transverse accelerations ranging up to 7 g. The amplitude of cyclical electrical activity was increased in the diaphragm with increasing levels of acceleration. Electrical activity was associated with inspiration, but began before the end of expiration at accelerations above 3 g. The neck muscles showed a constant activity that was increased with the rate of acceleration, but was not related to respiratory activity. No significant activity was observed in the abdominal or intercostal muscles. It is concluded that the diaphragm remains the principal inspiratory muscle during transverse acceleration.

A64-80280
ANALYSIS OF A CASE OF SICKNESS IN FLIGHT: ATTEMPT AT A PHENOMENOLOGICAL COMPREHENSION AND ELECTROENCEPHALOGRAPHIC

FINDINGS [ANALYSE D'UN CAS DE MALAISE EN VOL: ESSAI DE COMPREHENSION PHENOMENOLOGIQUE ET INCIDENCE ELECTROENCEPHALOGRAPHIQUE].
E. H. Cadour, R. G. Benevant, C. Pinet, and A. Joseph.
Revue de Médecine Aéronautique, vol. 3, Nov.–Dec. 1963, p. 500–505. In French.

A report is given of a case of air sickness manifested by vertigo and anxiety during flight. The pilot was treated for 8 months for disturbance of the vestibular apparatus without permanent improvement, and was then referred for psychologic examination. Electroencephalographic abnormalities suggestive of epilepsy of psychic origin were observed. Psychologic examination suggested an association between the pilot's symptoms and a dependency related to a dominant father. Treatment by the relaxation method of Schultz resulted in subjective improvement, but the pilot was declared unfit for flight.

A64-80281
CONTINUOUS REGISTRATION OF THE AIR TEMPERATURE AT THE LEVEL OF THE NASAL FOSSAE [ENREGISTREMENT CONTINU DE LA TEMPERATURE DE L'AIR AU NIVEAU DES FOSSES NASALES].
Jean Colin, Hubert Ducros, and Yvon Houdas (Centre d'Essais en Vol, Lab. de Physiol., Brétigny-sur-Orge, France).
Revue de Medecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 506–509. 11 refs. In French.

Continuous measurements of respiratory air temperature in relation to respiratory phase, ambient air temperature, and ambient humidity were made from a small thermocouple inserted in the nasal fossae of three subjects. Under resting conditions, expired air temperature remained stable during prolonged exposure to a constant ambient temperature and humidity. Increases in ambient air temperature at constant humidity resulted in a lesser increase in expired air temperature (10° C for a 30° C increase in ambient air temperature). At constant ambient air temperature levels, an increase in humidity from 20% to 70% increased expired air temperature about 2° C.

A64-80282
THE PRESSURE SUIT AND EXPLOSIVE DECOMPRESSION [LE VETEMENT PRESSURISE ET LES DECOMPRESSIONS EXPLOSIVES].
R. Beaussant, P. Varène, and Ch. Jacquemin (Centre d'Essais en Vol, Brétigny-sur-Orge, France).
Revue de Médecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 511–516. 17 refs. In French

A study was made of the protective value of the French high-altitude pressure suit (EFA-ARZ-30) during explosive decompression. Subjects were exposed with the glottis open to decompressions lasting from 3 to 20/100 second, with the ratio of initial to final pressure ranging from 1.6 to 5.3, and the ratio of orifice area to cabin volume (flow coefficient) constant at 1/17.5. Estimates of pulmonary overpressure were made by measurement of the esophageal pressure during decompression, and pulmonary function was evaluated by spirographic tests after the exposure. Maximum pulmonary overpressure during decompression was found to be well below the theoretical tolerance limit. Pulmonary overpressure was greater with lower initial pressures, and was more prolonged with lower final pressures. No spirographic evidence was found of any significant change in respiratory function. It is concluded that under the conditions studied, the pressure suit provides adequate protection to the aviator during explosive decompression.

A64-80283
PROTECTIVE ACTION OF MANGANESE SULFATE AGAINST CONVULSIVE ACCIDENTS CAUSED BY OXYGEN UNDER PRESSURE IN THE RAT [ACTION PROTECTRICE DU SULFATE DE MANGANESE SUR LES ACCIDENTS CONVULSIFS PROVOQUES PAR L'OXYGENE EN PRESSION CHEZ LE RAT].
G. Bertharion and G. Gilbert (Hôpital Maritime Sainte-Anne, Toulon, France).
Revue de Médecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 517. In French.

A study was made of the effect of manganese sulfate on the convulsions produced by exposure to high oxygen pressure. Fifty rats were exposed in a pressure chamber to 5 kg/cm^2 of oxygen pressure 5 minutes after a subcutaneous injection of manganese sulfate (80 mg/kg body weight). No convulsions occurred in treated rats even after more than 40 minutes of exposure. Untreated rats are known to experience convulsions under these conditions after 20 to 40 minutes.

A64-80284
AIR EVACUATION OF BURN CASUALTIES [L'EVACUATION AERIENNE DES BRULES].
G. Pesserau, C. Reynier, and R. Monteil.
Revue de Médecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 521–525. In French.

An analysis is presented of transportation factors in 364 burn cases evacuated by air to the Percy Burn Treatment Center in France. A brief summary is also given of in-flight treatment methods and criteria for the treatment of shock and burns before evacuation. Evacuation was accomplished in the first 36 hours after injury in most of the severe burn cases, but two or more relay flights were required in most evacuations from Algeria. Difficulties such as vomiting were experienced during flight in 23% of the patients, but only in association with severe burn injury. One death occurred during flight, and 38 occurred between the first and forty-sixth day after arrival at the center, but the deaths could not be attributed to air evacuation.

A64-80285
STUDY OF VERTEBRAL FRACTURES OBSERVED AFTER FORCED OR FAULTY LANDINGS [ETUDE DES FRACTURES VERTEBRALES OBSERVEES LORS D'ATTERRISSAGES FORCES OU DEFECTUEUX].
Grandpierre, Violette, Fabre, Marchesseau, Ginet, and Cholin.
Revue de Médecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 525–536. In French.

An analysis is presented of 16 cases of vertebral fracture occurring during 299 forced or faulty landings in the French Air Force from January 1954 to March 1961. None of the vertebral fractures was associated with accidents occurring entirely on a landing strip. All the vertebral fractures occurred in one- or two-seat aircraft, and the proportion of fractures was greater in accidents involving American jet aircraft than other jet aircraft or helicopters. Fourteen of the 16 fractures occurred at the dorso-lumbar junction, presumably because of the position of lumbar hyperlordosis assumed by the pilots in preparation for a crash. Analysis of accidents involving French and American jet aircraft in terms of pilot weight and height, weight of the aircraft, pilot restraint, seat composition, distance of the pilot from the bottom of the fuselage, position of the landing gear, stopping distance, speed at the time of impact, and position of the wings indicates that the higher rate of vertebral fractures in American aircraft was due to wing position. It is suggested that wings located low on the aircraft tend to protect the pilot from vertebral injury during crashes in which the landing gear is retracted.

A64-80286
DETECTION OF ASTHMA BY PNEUMOTACHOGRAPHY: ITS APPLICATION IN THE SELECTION OF FLYING PERSONNEL [DETECTION DE L'ASTHME PAR LA PNEUMOTACHOGRAPHIE: INTERET DANS LA SELECTION DE PERSONNEL NAVIGANT].
L. Tabusse and R. Pannier (Hôpital Militaire d'Instruction Dominique Larrey, Service Clinique de Médecine Aéronautique, Versailles, France).
Revue de Médecine Aéronautique et Cosmonautique, vol. 3, Nov.–Dec. 1963, p. 537–541. In French.

A method is proposed for the detection of asthma in young subjects by pneumotachography. The method is designed to eliminate the possibility of error in groups such as aviation candidates who may attempt to control results in the classic Tiffeneau measurement of maximal expiratory second volume after inhalation of acetylcholine and Aleudrine. In the pneumotachographic test, a continuous measurement is made of the inspiratory and expiratory air flux under basal resting conditions and after inhalation of increasing amounts of acetylcholine and Aleudrine. Normal subjects show a rapid increase in air flux during expiration, followed by a slower decrease to zero flux. During inspiration, the curves showing the increase and decrease of flux are grossly symmetrical. There is no effect of acetylcholine or Aleudrine. The expiratory curve of some asthmatic subjects under resting conditions includes a flattened portion that is eliminated by Aleudrine. In other asthmatics with normal tracings, acetylcholine inhalation produces a flattening of the expiratory curve, a decrease in maximal expiratory and inspiratory flux, and a decrease in ventilatory frequency. It is suggested that the pneumotachographic test should be included in the medical procedure for selection of flying personnel.

A64-80287
A SECOND LOOK AT SENSORY DEPRIVATION.
Eugene Ziskind (U. of Southern California School of Med., Dept. of Psychiat., Los Angeles, Calif.)
Journal of Nervous and Mental Disease, vol. 138, Mar. 1964, p. 223–232. 51 refs.

Four variables, namely, sensory invariance, quantitative (partial) sensory deprivation, sensory deprivation per se, and interpersonal isolation, are related to the production of the sensory-deprivation symptom complex. Reduced awareness and precipitating internal and external stimuli appear to be necessary conditions for symptom formation. Constant sensory input is a more common experience than diminution or increase of stimuli, and hence cannot be excluded as central to symptom formation. A review of quantitative alterations in sensory stimulation indicates that sensory deprivation experiments are partial rather than complete; that the critical limits are not known; and that the fact that all sensory deprivation is submaximal makes possible its study apart from the usual concomitant nonsensory factors, e.g., interpersonal isolation. Sensory deprivation per se seems to be the central agent responsible for the appearance of the sensory deprivation syndrome. However, a combination of all four

elements cannot be excluded as the central stress; singly, none of them has been proven to have causative significance. The significance of interpersonal isolation is as yet unexplored. Since isolation by eliminating symbolic communication interferes at the conceptual level, which is man's highest function and the most recently acquired one phylogenetically and ontogenetically, it may be the most vulnerable deprivation.

A64-80288
VISUAL CONSTANCY DURING MOVEMENT. I. EFFECTS OF SUBJECT'S FORWARD AND BACKWARD MOVEMENT ON SIZE CONSTANCY.
R. L. Gregory and Helen E. Ross (U. of Cambridge, England).
Perceptual and Motor Skills, vol. 18, Feb. 1964, p. 3–8. 6 refs.
USAF Grant No. AF-EOAR 63-93.

A novel method for estimating constancy is described, which is applied to the estimation of size constancy during motion of observers moved passively on a swing in darkness. Subjects viewed a circle traced on an oscilloscope tube and arranged to shrink as the subject approached it and to expand as he moved away. The variation in size of the display was adjusted by an experimenter until it appeared of constant size to the subject during his movement. Constancy was greater during forward than backward movement.

A64-80289
PERCEPTUAL SPEED AND BEHAVIOR PROFICIENCY.
A. J. Dinnerstein, B. Blitz, and M. Lowenthal (N.Y. Med. College, New York, N.Y.)
Perceptual and Motor Skills, vol. 18, Feb. 1964, p. 59–62. 9 refs.
Vocational Rehabilitation Administration Grant No. RD-1196-M-63

Perceptual speed in specific sensory modalities should lead to efficiency in behaviors governed by these modalities. To test this hypothesis, correlations were computed between measures of perceptual speed and scores on a modified Stroop test for 10 subjects. Those correlations relevant to the hypothesis were all significant and in the expected direction. The pattern of results is thus reasonably consonant with the hypothesis. Reserpine, which might be expected to affect the above relationships, was ineffective.

A64-80290
INTERSENSORY AND INTRASENSORY EFFECTS IN SIMPLE REACTION TIME.
Leo Rubinstein (N.Y. State Psychiatric Inst., New York, N.Y.)
Perceptual and Motor Skills, vol. 18, Feb. 1964, p. 159–172. 24 refs.
Grant PHS-MY-03616.

Reaction time (RT) was measured as a function of the interval between an irrelevant stimulus and a reaction stimulus, for visual and auditory stimuli. Reaction time was inversely related to the length of the interval when both stimuli were in the same sense mode, but remained relatively constant for stimuli differing in sense mode. Both the absolute and the percentage change in RT were greatest when both stimuli were visual; in this case, the changes in reaction time resulting from the variation of interval length were independent of the luminances of both the irrelevant and the reaction stimuli.

A64-80291
PERSONALITY AND TIME ESTIMATION IN SENSORY DEPRIVATION.
G. F. Reed and J. C. Kenna (Manchester U., Manchester, England).
Perceptual and Motor Skills, vol. 18, Feb. 1964, p. 182. 5 refs.

Ten subjects with scores of 30 and above on the Maudsley Personality Inventory Extraversion Scale and 10 subjects with scores of 20 or less on the same scale estimated 15-minute periods under normal and under sensory-deprivation conditions. Under deprivation conditions, errors in estimation were significantly greater. All but one subject made errors in the positive direction. The extravert group made larger errors than the introvert group.

A64-80292
INVESTIGATIONS OF A CENTRIFUGE SUBSTITUTE FOR ROTATING FIELD EXPERIMENTS WITH HUMAN SUBJECTS.
W. H. Hess, J. R. Lombrano, and R. L. Batterton.
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 240–245.

Investigations seeking to determine if an inexpensive centrifuge substitute could be devised to yield reliable data regarding human capabilities and performance within a rotating field of large radius are presented. A tilted room was mounted on a vehicle driven in a circular path at constant velocity, so that the resultant force passed essentially perpendicular to the room floor. The subjects in the room were given a series of performance tests including estimation of the horizontal, movements of the head in deliberate attempts to produce motion sickness, and past-pointing. After the head movements, subjects were interrogated on feelings of vertigo and nausea and on the occurrence of visual illusions. The centrifuge substitute appeared to furnish adequate acceleration characteristics. Some of the performance test results differ from expectations based upon the literature. The reasons for these differences are discussed.

A64-80293
EXTRATERRESTRIAL BIOLOGICAL INSTRUMENTATION PROBLEMS.
Jerry L. Stuart.
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 246–253.

Types and magnitudes of the various restrictions and limitations imposed upon the instrument developer by the spacecraft are outlined. These areas are reliability, weight, power, volume, data, and physical dimensions. Mechanical, thermal, and vacuum stresses must also be considered as well as variations of the electrical and frequency reference sources used during the experiment. This discussion is limited to those instruments designed to function after landing on a planetary surface, such as Mars. Considerations that the experimenter needs to be aware of to create a well designed experiment are discussed.

A64-80294
PHYSIOLOGICAL MONITORING IN THE HIMALAYAS.
Thomas O. Nevison, Jr. (Lovelace Found., Albuquerque, N. Mex.), Robert M. Adams (USAF Aerospace Med. Center, San Antonio, Tex.), and James R. Dickey.
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 260–265. 14 refs.

The United States Air Force participated in a Himalayan scientific expedition led by Sir Edmund Hillary. A 12-channel physiological monitoring system was constructed and used to obtain recordings on subjects at rest and during exercise at altitudes as high as 24,500 ft. The complete system, including batteries and recorder, could be carried easily by one man. This paper describes the "biopack," and other instrumentation developed for use on the expedition.

A64-80295
PORTABLE ELECTROMANOMETER: A MINIATURE BATTERY-POWERED READ-OUT SYSTEM FOR DIRECT BLOOD PRESSURE MEASUREMENT UNDER FIELD CONDITIONS.
Charles T. Dotter and Thomas B. Hutchins.
IN: Proceedings of the San Diego Symposium for Biomedical Engineering, La Jolla, Calif., 1963, p. 266–267. Oregon Heart Association and the Mallinckrodt Chemical Works-supported research
Grant PHS-G-H-3275.

A portable electromanometer permitting observation of variations in pulmonary arterial systolic and diastolic levels in the field is described. The prototype system is hand-held, weighs less than 5 lb. and uses seven transistors and two diodes. The peak-to-valley voltage is subtracted from the peak voltage in a special dual coil meter that has dual needle movements and is therefore able to display systolic and diastolic pressures simultaneously, i.e., continuously. For reliability and portability, battery power is used. Battery condition can be checked by the same voltmeter used for readout. Battery life using mercury cells is estimated in excess of 200 hr. The pressure transducer is connected to the instrument by a 3-ft cable but for remote monitoring a longer cable may be used.

A64-80296
EAR DRUM MOVEMENTS FOLLOWING STIMULATION OF THE MIDDLE EAR MUSCLES.
Hans-Eric Holst, Sven Ingelstedt, and Urban Ortegren (Lund U., Dept. of Otolaryngology, Lund, Sweden).
Acta Oto-Laryngologica, Supplementum 182, 1963, p. 73–83. In English, German summary.

A method designed for recording small ear drum movements is described and used for recording the movements following stimulation of the middle-ear-muscle reflex. This reflex is a simultaneous contraction of both muscles (tensor tympani and stapedius) in normal ears. The threshold for eliciting a contraction of the tensor muscle is 15 to 20 db higher than the normal threshold. These differences are explained on the basis of different types of muscle contraction elicited by more intense stimuli.

A64-80297
ON THE EXAMINATION OF THE FUNCTION OF THE OTOLITHS.
L. B. W. Jongkees (Amsterdam U., Dept. of Oto-Rhino-Laryngol., The Netherlands).
Acta Oto-Laryngologica, Suppl. 183, Sep. 1963, p. 84–86. 8 refs.

A review is presented of the research on otolithic function, which offers proof that the parallel swing combined with electronystagmography is a simple and practical method for the examination of the function of the otoliths.

A64-80298
A STUDY ON FALLING FROM HEIGHTS.
George El-Assal (Faculty of Med., Dept. of Forensic Med., Alexandria, Egypt).
Alexandria Medical Journal, vol. 9, Jan. 1963, p. 56–65. 11 refs.

Forty-six cases resulting in death from falling from various heights were analyzed from different medical and medicolegal viewpoints. Trauma types and

modes were divided regionally and explained in terms of biodynamics of the human body in acceleration and deceleration. The head was injured in 68.3% of the cases, the thorax in 53.8%, the abdomen in 30.4%, and the limbs in 24.7%. Although this article deals primarily with free fall, certain aspects are discussed that have possible application to parachute jumping.

A64-80299
INDIVIDUAL SOUND DAMAGE SUSCEPTIBILITY: ROLE OF MIDDLE EAR MUSCLES.
F. Blair Simmons (Stanford U., School of Med., Div. of Otolaryngology, Calif.)
Transactions of the American Otological Society, vol. 60, 1963, p. 128–147; discussion, p. 147–149. 16 refs.
Grant PHS-G-B2167.

The relation of individual susceptibility to acoustic damage and individual variability in the activity of the middle-ear-muscle acoustic reflex was explored in a population of normal, awake cats. Each animal's normal reflex reponses to a battery of test stimuli were measured before sound trauma exposure, and then compared to the degree of sound trauma sustained. Animals with better-than-average sustained reflex contractions showed less sound damage than animals with less-than-average reflex responses. The reason for this correlation does not seem to lie within individual differences of middle-ear mechanics or threshold acuity (reflex or auditory), and may be partially explained by differences in degree of habituation or adaptation. In clinical application, the results suggest that (1) more fruitful tests for trauma susceptibility may be derived by measuring adaptation; (2) the value of the presence or absence of a functioning stapedius muscle may depend upon the type of sound trauma environment; and (3) sedation or related states may predispose to increased trauma susceptibility.

A64-80300
CLEARANCE FUNCTION OF THE EUSTACHIAN TUBE.
G. O. Proud, E. D. Rathbun, and F. R. Kirchner (Kansas U., School of Med., Dept. of Otorhinolaryngology, Kansas City).
Transactions of the American Otological Society, vol. 60, 1963, p. 174–179. 20 refs.

Fluorescein solution (0.5%) was injected through the tympanic membrane into the middle ear of both dead and living dogs in a series of five experiments. The heads were placed in the desired positions, and at frequent intervals over a period of 1 hour the postnasal spaces were inspected for fluorescent areas with a Woods lamp, laryngeal mirror, tongue depressor, and head mirror. Since the solution passed through the Eustachian tube of the sacrificed animals only in instances when the pharynx was dependent, it would appear that gravity is a factor in tubal clearance. This concept is given substance by an experiment in which the solution passed to the pharynx quickly when the ear was uppermost and swallowing was initiated. Another experiment found the test ear higher than the pharynx again, but no fluid passed when the animal did not swallow. Such a result would tend to establish the necessity for release of the tubal sphincter tension by swallowing even with cilia and gravity factors both at play. The speed with which the solution passed when additional material was injected with light pressure lends support to this belief. The same reasoning speaks for the sphincteric rather than the milking action of the tubal musculature.

A64-80301
NEUROTIC ANXIETY AND VESTIBULAR FUNCTION AS REFLECTED IN THE VERTIGO AND NYSTAGMUS RESPONSES TO REPEATED CALORIC STIMULI.
Hans F. Lidvall (Serafimerlasarettet, Dept. of Neurology, Stockholm, Sweden).
Acta Oto-Laryngologica, vol. 56, May 1963, p. 445–456. 18 refs.

Neurotic anxiety was measured by means of a "neuroticism" inventory devised by the author. The vestibular caloric test was performed on 167 subjects. There was no correlation between the degree of neurotic anxiety and the average intensity of the vertigo and nystagmus responses. Those subjects who had distinct vertigo responses and "normal" nystagmus responses at the routine test were selected for a study of the responses to repeated identical monolabyrinthine caloric stimulations. Among these subjects there was no correlation between the degree of neurotic anxiety and the magnitude of habituation to the stimulations. The results and the methodological problems of the study are discussed.

A64-80302
SOME CONSIDERATIONS CONCERNING VESTIBULAR RECEPTORS [ALGUNAS CONSIDERACIONES SOBRE LOS RECEPTORES VESTIRULARES].
Pascual de Juan.
Acta Oto-Rino-Laringologica Ibero-Americana, vol. 15, 1963, p. 14–34. In Spanish.

A review is given of the morphological relations of the vestibular receptors, based on investigations by means of both the light and the electron microscope. Biophysical and biochemical phenomena related to the functions of these receptors (those in the ampullary crests of the semicircular canals as well as those connected with the otoliths in the saccule and utricle) are discussed. The sensory cells transform mechanical energy into a chemical discharge, producing an electrical impulse in the afferent nerve fibers. The membranous labyrinth presents an impermeable wall to electric currents.

A64-80303
VALUE OF THE VARIOUS RADIOLOGICAL METHODS USED IN THE SELECTION AND PULMONARY SURVEILLANCE OF MILITARY FLYING PERSONNEL [VALEUR DES DIFFERENTES METHODES RADIOLOGIQUES UTILISEES DANS LA SELECTION ET LA SURVEILLANCE PULMONAIRE DU PERSONNEL NAVIGANT MILITAIRE].
R. P. Delahaye and Y. Allain (Hop. Mil. d'Instruction Dominique Larrey, Serv. d'Electroradiologie, Versailles, Seine-et-Oise, France).
Revue Internationale des Services de Santé des Armées de Terre de Mer et de l'Air, vol. 36, Sep.–Oct. 1963, p. 559–566. 21 refs.
In French, English summary.

A discussion is presented of the use of thoracic radiology in the initial selection and periodic examination of military flying personnel in France. The initial radiograph permits detection of parenchymatous or pleural anomalies and bronchial diseases that can be obscured in a clinical examination. Radiography provides a permanent record for future comparative study, although it presents problems of storage and high cost. High-voltage radiography (above 100 k) is not considered necessary for the initial selection of personnel. A 7-cm radiophotograph is obtained at the annual examination of personnel. The method is rapid and inexpensive, and permits the detection of tuberculosis and gross pneumopathy, particularly when the radiophotograph is compared with the radiographic record. A radioscopic examination is made at 6-month intervals in the local unit, but this method requires special training to ensure that the unit physician utilizes techniques of proper dark adaptation and safety of radiation exposure.

A64-80304
MEDICAL PROBLEMS IN THE AIR TRANSPORTATION OF THE SICK AND WOUNDED [MEDIZINISCHE PROBLEME BEIM LUFTTRANSPORT KRANKER UND VERLETZTER].
Johannes Hagelsten and Hans Nolte (Bispebjerg Hosp., Copenhagen, Denmark).
Anaesthesist, vol. 12, Sep. 1963, p. 271–277. 10 refs. In German.

Air evacuation of wounded or ill patients is discussed with respect to problems arising in connection with flight conditions; advantages and disadvantages of propeller aircraft, jets, and helicopters; and difficulties encountered in transport on commercial airlines. Advice on evaluation of the flight fitness of patients is offered. Possible contraindications include certain mental diseases, heart diseases, coronary thrombosis, bronchial asthma, pneumothorax, internal bleeding, head and crush injuries, burns, fractures of the jaw, postoperative condition, severe anemia, etc. Physical–physiological conditions to be considered during air transport are airsickness, expansion of body gases, decreased oxygen saturation of the arterial blood at high altitudes, and acceleration and deceleration forces. Specifically outlined are medical problems and responsibilities arising during air evacuation. Acute as well as chronic diseases (diabetes mellitus, eye diseases) are discussed. A special section deals with pregnancy and epidemic diseases. Anesthetists are considered to be the best qualified medical specialists for the management of air transportation of patients.

A64-80305
HABITUATION, EFFERENCE AND VESTIBULAR INTERPLAY: THRESHOLD AFTER HABITUATION, HABITUATION OF HORIZONTAL AND VERTICAL SEMICIRCULAR DUCTS. Preliminary Report.
E. Fluur and L. Mendel (Karolinska Sjukhuset, Dept. of Otolaryngology, Stockholm, Sweden).
Acta Oto-Laryngologica, vol. 56, May 1963, p. 521–522.

A series of threshold investigations were conducted on both the horizontal and the vertical semicircular canals to see whether a rotatory habituation produces the same result as caloric habituation. The habituation process in stimulation of both the horizontal and the vertical semicircular canals proceeds in the same manner regardless of the nature of stimulation, i. e., caloric or rotatory. The strength of stimulation is important to the development of habituation. Also, the nystagmus duration is inversely related to stimulation threshold.

A64-80306
THE VALVE AND "LOCKING" MECHANISMS OF THE EUSTACHIAN TUBE.
Knut Flisberg, Sven Ingelstedt, and Urban Ortegren (Lund U., Dept. of Otolaryngology, Lund, Sweden).
Acta Oto-Laryngologica, Suppl. 182, 1963, p. 57–68.

During swallowing, air enters the middle ear cavity through the Eustachian tube by one of the following mechanisms: by a negative pressure produced in the ear (aspiration), by an overpressure in the rhinopharynx (inflation), or by a combination of the two pressure differentials. The amount of air passing

through the tube was determined by attaching a manometer to the ear cavity (either by mastoid puncture or by eardrum incision). Ventilation of the ear cavity at identical middle ear pressure is far greater under the condition of aspiration plus inflation than with aspiration alone. In the case of a common cold, the Eustachian tube is "locked" by a very small negative middle ear pressure; attempts to inflate the cavity by swallowing produce further negative pressure spikes in the middle ear. These phenomena are illustrated by an ear–Eustachian tube model.

A64-80307
ON MIDDLE EAR PRESSURE.
Knut Flisberg, Sven Ingelstedt, and Urban Ortegren (Lund U., Dept. of Otolaryngology, Lund, Sweden).
Acta Oto-Laryngologica, Suppl. 182, 1963, p. 43–56.
A new method for producing pressure variations in the middle ear, the mastoid puncture technique, is described. The volume displacement capacity of the normal eardrum, the role of the drum as the middle ear pressure regulator, and the vacuum effects on hearing and transudation are investigated. These changes are produced by intra-aural pressure variations under control. The accuracy of previous methods for indirect determination of middle ear pressure is analyzed.

A64-80308
DEAFENING EFFECTS ON THE CAT.
James D. Miller, Charles S. Watson, (Ind. U., Hearing and Commun. Lab., Bloomington), and Walter P. Covell (Wash. U. Med. School, St. Louis, Mo.)
Acta Oto-Laryngologica, Suppl. 176, 1963, 91 p. 43 refs.
Contracts AF 33(616)-3844; AF 33(616)-3637.
Aural effects of exposure to intense noise were investigated by behavioral measurements of the auditory sensitivity of cats before and after such exposures and by histological examination of their cochleas. Procedures for the training and the audiometric testing of the cat are described in detail. The result of extensive determinations of the cat's audibility curve for sound fields are reported, and a standard audibility curve is offered. A scale for the histological evaluation of injuries is also presented. The pattern of injury ratings along the basilar membrane emerges to be highly similar to the pattern of the behavioral audiograms, if both are placed on an anatomical frequency scale. A correlation coefficient of 0.85 was obtained for the average injury rating of the whole cochlea and the cat's average persistent threshold shift (PTS). It is hypothesized that similar results would be obtained for adult humans if the noise levels were increased by approximately 18.

A64-80309
THE LOCUS DIMENSION AS A BASIS FOR ELECTROCUTANEOUS COMMUNICATION.
Emerson Foulke (Louisville U., Dept. of Psychol., Louisville, Ky.)
Journal of Psychology, vol. 57, Apr. 1964, p. 253–257.
Communication through cutaneous channels has been approached via vibratory and electrical stimulation along the dimensions of intensity, frequency, duration, and locus. An electrocutaneous code similar to the Braille Code has been developed employing two intensities, two durations, and ten loci. The acquisition rate is equal to Morse Code; the reception rate is approximately 18 words per minute. A different adaptation of the principles of the Braille Code to electrocutaneous communication was investigated for possible improvement of the reception rate. In this the reader recognizes patterns of simultaneously presented electrical stimuli from six electrodes by moving his fingers over them. The results are conclusive regarding the impossibility of communication by means of patterns of electrical stimuli applied to a single fingertip. Simultaneous stimulation prohibits the required discrimination while successive stimulation is too slow. In addition, there is an unpleasant stinging sensation. Another method suggested would bypass these difficulties by having three electrodes attached on each side of the body at widely separated loci and varying the intensity. Several military and nonmilitary applications are considered.

A64-80310
REFLEX CONTROL OF ABDOMINAL MUSCLES DURING POSITIVE-PRESSURE BREATHING.
Beverly Bishop (N.Y. State U., Dept. of Physiology, Buffalo).
Journal of Applied Physiology, vol. 19, Mar. 1964, p. 224–232. 32 refs.
WADC-supported research.
Continuous positive-pressure breathing initiates expiratory activity in the abdominal muscle and inhibits the diaphragm in anesthetized cats. This investigation defines neural mechanisms involved in this abdominal-muscle response (AMR) to positive-pressure breathing. The AMR is not a segmental reflex since it is abolished by thoracic spinal transection. Bilateral rhizotomy (T_8-L_3) also eliminates AMR, but laparotomy and abdominal evisceration do not, suggesting that some neural inflow other than from abdominal muscle or viscera is necessary but insufficient for maintaining AMR. Abdominal vagotomy failed to interrupt AMR, which was abolished by bilateral cervical vagotomy, indicating that the necessary receptors lie in the thorax. Compression or local anesthesia of the cervical vagi provided the experimental means for abolishing either the inhibition of the diaphragm or the AMR, without necessarily interrupting the other. That one response may persist in the absence of the other indicates that vagal afferent pathways subserving AMR are distinct from those mediating diaphragm inhibition. Hence, the active expiration of pressure breathing is not a simple corollary of the Hering–Breuer inflation reflex, but is a separate reflex served by its own vagal pathway.

A64-80311
THE CARDIOVASCULAR SYSTEM IN CHILDREN FROM HIGH ALTITUDE.
John H. K. Vogel, Ray Pryor, and S. Gilbert Blount (Colo. U. Med. Center, Dept. of Med., Denver).
Journal of Pediatrics, vol. 64, Mar. 1964, p. 315–322. 12 refs.
The cardiovascular system in the normal child at high altitude may differ strikingly from that of the child at sea level or lower altitudes. Physical signs of pulmonary hypertension, right ventricular preponderance in the electrocardiogram, and prominence of the pulmonary artery, right ventricle, and atrium in the chest X-ray may be present. Cardiac catheterization studies have substantiated the presence of higher pulmonary arterial pressures in the normal resident of high altitude than those found at low altitude. Findings suggest that altitudes over 10,000 feet represent critical altitudes so far as pulmonary circulation is concerned.

A64-80312
RESPIRATORY THORACO-ABDOMINAL MECHANICS IN MAN.
Joseph Milic-Emili, Marcello M. Orzalesi, Charles D. Cook, and James M. Turner (Harvard School of Public Health, Dept. of Physiol.; Harvard Med. School, Dept. of Pediat.; and Children's Med. Center, Boston, Mass.)
Journal of Applied Physiology, vol. 19, Mar. 1964, p. 217–223. 14 refs.
Grants NIH-G-HE-05339-03; NIH-G-H-3804; NIH-G-HTS-5379; NIH-G-2A-5276; NIGMS-G-GM409.
The behavior of the diaphragm and the thoracic and abdominal muscles during various static and dynamic respiratory maneuvers was studied in six trained men by measuring intrathoracic (esophageal) and intra-abdominal (gastric) pressures together with lung volumes. The static maneuvers included voluntary relaxation of respiratory muscles, maximal inspiratory and expiratory efforts, and maximal abdominal expulsive efforts. The dynamic maneuvers were forced inspiratory and expiratory vital capacities and maximal voluntary ventilation. The patterns during the various respiratory maneuvers were relatively uniform. Although the number of subjects studied was small, the results would appear to give a general description of thoracoabdominal mechanics, at least in trained subjects.

A64-80313
AIR TRANSPORT IN THE SPREAD OF DISEASE.
E. Lafontaine.
World Medical Journal, vol. 11, Mar. 1964, p. 77–78.
The relative frequency of two tropical diseases, malaria and amoebiasis, often misdiagnosed by physicians, as they arise in a French population of 25,000 families employed by an air transportation company engaged in international travel, is reported. Patients described include a navigator, a person in management, a physician, a steward, and a pilot. Contrasts between the two diseases are given. Other communicable diseases introduced by aerial transport include sleeping sickness, bilharziasis (schistosomiasis), ankylostomiasis, strongyloidiasis, and ascaris infection. Better health education and increased technical and medical assistance to underdeveloped countries are needed to combat this spread of disease.

A64-80314
EFFECT OF HYPOXIA ON EVOKED POTENTIAL, SLOW NEGATIVE POTENTIAL AND STEADY POTENTIAL IN THE RABBIT CORTEX.
Fushiro Motobayashi, Genyo Mitarai, Sukeo Sugimoto, Shigeru Ando, and Sadaharu Takagi.
Annual Report of the Research Institute of Environmental Medicine, Nagoya University, vol. 11, 1962, p. 1–8. 6 refs. [Published 1963.]
The effect of hypoxia on the central nervous system was studied in rabbits in a decompression chamber. The potential evoked by light flashes from the cortical nerve cells was accompanied by a steady potential and a slow negative potential, both most likely coming from the satellites of the neuron interstitial spaces. All three potentials changed characteristically under hypoxia: the evoked potential became diminished and prolonged, the slow negative and the steady potential increased considerably, and the slow potential was greatly prolonged. It may be that these changes due to hypoxia manifest themselves metabolically, conditioned first in the satellites and passing from them to the neurons.

A64-80315
STUDIES ON KINETIC VISUAL ACUITY: THE IMPORTANCE OF KINETIC VISUAL ACUITY AS AN ABILITY OF PILOT.
Akihiro Suzumura.
Annual Report of the Research Institute of Environmental Medicine, Nagoya University, vol. 11, 1962, p. 9–18. 10 refs. [Published 1963.]

A new apparatus, the A-S Kinetic Vision Tester, is introduced for measurement of kinetic visual acuity. Several experiments were conducted on the relations between kinetic and static visual acuity, and between the former and object velocity, and on the effects of fatigue and jet flight. The smallest differences between the static and kinetic visual acuities were obtained in occupational groups (pilots, highway patrol police) where they were closely related to their proficiency. Kinetic visual acuity decreases as the velocity of the moving visual object increases. This decrease is influenced by individual differences, physical exertion, mental exhaustion, or insomnia. It is concluded that kinetic visual acuity is (1) controlled by a physiological eye mechanism different from that for static visual acuity; (2) closely related to variations in accommodative function; (3) a valuable indicator for qualifying pilots, highway patrol officers, and other traffic operators; and (4) an aid in evaluating fatigue.

A64-80316
RESPONSES TO AUDITORY STIMULATION, SLEEP LOSS, AND THE EEG STAGES OF SLEEP.
Harold L. Williams, John T. Hammack, Robert L. Daly, William C. Dement, and Ardie Lubin.
Electroencephalography and Clinical Neurophysiology, vol. 16, Mar. 1964, p. 269–279. 23 refs.

Auditory stimulation was used to examine the relation between three response measures and EEG patterns of sleep in human subjects before and after 64 hours of acute sleep deprivation. Electroencephalographic responses (EER), behavioral responses (BR), and durations of peripheral vasoconstriction (VCR) increased monotonically as the decibel level increased. Sleep deprivation reduced markedly the slope of each response-db line. EEG stages of sleep affected the EER and the BR, but had no consistent effect on the VCR. The differential effect of EEG stage tended to disappear for all response variables after sleep deprivation. Near-threshold stimuli evoked EER in EEG stages 2 and 3 before and after sleep loss. BR was evoked by near-threshold stimuli only in stages A, 1, and 2 of baseline sleep. After sleep loss BR was elicited only rarely. VCR was elicited by near-threshold stimuli before and after sleep loss. On the basis of this evidence the EEG stage of sleep is not an invariant indicator of the responsiveness of the organism. Sleep loss shifts the distribution of sleep time spent in each stage and decreases the responsiveness of the subject in all stages.

A64-80317
HEAT PROTECTIVE CLOTHING.
B. Metz (Faculty of Med., Lab. of Applied Physiol., Strasbourg, France).
Industrial Medicine and Surgery, vol. 33, Mar. 1964, p. 140–141.

Reduction of the heat load imposed on the human body is achieved by maintaining the superficial skin temperature as near as possible to 33° C, which is the skin temperature observed at rest in a thermoneutral environment. To achieve this goal, heat-protective clothing must: (1) hinder the entry of ambient heat reaching the outer surface of the garment through convection or radiation; and (2) get rid of the heat that has penetrated the garment or has been produced inside it. Discussions and descriptions are presented of: (1) technical methods of achieving this goal (metal coating, insulating the garment, counter-flow ventilation of the garment wall, wetting the shell of the garment, blowing cool air, etc); (2) means of assessing heat-protective clothing; and (3) fields of application, including missiles and supersonic aircraft.

A64-80318
PERCEPTION OF DEPTH FROM BINOCULAR DISPARITY.
Walter C. Gogel (Civil Aeromed. Res. Inst., Oklahoma City, Okla.)
Journal of Experimental Psychology, vol. 67, Apr. 1964, p. 379–386. 15 refs.

This study was concerned with the factors involved in the perception of depth from a binocular disparity. A binocularly observed configuration of constant covergences, constant visual angle, and having constant binocular disparities was made to appear at two different distances in a monocularly observed field-of-view. Both the perceived frontoparallel sizes and the perceived depth within the configuration were measured by means of a kinesthetic (hand) adjustment. It was found that the perceived frontoparallel size and the perceived depth in the binocularly observed configuration increased as the perceived distance of the configuration increased. It is concluded that the perceived depth resulting from a constant binocular disparity will differ depending upon the perceived size per unit of visual angle of frontoparallel extents in its depth vicinity.

A64-80319
EFFECTS OF ATROPINE AND SCOPOLAMINE ON THE CARDIOVASCULAR SYSTEM IN MAN.
J. S. Gravenstein, Thorkild W. Andersen, and C. B. De Padua.
Anesthesiology, vol. 25, Mar.–Apr. 1964, p. 123–130. 8 refs.

The cardiovascular effects of atropine and scopolamine were compared in male volunteers. The bases of atropine and scopolamine were found to be equipotent. Scopolamine was faster in onset and shorter in duration of action. Both exerted their principal effect on heart rate; low doses decreased and large doses accelerated heart rate. Cardiac output changed parallel to the changes of heart rate. Stroke volume was not affected. Both atropine and scopolamine were equally effective in enhancing the action of mephentermine on heart rate and blood pressure.

A64-80320
FUNDAMENTAL ASPECTS OF IMPACTS TO THE HUMAN BODY.
L. M. Patrick (Wayne State U., Detroit, Mich.)
IN: Conference on the Effects of Shock and Vibration on the Human Body. Denver, Colo., Mar. 13–14, 1964, p. 42–56. 9 refs.

The following list of conditions and contributing factors must be considered when the overall effect of impact to the human body is to be studied: (1) direction of impact; (2) duration of impact; (3) magnitude of acceleration induced by the impact; (4) size and shape of the impacting surface; (5) effects of acceleration on the organs and body components; (6) dynamics of the body component and the impacting device; and (7) interaction between the hydraulic surge and muscular and ligamentous attachments on remote areas. For injury prediction, the response acceleration is preferred over the input acceleration since the amplification due to the spring mass system is automatically included. Injury from impact cannot be predicted accurately from an analysis of a spring mass model. The strain in some parts of the vertebral column is far greater than indicated by the dynamic analysis. Cushions attenuate impact accelerations if the impact does not cause a relative displacement greater than the allowable cushion deflection. With larger displacement, cushions cause an overshoot of the acceleration response that can produce serious injury. Impacts can cause damage to organs and bones far from the point struck. Hydraulic surge from a chest impact can cause hemorrhaging in the eyes. Intracranial pressure caused by acceleration and skull deformation in head impacts produces shear strains in the brain stem area resulting in concussion.

A64-80321
THE ADAPTATIONAL BEHAVIOR OF CHICKS IN A SPINNING ENVIRONMENT.
Robert F. Morgan (Mich. State U., East Lansing).
Psychological Record, vol. 14, Apr. 1964, p. 153–156. 5 refs.
Fellowship PHS-1F1-MH-21,649-01.

The effects of spin, one of the relevant stimuli inherent in animal centrifuge studies, were investigated on an ontogenetic basis. Since the interest was primarily in the spin, increased gravity was kept to less than 0.1 g above normal. Fifteen chicks were randomly assigned to each of two identical brooders. One brooder was then spun at 33.3 rpm for 20 days. On the seventeenth day, two chicks from each brooder were removed, marked, and switched. Spinning chicks belatedly showed the same behavior patterns as the stationary controls. The whirling environment appeared to function as a three-stage stimulus for each maturational process as it appeared—noxious, novel, and negligible. There was no mortality.

A64-80322
THE INTENSITY-TIME RELATION OF A STIMULUS IN SIMPLE VISUAL REACTION TIME.
Victor Pease (Ariz. U., Tucson).
Psychological Record, vol. 14, Apr. 1964, p. 157–164. 5 refs.
Grant NSF-G-8720.

Visual reaction time data were taken to flashes varying in duration and luminance to investigate the $I \times t = C$ (I = luminance, t = time, C = constant) relationship over a wide stimulus range. Three subjects were used, and the data indicated that reaction time decreases with increases in duration up to a critical duration after which luminance alone determines the response, and that critical duration depends upon flash luminance.

A64-80323
HUMAN RESPONSE TO CARBON DIOXIDE IN THE LOW-PRESSURE, OXYGEN-RICH ATMOSPHERE.
Ralph G. Cutler, William G. Robertson, James E. Herlocher, Richard E. McKenzie, Frode Ulvedal, John J. Hargreaves, and Billy E. Welch (USAF School of Aerospace Med., Environmental Systems Dept., Space Med. Lab., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 317–323. 18 refs.

Eight subjects were successively exposed to an inspired carbon dioxide partial pressure of 21-mm Hg, equivalent to 3% at sea level, in an atmosphere of 700-mm Hg total pressure and in an oxygen atmosphere of 200-mm Hg total pressure. The duration of exposure to carbon dioxide was four days in each case. Response to carbon dioxide was nearly the same at the two different

pressures as measured by the degree of hyperventilation and hypercapnia produced. Respiratory acidosis reached a maximum after two days CO_2 exposure at each pressure and was followed by a pH shift on the third and fourth days due to renal and metabolic compensation. There was no objective evidence of an adaptive acclimatization to carbon dioxide during the 4-day exposures. The subjective ability to detect carbon dioxide in the atmosphere was not always reliable, especially after prolonged exposure. No performance deterioration was measured, and, in fact, operator efficiency was maintained at a remarkably even level.

A64-80324
"RADIOPHOSPHORS" AS LIGHTSOURCES FOR PHOTOSYNTHESIS.
H. Adler, W. Briegleb, and H. Heusinger.
Aerospace Medicine, vol. 35, Apr. 1964, p. 324–327. 7 refs.

The feasibility of using radioactively stimulated phosphors (radiophosphors) as a source of light for photosynthesis is discussed. The basic configuration studied consists of a radiophosphor in the form of thin layers, flat or arranged as concentric cylinders, embedded between radiation-resistant glass covers, e.g., high-purity quartz glass. This configuration is immersed in the algal suspension, amounting to about 100 liters per person, to be supplied and kept in continuous circulation between light source, heat exchangers, harvesting, and control units. The radioluminescent light source appears to be realizable from a technical point of view. Its high weight-to-power ratio—or, conversely, its low efficiency—makes it inferior to other sources of illumination for photosynthesis. It would regain interest only if phosphors could be found with a radiation resistance increased by several orders of magnitude such that alpha-radiating sources could be used that inherently release much higher decay energies combined with a suitable range of particles. Similar arguments apply to the radiation load on the environment.

A64-80325
PROBLEMS IN AIR TRAFFIC MANAGEMENT. III. IMPLICATIONS OF TRAINING-ENTRY AGE FOR TRAINING AND JOB PERFORMANCE OF AIR TRAFFIC CONTROL SPECIALISTS.
David K. Trites and Bart B. Cobb (Fed. Aviation Agency, Civil Aeromedical Res. Inst., Oklahoma City, Okla.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 336–340.

The relationship of chronological age at entry into air-traffic-control specialist training with training and job performance was examined in seven samples of air-traffic-control specialist trainees. The data conclusively confirmed the existence of an inverse relationship such that the older trainees had significantly less chance than their younger classmates of either completing training or being considered satisfactory in job performance.

A64-80326
THE EFFECT OF BLOOD PRESSURE UPON CHEMORECEPTOR DISCHARGE TO HYPOXIA, AND THE MODIFICATION OF THIS EFFECT BY THE SYMPATHETIC ADRENAL SYSTEM.
K. D. Lee, R. A. Mayou, and R. W. Torrance (Oxford U., Lab. of Physiol., Oxford, England).
Quarterly Journal of Experimental Physiology, vol. 49, Apr. 1964, p. 171–183. 15 refs.

The discharge rate of the chemoreceptors of the aortic nerve of the anesthetized cat was measured under varying conditions of hypoxia, hyperoxia, and blood pressure. The effect of adrenaline and noradrenaline was also observed. Under air breathing, when the blood pressure was raised mechanically, the discharge rate decreased from about 25 discharges per second at 100-mm Hg to 2 or 3 discharges per second at 300-mm Hg. Under artificial respiration with 14% oxygen, the discharge rate was about 14 per second at 100-mm Hg, and with 30% oxygen at 100-mm Hg was about 2 per second. Adrenaline and noradrenaline acted similarly but produced varying effects on the blood pressure and discharge rate. It is suggested that the sympathetic-adrenal system may have a significant effect on the sensitivity of the chemoreceptors.

A64-80327
THERMAL EFFECTS OF SIMULATED NUCLEAR FLASH ON AIRCREW MEMBERS.
W. C. Kaufman, H. T. Davis, and A. G. Swan (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 35, Apr. 1964, p. 345–350. 16 refs.

Operationally clothed subjects seated in a salvaged aircraft cockpit were exposed to thermal-energy pulses simulating those of nuclear explosions. Limits of thermal tolerance ranged from 2.6 to 3.4 cal/cm^2 at forehead level, delivered in a 3-second pulse. These pulses produced "painfully hot" sensations at the forehead, charred cardboard, and seared flying gloves. There were no skin burns. In supplementary studies, skin on the back of the hands of subjects exposed to this energy reached 110^0 F at the limit of tolerance. The temperature resulted from exposure to 3.4 cal/cm^2 delivered in an 11-second exposure. The temperatures found painful are lower and the amount of energy producing them is two to four times greater than that previously reported or predicted. This difference in the relation of temperature response to energy applied is due to spectral differences of the energy that result from the absorption characteristics of the plexiglass canopy. Twofold benefits are derived: considerable absorption of thermal radiation by the canopy, and a lowered pain threshold to temperatures below those that produce skin burns. These data can be used by the physical scientist to calculate nearest safe distance for the crew member.

A64-80328
EXPERIMENTAL ANALYSIS OF THE RELATION BETWEEN BODY FAT AND SUSCEPTIBILITY TO DECOMPRESSION SICKNESS.
R. B. Philp and C. W. Gowdey (Western Ontario U., London, Ontario, Canada).
Aerospace Medicine, vol. 35, Apr. 1964, p. 351–356. 39 refs.
Defence Research Board of Canada-supported research.

Decompression sickness phenomena were studied in rats by a standardized technique. The incidence and severity of bends following prolonged exposures to compressed air are related to the amount of body fat regardless of the age of the rat. There appears to be a critical fat–water ratio beyond which the severity of bends is markedly increased. Very lean rats are more resistant to bends even when they are in a poor nutritional condition. Nitrogen may be retained by body fat even after a stage decompression that is apparently safe and not accompanied by any manifestations of the bends. Further exposures to compressed air within a critical time increase the incidence and severity of the bends and the amount of nitrogen present in the body, these increases being inversely proportional to the time between exposures. Repeated exposures to compressed air every 48 hr appear to increase the risk of incurring and the severity of the bends. A high carbon dioxide content in the compressed gas mixture increases the severity of bends, but apparently not by increasing the nitrogen retention.

A64-80329
EFFECTS OF HYDRAZINE ON LIVER LIPIDS.
David L. Trout (USAF School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 357–360. 14 refs.

Liver lipids were studied after hydrazine administration (1.2 mM/kg) in 1-day fasted rats. Following the intravenous injection of hydrazine, the concentration of liver total fatty acids (TFA) increased significantly within 120 minutes and continued to rise rapidly during the next 2 hours to levels more than 50% above control values. The extra TFA found in the livers appeared chiefly as neutral glycerides. During the second day after intravenous hydrazine administration, liver TFA decreased almost to starting levels. With the intraperitoneal injection of hydrazine, liver TFA concentration was found to double in 12 hours. An anesthetic dosage of pentobarbital produced a reduction in liver TFA and retarded the accumulation of liver fat after hydrazine injection. No evidence was found to implicate the central nervous system in the hepatic lipid changes produced by hydrazine. However, hydrazine markedly elevated plasma-free fatty acids and is believed to speed the transport of these fatty acids to the liver.

A64-80330
CHARACTERISTICS OF NOISE ASSOCIATED WITH THE OPERATION OF MILITARY AIRCRAFT.
Donald C. Gasaway (USAF School of Aerospace Med., ENT-Audiology Lab., Brooks AFB, Tex.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 327–336. 15 refs.

The majority of personnel actively associated with ground and airborne operations of military aircraft are exposed to noise environments that may be potentially hazardous. Graphs illustrating the noise spectra of various noise sources are given: ground power units, aircraft on the ground and in flight, airbrakes, auxiliary power units, etc., measured at various positions relative to the source. Medical personnel responsible for the health and welfare of exposed persons must possess a comprehensive knowledge of characteristic noise exposures associated with various aircraft operations. Through the possession of this knowledge, a more meaningful estimate of the hazardous elements of noise can be ascertained. Basic, as well as unique, characteristics of noise associated with operations of fixed and rotary wing aircraft are presented.

A64-80331
DECOMPRESSION TESTS FOR THE B-58 ESCAPE CAPSULE SYSTEM.
Nicholas C. Nicholas, James R. Wamsley, and Richard W. Bancroft (USAF School of Aerospace Med., Brooks AFB, Tex.; and USAF Hosp., Carswell AFB, Tex.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 341–345. 5 refs.

Data on the high-altitude decompression tests for the B-58 escape capsule system to determine the ability of human subjects to operate the controls for encapsulation within the time of useful consciousness, and to determine

the compatibility of the capsule oxygen and pressurization systems with the human subject, are presented and discussed. Thirty rapid decompressions were performed to peak altitudes of 50,000 to 60,000 ft from cabin pressure altitudes of 12,500 to 30,000 ft. An additional series of 12 decompressions, consisting of three slow and nine rapid decompressions from 21,000 to 50,000 ft, were performed without prior warning to the subjects, again to determine reaction times. The average reaction time for manually initiating the encapsulation sequence was 2.4 sec during the 3-sec decompressions to 50,000 ft. The pressurization system functioned in a satisfactory manner in all the tests. The results indicate that, with indoctrination and training, adequate protection can be achieved with this type of capsule system.

A64-80332
THE RESPONSE OF THE DOG TO HEAD IRRADIATION.
W. J. Quinlan and S. M. Michaelson (Rochester U., School of Med. and Dentistry, Dept. of Radiation Biol., Rochester, N.Y.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 362–364. 20 refs.
Contracts W-7401-Eng-49; and DASAMD 960.

Dogs received head exposure to 1 Mev X-rays at doses of 5,000 r, 10,000 r, or 25,000 r. At 5,000 r, there was no evidence of neurological change. Survival time was greater than 30 days. Ten thousand r resulted in transient vomiting and disturbance in equilibrium. Death occurred at approximately 2 weeks. Marked central nervous system disturbance with motor incoordination, convulsions, and death within 24 hr resulted from exposure to 25,000 r.

A64-80333
ASPECTS OF THE HUMAN RESPONSE TO HIGH SPEED LOW LEVEL FLIGHT.
T. M. Fraser (RCAF Inst. of Aviation Med., Toronto, Canada).
Aerospace Medicine, vol. 35, Apr. 1964, p. 365–370. 11 refs.

Three experienced test pilots participated in a series of high-speed low-level flights over a rough terrain under varying conditions of turbulence. The instrumentation pack included accelerometers at head, hip, and seat; a modified transistorized electrocardiograph; and a pneumograph that recorded cyclic temperature changes during respiration. Average buffeting frequency over the series was 2.35 per second with a range of up to 4 per second. Acceleration peaks varied from 0.1 g to a maximum of 4 g at the head; jolts ranged in the order of 10 to 40 g per second. In all cases accelerations at the seat were of lower magnitude than at the head. Subjective evaluation of buffeting stress was directly related to the recorded g impacts and their frequency on the flight. Physiological indices showed a consistently high heart rate and hyperpnea throughout the flight and marked lethargy after the flight. An interesting feature of the heart rate was the frequent pronounced slowing often following a sudden severe acceleration.

A64-80334
A PRELIMINARY REPORT ON THE EFFECTS OF ELECTRIC FIELDS ON MICE.
Walter S. Moos (Ill. U., Coll. of Med., Dept. of Radiology, Chicago).
Aerospace Medicine, vol. 35, Apr. 1964, p. 374–377. 48 refs.

Male mice were restrained and exposed to a field of alternating current of a potential gradient of about 8 to 12 v/cm. The mice were kept on a rigid 12-hour light cycle, and activity was observed after each period of light and dark. Some mice were also exposed to X-rays of 900 r and then kept in the electric field. Nocturnal activity appeared to be greater when the electric field was applied. Mortality studies with the radiation experiments were variable and showed no real statistical significance. There was no significant difference in mortality between the nonirradiated mice kept in the electric field and irradiated mice not kept in the electric field. However, results indicated that 5 days after irradiation the mice died faster when exposed to an electric field. The data were insufficient to make any definite conclusions, but it appears that further experiments should be carried out to determine the effects of electric fields on biological systems.

A64-80335
THE EFFECT OF 1,1-DIMETHYLHYDRAZINE (UDMH) ON COMPLEX AVOIDANCE BEHAVIOR IN THE JAVA MONKEY.
Herbert H. Reynolds, Frederick H. Rohles, Jr., James R. Prine, and Kenneth C. Back (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.; and 6570th Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 35, Apr. 1964, p. 377–382.

The effects of the rocket fuel 1,1-dimethylhydrazine (UMDH) at the dosage of 30 mg/kg on learned behavior were investigated. Four adult male Java monkeys were trained to a criterion on a new series of R-S avoidance tasks designed to measure gross motor behavior, and visual and auditory response latency. The results indicate that following UMDH injection at that dosage clinical signs of illness may be expected after 2 to 3 hours, a performance decrement or change after 3 to 3 1/2 hours, and recovery to the preexperimental level between 6 and 9 hours. Performance decrement was always associated with clinical illness, although the converse was not true.

A64-80337
AIRCRAFT ACCIDENT INVESTIGATION AND HYPNOTIC RECALL.
Earl H. Cramer.
Aerospace Medicine, vol. 35, Apr. 1964, p. 385–387.

Four cases are presented where reconstruction of previously unexplained accidents was facilitated by hypnotic hypermnesia. The problem of validating material obtained in this way is discussed. Considerable skill and judgment are needed to evaluate the information so obtained. Such factors as the personality and needs of the subject, his potential culpability, plausibility of data obtained, and their consistency with other facts known about the accident need to be taken into consideration. While interpretation is admittedly difficult, this should not deter the investigator from utilizing this additional resource of hypnosis for securing more data about possible causes of aircraft accidents.

A64-80336
RADIATION RECOVERY IN MAN: A CLINICAL EVALUATION OF THE PROBLEM.
Robert van Hoek and Carl L. Hansen, Jr. (Natl. Naval Med. Center, Armed Forces Radiobiol. Res. Inst., Bethesda, Md.)
Aerospace Medicine, vol. 35, Apr. 1964, p. 383–385. 22 refs.

A reevaluation is made of experimental and clinical evidence supporting published data on radiation doses and their clinical effects in man and/or permissible doses as a function of exposure time and dose rate. It is concluded that the present information is not sufficient to permit reliable estimates of radiation recovery in man. Recent evidence suggests that recovery processes in large animals and man are significantly slower than the extrapolated values for man are based on experiments involving X- or gamma radiation. Comparable neutron data reveal a slower recovery from neutron-induced injuries. Recovery processes in large mammals from exposure to mixed radiation, protons, and other densely ionizing particles need to be investigated.

A64-80338
RESPONSE OF PULMONARY CIRCULATION OF RESTING, UNANESTHETIZED DOGS TO ACUTE HYPOXIA.
Otto G. Thilenius, Paul B. Hoffer, Robert S. Fitzgerald, and John F. Perkins, Jr. (Chicago U., Dept. of Physiol., Chicago, Ill.)
American Journal of Physiology, vol. 206, Apr. 1964, p. 867–874. 44 refs.
Grants PHS-H-1894; PHS-H-5516.

In nearly all of 54 experiments using 5 dogs there were striking responses to hypoxia (breathing 6% to 15% O_2), consisting of a marked rise in pulmonary artery pressure (PAP) up to 120%, in cardiac output (Q) up to 75%, in pulmonary vascular resistance (PVR) up to 200%, and a significant fall in left atrium pressure (LAP). In some animals these changes were not maintained throughout hypoxia. The PVR usually returned to normal first, followed by PAP, while Q remained elevated. The time sequence of these events varied in different animals. Effects of the same magnitude as in hypoxia accompanied restlessness caused by stress, but fluctuated markedly, were of shorter duration, and could largely be eliminated by providing quiet surroundings and by avoiding prolonged experiments. It was concluded that active vasoconstriction occurs in the pulmonary vascular bed during acute hypoxia in the intact, unanesthetized dog. Furthermore, normal values for PAP, Q, and PVR for the resting, waking dog are reported.

A64-80339
OCULAR NYSTAGMUS RECORDED SIMULTANEOUSLY IN THREE ORTHOGONAL PLANES.
G. Melvill Jones (Royal Air Force, Inst. of Aviation Med., Farnborough, England).
Acta Oto-Laryngologica, vol. 56, Oct. 1963, p. 619–631.

A cinephotographic method for simultaneous recording of eye movements about three axes at right angles to one another is described. The apparatus comprises a forward-facing cinecamera mounted on one side of a helmet that can be fixed to the skull by a dental bite. A periscope is attached to the lens in such a way that the camera takes a closeup picture of one eye. A semi-automatic analyzer subsequently resolves and prints out the horizontal, vertical, and rolling components of eye movements relative to the skull by making frame-to-frame measurements of eye displacement on the cinefilm records. The method is accurate to approximately $\pm 0.5^{\circ}$ for eye movements in horizontal and vertical planes and $\pm 1^{\circ}$ for torsional eye movements about the visual axis.

A64-80340
STUDIES ON HABITUATION OF VESTIBULAR REFLEXES. VI. HABITUATION IN DARKNESS OF CALORICALLY INDUCED NYSTAGMUS, LATEROTORSION AND VERTIGO IN MAN.
B. Forssman, N. G. Henriksson, and D. A. Dolowitz (Lund U., Depts. of Neurol. and Otolaryngol., Lund, Sweden).
Acta Oto-Laryngologica, vol. 56, Oct. 1963, p. 663–674.

Fifteen normal subjects received 12 consecutive caloric irrigations, all in darkness, with water of 30° C, in the right ear. For each calorization nystagmus and laterotorsion were recorded, and maximum vertigo was indicated by the subject. Four qualities were compared: (1) eye velocity, (2) duration of nystagmus, (3) laterotorsion, and (4) vertigo. There was a response decline of these four qualities. The order of habituation rate from the greatest to the slightest was: (1) vertigo, (2) eye velocity, and (3) duration of nystagmus equal to laterotorsion. At the end of the irrigations vertigo had usually disappeared, with nystagmus and laterotorsion still present. The mode of response decline of each of the four qualities showed considerable individual differences. There was growing dysrhythmia of nystagmus with increasing habituation.

A64-80341
STUDY OF LIGHT MUSCULAR WORK. II. ZONE OF LEAST ENERGY EXPENDITURE (BIMANUAL ACTIVITY) [ETUDE D'UN TRAVAIL MUSCULAIRE LEGER. II. ZONE DE MOINDRE DEPENSE ENERGETIQUE (ACTIVITE BIMANUELLE)].
A. Laville, S. Bouisset, and H. Monod (Ecole Pratique des Hautes Etudes, Paris, France).
Archives Internationales de Physiologie et de Biochimie, vol. 71, 1963, p. 431–440. 5 refs. In French.

Oxygen consumption was measured in five men doing light muscular work. A 500-g weight was moved simultaneously by each hand at angles of 90° and 30° to the lateral axis of the body at a rate of 24 movements per minute. The movements through 30° were either in the same direction (symmetrical) or in opposite directions (asymmetrical). The displacement of weights through the 90° angle caused a significant increase in oxygen consumption and a concurrent increase in energy expenditure. There appeared to be no difference in oxygen consumption during symmetrical and asymmetrical movements at an angle of 30°. These differences can probably be explained by a study of the electrical activity of the muscles of the trunk.

A64-80342
STUDY OF LIGHT MUSCULAR WORK. III. EFFECT OF THE LOAD [ETUDE D'UN TRAVAIL MUSCULAIRE LEGER. III. INFLUENCE DE LA CHARGE].
H. Monod, S. Bouisset, and A. Laville (Ecole Pratique des Hautes Etudes, Paris, France).
Archives Internationales de Physiologie et de Biochimie, vol. 71, 1963, p. 441–461. 16 refs. In French.

Oxygen consumption and heart rate were recorded in five men during light muscular work. Each subject had to move loads of 70 to 1,000 g between two places through angles of 30° or 90° to the lateral axis of the body at a rate of 24 movements per minute. The oxygen consumption was increased from all weights when the work was performed at 90°. This increase in oxygen consumption can be interpreted as the sum of two factors: the first is the increase due to the displacement of the load, and the second is the increase due to the movement of the arm and forearm. For the evaluation of the work performed, the arm and forearm are considered as equivalent masses. The measurement of the heart rate was fragmentary.

A64-80343
THE MUSCULAR REFLEX ACTIVITY DURING EXOGENOUS COLD STRESS IN MAN [DIE REFLEKTORISCHE MUSKELAKTIVITAT BEI EXOGENER KALTEBELASTUNG DES MENSCHEN].
W. Gärtner (Freiburg im Breisgau U., Inst. für Balneologie und Klimaphysiologie, Freiburg i. Br., Germany).
Archiv für Physikalische Therapie, vol. 15, Nov.–Dec. 1963, p. 401–403. In German.

Cooling of circumscribed body parts by thermal radiation against a surface of 5° C rarely results in increased reflex muscular activity. However, if the room temperature is simultaneously lowered to 10° C, the intensity of the reflex activity increases and electrical muscle activity appears simultaneously at symmetrically distributed parts (forearm, thorax). Partial unilateral cooling of an hour's duration does not affect the frequency of reflex muscle activity with respect to its symmetrical distribution over both halves of the body; but quantitatively the muscle activity is intensified on the exposed side. It is concluded that a superordinate regulatory mechanism is responsible for the bilateral appearance of reflex muscular activity; however, a local regulatory mechanism is apparent in the increased intensity of electrical muscle activity on the exposed side. Lack of a direct relationship between skin temperature and electrical muscle activity indicates that the former is not the sole regulator of reflex muscle activity.

A64-80344
ON THE TOPOGRAPHY OF MUSCULAR ACTIVITY DURING COLD EXPOSURE OF MAN [ZUR TOPOGRAPHIE DER MUSKELAKTIVITAT BEI KALTEBELASTUNG DES MENSCHEN].
K. GOLENHOFEN (Marburg an der Lahn U., Physiol. Inst., Marburg/Lahn, Germany).
Archiv für Physikalische Therapie, vol. 15, Nov.–Dec. 1963, p. 435–437. 6 refs. In German.

Ten male subjects were abruptly exposed to + 10° C by uncovering in a climatic chamber. Physiological indices obtained were: (1) action potentials from muscles in the lower arm, shoulder, thigh, and calf; (2) basal metabolic rate; and (3) rectal temperature. The same indices were measured during 5 minutes of mental arithmetic prior to cold exposure to determine emotional reactivity. The results show extreme individual variability in the cold sensitivity. The topography of muscular activity differed under emotional stress and under prolonged cold stress in that in the former it centered more peripherally (underarm), whereas in the latter it was central (thigh). Peripheral muscle activity in effect contributes little to preservation of the core temperature. It is primarily an expression of an increased readiness–defense reaction. Centralized muscle activity after prolonged cold stress (thermal muscle activity) serves to increase the core temperature. Spatial distribution of muscle action potentials upon sudden exposure to cold at first assumes the pattern of emotional reaction which upon prolonged cooling passes into the picture of typical thermal activation. There is an indication that with habituation the emotional reaction component is reduced.

A64-80345
MALE–FEMALE DIFFERENCES IN UNDERWATER SENSORY ISOLATION.
Cathryn Walters (Veterans Admin. Hosp., Res. Service, Oklahoma City), Oscar A. Parsons (Oklahoma U., Med. Center, Oklahoma City), and Jay T. Shurley (Oklahoma U., School of Med., Oklahoma City).
British Journal of Psychiatry, vol. 110, Mar. 1964, p. 290–295. 11 refs.
Veterans Admin. Med. Res. (8200) Funds.

The study reported here is a replication of an earlier investigation of sex differences in response to underwater sensory isolation, and differences in reports of these experiences as a function of different interviewers. The subjects for the first study were paid medical students, whereas those of the present study were drawn from a more varied population. The conditions of sensory isolation described elsewhere were the same for both studies, but in the second study the number of subjects was increased from 16 to 20. Results of the present investigation confirmed the findings of the first study for the isolation experience: women gave more nonstimulus bound responses than men. However, although differences in the postisolation interview revealed the same trend, the differences were markedly stronger for the medical students than for the more varied population.

A64-80346
DETERIORATION AND FACILITATION HYPOTHESIS IN SENSORY DEPRIVATION RESEARCH.
Charles A. Brownfield (Mendocino State Hosp., Talmage, Calif.)
Psychological Bulletin, vol. 61, Apr. 1964, p. 304–313. 35 refs.

Two opposing hypotheses have emerged from research in sensory deprivation: it impairs mental functioning and it facilitates mental functioning. A review of some of the literature suggests that whatever the requirements of the human organism for varied external stimulation, mere reduction or increased patterning of input will not alone produce major disruptive or enhancing effects. The multiplicity of reported results makes it appear unwise to conclude that sensory or perceptual isolation, as it is currently conceived, results in deterioration or facilitation of mental function until more research is accomplished. Evidence from learning studies, in which the disparate hypotheses are most pronounced, stimulated the present attempt to integrate empirically the phenomena reported in a wide range of studies in sensory deprivation.

A64-80347
EFFECT OF INTERVAL BETWEEN TWO CONSECUTIVE SIGNALS ON CHOICE REACTION TIME. IV. EFFECTS OF SHORT INTERVALS [VLIANIE NA INTERVALA MEZHDU DVA POSLEDOVATELNI SIGNALA VURKHU REAKTSIONNOTO VREME V USLOVIIA NA IZBOR. IV. VLIIANIE NA KRATKI PREDVARITELNI PERIODI].
V. Bakalska and A. Angelov.
Bulgarska Akademiia na Naukite, Izvestiia na Instituta po Fiziologiia, vol. 6, 1963, p. 99–107. 5 refs. In Bulgarian.

A series of experiments explored the reaction time to the second of a pair of signals when the time interval between them was varied. In the first experiment the series consisted of paired red signals only, whereas in the second experiment the series consisted of paired red signals and single white ones. In both cases 11 discrete, equally spaced warning intervals ranging from 0.10 to 1.10 sec were presented. The relationship between reaction time and the foreperiods was found to be the same in all cases. Equal reaction times were obtained with different warning intervals exceeding 0.40 sec.

A64-80348
EVIDENCE FOR PORPHYRINS IN THE ORGUEIL METEORITE.
G. W. Hodgson and B. L. Baker (Res. Council of Alberta, Edmonton, Canada).
Nature, vol. 202, Apr. 11, 1964, p. 125–131. 54 refs.

Six samples of four stones of the Orgueil meteorite were included in a series of spectral, chromatographic, and chemical tests. Extracted material showed the presence of pigments indistinguishable from esterfied vanadyl porphyrins of ancient terrestrial sediments and petroleum. These pigments were present either because they were indigenous or because the samples became contaminated in some manner. Chlorins, which are present in known meteorite contaminants, are not in the samples, a fact that does not support the possibility of contamination. Vanadyl porphyrins are found in ancient terrestrial carbonaceous rocks from sediments deposited under reducing conditions replete with biogenic activity. The Orgueil chondrite exhibits many of the organic components of ancient terrestrial rocks. It is indicated that the environment of the parent body of the meteorite was low-temperature aqueous system with an alkaline pH and a slight reducing potential. It is thought that the presence of the porphyrins suggests a strong possibility of biogenic means for the origin of the organic matter in the Orgueil meteorite.

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